LSDC
Lancaster Sewer District Commission

DRAFT

Wastewater Planning Evaluation Report

April 12, 2006

Weston&Sampson
ENGINEERS, INC.

Report

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INTRODUCTION

1.1 Background Information for the Town of Lancaster, Massachusetts

The Town of Lancaster, Massachusetts was founded in 1653 and is the oldest town in Worcester County. Lancaster is located in North Central Massachusetts near Route 2 and Interstate 190. Lunenburg and Shirley border on the north, Harvard and Bolton on the east, Clinton on the south, and Leominster and Sterling on the west. Located approximately 20 miles north of Worcester and approximately 40 miles west of Boston, Lancaster is located within the Nashua River Watershed, specifically the Nashua River Main Stem Sub-basin.

Lancaster is a bedroom community with little industry but does contain some working farms. It is a town full of history with its old houses scattered throughout the community, apple orchards, historic sites, ponds, and parks. Lancaster is also home to Atlantic Union College.

1.2 History of the Lancaster Sewer District

The Lancaster Sewer District was established in 1967 by a special act of the Massachusetts General Court, the Legislature. The act called for the formation of a body of government within the boundaries of the town of Lancaster. The District is a completely separate government entity from the Town of Lancaster itself. The District's governing authority and it's elected Commission does work with the Town of Lancaster to assure that mutual goals are met. The Commission, however, has no authority over the Town nor does the Town have any authority over the Commission.

1.3 Overview and Scope of the District's Wastewater Planning Report

In February 2003, the Lancaster Sewer District Commission (LSDC) hired Weston & Sampson Engineers, Inc. (Weston & Sampson) to begin an evaluation of their current wastewater collection system, an analysis of their current wastewater flows to the MWRA wastewater treatment plant in Clinton, MA, and considerations for possible sewer expansions within the current boundaries of the District and the area just south of the District.

The wastewater planning report was prepared by completing the following tasks:

- Assessment of current conditions
- Assessment of future conditions
- Define wastewater needs and problems
- Develop alternatives
- Evaluate alternatives
- Public participation
- Evaluation of remaining capacity
- Evaluation of rate structure
- Evaluation of moratorium
- Evaluation of existing infrastructure (maintenance and replacement, etc.)
- Potential for District expansion

The main goals of the completed report were to provide the District with the following:

- An up-to-date map of the entire sewer system
- A summary of the components of their entire sewer system
- An analysis of the existing and remaining capacity within the sewer system
- An evaluation of the existing pump stations and recommendations for improvements
- Identification of potential problem areas within the District and south of the District
- A comparison of the District's wastewater flows and the MWRA Clinton's wastewater flows
- An estimate of current infiltration/inflow (I/I) within the existing sewer system
- Proposed areas of sewer expansion
- Recommendations for improvements to the existing sewer system

One of the primary tasks was to assess current and future wastewater needs by examining existing conditions throughout the Town, and to analyze potential alternatives for wastewater management in areas of the District with current and potential wastewater disposal problems. The LSDC through its Commissioners and District Administrator provided guidance and advice to staff and consultants during the preparation of the wastewater planning report.

The planning area for this wastewater planning report is within the current boundaries of the Lancaster Sewer District and the area just south of the District between the borders of Sterling and Clinton. An initial goal of this project was to identify areas of the Sewer District that have challenges using on-site systems so that later phases of the project could have a more focused project area for the alternatives analysis.

ASSESSMENT OF CURRENT CONDITIONS

2.1 Summary of Existing Wastewater Collection System

This section describes the existing sewers within the boundaries of the District, existing wastewater flows as measured within the District and at the Massachusetts Water Resource Authority's (MWRA) Clinton Wastewater Treatment Plant (WWTP), existing and potential service connections, and the available remaining capacity within the existing system.

2.1.1 Existing Sewer within the Lancaster Sewer District

The approximate boundaries of the Lancaster Sewer District are the areas between Hilltop Road, Langen Road, North Main Street, and Seven Bridge Road, Bolton, Clinton, and Sterling Road (see Section 1.0, Figure 1). Within the Lancaster Sewer District, there is over 26 miles of sewer that comprise two main interceptors, the Main Street Interceptor and the High Street Interceptor. Table 1, below, provides a summary of the current pipe sizes and their respective type of sewer that are included in both interceptors.

