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Final Report

Comprehensive Wastewater Management Plan and Final Environmental Impact Report Phase IV - CWMP/FEIR Tyngsborough, Massachusetts

Prepared for:

Town of Tyngsborough
25 Bryants Lane
Tyngsborough, Massachusetts 01879

Prepared by:

Earth Tech AECOM
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742

December 2008

80764

December 15, 2008

Dear Project Reviewer:

Enclosed please find one copy of the report entitled "Comprehensive Wastewater Management Plan and Final Environmental Impact Report Phase IV completed in accordance with the Massachusetts Department of Environmental Protection's "Guide to Wastewater Management Planning" dated January 1996. The review of the Comprehensive Wastewater Management Plan (CWMP)/Environmental Impact Report (EIR) will be through the submission of four documents including: (1) Phase I Report; (2) Phase II Screening of Alternatives; (3) Phase III Draft CWMP/EIR; and (4) Phase IV Final CWMP/EIR.

This Phase IV Report is consistent with the general requirements of the MEPA regulations including being circulated per MEPA regulations at 301 CMR 11.16 (3). In addition, copies will be available for public review at the locations listed on the Distribution List in Chapter 5.

The public comment period on the Phase IV Report will be initiated by a notice of availability for review in the Environmental Monitor on December 24, 2008. Comments received will be in the permanent record for this project. If you have comments, please send them by January 23, 2009 to:

Secretary of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
Attention: MEPA Unit
EOEA # 11788

If you have questions regarding this project, please do not hesitate to contact the the MEPA office at 617-626-1000.

Very truly yours,
Earth Tech AECOM

James R. Barsanti, P.E.
Project Manager

enclosures

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Phase IV – Final CWMP/FEIR
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300 Baker Avenue, Suite 290
Concord, Massachusetts 01742-2167

December 2008

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Phase I Summary

The Phase I – Needs and Growth Management identified existing conditions, evaluated current and future water demands, drainage conditions and projected future wastewater disposal needs for the Town. The study area was comprised of 23 study areas (Figure ES-1) and are identified below. For each of the 23 study areas, a wastewater need determination was performed based on soil conditions, wetlands, topography, groundwater depths, presence of surface water or groundwater resources, lot size, and occurrence of on-site system malfunctions. Based on these analyses in each area, the Phase I report included recommendations for study areas that were candidates for alternative wastewater solutions and on-site wastewater management solutions which would be further evaluated in the Screening of Alternatives performed in Phase II.

STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE
PHASE I RECOMMENDATIONS
(Needs Areas Noted in **Bold)**

	Long Term Wastewater Disposal Alternative	
Study Area	On-site Innovative Alternative Systems, Local, Regional or Satellite WWTF	Septage Management Plan
1-Norris Road	X	
2-Merrimack East	X	
3-Coburn Road	X	
4-Sherburn North		X
5-Sherburn South		X
6-Althea Lake	X	
7-Merrimack West	X	

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Study Areas

- Area of Wastewater Need
- Septage Management Plan

NASHUA NH

HUDSON NH

PELHAM NH

DUNSTABLE

DRACUT

LOWELL

CHELMSFORD

WESTFORD

GROTON

(1) NORRIS ROAD

(2) MERRIMACK EAST

(3) COBURN ROAD

(4) SHERBURN NORTH

(5) SHERBURN SOUTH

(6) ALTHEA LAKE

(7) MERRIMACK WEST

(8) MIDDLESEX NORTH

(9) LOCUST NORTH

(10) LOCUST SOUTH

(11) FLINT POND

(12) INDUSTRIAL NORTH

(13) INDUSTRIAL SOUTH

(14) TYNGSBOROUGH ROAD

(15) CANON GATE

(16) RED GATE

(17) BRIDGE MEADOW BROOK

(18) WESTFORD ROAD

(19) SCRIBNER NORTH

(20) SCRIBNER SOUTH

(21) STATES COMPLEX

(22) DAVIS ROAD

(23) MASSAROAG

Merrimack River

Flint Pond

Mascuppic Lake

Althea Lake

Base map data provided by MassGIS.

Figure ES-1

Study Areas

Phase IV CWMP/FEIR
Town of Tyngsborough

Location Map

0 1,500 3,000 6,000
Feet

Map Document: (L:\work\80764\GIS\Maps\Fig ES-1_StudyAreas2.mxd)
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	Long Term Wastewater Disposal Alternative	
Study Area	On-site Innovative Alternative Systems, Local, Regional or Satellite WWTF	Septage Management Plan
8-Middlesex North	X	
9-Locust North	X	
10-Locust South	X	
11-Flint Pond	X	
12-Industrial North		X
13-Industrial South		X
14-Tyngsborough Road		X
15-Canon Gate		X
16-Red Gate		X
17-Bridge Meadow Brook		X
18-Westford Road		X
19-Scribner North		X
20-Scribner South		X
21-States Complex		X
22-Davis Road		X
23-Masspoag		X

The Phase I Needs and Growth Management Report, was submitted March 1, 2003, and on May 15, 2003 the EOEA issued the MEPA Certificate, which determined that the Phase I Report adequately and properly complies with the Massachusetts Environmental Policy Act (G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00).

Phase II Summary

The CWMP/EIR Phase II Document presented numerous alternatives for local wastewater treatment. The CWMP/EIR Phase II Document evaluated the viability of the discharge of treated wastewater effluent to surface waters and to groundwater in Tyngsborough. Due to the stringent regulatory requirements and lack of suitable surface waters located within the Town's borders, surface water discharges were described herein but eliminated for further evaluation. A preliminary investigation into the viability of siting wastewater treatment facility(s) and/or highly treated wastewater effluent disposal facilities in Tyngsborough resulted in 10 potential sites. The application of the screening criteria resulted in the elimination of all ten sites for a variety of reasons. All of the identified sites within the Town presented constraints for wastewater usage due to current land use, environmental conditions present on the property, severe soil and/or groundwater conditions, and other factors. Phase II was submitted in June 15, 2006. On July 28, 2006, the Executive Office of Environmental Affairs (EOEA) issued the MEPA

Certificate (EOEA No. 11788), which determined that the project adequately and properly complied with the Massachusetts Environmental policy Act (G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00). A copy of the Certificate as well as the comment letters received on the Phase II CWMP and the responses to those comments was included in the Phase III CWMP/DEIR.

Phase III Summary

The Phase III CWMP/DEIR included draft recommendations for wastewater management in the identified areas of the Town of Tyngsborough where existing on-site septic systems are shown to be inadequate for wastewater disposal. Evaluations for each Needs Area were performed to determine the appropriateness of utilizing: (1) innovative/alternative on –site wastewater disposal systems; (2) conventional wastewater collection combined with low pressure sewers; and (3) regional wastewater collection treatment and disposal facilities. The Phase III report included evaluation of the environmental impacts, technical design, institutional factors, and project costs associated with each alternative and recommended the appropriate solution to wastewater disposal for each of the 23 Study Areas identified in Phase I. Phase III was submitted in June 13, 2008. On August 1, 2008, the Executive Office of Environmental Affairs (EOEA) issued the MEPA Certificate (EOEA No. 11788), which determined that the project adequately and properly complied with the Massachusetts Environmental policy Act (G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00) and that the Phase IV CWMP/FEIR could be prepared.

Phase IV Summary

The Phase IV report is the Final CWMP/EIR. It updates the text of the Phase III report to address the public comments received on that report. In addition, appendices have been included in the Phase IV report with information to respond to comments that are not addressed in the body of the main report. The Secretary of Environmental Affairs requested that the following items be addressed in the Phase IV Report:

1. Brief descriptions of each permit required or potentially required for each phase of the project and should demonstrate consistency with applicable performance standards.
2. Discussion of sewer districts and development of Septage Management Plan.
3. Provide plans at a readable scale that more clearly define the proposed improvements, including installation of the force mains below the Merrimack River.

4. Identify wetlands and buffer zones impacted by the project, quantify the impacts and describe the nature of the impacts, and show the areas of proposed construction in the vicinity of the wetlands.
5. Provide updated habitat maps.
6. Address potential impacts to hydrology from sewer system extensions.
7. Identify alternative sites that would avoid or minimize impacts to Article 97 land and provide detailed explanation why the alternative sites are not feasible. If alternative sites are infeasible, provide compensatory area.
8. Identify any sewer extensions in Zone I areas and confirm that they are necessary to eliminate existing sources of pollution. Confirm assumptions of water balance estimates with respect to existing and projected customers of municipal water system.
9. Discussion of reduction of greenhouse gases.
10. Mitigation measures and draft Section 61 findings.

Each of these comments has been addressed in the Phase IV CWMP/DEIR. Appendix A includes the MEPA Certificate and copies of comment letters and Appendix B includes the Response to Comments.

Phase IV Wastewater Flow Evaluation

The Town of Tyngsborough has Intermunicipal Agreements (IMA) with the Town of Dracut, Town of Chelmsford (via North Chelmsford), and the City of Lowell for the transport and treatment of its wastewater. All the flow from the Town is treated by the Lowell Regional Wastewater Utility (LRWWU). The capacities and flows and average daily flows for each IMA are presented below:

INTERMUNICIPAL AGREEMENT CAPACITIES

Intermunicipal Agreement	IMA Capacity (Average Daily Flow)
Dracut	1,000,000 gpd
North Chelmsford	350,000 gpd
Lowell	80,000 gpd
Total	1,430,000 gpd

The projected buildout of current sewered areas and the Needs Areas exceeds the capacity available in the Intermunicipal Agreements (IMA). Based on the analysis of buildout flows for the current sewered areas and Needs Areas, the projected wastewater flow is the sum of 606,000 gpd and 1,169,200 gpd or 1,775,200 gpd which exceeds the current available total capacity of 1,430,000 in the IMA's. Therefore,

the Recommended Plan in the Phase IV CWMP/FEIR includes proposed flow allocations to account for existing flows, flows for buildout in the current sewered areas, and flows for buildout in the Needs Areas such that the flow to each IMA is not exceeded are required and are presented below.

PROPOSED FLOW ALLOCATIONS TO INTERMUNICIPAL AGREEMENTS

IMA	Total IMA Capacity	Approximate Existing Flow	Estimated Available Capacity	Allocated Flow for Current Sewered Areas	Allocated Flow for Needs Areas
North Chelmsford	350,000	56,000	294,000	184,000	110,000
Dracut	1,000,000	382,000	618,000	171,585	446,415
Lowell	80,000	20,000	60,000	45,489	14,511
TOTAL	1,430,000	458,000	972,000	401,074	570,926

In addition to the flow allocations noted above, the following considerations are included in the Recommended Plan:

- Reevaluation of the Needs Areas and use of on-site systems for wastewater disposal in areas with low occurrences of septic system failures;
- Development of a control strategy, for example, establishment of Sewer Districts, to allow the Town to monitor and control connection of new wastewater flows to the existing and future collection system such that current IMA capacities are not exceeded;
- Infiltration/inflow removal;
- Water conservation measures; and
- New or renegotiated Intermunicipal Agreements with increased capacities.

Phase IV Recommended Plan

Based on the above, the following table presents the Phase IV CWMP/FEIR recommendations for conventional sewer systems areas and Septage Management Plan areas.

PHASE IV CWMP/FEIR RECOMMENDED STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE

(Needs Areas Noted in **Bold**)

Study Area	Long Term Wastewater Disposal Alternative	
	Conventional Sewer Systems Utilizing Current Intermunicipal Agreement Capacity	Septage Management Plan
1-Norris Road	X	X
2-Merrimack East	X	
3-Coburn Road		X
4-Sherburn North		X
5-Sherburn South		X
6-Althea Lake	X	
7-Merrimack West	X	
8-Middlesex North	X	
9-Locust North	X	X
10-Locust South		X
11-Flint Pond	X	
12-Industrial North		X
13-Industrial South		X
14-Tyngsborough Road		X
15-Canon Gate		X
16-Red Gate		X
17-Bridge Meadow Brook		X
18-Westford Road		X
19-Scribner North		X
20-Scribner South		X
21-States Complex		X
22-Davis Road		X
23-Masspoag		X

In order allocate flow for existing sewered areas and the Needs Areas within the existing IMAs, the Phase IV CWMP/FEIR recommends that the following Needs Areas utilize on-site wastewater disposal systems with oversight from the Town under a Septage Management Plan:

- Needs Area 1: Norris Road with the exception of the Sunset Park Area (located in the south central portion of the Needs Area) due to high incidences of failure in this area
- Needs Area 3: Coburn Road
- Needs Area 9: Locust North: Portion of Needs Area west of Route 3
- Needs Area 10: Locust South

The Phase IV CWMP/FEIR presents the recommended plan for gravity sewers, pump stations, force mains, and low pressure sewers for the Needs Areas. The estimated capital cost for the recommended plan contained in this Phase IV CWMP/FEIR is $39.1 million (Present Day Cost) based on an Engineering News Record (ENR) Construction Cost Index of 8,140 for May 2008. The report includes recommendations for six phases of sewer system design and construction during the planning period of 2009 to 2028.