TABLE 1

SUMMARY OF EXISTING SEWER

GRAVITY SEWER		**FORCE MAIN AND PRESSURE SEWER**		**SIPHONS**	
Pipe Size (in)	Length (LF)	Pipe Size (in)	Length (LF)	Pipe Size (in)	Length (LF)
8	68,255	2	1,818	6	483
10	36,325	6	2,571	8	1,956
15	11,367	8	9,078	12	483
18	2,760			16	1,956
21	324				
36	446				

Figure 2 (Main Street Interceptor) and Figure 3 (High Street Interceptor), attached herein at the end of this section, present a detailed summary of the pipe sizes, types, pump stations, and direction of wastewater flow of all existing sewer within the Lancaster Sewer District. All wastewater flows within the Lancaster Sewer District are conveyed to and treated at the Clinton MWRA Clinton WWTP, which is located on High Street just over the Clinton/Lancaster border.

2.1.2 Summary of Existing Wastewater Flows

The MWRA Clinton WWTP provides advanced sewage treatment services to the Lancaster Sewer District and the Town of Clinton. The MWRA assumed formal operational responsibility for the Clinton plant in 1987. Since then, the MWRA has designed and constructed new primary, secondary, and advanced treatment facilities that incorporate rehabilitated portions of the existing plant with new construction. The new facilities, designed to meet all current and projected NPDES discharge standards, were completed in 1992.

The plant provides secondary treatment using an activated sludge process in combination with advanced nutrient removal and dechlorination. The major facilities include headworks, primary settling tanks, digesters, sludge processor, trickling filters, aeration tanks, secondary tanks, and a chemical addition building. Figure 4, on the following page, presents a detailed schematic of the MWRA Clinton WWTP. The plant discharges its effluent into the South Nashua River in accordance with the discharge limits of the facility's NPDES permit. Residual materials are pressed and transported to an MWRA owned landfill for disposal. Staff also performs regular monitoring of the landfill site.

The MWRA has pre-determined that the average daily wastewater flow (ADF) from the Lancaster Sewer District cannot exceed 0.37 million gallons per day (MGD). Therefore, the maximum allowable ADF at the Clinton MWRA WWTP from the Lancaster Sewer District, or the capacity of all sewers within the District, is 0.37 MGD.

Wastewater data was obtained from the operator of the MWRA Clinton WWTP from May 2002 through December 2005. Flow data over that period was analyzed to provide average daily

wastewater flows produced by the Lancaster Sewer District. Figure 5 presents the Dsitrict's ADF in comparison with its maximum allowable ADF of 0.37 MGD or 370,000 gallons per day (GPD).

In addition to the MWRA Clinton WWTP data, the existing water use data from the FY04 billing records was obtained. The District provides sewer use bills to its members based on 100 percent of their water use. Table 2, below, summarizes the capacity and flow data from the WWTP and the District's billing records.

TABLE 2

SUMMARY OF EXISTING WASTEWATER FLOWS

DESCRIPTION	EXISTING FLOW IN GPD (PER LANCASTER DATA)[1]	EXISTING FLOW IN GPD (PER MWRA DATA)[2]
Allowable ADF at MWRA WWTP	370,000	370,000
Average Daily Flow (ADF)	177,000	230,000
Remaining Capacity	193,000	140,000

(1) – Existing Lancaster wastewater flow data obtained from FY04 billing records (2nd and 3rd Quarter).

(2) – Existing Clinton wastewater flow data obtained from MWRA Clinton WWTP records (9/02 thru 12/05).

The remaining capacity was calculated by subtracting the average daily flow from the allowable daily flow approved by the MWRA. According to the water usage records obtained from Lancaster, the remaining capacity of the existing sewer system is approximately 193,000 GPD. However, the data from the MWRA Clinton WWTP estimates the remaining capacity at approximately 140,000 GPD. The MWRA Clinton WWTP data yields a smaller remaining capacity due to the fact that the metered data at the plant is a true reading of actual flow within the sewer pipe. This data includes infiltration and inflow (I/I) within the entire District that is not quantified using the Town of Lancaster's water use records. A more detailed explanation of I/I is included herein in Section 4.0 of the report.

Table 3, on the following page, presents a comparison of the District's and the MWRA's wastewater flow data for two specific District billing quarters. The difference in flow between the two sets of data is directly attributed to the inclusion of I/I within the MWRA data.

TABLE 3

COMPARISON OF LANCASTER AND MWRA WASTEWATER FLOW DATA

PERIOD	ADF PER DISTRICT BILLING RECORDS (GPD)	ADF PER MWRA WWTP FLOW RECORDS (GPD)	DIFFERENCE (GPD)
Oct 2003 through Dec 2003 (Q2)	174,955	191,623	16,645
Jan 2004 through March 2004 (Q3)	179,061	188,696	9,639

The difference in wastewater flows during the second quarter of the FY04 was 16,645 GPD; and during the third quarter the difference was 9,639 GPD. The difference between the sources of data can be assumed to be I/I.

A more accurate calculation of I/I within the District's sewer system is quantified using wastewater flows recorded at the WWTP, shown below in Table 4. The difference in ADF in the spring when groundwater levels and rain events are high and the drier summer months is a good indication of the amount of extraneous water entering the sewer system via I/I.

TABLE 4

SUMMARY OF I/I

SPRING[1]	ADF (GPD)	SUMMER[2]	ADF (GPD)	I/I (GPD)
2003	250,000	2003	190,000	60,000
2004	230,000	2004	180,000	50,000
2005	360,000	2005	230,000	130,000

1. Spring (wet) = March, April, and May
2. Summer (dry) = June. July, and August

The estimated I/I in 2003 was 60,000 GPD, in 2004 was 50,000 GPD, and in 2005 was 130,000 GPD.

2.1.3 Summary of Service Connections and Available Remaining Capacity

The Lancaster Sewer District provided Weston & Sampson Engineers, Inc. with record drawings of the existing sewers within the District boundaries. The capacity and number of connections on each street within the District was calculated using the record drawings. Per record drawing information, there are approximately 756 service connections within the District. The LSDC billing records indicate that 660 of the 756 service connections are active, resulting in 96 remaining service connections. Table 5, below, summarizes the capacity available per service connection using the remaining capacity data from both the Lancaster water usage records and the MWRA Clinton WWTP data (also refer to Table 1).

TABLE 5

SUMMARY OF WASTEWATER FLOW PER SERVICE CONNECTION

DESCRIPTION	EXISTING FLOWS IN GPD **(PER LANCASTER DATA)**	**EXISTING FLOWS IN GPD (PER MWRA DATA)**
Remaining Capacity	193,000	140,000
Remaining Service Connections	96	96
Available Capacity per Service Connection	Approx. 2,000 gpd/service connection	Approx. 1,450 gpd/service connection

The remaining capacity for the 96 available service connections is between 1,450 and 2,000 GPD per connection. Using Title 5 values to estimate the remaining number of residential connections, the remaining capacities must be divided by 330 GPD. Using the Lancaster water use data, there would be approximately 585 (193,000 GPD / 330 GPD) remaining connections available; using the MWRA data, there would be approximately 424 (149,000 GPD / 330 GPD) connections remaining. Assuming that the remaining 96 service connections have first right to connect to the District's, there is room for the addition of approximately 330 to 490 new service connections to the District.

2.2 Evaluation of the District's Existing Wastewater Pump Stations

In February 2004, Weston & Sampson and Weston & Sampson Services performed evaluations of the District's seven existing wastewater pump stations:

- George Hill Road Pump Station
- Mill Street Pump Station
- Bigelow Gardens Pump Station
- North Center Bridge Road Pump Station
- South Center Bridge Road Pump Station
- Neck Road Pump Station
- Main Street Pump Station

Included in the evaluation of each station are the existing conditions and equipment, recommended short term and long-term capital improvements. The estimated associated costs are presented herein in Section 4.0 of the report.

2.2.1 George Hill Road Pump Station

This station is a flooded suction type station built in 1978. The pumps are located in a "CARLGEN" Concrete pump chamber underneath a brick building containing the controls and standby generator. The system is a duplex pump system that draws the wastewater from a concrete wet well. The following activities were performed at this station:

1. Exterior Inspection.
2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
    - Pumps and Motors
    - Check and Gate Valves

- Mechanical Piping
- Standby Generator
- Wet well walls and Interior

The following is a list of deficiencies made during the evaluation:

2.2.1.1 Exterior

1. The area around the backside of the building is overgrown and the right side of the building has an open trench. Recommendations include removing the growth, filling the trench, and looming and seeding the area.
2. The existing entrance to the wet well consists of a 24-inch diameter manhole cover. It is recommended that an aluminum hatch with a safety grate is installed in place of the manhole for ease of access and safety.