1.0 INTRODUCTION

A. BACKGROUND

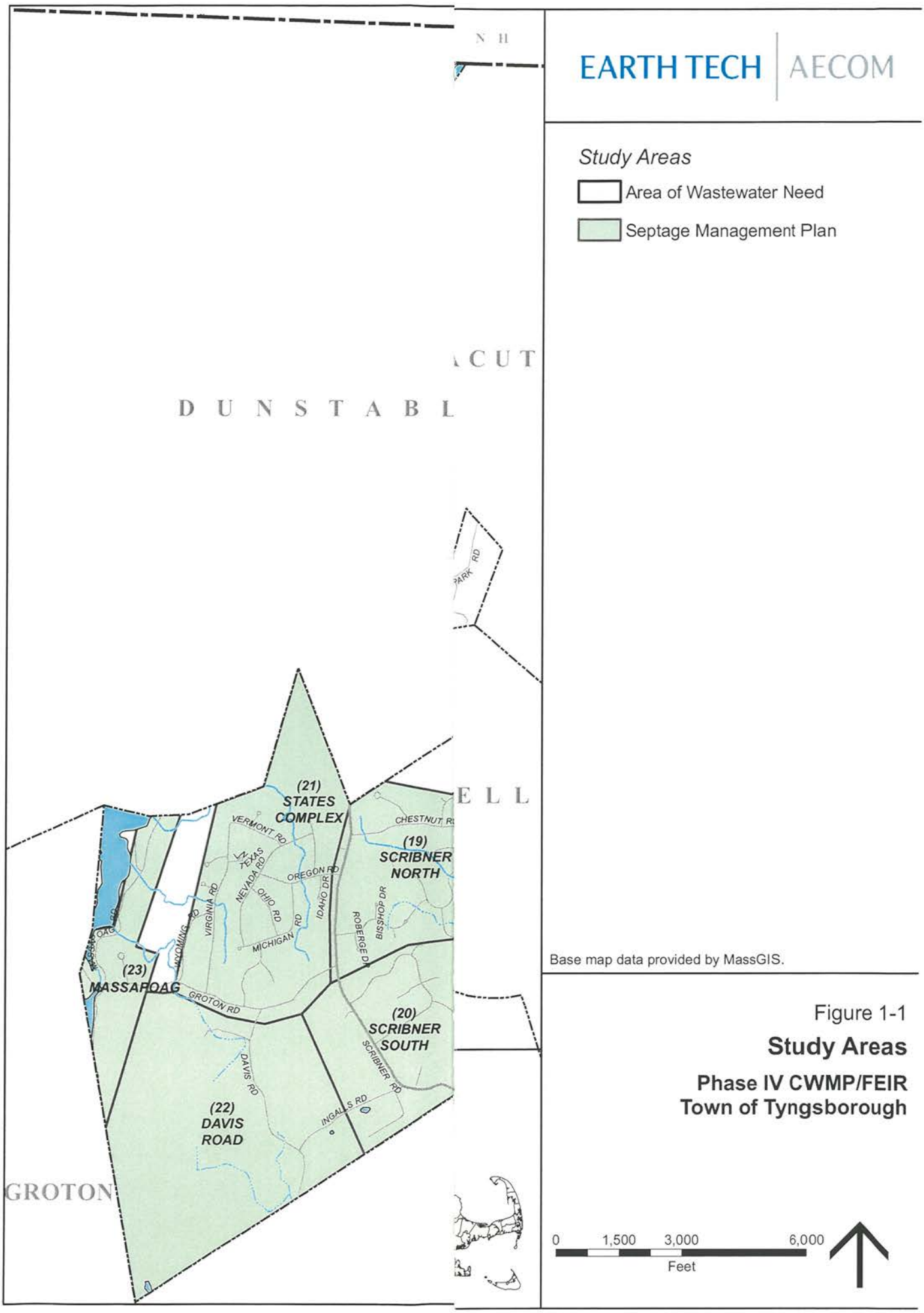
The Town of Tyngsborough submitted an Environmental Notification Form (ENF) to MEPA in the fall of 1998. The comment period for the ENF ended on November 14, 1998 and on December 1, 1998 the Executive Office of Environmental Affairs (EOEA) determined that the project required an Environmental Impact Report (EIR) and established a Special Procedure for phased review of the required EIR. This procedure divides the planning process into four separate phases:

- Phase I – Needs and Growth Management
- Phase II – Screening of Alternatives
- Phase III – Draft Comprehensive Wastewater Management Plan/Environmental Impact Report
- Phase IV – Final Comprehensive Wastewater Management Plan/Environmental Impact Report

Each phase of the project is distributed for review according to MEPA regulations to provide an opportunity for public comment.

B. PHASE I REPORT SUMMARY

The Phase I – Needs and Growth Management identified existing conditions, evaluated current and future water demands, drainage conditions and projected future wastewater disposal needs for the Town. The study area was comprised of 23 study areas and are shown in Figure 1-1.



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Study Areas

- Area of Wastewater Need
- Septage Management Plan

Base map data provided by MassGIS.

Figure 1-1

Study Areas

Phase IV CWMP/FEIR
Town of Tyngsborough

0 1,500 3,000 6,000
Feet

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The Phase I report investigated the following areas:

- Existing Environmental Conditions
- Water Demand Projections
- Stormwater Management Systems
- Wastewater Management Systems and Determination of Wastewater Needs

For each of the 23 study areas, a wastewater need determination was performed based on soil conditions, wetlands, topography, groundwater depths, presence of surface water or groundwater resources, lot size, and occurrence of on-site system malfunctions. Based on these analyses in each area, the Phase I report included recommendations for study areas that were candidates for alternative wastewater solutions and on-site wastewater management solutions which would be further evaluated in the Screening of Alternatives performed in Phase II.

The Phase I Needs and Growth Management Report, was submitted March 1, 2003, and on May 15, 2003 the EOEA determined that the Phase I Report adequately and properly complies with the MEPA regulations and the special procedure.

C. PHASE II REPORT SUMMARY

During Phase II, a wide range of alternatives for wastewater collection, treatment and disposal were evaluated to address the needs identified in Phase I. As shown in Table 1-1, of the 23 study areas identified in the Phase I report, the Phase II report identified the areas where on-site and off-site wastewater solutions would be evaluated.

TABLE 1-1
STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE

	Long Term Wastewater Disposal Alternative	
Study Area	On-site Innovative Alternative Systems, Local, Regional or Satellite WWTF	Septage Management Plan
1-Norris Road	**X**	
2-Merrimack East	**X**	
3-Coburn Road	**X**	
4-Sherburn North		X
5-Sherburn South		X
6-Althea Lake	**X**	
7-Merrimack West	**X**	
8-Middlesex North	**X**	
9-Locust North	**X**	
10-Locust South	**X**	
11-Flint Pond	**X**	
12-Industrial North		X
13-Industrial South		X
14-Tyngsborough Road		X
15-Canon Gate		X
16-Red Gate		X
17-Bridge Meadow Brook		X
18-Westford Road		X
19-Scribner North		X
20-Scribner South		X
21-States Complex		X
22-Davis Road		X
23-Masspoag		X

Note: Needs Areas shown in **Bold**.

The major facets of the Phase II report included:

- Alternatives Evaluation for Wastewater Disposal including regional solutions utilizing the Town's current Intermunicipal Agreements with Dracut, North Chelmsford and Lowell and evaluation of waste reduction, decentralized facilities, conventional and alternative sewer systems, and wastewater treatment facilities;

- Development of screening criteria for treatment and/or disposal;

- Preliminary site identification and site screening for areas for treatment and/or disposal;
- Identification of the most feasible sites based on the screening analysis; and
- Public Participation.

The Phase II report presented numerous alternatives for local wastewater treatment. The treatment alternatives identified included those technologies that would provide an appropriate level of wastewater treatment, which would allow treated effluent discharge within the borders of Tyngsborough. The treatment technologies described many of the available treatment processes necessary, which could potentially accomplish the treatment needed to meet proposed effluent limits mandated by the Massachusetts Department of Environmental Protection (DEP).

The Phase II report evaluated the viability of the discharge of treated wastewater effluent to surface waters and to groundwater in Tyngsborough. Due to the stringent regulatory requirements and lack of suitable surface waters located within the Town's borders, surface water discharges were described but eliminated for further evaluation.

A preliminary investigation into the viability of siting wastewater treatment facility(s) and/or highly treated wastewater effluent disposal facilities in Tyngsborough resulted in 10 potential sites. The screening criteria used to evaluate these potential sites was based upon eleven environmental criteria as follows: (1) wetlands; (2) soils; (3) drinking water supply - wellhead protection areas (Zone I and Zone II); (4) fisheries; (5) waterbodies (distance from surface water); (6) floodplains; (7) sensitive habitats; (8) park lands; (9) recreational resources; (10) historical interests; and (11) ACEC. The criteria was developed with respect to whether or not there was an existing environmental "Opportunity" or "Constraint" for a site to be utilized for a wastewater treatment facility and/or disposal location. The application of the screening criteria resulted in the elimination of all ten sites for a variety of reasons. All of the identified sites within the Town presented constraints for wastewater usage due to current land use, environmental conditions present on the property, severe soil and/or groundwater conditions, and other factors.

The Secretary requested that the following be addressed in the Phase III report:

- Reconsideration of potential sites for wastewater facilities.
- Development of projected flows for the needs areas to assess whether permitted capacity (1.43 mgd) is adequate to handle existing flows and projected growth.
- The effects of the expansion of the sewer system on tributary stream flows and maintenance of water balance.
- Inclusion of Current IMA's with Dracut, North Chelmsford and Dracut
- Inclusion of the Interim Basin Plan as referenced in the IMA's in the Phase III report appendix
- Reevaluation of water use data
- Consideration of on-site systems for the Norris Road and Coburn Road needs areas
- The Town's plans to identify sources if infiltration and inflow
- Coordination of the CWMP with the Town's Master Plan
- Assessment of management requirements for the Town to oversee the Title 5 and I/A systems for these areas
- Impacts of additional sewering on CSO's in Lowell

Responses to each of the Phase II comments that were included with the MEPA certificate are provided in Appendix B.

D. PHASE III REPORT SUMMARY

The CWMP/DEIR Phase III report presented the selected alternatives in accordance with the scope that was approved by the Secretary of EOEA. It included draft recommendations for wastewater management in the identified areas of the Town of Tyngsborough where existing on-site septic systems were shown to be inadequate for wastewater disposal. Specific recommendations by Study Area took into account the appropriateness of utilizing: (1) innovative alternative systems; (2) communal systems;

(3) local wastewater collection, treatment, and disposal facilities; and (4) regional wastewater collection treatment and disposal facilities. The Phase III report included evaluation of the environmental impacts, technical design, institutional factors, and project costs associated with each alternative and recommended the draft solution for wastewater disposal in the Town of Tyngsborough on a long term basis.

The Phase III Comprehensive Wastewater Management Plan and Draft Environmental Impact Report was submitted to MEPA on June 13, 2008 and on August 1, 2008 the EOEA determined that the Phase III Report adequately and properly complies with the MEPA regulations.

The Secretary requested that the following be addressed in the Phase IV Report:

- Description of each state permit required ort potentially required for each phase of the project
- Discussion of implementation of sewer districts and the development of septage management plans
- Inclusion of Scope of Services and schedule for Infiltration/Inflow program
- Plans at a readable scale that more clearly define the improvements, including the installation of force mains under Merrimack River
- Evaluation of wetlands and buffer zones impacted by the project
- Provision of updated habitat maps
- Impact of sewer extensions on groundwater hydrology
- Impacts to conservation land under Article 97
- Identify any sewer extensions in Zone I areas to public water supply
- Greenhouse gas reduction opportunities

Responses to each of the Phase III comments that were included with the Phase III MEPA certificate are provided in Appendix B.

E. PURPOSE AND SCOPE OF PHASE IV REPORT

The Phase IV report is the Final CWMP/EIR. It updates the text of the Phase III report to address the public comments received on that report. In addition, appendices have been included in the Phase IV report with information to respond to comments that are not addressed in the body of the main report.

2.0 WASTEWATER FLOW EVALUATION

A. BACKGROUND

As noted in the Phase II CWMP, the Town of Tyngsborough has Intermunicipal Agreements (IMA) with the Town of Dracut, Town of Chelmsford (via North Chelmsford), and the City of Lowell for the transport and treatment of its wastewater. All the flow from the Town is treated by the Lowell Regional Wastewater Utility (LRWWU). The capacities and flows and average daily flows for each IMA are presented below:

TABLE 2-1
INTERMUNICIPAL AGREEMENT CAPACITIES

Intermunicipal Agreement	IMA Capacity (Average Daily Flow)	IMA Capacity (Peak Hour Flow)
Dracut	1,000,000 gpd	3,500,000
North Chelmsford	350,000 gpd	1,350,000
Lowell	80,000 gpd	Peak Hour Flow Not Identified in IMA

As noted in the Phase I CWMP, the Town has 21.9 miles of sanitary sewer ranging in size from 8 to 24 inches in diameter. Table 2-2 identifies the quantities of gravity sewer in the system:

TABLE 2-2
SUMMARY QUANTITIES OF EXISTING GRAVITY SEWER SYSTEM

Diameter	Pipe Length (feet)
8-inch	86,271
10-inch	13,685
12-inch	5,831
15-inch	1,500
18-inch	3,948
24-inch	4,425
Total	115,660

The Town is serviced by 13 major wastewater pumping stations. Table 2-3 presents data on the existing pump stations.

TABLE 2-3
SUMMARY INFORMATION ON EXISTING WASTEWATER PUMPING STATIONS

Date Built	Name	Pump Number and Capacity	Force Main Size	Force Main Length	Estimated Daily Flow	Estimated Service Population[1]
1982	Audrey Avenue	2 x 180 gpm	4-inch	400 feet	15,000 gpd	230
1998	Bridge Meadow Brook	2 x 535 gpm	6-inch	1,900 feet	74,000 gpd	1,100
2005	Bridgeview	2 x 462 gpm	10-inch	875 feet	14,000 gpd	215
1995	Coburn Road	2 x 230 gpm	6-inch	550 feet	61,000 gpd	940
1998	Cummings Road	2 x 197 gpm	4-inch	2,800 feet	31,000 gpd	475
1995	Elm Street	2 x 245 gpm	6-inch	1,200 feet	28,000 gpd	430
1998	Flint's Corner	2 x 1,050	8-inch	4,250 feet	76,000 gpd	1,170
2000	Jefferson Drive	2 x 35 gpm	2-inch	1,000 feet	2,900 gpd	45
1976	Mascuppic Trail	3 x 1,500 gpm	12-inch	1,400 feet	162,000 gpd	2,500
2000	Phalanx Street	2 x 275 gpm	6-inch	8,000 feet	20,000 gpd	310
1998	Sequoia Drive	2 x 30 gpm	2-inch	1,200 feet	5,000 gpd	80
1976	Willowdale Avenue	2 x 800 gpm	8-inch	450 feet	62,000 gpd	950

1. Service population estimates based on total flow received at the pump station and an assumed per capita wastewater rate of 65 gpcd.

There are also five (5) privately owned pumping stations that transport wastewater from specific developments in the Town. Presently, the existing system serves approximately 1,500 sewer connections to the system, the majority of which are single family residential (1,431 connections) with 35 multi-family connections and 65 commercial connections. According to the Master Plan, approximately 33% of the Town's 12,000 residents are served by the sewer system. Therefore, the service population of the existing system is approximately 4,000 people. The municipal sewer system is comprised of four sewer service areas which are described below.

Dracut North/Lakeview Service Area

The Dracut North/Lakeview service area includes 67,000 linear feet of gravity sewers. The service are collects wastewater north of Mascuppic Lake and to the eastern side of the Merrimack River. The sewers serving this area discharge to the Dracut collection system through the Lake view Avenue flow metering station at the Tyngsborough /Dracut town line. The pump stations located on Coburn Road, Phalanx Street, Jefferson Drive, Elm Street and Audrey Avenue, as well as the private pump stations on Village Lane and Patricia Drive pump wastewater to the north where the flow discharges to the Mascuppic Trail Pump Station which then discharges the flow to the Lakeview Avenue metering station.

Dracut South/Willowdale Service Area

The Dracut South/Willowdale service area includes 15,000 linear feet of gravity sewer. The sewers serving this area discharge to a second connection to the Dracut system through the Willowdale Avenue flow metering station located on the Tyngsborough /Dracut town line. The area includes the Sequoia Drive pump station which pumps wastewater to the south of Lake Mascuppic to the Willowdale Avenue pump station which them discharges to the Willowdale Avenue metering station.