2.2.1.2 Control Room

1. The existing bubbler level control system and pump control panel are deteriorated. Installation of a new bubbler level control system with purge valve and pump control panel is recommended. Also recommended is upgrading the motor starters with solid-state soft starters. The existing air compressors for the bubbler level control system are deteriorated. It is recommended that the existing compressor be replaced with a commercial grade 2-gallon compressor made for this environment.
2. The exhaust fan is deteriorated and may have bearing problems. Installation of a new exhaust fan is recommended
3. The existing intake louver actuator is not working properly. It is recommended that a new mechanical arm is installed on the actuator to properly operate the louver.
4. The generator is operational; however, it is deteriorated and in poor condition. There is no insulation around the exhaust piping and the day tank is in poor condition. Also, the transfer switch is rusted.

5. The heater is rusted and is in poor condition.
6. The dehumidifier is not operational.
7. The flow meter is not operational.
8. The back flow preventer is not inspected.
9. The pumps are both in poor condition, the vibration is high, and the seals are leaking.
10. The motors are worn and should be upgraded to an energy efficient type.

2.2.2 Mill Street Pump Station

This station is a flooded suction type station built in 1983. The pumps are located in a "CARLGEN" Concrete pump chamber underneath a circular brick building containing the controls and standby generator. The system is a duplex pump system that draws the wastewater from a concrete wet well. The following activities were performed at this station:

1. Exterior Inspection.
2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
   - Pumps and Motors
   - Check and Gate Valves
   - Mechanical Piping
   - Standby Generator
   - Wet well walls and Interior

The following is a list of deficiencies made during the evaluation:

2.2.2.1 Exterior

1. The area around the backside of the building is overgrown and the right side of the building has an open trench. Recommendations include removing the growth, filling the trench, and looming and seeding the area.
2. The existing entrance to the wet well consists of a 24-inch diameter manhole cover. It is recommended that an aluminum hatch with a safety grate is installed in place of the manhole for ease of access and safety.

2.2.2.2 Control Room

1. The existing bubbler level control system and pump control panel are deteriorated. Recommendations include a new bubbler level control system with purge valve and pump control panel be installed. Also recommended is upgrading the motor starters with solid-state soft starters. The existing air compressors for the bubbler level control system are deteriorated. It is recommended that the existing compressor should be replaced with a commercial grade 2-gallon compressor made for this environment.
2. The exhaust fan is deteriorated and may have bearing problems. It is recommended a new exhaust fan be installed.
3. The existing intake louver actuator is not working properly. It is recommended that a new mechanical arm be installed on the actuator to properly operate the louver.
4. The generator is operational; however, it is deteriorated and in poor condition. There is no insulation around the exhaust piping and the day tank is in poor condition. Also, the transfer switch is rusted.
5. The heater is rusted and is in poor condition.
6. The dehumidifier is not operational.
7. The flow meter is not operational.
8. The back flow preventer is not inspected.
9. The pumps are both in poor condition, the vibration is high, and the seals are leaking.

10. The motors are worn and should be upgraded to an energy efficient type.
11. The suction and gate valves on both pumps are deteriorated. Installation of new gate valves is recommended.
12. The check valves on both pumps are deteriorated. Installation of new check valves is recommended.
13. The piping is rusting. Recommendations include that the pumps, stands, and piping be sanded, primed, and painted.
14. The stand-by generator exhaust manifold does not have a heat shield on the exhaust pipe. It is recommended that a heat shield or wrap be placed on the exhaust manifold of the generator.
15. There is no lightning or surge protection in the station. Installation of lightning and surge protection is recommended.
16. The wet well should be cleaned, if it has not been cleaned recently (within the last 2 years).

2.2.3 Bigelow Gardens Pump Station

This station is a flooded suction type station built in 1978. The pumps are located in a "CARLGEN" Concrete pump chamber underneath a circular brick building containing the controls and standby generator. The system is a duplex pump system that draws the wastewater from a concrete wet well. The following activities were performed at this station:

1. Exterior Inspection.
2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
   - Pumps and Motors
   - Check and Gate Valves
   - Mechanical Piping
   - Standby Generator
   - Wet well walls and Interior

The following is a list of deficiencies made during the evaluation:

2.2.3.1 Exterior

1. The area around the backside of the building is overgrown and the right side of the building has an open trench. Recommendations include removing the growth, filling the trench, and looming and seeding the area.
2. The existing entrance to the wet well consists of a 24-inch diameter manhole cover. It is recommended than an aluminum hatch with a safety grate is installed in place of the manhole for ease of access and safety.

2.2.3.2 Control Room

1. The existing bubbler level control system and pump control panel are deteriorated. A new bubbler level control system with purge valve and pump control panel should be installed. It is also recommend that the motor starters be upgraded with solid-state soft starters. The existing air compressors for the bubbler level control system are deteriorated. The existing compressor should be replaced with a commercial grade 2-gallon compressor made for this environment.
2. The exhaust fan is deteriorated and may have bearing problems. Installation of a new exhaust fan is recommended.
3. The existing intake louver actuator is not working properly. It is recommended that a new mechanical arm be installed on the actuator to properly operate the louver.
4. The generator is operational, however, it is deteriorated and in poor condition. There is no insulation around the exhaust piping and the day tank is in poor condition. Also, the transfer switch is rusted.
5. The heater is rusted and is in poor condition.
6. The dehumidifier is not operational.
7. The flow meter is not operational.

8. The back flow preventer is not inspected.
9. The pumps are both in poor condition, the vibration is high, and the seals are leaking.
10. The motors are worn and should be upgraded to an energy efficient type.
11. The suction and gate valves on both pumps are deteriorated. Installation of new gate valves is recommended.
12. The check valves on both pumps are deteriorated. Installation of new check valves is recommended.
13. The piping is rusting. Recommendations are that the pumps, stands, and piping be sanded, primed, and painted.

14. The stand-by generator exhaust manifold does not have a heat shield on the exhaust pipe. It is recommend that a heat shield or wrap be placed on the exhaust manifold of the generator.
15. There is no lightning or surge protection in the station. It is recommended that lightning and surge protection be installed.
16. Cleaning of the wet well is recommended, if it has not been cleaned recently (within the last 2 years).

2.2.4 North Center Bridge Road Pump Station

2.2.5 South Center Bridge Road Pump Station

This station is a submersible type station. The pumps and controls are located in a concrete well. The system is a duplex pump system that draws the wastewater from the wet well. The standby generator and controls are located in a sound attenuated enclosure and the pump controls are located in a NEMA-rated enclosure.

The following activities were performed at this station:

1. Exterior Inspection.

2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
    - Pumps and Motors
    - Check and Gate Valves
    - Mechanical Piping
    - Standby Generator
    - Wet well walls and Interior

The station is in excellent operating condition.

2.2.6 Neck Road Pump Station

This station is a suction lift type station. The pumps are located in a GORMAN RUPP fiberglass pump chamber. The system is a duplex pump system that draws the wastewater from a concrete wet well. A standby pump and controls are located in buildings.

The following activities were performed at this station:

1. Exterior Inspection.
2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
    - Pumps and Motors
    - Check and Gate Valves
    - Mechanical Piping
    - Standby Generator
    - Wet well walls and Interior

The pump station is in excellent operating condition. The belts for each pump require adjustment.

2.2.7 Main Street Pump Station

This station is a submersible type station installed in 2002. The pumps and controls are located in a concrete well. The system is a duplex pump system that draws the wastewater from the wet well. The standby generator and controls are located in a sound attenuated enclosure and the pump controls are located in a NEMA-rated enclosure.

The following activities were performed at this station:

1. Exterior Inspection.
2. Inspection of Electrical Panels, Breakers, and Control Panels.
3. Miscellaneous Inspection and Operation:
    - Pumps and Motors
    - Check and Gate Valves
    - Mechanical Piping
    - Standby Generator
    - Wet well walls and Interior

The station is in excellent operating condition. The generator was found with a blown control fuse and the batteries were weak. It is recommended the generator be serviced.

ASSESSMENT OF FUTURE CONDITIONS

3.1 Problems Caused by Failing Septic Systems

In Massachusetts, Section 310 CMR 15.000, the State Environmental Code (Title 5), governs standard requirements for on-site systems. These regulations are administered through the local Board of Health.