Lowell/Pawtucket Service Area

The Lowell/Pawtucket service area includes 1,500 feet of gravity sewer. The majority of wastewater flows in this area are generated by the Greater Lowell Vocational School, Vespa Country Club, and Stonehedge Inn. The sewers serving this area discharge to the Lowell collection system through the Pawtucket Boulevard flow metering station. Private pump stations owned by the Vespa Country Club, Stonehedge Inn and Vocational School pump to a central, jointly owned pump station on Pawtucket Boulevard. Wastewater is then pumped to the Pawtucket Boulevard metering station.

Chelmsford/Worden Service Area

The Chelmsford/Worden service area includes 16,000 linear feet of gravity sewer. The sewers in this area discharge to the Chelmsford collection system through the Worden Road metering station located at the Tyngsborough/Chelmsford town line. The area includes the Progress Road, Cummings Road, Bridge Meadow Brook and Flints Corner pumping stations which pump to a gravity sewer that discharges to the Worden Road metering station.

The Phase II CWMP presented flow totals for a 6-month period between December 2004 through May of 2005. The range of flows for each IMA is presented below.

TABLE 2-4
RANGE OF FLOW RATES

Intermunicipal Agreement	Dates	Range of Measured Flows	Average Daily Flow
Dracut	December 2004 - May 2005	192,000 - 690,000 gpd	382,000 gpd
North Chelmsford	April 2005 - November 2005	33,000 - 72,000 gpd	56,000 gpd
Lowell	December 2004 - June 2005	17,000 - 27,000 gpd	20,000 gpd
Totals		242,000 gpd - 789,000 gpd	458,000 gpd

Recent (2007) flow data for each of the IMA's were reviewed and it was determined that the current flows are similar to those noted in Table 2-4. Review of the range of flows and average daily flows appears to suggest that infiltration/inflow (I/I) is a significant contributor to overall flows. This conclusion was also noted in the Phase I Report.

Table 2-5 presents the estimated I/I component of the flows presented in Table 2-4 assuming the following:

- Lowest flow presented in Table 2-4 for each IMA is assumed to be representative of base wastewater flow conditions. The average daily flow consisted of the sum of these quantities; and
- Total length of sanitary sewer is 21.9 miles and an average diameter of 12-inches or a total of 262 inch-diameter miles.

TABLE 2-5
ESTIMATE OF POTENTIAL INFILTRATION/INFLOW

IMA	Average Daily Flow (a)	Assumed Base Wastewater Flow (b)	Potential I/I Component (a) – (b)	I/I gpd/in-diameter/mile
All	458,000 gpd	242,000 gpd	216,000 gpd	824 gpd

I/I rates for sewer design are typically 300 gpd/in-diameter/mile for new sewers and 500 gpd/in-diameter/mile for older sewers. Therefore, it appears that the existing system exhibits a significant portion of I/I in its base wastewater flow and that I/I removal is a critical element of the overall wastewater management plan. In 2002, the Town prepared an infiltration/inflow study of the existing wastewater collection system. Infiltration rates identified in that study ranged from 600 gpd/in-diameter mile to 1,600 gpd/in-diameter mile.

In 2007, the Town submitted a Project Evaluation Form to DEP for funding for additional infiltration/inflow investigations. The application was approved and the project is on the Intended Use Plan. An article for funding for the project is included in the Spring 2008 Town Meeting.

B. BUILDOUT ANALYSIS FOR DRACUT, LOWELL AND NORTH CHELMSFORD INTER MUNICIPAL AGREEMENTS

A Build-Out Analysis of the Dracut IMA, North Chelmsford IMA and Lowell IMA Areas was performed (current sewered areas and infill areas) to determine the buildout wastewater flowrates in each of the service areas and to determine the available remaining capacity to serve the Needs Areas. The following various data sources were used for the analysis:

(1) System data. The data consisted of the existing municipal wastewater system location within the designated area, pumping station locations, road names, town boundaries, and water bodies.

(2) Assessor's data provided by the Town of Tyngsborough

(3) Town of Tyngsborough Zoning By-Law, Reprinted with Amendments & Updates June 24, 2003, and;

(4) Town of Tyngsborough Billing Records for sewer usage.

The data provided and used as the basis of the analysis is the best available information at the time this analysis was conducted and is considered appropriate for the analysis being performed herein.

1. Land Utilization Factor

Estimating impacts to the existing utility infrastructure due to potential development in each IMA Study Area required the determination of buildable land within each Study Area. In accordance with current Massachusetts DEP regulations, all freshwater wetlands are regulated and assumed unbuildable therefore the "Buildable Area" was approximated by subtracting wetland areas from the "Total Parcel Area" acreage.

According to the "Phase I – Needs and Growth Management Report", completed by SEA Consultants in March 2003, Tyngsborough's 634 acres of wetlands comprise approximately 5.7-percent of the Town's total land area. Therefore, 5.7-percent of the Study Area was subtracted to account for any wetlands within the study area. The "Adjusted Area" was approximated based on the "Buildable Area" less 25 percent for future roadways, sidewalks, parking lots, zoning setbacks, landscaped areas, and open space.

The intended use of available land areas in the Town of Tyngsborough is governed by the Town of Tyngsborough Zoning By-Law, Reprinted with Amendments & Updates June 24, 2003. Table 2-6 summarizes the nine (9) classes of zoning districts, located within the Study Area, and minimum square foot areas for each zoning district.

TABLE 2-6
CLASSES OF EXISTING ZONING DISTRICTS
LOCATED WITHIN STUDY AREA

Zoning Class	Minimum Lot Area (sq. ft.)
Residential District - Low Density (R-1)	65,000
Residential District – Moderate Density (R-2)	20,000
Residential District – Multi-Family (R-3)	20,000
Business District – Neighborhood (B-1)	20,000
Business District – Office/Professional (B-2)	20,000
Business District – General Shopping (B-3)	80,000
Business District – Adult Zone (B-4)	80,000
Industrial District – Light (I-1)	80,000
Industrial District – Heavy (I-2)	120,000

Source: Town of Tyngsborough Zoning By-Law, Reprinted with Amendments & Updates June 24, 2003.

Based on the data sources available, the following assumptions were made for the Build-Out Analysis:

- If a parcel is less than the current minimum lot area (square feet) based on zoning, it will be assumed to be developed and grandfathered in as a developable lot.
- If a parcel is larger than the current minimum lot area (square feet), it will be divided into the maximum number of lots according to zoning based on square footage requirements.

- Based on the results of the analysis and discussions with the Town, it is unlikely that 100 percent of the Study Area will reach maximum Build-Out within a reasonable planning period (20 years); therefore, a Build-Out factor of 80-percent was applied to maximum Build-Out to account for the development likely to occur during the planning period.

- For wastewater projections, it was assumed that the entire Study Area where sewer is currently available would connect to the sewer system and not utilize on-site wastewater disposal. Potential wastewater flows, due to Build-Out, would be lower if on-site sewerage disposal systems are maintained within the Study Area.

- Established public and private roadways were taken out of the analysis of developable area.

- Zoning Specific assumptions with minimum lot size used for Build-Out in ( ) are as follows:

    - R-1 – Residential District: Low Density (65,000 sq. ft)
    - R-2 – Residential District: Moderate Density (20,000 sq. ft.)
    - R-3 – Residential District: Multi-Family Development (20,000 sq. ft.)
    - B-1 – Business District: Neighborhood Development (20,000 sq. ft.)
    - B-2 – Business District: Office/Professional Development (20,000 sq. ft.)
    - B-3 – Business District: General Shopping Development (80,000 sq. ft.)
    - B-4 – Business District: Adult Zone Development (80,000 sq. ft.)
    - I-1 – Industrial District: Light Development (80,000 sq. ft.)
    - I-2 – Industrial District: Heavy Development (120,000 sq. ft.)

- Minimum frontage was not used as part of the analysis to determine if a parcel can be subdivided or developed. It was assumed that if all other aspects of the Town's zoning by-laws were met, then it was likely that the Planning Board would grant a variance if the frontage requirement was not met and the parcel would be developed.

2. Determination of Buildable Area

Based on the above methodology and assumptions, the buildable land area was determined on a parcel by parcel basis. The buildable land area for each parcel and resulting number of buildable future lots were calculated as follows as defined by the following terms:

- "Gross Parcel Area" is defined as the entire land area of a parcel contained within the Study Area.

- "Buildable Area" is defined as the "Gross Parcel Area" less 5.7-percent of the total area to account for wetlands.

- "Adjusted Parcel Area" is defined as the "Buildable Area" multiplied by the Land Utilization Factor (LUF) of 75 percent, which accounts for future roadways, sidewalks, parking lots, zoning setbacks, and landscaped areas.

- "Number of Lots" is defined as the "Adjusted Parcel Area" divided by "Minimum Lot Size" allowed based on zoning.

3. Estimate of Wastewater Flows

Wastewater flows from the study area were estimated by applying some of the assumptions discussed below.

4. Residential

Initial estimates for residential wastewater flows were estimated at 330 gallons per day per residential lot assuming all future build-out would be 3-bedroom single family houses. For all lots that are currently developed, there are some single family houses with 4-bedrooms. In those cases, based on the direction of the Town of Tyngsborough Sewer Commission, it was assumed that all residential properties generate 330 gallons per day of wastewater, regardless of the number of bedrooms. The Phase II CWMP also noted that review of actual water useage data indicated a per household water use of approximately 310 gpd. Comments received on the Phase II CWMP from DEP indicated that this flowrate seemed high and should not be used as a figure to project wastewater generation. Based on the above, it appears these higher rates may include a significant portion of extraneous flow. Recent discussions with the Tyngsborough and Dracut Water District's indicate a per capita water useage rate of 71 gpd. The current average occupancy rate in Tyngsborough is approximately 3 persons per dwelling unit. This is equivalent to a water use rate of 213 gpd. If it is assumed 90% of the water use is returned to the sewer, this results in a wastewater flowrate of 192 gpd per household which was used in the analysis.

5. Commercial

Future flows for commercial areas were estimated assuming office building type development where a 17,000 square foot building could be constructed on a one acre lot which would also include parking, landscaping and setbacks. Based on information provided in ASCE, Manual of Practice No. FD-5, commercial office buildings generate about 100 gpd/1,000 square feet of gross floor area; hence a wastewater flow of 1,700 gallons per day per acre (gpda) was applied to commercial areas. The minimum lot size for commercial lots in B-1 and B-2 Zoning is 20,000 square feet, and the minimum lot size for commercial lots in B-3 and B-4 Zoning is 80,000 square feet. Based on this lot size and the flow projection per acre, future commercial wastewater flows were estimated at 780 gallons per day per commercial lot in Zoning Areas B-1 and B-2 and 3,125 gallons per day per commercial lot in Zoning Areas B-3 and B-4.

6. Industrial

Future flows for industrial areas were estimated by using flow projections of 1,250 gallons per day per day per acre (gpda). According to Metcalf & Eddy's 4th Edition "Wastewater Engineering Treatment and Reuse", typical design values for estimating the flows from industrial areas that have no or little wet-process-type industries are 1,000-1,500 gpd/acre (gpda) for light industrial developments. As Tyngsborough currently has light industrial developments with little to no wet-process-type industries, the wastewater flow per acre for industrial use was assumed to be 1,000 gpda for I-1 Zoning and 1,500 gpda for I-2 Zoning. The minimum lot size of 80,000 square feet per lot for I-1 Zoning and 120,000 square feet for I-2 Zoning was used for flow projections. Therefore, future industrial wastewater flows were estimated at 1,850 gallons per day per industrial lot for I-1 Zoning and 3,500 gallons per day per industrial lot for I-2 Zoning.

7. Infiltration/Inflow

An infiltration/inflow allowance of 500 gpd/in-diameter/mile was used to estimate future infiltration/inflow.

8. Estimated Buildout Flowrates for Current Sewered Areas

Based on the above, the estimated buildout flowrates for the currently sewered portions of the North Chelmsford, Dracut, and Lowell IMA's were calculated and are presented in the Table 2-7. It should be noted that the total buildout flow projection for the North Chelmsford IMA presented in Table 2-7 includes the following allocations provided by the Board of Sewer Commissioners:

Maple Ridge Real Estate = 63,330 gpd

Merrimack Landing Development = 39,600 gpd

Old Tyng Road Residences = 1,320 gpd

Existing Residences and Buildings = 49,823 gpd

TABLE 2-7
ESTIMATED BUILDOUT
WASTEWATER FLOWRATES FOR IMA'S

Intermunicipal Agreement	Estimated Buildout Wastewater Flowrates	Residential Component of Wastewater Flow	Commercial/Industrial Component of Wastewater Flow
Dracut	249,000 gpd	222,000	27,000
North Chelmsford	314,000 gpd[1]	298,000	16,000
Lowell	43,000 gpd	43,000	0
Total	606,000 gpd	563,000	43,000

1. Flowrates include 154,000 gallon flow allocation for flows as noted above.

C. ESTIMATES OF WASTEWATER FLOWRATES IN THE NEEDS AREAS

The flow projections for the Needs Areas based on buildout conditions using the assumptions noted above for residential, commercial, and industrial land uses are presented in Table 2-8. An infiltration/inflow allowance of 500 gpd per inch diameter mile of sewer is included the wastewater flow projections presented for the Needs Areas.

TABLE 2-8
ESTIMATED WASTEWATER
BUILDOUT FLOWRATES FOR NEEDS AREAS

Needs Area	Projected Buildout Wastewater Flow	Residential Component of Wastewater Flow	Commercial/Industrial Component of Wastewater Flow
1 - Norris Road	69,100 gpd	69,100	0
2 - Merrimack East	86,500 gpd	84,000	2,500
3 - Coburn Road	35,000 gpd	35,000	0
6 - Althea Lake	7,600 gpd	7,600	0
7 - Merrimack West	170,000 gpd	17,000	153,000
8 - Middlesex North	109,000 gpd	9,000	100,000
9 - Locust North	123,000 gpd	0	123,000
10 - Locust South	195,000 gpd	10,000	185,000
11 - Flint Pond	374,000 gpd	3,700	370,300
Total	1,169,200 gpd	235,400	933,800

It should be noted that the Flint Pond Needs Area flow projection includes a flow allowance of 133,000 gpd allocated for the potential development of the Sycamore property which is a 187 acre industrial parcel. This property is not located within the Needs Area, but is adjacent to the boundary and is located in the Industrial South Study Area (designated for Septage Management).

D. CAPACITY AVAILABLE FOR FLOWS

Table 2-4 above presented an estimate of the current flows being discharged to each of the North Chelmsford, Dracut and Lowell IMA's based on a review of flow data. Table 2-9 presents an estimate of available capacity for flows generated by new development in current sewered areas and/or for flows generated in the Needs Areas based on the current IMA capacities and current flows.