Present day on-site systems are usually called 'septic systems' or 'Title 5 systems.' These typically include a buried tank (septic tank) to separate the solids and floating waste from the wastewater, after which the remaining liquid, or 'effluent,' flows to a buried system of pipes (leaching field) that spreads it to the ground for biological treatment and soil filtering. On-site systems for lots or parcels with limited space have a septic tank but use a leaching pit for spreading the wastewater into the ground. In very old systems, the wastewater goes into a single 'cesspit' or 'cesspool' and then directly into the ground. Cesspools and systems with leaching pits are less desirable in that they provide less treatment and may not meet Title 5 requirements.

There are often challenges to siting and using on-site systems on individual lots. Some of these challenges include: insufficient space, proximity to resource areas, insufficient depth to groundwater, inappropriate soils for wastewater treatment, insufficient depth to bedrock, etc.

Using the Town's assessor maps, Weston & Sampson determined on a parcel-by-parcel basis what areas of the District would be most likely to experience challenges with on-site wastewater systems both now and in the future. The assessment resulted in the identification of parcels that would likely be unable to support an on-site system without some type of Board of Health variance. Ideally, these parcels would be provided with an alternative wastewater management solution (such as connection to the existing centralized sewer system) to overcome the existing and potential challenges for an on-site system and to minimize the granting of variances.

Title 5 information was obtained from the Nashoba Associated Boards of Health for these parcels. Failing Title 5 inspections are indications that existing septic tanks cannot support the

wastewater flows. Table 6, below, presents all properties with failed Title 5 inspections and the date of inspection in areas with existing sewer.

TABLE 6

PROPERTIES WITH FAILED TITLE 5 INSPECTIONS WITHIN DISTRICT

ADDRESS	INSPECTION DATE
43 Bigelow Road	10/23/1999
246 Bolton Station Road	7/31/2000
85 Center Bridge Road	8/17/1999
111 Center Bridge Road	8/9/2001
113 Center Bridge Road	8/21/2001
125 Center Bridge Road	8/21/2001
397 Center Bridge Road	5/9/2001
60 Creamery Road	6/13/2002
105 Harvard Road	5/22/2002
258 High Street Ext.	11/17/2000
405 High Street Ext.	4/9/2001
122 Hilltop Road	6/29/2001
15 Ivy Drive	7/10/2001
32 Lee Street	4/15/2000
162 Main Street	1/29/2001
602 Main Street	6/4/2001
780 Main Street	1/13/2001
32 Old Common Road	8/12/2000
169 Old Common Road	3/28/2000
217 Old Common Road	8/15/1997
251 Old Common Road	7/24/2001
224 Packard Street	9/7/2001
45 Parker Road	6/26/2002
310 Parker Road	2/20/2001
483 Parker Road	4/8/2002
171 Seven Bridge Road	3/6/2002
91 Whitcomb Drive	4/19/2001

3.2 Areas for Future Sewer Expansion

In February 2003, the LSDC began an evaluation process to develop a guide for town-wide wastewater management. The primary task was to assess current and future wastewater needs by examining existing conditions throughout the Town, and to analyze potential alternatives for

wastewater management in areas of Town with current and potential wastewater disposal problems. The LSDC provided guidance and advice during the evaluation process.

The initial step in the wastewater evaluation process was the identification of areas of the Lancaster Sewer District with long-term challenges to using on-site wastewater treatment and disposal systems. Three areas in specific were identified: North George Hill Road, Mill Street Extension, and the Poulin Drive/Kelley Drive area.

Table 7, below, identifies the properties in areas considered for future sewer expansion with failed Title 5 inspections.

TABLE 7

FAILING TITLE 5 INSPECTIONS IN AREAS FOR FUTURE EXPANSION

ADDRESS	INSPECTION DATE
115 Beach Point Road	2/25/2000
21 Poulin Drive	9/6/2002
288 George Hill Road	8/2/1995
325 George Hill Road	1/8/1997
793 George Hill Road	10/22/2003

3.2.1 North George Hill Road Area

The sewer expansion of North George Hill Road has already been designed with construction to begin in Spring 2006. The design consists of approximately 2,200 linear feet of gravity sewer on George Hill Road to the George Hill Road Pump Station at Langen Road. Heritage Lane will have approximately 750 linear feet of pressure sewer that will connect to the gravity sewer on George Hill Road. The remaining section of George Hill Road from the intersection of Hilltop Road to the existing sewer in George Hill Road at the top of the hill will consist of approximately 1,500 linear feet of 2-inch pressure sewer and approximately 1,700 linear feet of 1 ½ - inch private force main from the Maharishi Vedic Health Center.