TABLE 2-9
ESTIMATED AVAILABLE CAPACITY OF INTERMUNICIPAL AGREEMENTS

Intermunicipal Agreement	Average Daily Flow Capacity	Average Daily Flow (From Table 2-4)	Estimated Available Capacity
North Chelmsford	350,000 gpd	56,000	294,000 gpd
Dracut	1,000,000 gpd	382,000	618,000 gpd
Lowell	80,000 gpd	20,000	60,000 gpd
Total	1,430,000 gpd	458,000	972,000 gpd ← BMD

Based on the analysis of buildout flows for the current sewered areas and Needs Areas, the projected wastewater flow is the sum of 606,000 gpd and 1,169,200 gpd or 1,775,200 gpd which exceeds the current available total capacity of 1,430,000 in the IMA's as noted in Table 2-9. Therefore, since the buildout projections exceed current capacity, the following considerations will be required to develop the Recommended Plan:

- Establishment of flow allocations for existing flows, flows for buildout in the current sewered areas, and flows for buildout in the Needs Areas such that the flow to each IMA is not exceeded;
- Reevaluation of the Needs Areas and use of on-site systems for wastewater disposal in areas with low occurrences of septic system failures;
- Development of a control strategy, for example, establishment of Sewer Districts, to allow the Town to monitor and control connection of new wastewater flows to the existing and future collection system such that current IMA capacities are not exceeded;
- Infiltration/inflow removal;
- Water conservation measures; and
- New or renegotiated Intermunicipal Agreements with increased capacities.

Based on the above, and the evaluation of alternatives presented in Chapter 3, the Recommended Plan presented in Chapter 4 will be developed using these considerations.

E. MASTER PLAN BUILDOUT DISCUSSION

As noted in the Master Plan, the forecast by the Northern Middlesex Council of Governments in 2001 projected that Tyngsborough could utilize all developable residential properties in the entire Town by 2015. With regard to commercial/industrial buildout projections, the Master Plan noted that full buildout of commercial/industrial was unlikely to be achieved in the next 20 years or even in the foreseeable future. The Master Plan noted that by 2025, total employment in Tyngsborough is forecast to increase by approximately 39%. The buildout projections noted above in Table 2-7 and 2-8 for current sewered areas and the Needs Areas are based on full buildout of developable areas for residential and commercial/industrial, and thus, provide conservative estimates with regard to projected wastewater flowrates for the planning period.

It is noted that the Master Plan projected an additional commercial/industrial water demand of approximately 1,000,000 gpd at buildout. If it is assumed that 90% of the water useage is returned to the sewer, the estimated additional wastewater flow is 900,000 gpd at buildout. The estimated commercial/industrial buildout flow noted above for the existing sewered areas and Needs Areas is approximately 976,000 gpd (sum of commercial/industrial flows from Table 2-7 and 2-8) which appears to provide reasonable correlation between the Master Plan and CWMP projections. With regard to residential water useage, the Master Plan projected additional water demand of approximately 388,000 gpd, which results in an estimated wastewater flow of approximately 350,000 gpd. The flows estimate was based on a consumption rate of 75 gpcd and an anticipated population increase of 5,166 residents. The estimated additional residential wastewater flow in the CWMP is estimated to be approximately 400,000 gpd (sum of residential flows from Table 2-7 and 2-8 of 798,000 reduced by the estimated existing residential wastewater flow (assumed to be 85% of the existing average daily flow of 458,000 gpd presented in Table 2-9) and was based on estimated residential growth based on zoning as noted in the buildout analysis above. Therefore, the methodology based on zoning used for the residential flow projections in the CWMP has resulted in a more conservative estimate for the additional residential wastewater flows at buildout. The portion of the Master Plan that discusses buildout is included in Appendix F.

3.0 PLAN SELECTION

A. EVALUATION OF SHORT LISTED ALTERNATIVES

The following presents the short list of alternatives for the disposal of wastewater that have been identified for detailed evaluation of costs, direct impacts, indirect impacts, institutional arrangements, potential for flow and waste reduction, residuals disposal, phased construction, and flexibility and reliability, implementation capability, and regulatory, design and reliability requirements.

1. Wastewater Disposal and Treatment

The screening of sites for treatment/disposal that was performed in Phase II concluded that there were no feasible locations on public property for groundwater disposal in the Town. In response to comments on the Phase II Report, a similar analysis of private property areas was conducted which is included in Appendix G. The conclusion of the analysis was similar to the evaluation of public sites, which is that each of the areas was constrained by one of more environmental factors. Therefore, regional solutions will be the alternative that is evaluated for the disposal and treatment of wastewater. This alternative will include utilizing the existing flow capacities that are available in the Dracut, North Chelmsford, and Lowell Intermunicipal Agreements.

In addition to utilizing the current IMAs noted above, it is noted that the Phase II CWMP included, as a regional solution, an evaluation of an alternative consisting of connecting a portion of the proposed wastewater collection system from the area along Middlesex Road (Middlesex North Needs Area) that directly abuts the Daniel Webster Highway to the Nashua, New Hampshire wastewater collection system. This option would require the Town of Tyngsborough to enter into negotiations with the City of Nashua to establish an agreement to collect, treat and dispose of Tyngsborough's wastewater.

Discussions with Nashua and the Town of Tyngsborough Sewer Commission are ongoing, but the availability of flow capacity to serve the Needs Areas has not been determined as of the preparation of this Phase IV CWMP Report.

B. EVALUATION OF COSTS

1. Project Costs

Cost estimates have been prepared for the various alternatives for the areas of wastewater disposal need. The presentation of costs is preliminary in nature and contains construction, construction contingencies, administrative, legal, land acquisitions, easements, design engineering, and construction engineering. Construction costs are based upon present day, competitively bid construction work prices and on an Engineering News Record (ENR) Construction Cost Index of 8,142 for May 2008. The budget costs presented in this report must be updated prior to each construction phase based the time of design and construction.

The following alternatives were evaluated for addressing the areas of wastewater disposal need in the Town of Tyngsborough. The alternatives are: (a) Collection System composed of gravity sewers, force mains, pump stations, and low pressure sewers; and (b) Innovative/Alternative Systems with on-site disposal. An estimated project cost, estimated operation and maintenance cost, and present worth cost was developed for each of these alternatives for the needs areas. The present worth analysis for the collection and transmission alternatives is based on the cost to both the Town and the individual homeowner.

2. Costing of Collection System Alternative

For all of the Needs Areas, a preliminary collection system layout was completed and is presented on Figure 3-1. This system was composed of gravity sewers, force mains, pump stations, and low-pressure sewers (in areas as needed). The project costs for this system layout were estimated by Needs Areas. The estimated project costs are based on the following:

- Collector and Interceptor Sewers and appurtenances are estimated to be an average of $225 per linear foot for pipes ranging in size from 8 inches to 15 inches. The majority of the gravity sewer will be 8-inch to 10-inch. The cost includes excavation, backfill, manholes, services, and paving;
- Custom or upgraded pumping stations are estimated to be $500,000 to $1,000,000 per pumping station;

- Force Mains and appurtenances are estimated to be $100 per linear foot for pipes ranging in size from 4 inches to 8 inches and $150 per foot for 12-inch.
- Horizontal directional drilling of twin force main across Merrimack River is estimated to be $400 per foot for pipes, access pits and appurtenances.
- Low Pressure Sewers and appurtenances are estimated to be $125 per linear foot for pipes ranging in size from 1-1/2 inches to 3 inches;
- Low Pressure Sewer Pumping System estimated at $12,500 each and includes the purchase and installation of the pumping unit, control panel, piping and abandonment of the existing on-site wastewater disposal system;
- Stream/Bridge Crossings at $50,000
- Railroad crossings at $165,000
- An allowance for construction of gravity sewers by developers to serve currently undeveloped parcels has been included using similar unit costs as noted above.
- Design (8%) and Construction Engineering (12%) is estimated to be a total of twenty (20) percent of Construction Cost;
- Administrative, Fiscal and Legal Costs are estimated to be five (5) percent of Construction Cost;
- Land Takings for pumping stations are estimated at $200,000 per acre and that ½ acre of land is required for each pumping station. The cost estimates assumes that no other Land Takings and/or Easements are required;
- Sub-Total of Project Cost includes all items listed above;
- Contingency is estimated to be fifteen (15) percent of the Construction Cost; and
- Total Estimate Project Cost includes Sub-Total Project Cost plus Contingency.

3. Costing of On-Site Innovative/Alternative and Conventional Septic Systems

Since the treatment capabilities as well as the costs of the innovative/alternative (I/A) technologies are similar, one on-site I/A technology, FAST® System, was selected in order to evaluate the wastewater disposal alternatives for the areas of wastewater disposal need. The FAST® System can accommodate flows up to 1000 gallons per day (gpd). For a residential lot and up to 9000 gpd for a commercial/industrial lot. In the areas of wastewater disposal need, it was assumed that fifty percent (50%) of the lots will utilize I/A technology, and the other fifty percent (50%) will utilize conventional septic systems.

The site conditions on each property play a major role in the costing of both I/A and conventional septic systems. In the case of the I/A systems, it has been assumed that each property has enough usable land to accommodate a septic tank, a FAST® system, pump chamber, necessary piping, distribution box, and a rectangular leaching area. As for the conventional septic systems, it has been assumed that each property has enough usable land to accomodate a septic tank, distribution box, and a rectangular leaching area. For the areas of wastewater disposal need, the construction cost of a FAST® system and conventional system have been estimated. The effluent loading rates, leaching area requirements, and I/A system credits are based on the requirements/provisions of Title 5.

The estimated construction costs for new on-site systems utilizing the FAST® systems are estimated at $40,000 for a residential lot and $95,000 for a commercial/industrial lot. The estimated construction cost is based on the following:

- Single Home FAST® System requires a 2,000 gallon tank and/or pump chamber;
- Single Home FAST® System requires 4 days for installation;
- Assume Commercial/Industrial FAST® System is 4,500 gpd with a 10,000 gallon septic tank
- Filter fabric and washed stone are used within leaching trenches;
- Site will be loam and seeded after construction of I/A system;
- Contractor's payroll burden is approximately 50 percent of labor cost;
- Contractor's overhead and profit is approximately 15 percent of material, equipment and labor cost; and
- Construction contingency is approximately 20 percent of the total construction cost.

The cost to upgrade existing systems with an I/A system were estimated to be $30,000 and $70,000 respectively. These costs were based on the assumption that upgrades would be required to the existing on-site disposal system and installation of the new I/A system.

The estimated construction costs for new conventional septic system are estimated at $20,000 for a residential lot and $60,000 for a commercial/industrial lot. The estimated construction cost is based on the following:

- Assume conventional septic system requires a 1,500 gallon septic tank
- Assume Commercial/Industrial septic system requires a 10,000 gallon septic tank
- Filter fabric and washed stone are used within leaching trenches;
- Site will be loam and seeded after construction of septic system;
- Contractor's payroll burden is approximately 50 percent of labor cost;
- Contractor's overhead and profit is approximately 15 percent of material, equipment and labor cost; and
- Construction contingency is approximately 20 percent of the total construction cost.

4. Operation and Maintenance Costs

Operation and Maintenance Costs for Collection System Alternative

The annual operation and maintenance (O&M) costs for the design year has been estimated. The annual O&M costs vary between Needs Areas, primarily depending on the number of pump stations located in each area. The costs are composed of estimated manpower, electrical power, supplies, equipment and maintenance for the gravity sewers, pump stations, force mains, wastewater treatment facilities and groundwater disposal sites. In order to maximize the life of the system, particularly the pumping stations, a comprehensive O&M program is recommended. This will require a full time operating staff that will perform daily, weekly and monthly tasks in order to achieve this goal. Therefore, the largest factor in the O&M costs for each of the alternatives is labor. It has been assumed that other Town resources will be used to aid in the operation of the system including billing, and sharing of equipment and manpower during emergencies. The O&M costs are based on the following:

- Operating Staff
  - Visit each Pump Station once per day by 1 operator for 1 hour.
  - Staff for Septage Management Plan has been estimated to include: 1 superintendent, 1 administrative assistant.
  - Staffing Cost estimated at an average of $30.00 per hour per person including benefits.

- Power Cost estimated at $0.15 per kilowatt hour with each system/pump operating for 6 hours per day.

- Annual cost for supplies, spare parts, lubrication and equipment calibration
    - Pumping Stations estimated at $5,000 per station.
- Compliance Monitoring and Testing
    - Pumping Stations at $2,500 per station.
- Maintenance Contract including yearly inspection, supplies, spare parts, and lubrication for Low Pressure System Pumping Unit estimated at $500 per unit.
- Present Worth Cost based on 20 years at 4.875 discount rate, 3% inflation rate, Effective Discount Rate = (Discount Rate-Inflation Rate) / (1 + Inflation Rate)

  (Formula Source: Department of Environmental Protection, *Guide to Comprehensive Wastewater Management Planning*, January 1996).

Operation and Maintenance Costs for On-Site Innovative/Alternative and Conventional Septic Systems

O&M of the FAST® System includes septic tank pumping, blower maintenance, periodic inspections, and electrical costs. Depending on the approval and permit issued by DEP, water quality testing may also be required. Septic tank pumping should be performed on a regular basis such as once every two to three years. The cost of this service is about $200 per pump-out for a residential system and $500 for a commercial/industrial system. Yearly maintenance service contracts may be obtained through the manufacturer's representative of the FAST® System. The service contract includes the two service visits and two tests. The estimated costs of the service contracts, including water quality testing, for the Single Home FAST® System is estimated $400 per year. The cost for a service and testing of commercial/industrial lot, including 4 service visits and 4 tests, is $2,000. Annual electrical cost for a Single Home FAST® System is estimated at about $25 a month or approximately $300 per year. For a commercial/industrial lot, annual electrical costs have been estimated to be $50/month or approximately $600/year. Therefore the total annual operation and maintenance cost for a Single Home FAST® System is estimated $700 and for a commercial/industrial FAST® System is $3,300.

O&M of the conventional septic systems include septic tank pumping and periodic

inspections. Depending on the approval and permit issued by DEP, water quality testing may also be required. Septic tank pumping and overall system inspection and maintenance should be performed on a regular basis. The average annual cost of maintaining a conventional septic system is approximately $250 annually for a residential system and approximately $1000 annually for a commercial system.

Study Area 1 – Norris Road

Alternative No. 1 consists of the installation of approximately 23,075 linear feet of gravity sewers, 1,926 linear feet of force main, 4,588 linear feet of low pressure sewer, 48 low pressure sewer pumping systems, 2 pumping stations, 4,600 linear feet of sewer for future development, and 4 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots while the pumping stations would require the purchase of land. The approximate 69,129 gpd of wastewater (including infiltration/inflow) generated in Study Area 1 would be transported and distributed to three locations within the existing system: 1) existing gravity sewer at Lakeview Avenue, 2) existing gravity sewer at Norris Road, and 3) existing gravity sewer at Ratner Road. Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 102 new residential I/A systems, 33 residential I/A upgrades, 134 residential conventional septic systems, and zero commercial/industrial I/A or conventional septic systems. The approximate 51,648 gpd of wastewater generated in Study Area 1 would be treated and disposed locally.

Table 3-1 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 2 – Merrimack East

Alternative No. 1 consists of the installation of approximately 33,826 linear feet of gravity sewers, 1,498 linear feet of force main, 3,563 linear feet of low pressure sewer, 37 low pressure sewer pumping systems, 1 pumping station, 13,950 linear feet of sewer for future development, and 4 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots while the pumping station would require the purchase of land. The approximate 86,529 gpd of wastewater generated in Study Area 2 would be transported and distributed to three locations within the existing system: 1) existing gravity sewer at Frost Road, 2) existing gravity sewer at Pawtucket Boulevard, and 3) existing force main on Patricia Road. Upgrades to the existing system that are required in this area to convey new flows are described in Section 5 below. Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 114 new residential I/A systems, 37 residential I/A upgrades, 151 residential conventional septic systems, 2 new commercial/industrial I/A systems, and 2 commercial/industrial conventional septic systems. The approximate 59,928 gpd of wastewater generated in Study Area 2 would be treated and disposed locally.

Table 3-2 presents the estimated project cost, operation and maintenance cost and present worth for each of the three alternatives for this study area.

Study Area 3 – Coburn Road

Alternative No. 1 consists of the installation of approximately 8,994 linear feet of gravity sewers, 889 linear feet of force main, 1 pumping station, 5,513 linear feet of additional sewer for future development, and 4 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, while the pumping station would require the purchase of land. The approximate 35,037 gpd of wastewater (including infiltration/inflow) generated in Study Area 3 would be transported to the existing collection system located at Pawtucket Boulevard. Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 56 new residential I/A systems, 18 residential I/A upgrades, 73 residential conventional septic systems, and zero commercial/industrial I/A or conventional septic systems. The approximate 28,224 gpd of wastewater generated in Study Area 1 would be treated and disposed locally.

Table 3-3 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 6 – Althea Lake

Alternative No. 1 consists of the installation of approximately 4,404 linear feet of low pressure sewer, 29 low pressure sewer pumping systems, and 563 linear feet of low pressure sewer for future development. All low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots. The approximate 7,555 gpd of wastewater (including infiltration/inflow) generated in Study Area 6 would be transported to the existing collection system located at Althea Avenue. Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 12 new residential I/A systems, 3 residential I/A upgrades, 14 residential conventional septic systems, and zero commercial/industrial I/A or conventional septic systems. The approximate 5,568 gpd of wastewater generated in Study Area 6 would be treated and disposed locally.

Table 3-4 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 7 – Merrimack West

Alternative No. 1 consists of the installation of approximately 8,027 linear feet of gravity sewers, 619 linear feet of force main, 1,919 linear feet of low pressure sewer, 12 low pressure sewer pumping systems, 11,375 linear feet of sewer for future development, and 2 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots. The approximate 170,127 gpd of wastewater (including infiltration/inflow) generated in Study Area 7 would be transported to the an upgraded collection system located at Phalanx Street which is described in Section 5 below. Figure 3-1 presents the

layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 46 new residential I/A systems, 15 residential I/A upgrades, 60 residential conventional septic systems, 22 new commercial/industrial I/A systems, 7 commercial/industrial I/A upgrades, and 29 commercial/industrial conventional septic systems. The approximate 162,592 gpd of wastewater generated in Study Area 7 would be treated and disposed locally.

Table 3-5 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 8 – Middlesex North

Alternative No. 1 consists of the installation of approximately 13,326 linear feet of gravity sewers, 1,343 linear feet of force main, 3,911 linear feet of low pressure sewer, 20 low pressure sewer pumping systems, 1 pumping station, 4,175 linear feet of sewer for future development, and 2 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots while the pumping station would require the purchase of land. The approximate 108,629 gpd of wastewater (including infiltration/inflow) generated in Study Area 8 will be transported as follows:

- Northern Portion of Study Area: Conveyed to the River Road Pump Station which will discharge flow via twin force mains below the Merrimack River to the Phalanx Street Pump Station, which is described in more detail in Section 5 below.
- Southern Portion of Study Area – Gravity conveyance along Middlesex Road to a new Pump Station on Middlesex Road in the Flint Pond Study Area.

Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 17 new residential I/A systems, 5 residential I/A upgrades, 21 residential conventional septic systems, 33 new commercial/industrial I/A systems, 11 commercial/industrial I/A upgrades, and 43 commercial/industrial conventional septic systems. The approximate 98,533 gpd of wastewater generated in Study Area 8 would be treated and disposed locally.

Table 3-6 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 9 – Locust North

Alternative No. 1 consists of the installation of approximately 1,712 l.f. of gravity sewer, 2,400 linear feet of sewer for future development, and 1 brook crossing. All gravity sewers would be located in existing roadways. The approximate 122,877 gpd of wastewater (including infiltration/inflow) generated in Study Area 9 would be conveyed to the River Road Pump Station which will discharge flow via twin force mains below the Merrimack River to the Phalanx Street Pump Station, which is described in more

detail in Section 5 below.

Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 12 new residential I/A systems, 3 residential I/A upgrades, 14 residential conventional septic systems, and zero commercial/industrial I/A or conventional septic systems. The approximate 121,580 gpd of wastewater (including infiltration/inflow) generated in Study Area 9 would be treated and disposed locally.

Table 3-7 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 10 – Locust South

Alternative No. 1 consists of the installation of approximately 12,695 linear feet of gravity sewers, 3,221 linear feet of force main, 997 linear feet of low pressure sewer, 6 low pressure sewer pumping systems, 3 pumping stations, and 8,625 linear feet of sewer for future development, and 4 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots while the pumping station would require the purchase of land. The approximate 194,632 gpd of wastewater (including infiltration/inflow) generated in Study Area 10 would be conveyed as follows:

- Locust Avenue (eastside of Route 3): Conveyance to the River Road Pump Station which will discharge flow via twin force mains below the Merrimack River to the Phalanx Street Pump Station, which is described in more detail in Section 5 below.

- Kendall Road/Cummings Road/Locust Avenue (westside of Route 3): Conveyance along Kendall Road to Middlesex Road to new Pump Station on Middlesex Road in the Flint Pond Study Area..

Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 18 new residential I/A systems, 5 residential I/A upgrades, 23 residential conventional septic systems, 42 new

commercial/industrial I/A systems, 14 commercial/industrial I/A upgrades, and 55 commercial/industrial conventional septic systems. The approximate 185,015 gpd of wastewater generated in Study Area 10 would be treated and disposed locally.

Table 3-8 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

Study Area 11 – Flint Pond

Alternative No. 1 consists of the installation of approximately 13,499 linear feet of gravity sewers, 2,892 linear feet of force main, 2,279 linear feet of low pressure sewer, 31 low pressure sewer pumping systems, 1 pumping station, 21,163 linear feet of sewer for future development, and 2 brook crossings. All gravity sewers and force mains and low pressure sewers would be located in existing roadways, low pressure sewer systems would be located on individual private lots while the pumping station would require the purchase of land. The approximate 373,687 gpd of wastewater (including infiltration/inflow) generated in Study Area 11 would be conveyed to a new pump Station on Middlesex Road which will be discharge its flow via a force main connected to the existing sewer on Middlesex Road. Figure 3-1 presents the layout of the collection systems for this area.

Alternative No. 2 consists of the installation of approximately 11 new residential I/A systems, 3 residential I/A upgrades, 14 residential conventional septic systems, 105 new commercial/industrial I/A systems, 35 commercial/industrial I/A upgrades, and 139 commercial/industrial conventional septic systems. The approximate 362,083 gpd of wastewater generated in Study Area 11 would be treated and disposed locally.

Table 3-9 presents the estimated project cost, operation and maintenance cost and present worth for each of the alternatives for this study area.

TABLE 3-1
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 1 – NORRIS ROAD ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	23,075	L.F	$225	$5,191,916	$7,268,682	$0	$7,268,682
	Grinder or Suction Lift Pumping Station	2	Each	$500,000	$1,000,000	$1,400,000	$40,000	$2,065,600
	Force Main	1,926	L.F	$100	$192,612	$269,657	$0	$269,657
	Land Acquisition	2	Each	$100,000	$200,000	$280,000	$0	$280,000
	Low Pressure Sewer	4,588	L.F	$125	$573,518	$802,925	$0	$802,925
	Low Pressure Sewer Pumping System	48	Each	$12,500	$600,000	$840,000	$24,000	$1,239,360
	Brook Crossing	4	Each	$50,000	$200,000	$280,000	$0	$280,000
	Sewer for Future Development	4,600	L.F	$225	$1,035,000	$1,449,000	$0	$1,449,000
	Total Collection System Cost					**$12,590,263**		**$13,655,223**
2	Innovative/Alternative Residential							
	New	102	Each	$40,000	$4,080,000	$4,896,000	$71,400	$6,084,096
	Upgrade	33	Each	$30,000	$990,000	$1,188,000	$23,100	$1,572,384
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	$95,000	$0	$0	$0	$0
	Upgrade	0	Each	$70,000	$0	$0	$0	$0
	Conventional Residential Septic System							
	New	134	Each	$20,000	$2,680,000	$3,216,000	$33,500	$3,773,440
	Conventional Commercial Septic System							
	New	0	Each	$60,000	$0	$0	$0	$0
	Total Innovative/Alternative and Conventional Septic System Cost					**$9,300,000**		**$11,429,920**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-2
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 2 - MERRIMACK EAST ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	33,826	L.F	$225	$7,610,942	$10,655,319	$0	$10,655,319
	Grinder or Suction Lift Pumping Station	1	Each	$500,000	$500,000	$700,000	$20,000	$1,032,800
	Force Main	1,498	L.F	$100	$149,813	$209,738	$0	$209,738
	Land Acquisition	1	Each	$100,000	$100,000	$140,000	$0	$140,000
	Low Pressure Sewer	3,563	L.F	$125	$445,425	$623,595	$0	$623,595
	Low Pressure Sewer Pumping System	37	Each	$12,500	$462,500	$647,500	$18,500	$955,340
	Brook Crossing	4	Each	$50,000	$200,000	$280,000	$0	$280,000
	Sewer for Future Development	13,950	L.F	$225	$3,138,750	$4,394,250	$0	$4,394,250
	Total Collection System Cost					**$17,650,401**		**$18,291,041**
2	Innovative/Alternative Residential							
	New	114	Each	$40,000	$4,560,000	$5,472,000	$79,800	$6,799,872
	Upgrade	37	Each	$30,000	$1,110,000	$1,332,000	$25,900	$1,762,976
	Innovative/Alternative Commercial/Industrial							
	New	2	Each	$95,000	$190,000	$228,000	$6,600	$337,824
	Upgrade	0	Each	$70,000	$0	$0	$0	$0
	Conventional Residential Septic System							
	New	151	Each	$20,000	$3,020,000	$3,624,000	$37,750	$4,252,160
	Conventional Commercial Septic System							
	New	2	Each	$60,000	$120,000	$144,000	$2,000	$177,280
	Total Innovative/Alternative and Conventional Septic System Cost					**$10,800,000**		**$13,330,112**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-3
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 3 – COBURN ROAD ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	8,994	L.F	$225	$2,023,605	$2,833,047	$0	$2,833,047
	Grinder or Suction Lift Pumping Station	1	Each	$500,000	$500,000	$700,000	$20,000	$1,032,800
	Force Main	889	L.F	$100	$88,890	$124,446	$0	$124,446
	Land Acquisition	1	Each	$100,000	$100,000	$140,000	$0	$140,000
	Low Pressure Sewer	0	L.F	$125	$0	$0	$0	$0
	Low Pressure Sewer Pumping System	0	Each	$12,500	$0	$0	$0	$0
	Brook Crossing	4	Each	$50,000	$200,000	$280,000	$0	$280,000
	Sewer for Future Development	5,513	L.F	$225	$1,240,313	$1,736,438	$0	$1,736,438
	Total Collection System Cost					**$5,813,931**		**$6,146,731**
2	Innovative/Alternative Residential							
	New	56	Each	$40,000	$2,240,000	$2,688,000	$39,200	$3,340,288
	Upgrade	18	Each	$30,000	$540,000	$648,000	$12,600	$857,664
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	$95,000	$0	$0	$0	$0
	Upgrade	0	Each	$70,000	$0	$0	$0	$0
	Conventional Residential Septic System							
	New	73	Each	$20,000	$1,460,000	$1,752,000	$18,250	$2,055,680
	Conventional Commercial Septic System							
	New	0	Each	$60,000	$0	$0	$0	$0
	Total Innovative/Alternative and Conventional Septic System Cost					**$5,088,000**		**$6,253,632**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-4
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 6 – ALTHEA LAKE ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	0	L.F	$225	$0	$0	$0	$0
	Grinder or Suction Lift Pumping Station	0	Each	$500,000	$0	$0	$0	$0
	Force Main	0	L.F	$100	$0	$0	$0	$0
	Land Acquisition	0	Each	$100,000	$0	$0	$0	$0
	Low Pressure Sewer	4,404	L.F	$125	$550,448	$770,627	$0	$770,627
	Low Pressure Sewer Pumping System	29	Each	$12,500	$362,500	$507,500	$14,500	$748,780
	Brook Crossing	0	Each	$50,000	$0	$0	$0	$0
	Low Pressure Sewer for Future Development	563	L.F	$225	$126,563	$177,188	$0	$177,188
	Low Pressure Sewer Pumping System for Future Development	29	Each	$12,500	$362,500	$507,500	$14,500	$748,780
	Total Collection System Cost					**$1,455,314**		**$1,696,594**
2	Innovative/Alternative Residential							
	New	12	Each	$40,000	$480,000	$576,000	$8,400	$715,776
	Upgrade	3	Each	$30,000	$90,000	$108,000	$2,100	$142,944
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	$95,000	$0	$0	$0	$0
	Upgrade	0	Each	$70,000	$0	$0	$0	$0
	Conventional Residential Septic System							
	New	14	Each	$20,000	$280,000	$336,000	$3,500	$394,240
	Conventional Commercial Septic System							
	New	0	Each	$60,000	$0	$0	$0	$0
	Total Innovative/Alternative and Conventional Septic System Cost					**$1,020,000**		**$1,252,960**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-5
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 7 – MERRIMACK WEST ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	8,027	L.F	$225	$1,806,163	$2,528,628	$0	$2,528,628
	Grinder or Suction Lift Pumping Station	0	Each	$750,000	$0	$0	$0	$0
	Force Main	619	L.F	$100	$61,899	$86,659	$0	$86,659
	Land Acquisition	0	Each	$100,000	$0	$0	$0	$0
	Low Pressure Sewer	1,919	L.F	$125	$239,858	$335,801	$0	$335,801
	Low Pressure Sewer Pumping System	12	Each	$12,500	$150,000	$210,000	$6,000	$309,840
	Brook Crossing	2	Each	$50,000	$100,000	$140,000	$0	$140,000
	Sewer for Future Development	11,375	L.F	$225	$2,559,375	$3,583,125	$0	$3,583,125
	Total Collection System Cost					**$6,884,212**		**$6,984,052**
2	Innovative/Alternative Residential							
	New	46	Each	$40,000	$1,840,000	$2,208,000	$32,200	$2,743,808
	Upgrade	15	Each	$30,000	$450,000	$540,000	$10,500	$714,720
	Innovative/Alternative Commercial/Industrial							
	New	22	Each	$95,000	$2,090,000	$2,508,000	$72,600	$3,716,064
	Upgrade	7	Each	$70,000	$490,000	$588,000	$23,100	$972,384
	Conventional Residential Septic System							
	New	60	Each	$20,000	$1,200,000	$1,440,000	$15,000	$1,689,600
	Conventional Commercial Septic System							
	New	29	Each	$60,000	$1,740,000	$2,088,000	$29,000	$2,570,560
	Total Innovative/Alternative and Conventional Septic System Cost					**$9,372,000**		**$12,407,136**

[1] Estimate Project Cost includes Cost for Project Services.