3.2.2 Mill Street Extension Area

This area of Mill Street Extension, east of the High Street intersection, is a possible site for sewer expansion. The Town wells are located on site at the Lancaster Department of Public Works. It is in the best interest of the Town to provide sewer to the surrounding properties to protect the water supply, as well as the Nashua River via its tributaries, from failing septic systems.

3.2.3 Poulin Drive/Kelley Drive Area

The area south of Sterling Road and within the Town of Lancaster's southern limits represents a large area just outside the current boundaries of the District. This area was further examined for the possibility of expanding the boundaries of the District to include this entire area. Weston & Sampson divided this area into three subsections, as presented in Figure 6, in order to mail out a questionnaire requesting septic system information and public opinion regarding sewer expansion. Table 8 summarizes the mailings sent to each of the three areas.

TABLE 8
SUMMARY OF SEWER QUESTIONAIRRES

	NO. OF MAILINGS	NO. OF RESPONSES	FOR SEWER EXPANSION	AGAINST SEWER EXPANSION
Area I	72	13	9	4
Area II	217	38	26	12
Area III	118	23	13	10
Totals	407	74	48	26

Overall, almost 20% of the mailings were returned. A return rate of 20% is considered good for a survey similar to this one. Of the 74 responses, 48 of them were in favor of sewer expansion in their local community, or about 65%.

As a result of the questionnaires, a small section of Area II, the Poulin Drive/Kelley Drive area, did present itself as an area for possible District expansion. It is located just south of the current District boundary off of Deershorn Road and there is currently gravity sewer available in Sterling Road. The questionnaires that were returned for this area were in favor of sewers and there are some failing septic systems in this area. There is also a wetland area present in this area that would be protected from the failing septic systems if sewers were extended to the Poulin Drive/Kelley Drive area. This area will be discussed in more detail under the Recommendations in Section 4.0 of this report.

It would also be in the interest of the town to protect the South Meadow Pond from failing septic systems in the future, similar to expansion reasons on Mill Street Extension. This area, however, is extremely removed from the District's existing sewer system. Therefore, it would be necessary to connect this area directly to the Clinton wastewater system.

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on all of the information compiled herein in this report, there are two main conclusions of this Wastewater Evaluation Planning Report. They are:

- The current capacity of the Lancaster Sewer District's system has allowable room for additional expansion.

- There is a significant I/I problem that must be addressed prior to adding capacity to the current sewer system and before the Department of Environmental Protection (DEP) will consider lifting the current moratorium on sewer expansion.

The wastewater capacity analysis of the Lancaster Sewer District's system determined that there are 96 existing service connections remaining and that there is room for the expansion of approximately 330 to 490 new service connections.

As presented in Section 2.0, data obtained at the MWRA Clinton WWTP indicates a significant I/I increase over the last three years, specifically in 2005.

TABLE 9
SUMMARY OF INFLOW AND INFILTRATION

SPRING[1]	ADF (GPD)	SUMMER[2]	ADF (GPD)	I/I (GPD)
2003	250,000	2003	190,000	60,000
2004	230,000	2004	180,000	50,000
2005	360,000	2005	230,000	130,000

1. Spring (wet) = March, April, and May

2. Summer (dry) = June. July, and August

In the spring of 2005, nearly 57% of the average daily flow was identified as I/I.

4.2 Recommendations

The following paragraphs present Weston & Sampson recommendations as a result of the overall wastewater evaluation planning process.

4.2.1 Sanitary Sewer Evalaution Survey

Prior to expansion of the Lancaster Sewer District, it is recommended that the District perform a Sanitary Sewer Evaluation Survey (SSES) to identify and remove I/I. I/I is the extraneous water within the system that is not considered wastewater and does not need to be treated at the MWRA Clinton WWTP. Extraneous water from I/I sources reduces the capacity and capability of sewer systems and treatment facilities to transport and treat wastewater. Infiltration occurs when existing sewer lines undergo material and joint degradation as well as when sewer lines are poorly designed and constructed. Inflow normally occurs when rainfall enters the sewer system through direct connections such as roof leaders, yard drains, catch basins, sump pumps, manhole covers and frame seals or indirect connections with storm sewers. The elimination of I/I by sewer system rehabilitation and an on-going operation and maintenance program to identify these areas is essential to protect the enormous investment made by cities, towns, and the Commonwealth as well as for the protection of the environment.