TABLE 3-6
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 8 - MIDDLESEX NORTH ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	13,326	L.F	$225	$2,998,413	$4,197,778	$0	$4,197,778
	Grinder or Suction Lift Pumping Station	1	Each	$750,000	$750,000	$1,050,000	$20,000	$1,382,800
	Force Main	1,343	L.F	$100	$134,296	$188,014	$0	$188,014
	Land Acquisition	1	Each	$100,000	$100,000	$140,000	$0	$140,000
	Low Pressure Sewer	3,911	L.F	$125	$488,919	$684,486	$0	$684,486
	Low Pressure Sewer Pumping System	20	Each	$12,500	$250,000	$350,000	$10,000	$516,400
	Brook Crossing	2	Each	$50,000	$100,000	$140,000	$0	$140,000
	Sewer for Future Development	4,175	L.F	$225	$939,375	$1,315,125	$0	$1,315,125
	Total Collection System Cost					**$8,065,404**		**$8,564,604**
2	Innovative/Alternative Residential							
	New	17	Each	$40,000	$680,000	$816,000	$11,900	$1,014,016
	Upgrade	5	Each	$30,000	$150,000	$180,000	$3,500	$238,240
	Innovative/Alternative Commercial/Industrial							
	New	33	Each	$95,000	$3,135,000	$3,762,000	$108,900	$5,574,096
	Upgrade	11	Each	$70,000	$770,000	$924,000	$36,300	$1,528,032
	Conventional Residential Septic System							
	New	21	Each	$20,000	$420,000	$504,000	$5,250	$591,360
	Conventional Commercial Septic System							
	New	43	Each	$60,000	$2,580,000	$3,096,000	$43,000	$3,811,520
	Total Innovative/Alternative and Conventional Septic System Cost					**$9,282,000**		**$12,757,264**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-7
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 9 – LOCUST NORTH ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	1,712	L.F	$225	$385,306	$539,428	$0	$539,428
	Grinder or Suction Lift Pumping Station	0	Each	$500,000	$0	$0	$0	$0
	Force Main	0	L.F	$100	$0	$0	$0	$0
	Land Acquisition	0	Each	$100,000	$0	$0	$0	$0
	Low Pressure Sewer	0	L.F	$125	$0	$0	$0	$0
	Low Pressure Sewer Pumping System	0	Each	$12,500	$0	$0	$0	$0
	Brook Crossing	1	Each	$50,000	$50,000	$70,000	$0	$70,000
	Sewer for Future Development	2,400	L.F	$225	$540,000	$756,000	$0	$756,000
	Total Collection System Cost					**$1,365,428**		**$1,365,428**
2	Innovative/Alternative Residential							
	New	0	Each	$40,000	$0	$0	$0	$0
	Upgrade	0	Each	$30,000	$0	$0	$0	$0
	Innovative/Alternative Commercial/Industrial							
	New	12	Each	$95,000	$1,140,000	$1,368,000	$39,600	$2,026,944
	Upgrade	3	Each	$70,000	$210,000	$252,000	$9,900	$416,736
	Conventional Residential Septic System							
	New	0	Each	$20,000	$0	$0	$0	$0
	Conventional Commercial Septic System							
	New	14	Each	$60,000	$840,000	$1,008,000	$14,000	$1,240,960
	Total Innovative/Alternative and Conventional Septic System Cost					**$2,628,000**		**$3,684,640**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-8
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 10 – LOCUST SOUTH ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	12,695	L.F	$225	$2,856,395	$3,998,953	$0	$3,998,953
	Grinder or Suction Lift Pumping Station	3	Each	$500,000	$1,500,000	$2,100,000	$60,000	$3,098,400
	Force Main	3,221	L.F	$100	$322,062	$450,887	$0	$450,887
	Land Acquisition	3	Each	$100,000	$300,000	$420,000	$0	$420,000
	Low Pressure Sewer	997	L.F	$125	$124,666	$174,533	$0	$174,533
	Low Pressure Sewer Pumping System	6	Each	$12,500	$75,000	$105,000	$3,000	$154,920
	Brook Crossing	4	Each	$50,000	$200,000	$280,000	$0	$280,000
	Sewer for Future Development	8,625	L.F	$225	$1,940,625	$2,716,875	$0	$2,716,875
	Total Collection System Cost					**$10,246,248**		**$11,294,568**
2	Innovative/Alternative Residential							
	New	18	Each	$40,000	$720,000	$864,000	$12,600	$1,073,664
	Upgrade	5	Each	$30,000	$150,000	$180,000	$3,500	$238,240
	Innovative/Alternative Commercial/Industrial							
	New	42	Each	$95,000	$3,990,000	$4,788,000	$138,600	$7,094,304
	Upgrade	14	Each	$70,000	$980,000	$1,176,000	$46,200	$1,944,768
	Conventional Residential Septic System							
	New	23	Each	$20,000	$460,000	$552,000	$5,750	$647,680
	Conventional Commercial Septic System							
	New	55	Each	$60,000	$3,300,000	$3,960,000	$55,000	$4,875,200
	Total Innovative/Alternative and Conventional Septic System Cost					**$11,520,000**		**$15,873,856**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 3-9
TOWN OF TYNGSBOROUGH
CWMP/DEIR
STUDY AREA 11 – FLINT POND ALTERNATIVES
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Alternative Number	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Collection System							
	Gravity Sewer	13,499	L.F	$225	$3,037,165	$4,252,031	$0	$4,252,031
	Grinder or Suction Lift Pumping Station	1	Each	$750,000	$750,000	$1,050,000	$20,000	$1,382,800
	Force Main	2,892	L.F	$100	$289,201	$404,881	$0	$404,881
	Land Acquisition	1	Each	$100,000	$100,000	$140,000	$0	$140,000
	Low Pressure Sewer	2,279	L.F	$125	$284,898	$398,858	$0	$398,858
	Low Pressure Sewer Pumping System	31	Each	$12,500	$387,500	$542,500	$15,500	$800,420
	Brook Crossing	2	Each	$50,000	$100,000	$140,000	$0	$140,000
	Sewer for Future Development	21,163	L.F	$225	$4,761,563	$6,666,188	$0	$6,666,188
	Total Collection System Cost					**$13,594,457**		**$14,185,177**
2	Innovative/Alternative Residential							
	New	11	Each	$40,000	$440,000	$528,000	$7,700	$656,128
	Upgrade	3	Each	$30,000	$90,000	$108,000	$2,100	$142,944
	Innovative/Alternative Commercial/Industrial							
	New	105	Each	$95,000	$9,975,000	$11,970,000	$346,500	$17,735,760
	Upgrade	35	Each	$70,000	$2,450,000	$2,940,000	$115,500	$4,861,920
	Conventional Residential Septic System							
	New	14	Each	$20,000	$280,000	$336,000	$3,500	$394,240
	Conventional Commercial Septic System							
	New	139	Each	$60,000	$8,340,000	$10,008,000	$139,000	$12,320,960
	Total Innovative/Alternative and Conventional Septic System Cost					**$25,890,000**		**$36,111,952**

[1] Estimated Project Cost includes Cost for Project Services.

Upgrades to Existing Collection System

Existing System Upgrades Required for Flows From Merrimack East Needs Area

In order to accommodate the flow from Study Area 2 that is being conveyed to a new Pump Station located at the intersection of Curtis Road and Indian Lane, it is proposed that flow from this pump station be connected to the existing force main that presently serves the existing privately owned pump station on Patricia Road. It is proposed that flow from the private pump station be conveyed to the new pump station via a new gravity connection, and the private pump station decommissioned. Flow from this pump station discharges to an existing 8-inch sewer on Beech Street which will be required to be upgraded to a 12-inch pipe to accommodate additional flows.

Existing System Upgrades Required for Flows from Merrimack West, the Northern Portion of Middlesex Road, Locust North, and the Northern Portion of the Locust South Areas

In order to accommodate the flow from Study Areas 7, 8, 9, 10, upgrades to the existing collection system will be required. The River Road Pump Station is proposed to be located on Town owned conservation land and will be a major new pump station that will ultimately pump all flow from the east side of the proposed system via a force main constructed below the Merrimack River over to the west side of the system. Flow will be conveyed from the pump station via a twin force main proposed to be constructed by directional drilling below the Merrimack River to the existing Phalanx Street Pump Station. On the east side of the Merrimack River, the Town owns a right of way between the river and the Phalanx Street Pump Station that will be utilized for the force main alignment.

The Phalanx Street Pump Station discharges through a 6,300 linear foot, 6-inch diameter force main to the existing 10-inch diameter sewer on Lakeview Avenue The Phalanx Street Pump Station has a pumping capacity of 275gpm which corresponds to a design average daily flow of wastewater flow of up to 64,000 gpd. Based on the needs analyses presented in this report, the buildout flows from the study areas to the proposed River Road Pump Station could generate approximately 350,000 gpd average daily flow.

In an effort to address future needs while maximizing the use of existing infrastructure, a number of factors were considered in developing alternatives for conveying flows to the existing collection system at Phalanx Street:

- The existing 6-inch force main connection has a peak flow capacity limited to approximately 500 gpm based on industry accepted velocity and hydraulic losses during pumping.
- The existing 10-inch diameter gravity sewer has a peak flow capacity of over 1,000 gpm, based on the as-built profile.
- The existing Phalanx Street Pump Station would require a new pump, motor and generator (electrical) upgrade to deliver more flow through the 6-inch force main, up to the 500 gpm pipe capacity. The new pumps would likely require 75 BHp motors compared with the 40 Hp currently existing.
- Connecting the new force main from the proposed River Road Pump Station to the existing 6-in diameter force main directly is not recommended. There are a number of potential pump operation and control problems when two pump stations discharge into a common pipeline. Furthermore, the changed conditions would still require an upgrade of the Phalanx Street Pump Station.
- A new force main installed from the River Road Pump Station and connected to the existing gravity sewer on Lakeview Avenue, with an overall llength of approximately 9,000 feet is very costly.

With all the piping and pump capacity limitations noted above, alternatives that include flow equalization were considered to mitigate the effects of the increased average daily and peak flows that would are projected from the buildout in these areas. Such an arrangement would maximize the total daily flow through the 6-inch force main and sanitary sewer by increasing the pump run time at the same pumping rate. The goal is to maximize the capacity of the Phalanx Street Pump Station arrangement and thus accommodate higher wastewater flows from the River Road Pump Station. Without additional storage at Phalanx Street pump station, the peak flow managed from the River Pump Station would need to be limited to 225 gpm, which corresponds to a design average daily flow of only 43,000 gpd average daily flow.

The following scenarios were considered and are compared in Table 3-10.

- **A** - Zero additional storage/equalization volume at either Phalanx Street or River Road
- **B** - 30,000 gallons of storage at Phalanx Street and at River Road
- **C1** - 15,000 gallons of storage/equalization at Phalanx Street and 30,000 gallons of storage/equalization at River Road
- **C2** - 15,000 gallons of storage/equalization at Phalanx Street and 45,000 gallons of storage/equalization at River Road.

In all cases of this comparison, the Phalanx Street Pump Station would be upgraded to deliver the 500 gpm maximum flow through the existing 6-inch force main. It is also assumed that the original pump station service area and capacity requirements would not change from the 275 gpm peak influent flow (64,000 gpd average daily flow). As noted previously, not providing any additional storage at the Phalanx Street Pump Station (Scenario A) limits the influent flow allowable from the River Road Pump Station to 225 gpm.

As summarized on Table 3-10, providing storage volume buffers the differential in peak hour flows influent to the station with the pump discharge flows. In general, the analysis is based on providing one hour of storage at peak flow rates. With the addition of 30,000 gallons of storage at the Phalanx Street site (Scenario B) the station can accept peak influent flows of up to 725 gpm from the River Road Pump Station. Also indicated is that with an additional 30,000 gallons of storage provided at the River Road Pump Station, that station can accommodate an average daily flow of up to 400,000 gpd.

Scenarios C1 and C2 are both based on providing a smaller storage volume at the Phalanx Street Pump Station. As shown, reducing the storage at the Phalanx Street Pump Station significantly limits the available capacity to accommodate peak influent flows. The maximum flow allowed from the River Road Pump Station would be 475 gpm. As noted in Scenario C1, a storage volume of 45,000 gallons would be needed to provide sufficient equalization for the River Road Pump Station to accept flows of up to 400,000 gpd on a daily basis. The additional cost in storage is offset by the reduced horsepower required to transfer flows across the river.

In all scenarios, the recommendation is to provide variable frequency (speed) drives (VFDs) on the pump motors which allow the controls to modulate the flows based on influent conditions. This is especially important during low flow periods to reduce the cycle lag times and maintain 'fresh' conditions. The storage/equalization tank would include instrumentation and valving as appropriate to allow maximum utilization when necessary during peak flows. In addition, larger volume tanks could be constructed in phases as the wastewater flows increase over time. Initial flows could also be accommodated with a lower capacity (and horse power motor) pumps that could be later replaced with a larger pump when appropriate. However, providing VFDs for the motors and including storage will help mitigate the potential issues with initial low flows.

Further consideration may be given to providing additional storage to allow for off-peak pumping. This alternative could yield significant power savings on pumping operations. However, the potential issues to consider include odor control requirements, aeration requirements for any extended storage periods and the potential issues during typical off-duty time of operation. In any event, with the 500 gpm limitation through the 6-inch force main will also affect the potential application for off-peak pumping.

The recommended plan is Scenario B which includes 30,000 gallons of storage at each pump station. This allows a larger pump at the River Road Pump Station which would be provided with a VFD. However, during the design and implementation of the recommended plan a smaller low-flow pump can be considered to accommodate the initial phase of buildout. Likewise, the installation of storage volume in sections could be considered in phases to correspond with development needs. Table 3-11 presents the estimated project cost, operation and maintenance cost and present worth for the upgrades required to the existing collection system in order to service these Needs Areas.

TABLE 3-10
EVALUATION OF PUMPING AND EQUALIZATION STORAGE ALTERNATIVES

SCENARIO	A		B		C1		C2	
	PHALANX	RIVER	PHALANX	RIVER	PHALANX	RIVER	PHALANX	RIVER
Peak Flow IN (gpm)	275	225	275	1,225	275	975	275	1,225
Peak Duration (hrs)	1	1	2	2	2	2	2	2
Avg Flow (gpd)	64,000	49,000	64,000	400,000	64,000	300,000	64,000	400,000
Avg Duration (hrs)	24	24	24	24	24	24	24	24
Pump Rating (gpm)	500	225	500	725	500	475	500	475
Discharge Location	10-in sewer	to Phalanx	10-in sewer	to Phalanx	10-in sewer	to Phalanx	10-in sewer	to Phalanx
Eq/Storage Volume (gal)	0	0	30,000	30,000	15,000	30,000	15,000	45,000
Eq/Storage Volume (cf)	0	0	4,011	4,011	2,005	4,011	2,005	6,016
Possible Dimensions (ft)	-	-	20 x 20 x 10	20 x 20 x 10	10 x 20 x 10	20 x 20 x 10	10 x 20 x 10	20 x 30 x 10
Wet Well Diameter (ft)	8-ft Dia	8-ft Dia	8-ft Dia	8-ft Dia	8-ft Dia	8-ft Dia	8-ft Dia	8-ft Dia
Wet Well Vol/VF (gal)	375 gal/vf	375 gal/vf	375 gal/vf	375 gal/vf	375 gal/vf	375 gal/vf	375 gal/vf	375 gal/vf
Force Main Dia (in)	6-in	6-in	6-in	8-in	6-in	8-in	6-in	8-in
Velocity (fps)	5.7 fps	2.5 fps	5.11 fps	4.60	5.11 fps	3 fps	5.11 fps	3 fps
Estimated BHP	75 BHP	3 BHP	75 BHP	15 BHP	75 BHP	7.5 BHP	75 BHP	7.5 BHP

TABLE 3-11
TOWN OF TYNGSBOROUGH
CWMP/DEIR
UPGRADES TO EXISTING COLLECTION SYSTEM
ESTIMATED PROJECT COSTS, OPERATION AND MAINTENANCE COSTS AND PRESENT WORTH COSTS

Upgrade	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]	Estimated O&M Cost	Present Worth Cost
1	Upgrade Existing Collection System - Needs Areas 7, 8, 9,10							
	Railroad Crossing	1	L.S.	$165,000	$165,000	$231,000	$0	$231,000
	Merrimack River - Bridge Crossing Phase I							$0
	Borings	1	L.S.	$50,000	$50,000	$70,000	$0	$70,000
	Directional Drilling (Twin Force Mains)	1200	L.F	$400	$480,000	$672,000	$0	$672,000
	River Road Pump Station	1	L.S.	$750,000	$750,000	$1,050,000	$20,000	$1,382,800
	Phalanx Pump Station Upgrade	1	L.S.	$1,000,000	$1,000,000	$1,400,000	$35,000	$1,982,400
	Brook Crossing	1	Each	$50,000	$50,000	$70,000	$0	$70,000
	Total Collection System Cost					**$3,493,000**		**$4,408,200**
2	Upgrade Existing Collection System - Needs Area 2 & 3							
	Gravity Sewer	1,475	L.F	$225	$331,875	$464,625	$0	$464,625
	Total Collection System Cost					**$464,625**		**$464,625**
	TOTAL UPGRADE COSTS					**$3,957,625**		**$4,872,825**

[1] Estimated Project Cost includes Cost for Project Services.

3. Wastewater Disposal and Treatment

The screening of sites for treatment/disposal that was performed in Phase II concluded that there were no feasible locations for groundwater disposal in the Town. Therefore, regional solutions will be the alternative that is evaluated for the disposal and treatment of wastewater. This alternative will include disposing and treating wastewater at the Lowell Regional Wastewater Utility (LRWWU) by utilizing the existing flow capacities that are available in the Dracut, North Chelmsford, and Lowell Intermunicipal Agreements.

Chapter 2 presented the current average daily flow and capacity for each of the Intermunicipal Agreements. Table 3-12 presents the estimate current cost per year and estimated cost per year if the full capacity of the IMA's is utilized.

TABLE 3-12
ESTIMATED COST TO UTILIZE EXISTING
INTERMUNICIPAL AGREEMENT CAPACITIES

IMA	Average Cost/Million Gallons of Flow	Estimated Cost/Year (Current Based on ADF)	Estimated Cost/Year (Projected at Full Utilization of IMA)
Dracut	$700	$267,000	$700,000
North Chelmsford	$869	$10,000	$65,000
Lowell	$1,588	$19,000	$76,000

4. Evaluations Based on Cost

Evaluation of alternatives for collecting, transporting, treating and disposing of the wastewater included gravity sewers, low-pressure sewers, and Innovative/Alternative Systems and conveying all flow to the Lowell Regional Wastewater Utility (LRWWU) via the Intermunicipal Agreements for treatment and disposal.

Table 3-13 presents a summary of the evaluations of alternatives based on a review of the costs presented above.

TABLE 3-13
TOWN OF TYNGSBOROUGH
CWMP/DEIR
SUMMARY OF MOST COST EFFECTIVE ALTERNATIVE

Project Description
Collection Study Area 1 - Norris Road – Innovative/Alternative and Conventional Septic Systems Study Area 2 - Merrimack East - Conventional Sewer System and Low Pressure Sewers and Innovative/Alternative Systems are approximately equal in cost Study Area 3 - Coburn Road - Conventional Sewer System and Low Pressure Sewers Study Area 6 – Low Pressure Sewer System Innovative/Alternative Systems are approximately equal in cost Study Area 7 - Merrimack West - Conventional Sewer System and Low Pressure Sewers Study Area 8 - Middlesex North - Conventional Sewer System and Low Pressure Sewers Study Area 9 – Locust North - Conventional Sewer System and Low Pressure Sewers Study Area 10 – Locust South - Conventional Sewer System and Low Pressure Sewers Study Area 11 – Flint Pond - Conventional Sewer System and Low Pressure Sewers
Disposal and Treatment Regional Solution – Lowell Regional Wastewater Utility (LRWWU) via Intermunicipal Agreements

C. ENVIRONMENTAL EVALUATION

The alternatives (Innovative/Alternative systems, connecting to the existing wastewater collection system and utilizing the existing Intermunicipal Agreement Capacity for the Need Areas identified in the Phase I Report, were screened for direct and indirect impact. The direct and indirect impacts of the short listed alternatives were screened for conveying all existing and future flow to the Lowell Regional Wastewater Utility (LRWWU) via the existing Intermunicipal Agreement. The alternatives were evaluated for the following direct impacts: (a) Historical, Archaeological, Cultural, Conservation and Recreation; (b) Wetlands, Flood Plains, and Agricultural Lands; (c) Zones of Contribution of Existing and Proposed Water Supply Sources; (d) Surface and Groundwater Resources; (e) Displacements of Households, Businesses and Services; (f) Noise or Air Pollution or Odor and Public Health Issues Associated with Construction and Operation; (g) Violation of Federal, State or Local Environmental and Land Use Statutes.

In addition, the alternatives were evaluated for the following indirect impacts: (a) Changes in Development and Land Use Patterns; (b) Pollution Stemming from Changes in Land; (c) Damage to Sensitive Ecosystems; and (d) Socioeconomic Pressures for Expansion.

The following is a summary of each of the evaluation criteria.

1. **Direct Impacts**

Historical, Archaeological, Cultural, Conservation and Recreation

There are no known impacts to historical, archeological, cultural, or recreational resources for any of the alternatives. With I/A systems, each property would have to be evaluated site specific for impact review. With regards to Massachusetts Natural Heritage and Endangered Species Program (NHESP) Priority Habitat of Rare Species and Estimated Habitat of Rare Wildlife, there are several areas where work would be in these mapped areas. For the most part, this work would be occurring in roads or other areas that are already disturbed (for the off-site wastewater disposal alternative) or presumably in lawns (for the I/A alternative), and would be expected to have negligible potential impact. Areas in which work would not occur in currently disturbed areas will need to be evaluated for potential impact.

Some of the proposed work associated with gravity sewers will impact conservation lands. Proposed work associated with the gravity sewers will occur in town roads near areas such as the Times Farm Area (Merrimack East Needs Area), the Lowell-Dracut-Tyngsborough State Forest (Althea Lake Needs Area), the Hunter Property town conservation area (Merrimack West Needs Area). The work proposed for the River Road Pump Station and force main crossing of the Merrimack River will impact the conservation land on the Hunter property, however the majority of the work will be in an existing area that is presently cleared. This work is presented in more detail in Chapter 4.

There are no known impacts for connecting the Need Areas to the existing infrastructure that currently transports wastewater to the Lowell Regional Wastewater Utility (LRWWU) via the Intermunicipal Agreements.

Wetlands, Flood Plains, and Agricultural Lands

There is a potential for temporary impacts to wetlands and agricultural lands from each of the alternatives. All three alternatives potentially impact the 100-foot wetland buffer zone. The impacts would be temporary and associated with the construction of sewer infrastructure. Any impacts would be mitigated by erosion control during construction. The Conservation Commission and the DEP will review all erosion control measures during the Notice of Intent process.

Potential impacts to agricultural lands include easements necessary for locations of pump stations and cross-country mains. While a land easement would be required for infrastructure, the land use would not be significantly impacted.

Zones of Contribution of Existing and Proposed Water Supply Sources

In regards to water supply, there are portions of sewer main extension within zones of contribution. This portion of the project will not negatively impact the Zone II areas of contribution, since the sewer main in this area of the project is within existing roadway right-of-ways. Further, the sewers in the Zone II areas will be designed in accordance with DEP requirements for such construction and will include stringent measures to guard against exfiltration of untreated wastewater. The project site will be restored to existing conditions and the water supply will not be impacted.

Since some Needs Areas, such as the Norris Road Area, have close proximities to water resources, including Zone II, on-site wastewater disposal options which achieve the highest practicable levels of treatment should be utilized to avoid impacts to zones of contribution.

Figure H-1 in Appendix H depicts the Zone I, Zone II and Interim Wellhead Protection Areas (IWPA). Extensions into the Zone 1 Areas are required to eliminate existing and/or potential future sources of pollution from on-site wastewater disposal systems.

Surface and Groundwater Resources

The I/A systems would potentially have negative impacts in the proposed sewered areas. While I/A systems provide a higher level of treatment then current on-site wastewater

disposal systems, the I/A systems do not provide the same level of treatment as an advanced wastewater treatment facility.

Displacements of Households, Businesses and Services

The construction of gravity sewers, force mains and pumping stations would have the potential to cause slight temporary constraints regarding displacement of households, businesses and services during construction. Construction in roadways would provide for one lane of the roadway to be open at all times as space allows. Every attempt would be made to provide access to households, businesses and services during construction planning.

Noise Pollution, Air Pollution, Odor and Public Health Issues Associated with Construction and Operation

There will be some temporary construction noise associated with all of the alternatives. Limiting the hours and the days of construction will mitigate the construction noise impacts. Any temporary impacts associated with these alternatives will be mitigated in the final design.

Violation of Federal, State or Local Environmental and Land Use Statutes or Regulations and Plans Imposed by Such Statutes and Regulations

None of the alternatives would violate any of the Federal, State or Local Environment and/or Land Use Statutes or Regulations and plans imposed by any of the statutes and regulations.

2. Indirect Impacts

Changes in Development and Land Use Patterns

Connecting the proposed sewer infrastructure from all Needs Areas to the existing infrastructure would impact land use and development patterns in various areas of Town, particularly along areas where gravity sewers would be located. An expansion of this magnitude could potentially open up these areas and the areas along the way to significant development.

Construction of I/A systems are not anticipated to impact development and land use patterns.

Pollution Stemming from Changes in Land Use

Connecting the proposed sewer infrastructure to the existing infrastructure would impact land use and development patterns in various Town locations, particularly along areas that presently do not have infrastructure. These changes in development and land use could potentially cause noise pollution, impacts to historical and cultural resources, and impacts to water resources.

Construction of I/A systems are not anticipated to increase pollution or impact development and land use patterns.

Damage to Sensitive Ecosystems

I/A systems would negatively impact the sensitive ecosystems of all of the proposed sewer expansion areas. I/A systems do not treat wastewater to as high of a level of treatment as wastewater treatment facilities. The wastewater effluent from I/A systems has the potential to negatively impact wetlands, and watershed areas.

Construction of portions of the gravity collection system, specifically the proposed pump station on River Road and the crossing of the Merrimack River with a force main via directional drilling, will require careful and thorough planning and permitting to ensure that mitigation measures are incorporated to protect sensitive ecosystems from being impacted. Planning and design in the construction stage for all options to lessen potential impact would be utilized.

Socioeconomic Pressures for Expansion

Socioeconomics would not be affected by I/A systems.

The expansion of the sewer system could cause increased development and negatively impact the socioeconomics in regard to several factors associated with development, such as increased budget need for items such as school systems, maintenance of roadways, fire protection and other Town services.

3. Recommendations Based on Environmental Evaluation Criteria

The short listed alternatives were evaluated considering primarily cost and environmental criteria. The following alternatives were evaluated using this criteria:

- Collection system – Conventional Collection System with Low Pressure Sewers
- Regional wastewater treatment at the LRWWU
- I/A Systems.

The cost evaluation revealed that a conventional collection system with low pressure had the lower overall present worth costs compared to I/A systems. Tables 3-14 and 3-15 summarize the evaluation of the environmental criteria with regards to the utilization of I/A systems and expansion of the existing conventional sewer system. The evaluation of environmental impacts indicates that I/A systems rated less favorable because of the potential impacts to groundwater and surface water resources and sensitive ecosystems.