The SSES is performed to determine the specific location, estimated flow rate, method of rehabilitation and cost of rehabilitation versus cost of transportation and treatment for each defined source of I/I.

An SSES includes the following:

- Inventory of existing conditions (which has been completed under this project)

- Map development (which has also been completed under this project)
- Manhole inspections
- Flow isolation
- Television inspection
- Smoke testing
- Dyed water testing and flooding
- Groundwater level measurement.

Manhole inspections consist of a topside visual inspection of sanitary sewer manholes performed during a period of high groundwater. Manhole location, diameter, depth, and material; casting and cover size; and a flow estimate for all infiltration sources are recorded for each manhole inspected. The inspections are completed during high groundwater periods to identify active infiltration sources. The inspection also provides data on sources of inflow such as depressed manhole covers. Information on the leveling course and the chimney section of manhole identifies potential sources of indirect inflow. The inspection also provides information on structural defects in manholes that should be repaired as part of the city's regular maintenance activities.

Flow isolation consists of measuring infiltration rates in manhole-to-manhole reaches of sanitary sewers during periods of high groundwater and minimum wastewater flow, such as early morning measurements during the spring season.

Television inspection is conducted to locate and document defects within a sewer system and to make direct observations of infiltration rates. A closed circuit television camera is used to record the interior condition of each line segment. Television inspection logs are completed for each segment documenting the location of each service connection; joint condition and spacing; deposition of debris; and pipe defect locations and infiltration rates. This information is used to specify the appropriate rehabilitation technique and to determine the cost-effectiveness of rehabilitating the defect.

Smoke testing consists of pumping a white, non-toxic smoke into the sanitary sewer collection system and observing the surrounding area for smoke escaping from the ground or from drainage structures. The appearance of smoke indicates either a direct or indirect connection through which surface runoff may enter the sewer system. Indirect sources include cracked pipes or offset joints in adjacent sewer and drainpipes. This creates an indirect connection between the drain and sewer systems. Direct sources include catch basins, driveway drains, patio drains, stairwell drains, yard drains, or roof leaders, which are directly connected to the sewer system.

Dye flooding involves plugging and filling drain lines and manholes with dyed water and observing surrounding sewer and drain lines for the emergence of dye. Television inspection is used in conjunction with the dye flooding to pinpoint the inflow source's connection to the sewer.

4.2.2 Sewer System Expansion

Assuming that the existing 96 sewer connections have first right to connect, there are three areas for expansion of the Lancaster Sewer District; North George Hill Road and East Mill Street areas are within the current boundaries of the Lancaster Sewer District, while the Poulin Drive/Kelly Drive area south of Sterling Road borders the District. North George Hill Road has been designed and construction is to begin in Spring 2006. East Mill Street warrants sewer expansion to protect the Town water supply located on site at the Department of Public Works. Lastly, the area south of Sterling Road bordering the Sewer District can be connected via gravity sewer to the existing system on Sterling Road and has favorable public support.

4.2.3 Pump Station Rehabilitation

In February 2004, Weston and Sampson Services inspected and evaluated the District's seven wastewater pump stations. A detailed report of each pump station's capitol improvements and estimated cost summary can be found in Appendix. Table 10, on the following page, is a summary of the total cost to rehabilitate each of the pump stations. It should be noted that the George Hill Road, Mill Street, and Bigelow Gardens pump stations are currently under design for rehabilitation. Contract documents for the rehabilitation of these stations should be completed in the Spring 2006. Construction of these pump station improvements should be underway in the Summer 2006 and completed by Spring 2007.

TABLE 10

PUMP STATION REHABILITATION COST ESTIMATES

Short Term - 1 Year	
Pump Station/Description	Estimated Cost
George Hill	TBD
Mill Street	TBD
Bigelow Gardens	TBD
North Center Bridge	TBD
South Center Bridge	$0, Excellent Operating Condition
Neck Road	$0, Excellent Operating Condition
Main Street	$0, Excellent Operating Condition
Total Short Term	
Long Term – 1 to 2 Years	
George Hill	
Mill Street	
Bigelow Street	
North Center Bridge	
South Center Bridge	
Neck Road	
Main	
Total Long Term	