TABLE 3-14
TOWN OF TYNGSBOROUGH
CWMP/DEIR
INNOVATIVE/ALTERNATIVE SYSTEM EVALUATION

	Direct Impacts								Indirect Impacts		
Description	Historical, Archaeological, Cultural, Conservation and Recreation	Wetlands, Flood Plains, and Agricultural Lands	Zones of Contribution of Water Supply Sources	Surface and Groundwater Resources	Displacements of Households, Businesses and Services	Construction and Operation Pollution	Violation of Land Use Statutes	Changes In Land Use Patterns	Pollution Stemming from Changes in Land	Damage to Sensitive Ecosystems	Socioeconomic Pressures for Expansion
Norris Road Needs Area 1	○	◒	◒	◒	○	◒	○	○	○	◒	○
Merrimack East Needs Area 2	○	◒	◒	◒	○	◒	○	○	○	◒	○
Coburn Road Needs Area 3	○	◒	◒	◒	○	◒	○	○	○	◒	○
Althea Lake Needs Area 6	○	◒	○	◒	○	◒	○	○	○	◒	○
Merrimack West Needs Area 7	○	◒	○	◒	○	◒	○	○	○	◒	○
Middlesex North Needs Area 8	○	◒	◒	◒	○	◒	○	○	○	◒	○
Locust North Needs Area 9	○	◒	◒	◒	○	◒	○	○	○	◒	○
Locust South Needs Area 10	○	◒	○	◒	○	◒	○	○	○	◒	○
Flint Pond Needs Area 11	○	◒	○	◒	○	◒	○	○	○	◒	○

○ High potential alternative, minimal impact

◒ Moderate potential alternative, some constraints

● Low potential alternative, severe constraints

TABLE 3-15
TOWN OF TYNSBOROUGH
CWMP/DEIR
EXPANSION OF SEWER SYSTEM AND UTILIZATION OF IMA's

	Direct Impacts							Indirect Impacts			
Description	Historical, Archaeological, Cultural, Conservation and Recreation	Wetlands, Flood Plains, and Agricultural Lands	Zones of Contribution of Water Supply Sources	Surface and Groundwater Resources	Displacements of Households, Businesses and Services	Construction and Operation Pollution	Violation of Land Use	Changes In Land Use Patterns	Pollution Stemming from Changes in Land	Damage to Sensitive Ecosystems	Socioeconomic Pressures for Expansion
Norris Road Needs Area 1	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Merrimack East Needs Area 2	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Coburn Road Needs Area 3	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Althea Lake Needs Area 6	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Merrimack West Needs Area 7	◒	◒	○	◒	◒	◒	○	○	○	◒	◒
Middlesex North Needs Area 8	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Locust North Needs Area 9	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Locust South Needs Area 10	○	◒	○	◒	◒	◒	○	○	○	◒	◒
Flint Pond Needs Area 11	○	◒	○	◒	◒	◒	○	○	○	◒	◒

○ High potential alternative, minimal impact

◒ Moderate potential alternative, some constraints

● Low potential alternative, severe constraints

D. INSTITUTIONAL ARRANGEMENTS

1. General

The Board of Sewer Commissioners reports to the Board of Selectmen. At present, the Town does not own nor operate a municipal wastewater treatment facility. The Town does, however, operate a municipal sewer system that currently collects, treats and disposes of wastewater through three Intermunicipal Agreements (IMA). All areas presently not connected to the municipal system rely on individual on-site wastewater disposal systems, which are under the jurisdiction of the local Board of Health under state Title 5 rules and regulations at "310 CMR 15.000 - The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage, Effective 3/31/95.

The analysis of impacts indicates that the best alternative for wastewater disposal is to continue operating under the current IMAs. In general, the objective of a CWMP/EIR is to identify areas within the Town with subsurface wastewater disposal problems and to develop a plan to mitigate or eliminate the problems.

The Executive Office of Environmental Affairs established a special procedure for review of this major and complicated project. The special procedure consists of a four-phase review of the CWMP/EIR Document. The Document has been delineated into four phases, where the scope of future phases is based in part on the results of the preceding phase. The first phase, Phase I, included the Needs Analysis. The Phase II Report contained the Screening of Alternatives, and this Phase III included the Draft Environmental Impact Report (DEIR) and this Phase IV CWMP/FEIR is the Final Environmental Impact Report (FEIR). The scope of the CWMP/EIR is twofold: (1) to determine the areas in Town with wastewater disposal problems that cannot be solved with a conventional Title 5 wastewater disposal system; and (2) evaluate and make recommendations on the most viable solution for wastewater disposal in each study area based on environmental, technical, and economic considerations. With the filing of this Phase IV Report, all of these scope items have been determined and a final recommended plan has been established.

The currently recommended plan for new and expanded wastewater collection, transmission and treatment facilities have been evaluated, and are proposed to be designed and constructed under the guidance and direction of the Town of Tyngsborough Sewer Department under the auspices of the Board of Sewer Commissioners.

In order to manage and operate the proposed wastewater collection and transmission facilities, the Town will need to implement institutional and system management procedures, which are briefly described in the following paragraphs.

2. Review of the Current Sewer Use Rules and Regulations

A thorough review of the current Sewer Use Rules and Regulations needs to be completed in order to set the minimum requirements for all users of the Town's wastewater collection and transmission facilities. This will enable the Town to continue to comply with all applicable state and federal laws. Included in these regulations will be the provisions for sewer connections and extensions, building sewers, infiltration/inflow, construction requirements, regulation of wastewater discharges, pretreatment of industrial wastewater, permit applications and issuance, reporting requirements, compliance monitoring, enforcement proceedings, service charges and fees. The main purpose of these regulations is to prevent the introduction of undesirable pollutants and to provide standard requirements for all users discharging into the sewer system. These regulations must be in accordance with those of the receiving treatment facilities accepting Tynsborough's wastewater.

In addition, due to the capacity restrictions presented by the current capacities of the Intermunicipal Agreements, the Town will have to closely review and regulate new connections to the system to ensure that flow allowances are not exceeded. This is further discussed in Section 5 below.

3. Cost Recovery Plan

A Cost Recovery Program will need to be developed in order to recover the capital costs of new and expanded wastewater collection and transmission facilities. Tyngsborough will need to address the problem of how to equitably apportion the capital costs among its system's users. The cost recovery for the planning, design, construction and

implementation of Tyngsborough's wastewater facilities and the cost(s) of capital outlay could involve several scenarios. An equitable means of recovering these costs could be: to recover the cost of any portion of the project that provides a general benefit to the entire community through municipal property taxes; and to recover the cost of public improvements which are of specific benefit to a particular area in the community by betterments. Tyngsborough must arrive at a financing solution that is fair, equitable and politically acceptable. A cost recovery plan has been formulated, and will need to be reviewed, and adopted by the Town prior to the start of construction of the Project.

4. Review of Current Sewer User Charge System

A review of the current sewer user charge system will need to be completed and, reviewed and any changes adopted by the Town which meets the requirements of the state regulations in order to recover the costs required to operate, maintain and replace the wastewater collection and transmission facilities. The Sewer Commission is currently working with a consulting firm to assess its current rates and to develop a strategy for future rates.

5. Sewer System Expansion Control Policy

A Sewer System Expansion Control Policy will need to be developed and adopted by the Board of Sewer Commissioners that deals with issues concerning the expansion of the sewer collection system to the finalized "Needs Areas" approved in the CWMP/EIR. The expansion of the sewer service areas within Town will need to be controlled in order for the Town to stay within its allotted flow allowances of the IMAs facilities. This policy should address issues such as:

- The number of service connections allotted to large parcels of undeveloped land that have frontage on a sewer line in a designated area;
- Connections to force mains;
- Sewer service to back lots which do not have frontage on a street that has sewers;
- The possibility of establishments not in a designated sewer service area connecting into a gravity main that services a designated sewer area;

- Sewer system extension outside the "Needs Areas" as identified and approved in the CWMP/EIR;
- Title 5 failures outside of the designated sewer areas;
- Policy to service the first floor of a structure by gravity and exceptions to this rule;
- Connections to interceptors outside of the designated service area; and
- Establishment of "Low Flow Sewer Systems".

This policy should address the above issues and, when implemented, will prioritize the concerns for the Town to include in any future expansion plans for the sewer system if there are adequate capacities remaining within their flow allowances of the IMAs.

6. **Review of Sewerage System Staffing and Operations Plan**

A review of the current and projected Sewerage System Staffing and Operations Plan will need to be completed. This plan will review and estimate the current and proposed tasks, responsibilities and staffing requirements for each aspect of the operation and maintenance of the current and proposed wastewater collection and transmission facilities.

7. **Review of Current System Construction Standards**

The town has standard design and construction specifications which are utilized for all new construction and upgrades to existing system components.

8. **Septage Management Plan**

A Septage Management Plan will be required for the areas of Town proposed for long-term on-site wastewater disposal as well as those areas proposed for future infrastructure until such time as the recommended plan is implemented in those areas. The goal of this Septage Management Plan (SMP) is to protect and maintain public health, ensure protection of surface and groundwater quality, provide sustainability of the Town's aquifers, maintain water resources as recreational, aesthetic and economic assets, improve the environment and prevent its deterioration, preserve and retain local control of on-site wastewater disposal systems without regulatory intervention and to protect private investments with regards to residential property values that is not only accepted locally but in accordance with all regulatory requirements.

9. Flow and Waste Reduction

Flow and waste reduction include the steps to decrease the amount of wastewater flow and the potency of the flow that is collected in the sewer system and conveyed to the wastewater treatment facility.

Flow Reduction

Flow reduction measures include activities to minimize infiltration and inflow (I/I), and water conservation measures.

Specific programs for I/I reduction are outlined in Chapter 4 of this report. The Town prepared and submitted a CY2008 Project Evaluation Form to the Department of Environmental Protection in 2007 for financing for additional inflow/infiltration and sewer system evaluation survey investigations in their wastewater collection system to continue the work that resulted from the 2002 I/I Study. The PEF was approved and the project is included in the Intended Use Plan. An article for funding the project has been included in the May 2008 Town Meeting. A copy of the proposed Scope of Work is included in Appendix D.

Guidance on the water conservation measures that a municipality should implement are provided by the Massachusetts Water Resources Commission who, in October 1992, published a document establishing water conservation standards and recommendations applicable to communities within the Commonwealth of Massachusetts. This program identified following categories for water conservation: (1) public education; (2) leak detection and repair; (3) metering; (4) pricing; (5) residential water use; (6) public sector water use; (7) Industrial, commercial, and institutional water use; and (8) water supply system management. Under each category, the Commission outlines minimum standards that must be implemented as well as additional recommendations that each community should consider. The following table provides a summary of each category.

Category	Standard	Recommendations
Public Education	No specific standard was given.	The goal of this category is for a community to implement a program that promotes public awareness of the long-term economic and environmental benefits of conserving water.
Leak Detection and Repair	(1) A full leak detection survey of the distribution system should be completed every two years. (2) Leak detection and repair should be recognized as expenses of the water supply system and included in a full-cost pricing structure.	(1) Because leak detection requires substantial skill, regularly trained, in-house teams are recommended; communities should investigate the advantages of sharing leak detection equipment and personnel to reduce costs. (2) There should be consideration given to assuring the penalty for water theft.
Metering	(1) Each public water supplier should develop a program to implement 100% metering of all public sector and private users with meters. (2) The metering program should include regular meter maintenance. (3) The metering program should include regular meter reading of all public sector users and regular accounting of their use. (4) Meter reading and billing for domestic accounts should be done quarterly. (5) Master meters should be calibrated annually.	(1) Meter reading and billing for the largest users should be done more frequently than domestic accounts. (2) Exterior meter reading devices should be installed. (3) Meter reading and billing frequency would be most effective if done on a monthly basis.
Pricing	(1) Water pricing structure should include the full-cost of operating the water supply system. (2) Water supply system operations should be fully funded by water supply system revenues. (3) Each water supplier should regularly evaluate existing rate structures, including any peak demand and seasonal pricing components. In addition, the water supplier should consider all possible pricing options, such as increasing block rates. (4) Water and sewer rates, where applicable, should be billed so as to inform customers of their actual use and cost of each.	(1) Each water supplier should establish an enterprise account for water. (2) Water suppliers should consider adopting increased seasonal rate to moderated peak demands and/or to protect/maintain supply levels.
Residential Water Use	(1) Water suppliers, in cooperation with manufacturers and professional organizations, should make available to residential users at least the following water saving devices: low-flow shower heads; faucet aerators, toilet displacement devices and/or low-flow toilets, toilet leak detection kits; and educational literature about installation and water conservation savings (in gallons and dollars), including outdoor watering and xeriscaping. (2) The state plumbing code should be strictly and consistently enforced at the local level.	(1) In order to ensure proper installation and greater payoff of retrofit devices, professional installation is recommended. (2) Statewide efficiency standards should be legislatively set for appliances. (3) Water audits should be made available to residential customers.

Category	Standard	Recommendations
Public Sector Water Use	(1) Government facilities, including school departments and hospitals should account their full use of water, based on full metering of public buildings, parks and other facilities. (2) Public building should be built or retrofitted with equipment that reduces water use. (3) Water used by contractor using fire hydrants for pipe flushing and construction should be metered and they should be charged, including service fees. (4) Irrigation of municipal property should be sensitive to soil moisture. (5) Strictly apply plumbing codes and incorporate other conservation measure in new and renovated buildings.	(1) Encourage manufacturers to provide water saving devices to municipalities for demonstration projects for free or at reduced cost; master water temperature regulation should be considered for public buildings (2) Encourage xeriscaping or use of native vegetation to reduce outdoor watering; emphasize the advantages of drip irrigation over broadcast watering, and promote these measures in educational campaigns. (3) Investigate the potential uses of non-potable water supplies and small irrigation wells for landscaping, street cleaning and building washing, within the public health considerations, existing connection programs, and plumbing board decisions.
Industrial, Commercial, and Institutional Water Use	(1) All industrial, commercial, and institutional water users should develop and implement a written water policy. (2) All industrial and commercial water users should carry out a water audit.	(1) All industrial, commercial, and institutional users should install/retrofit water saving sanitary devices. (2) Industrial and commercial users should work with code officials, standards committees, state programs, manufacturers, and legislators to promote water conservation.
Water Supply System Management	(1) Municipalities should develop regulations, by-laws or ordinances which can be imposed in the event of water supply emergency. (2) Water suppliers should develop strategies to reduce daily and seasonal peak demands and should develop contingency plans for seasonal shortages. (3) Water suppliers should carry out water supply system audits every 3 to 5 years. (4) Water suppliers should develop a plan to identify all uses of water. (5) Water suppliers should investigate and develop plans for interconnections with other systems for emergency supplies.	(1) Communities should develop a local water resources management plan. (2) Water suppliers should keep local officials regularly informed of water consumption and supply availability. (3) Communities should adopt municipal by-laws requiring commercial, industrial and institutional water users to carry out regular water audits.

The Town has taken, and continues to take, measures aimed at water conservation. In 2002, the Town prepared the *Report on the Water System Master Plan Update*. The report included the following existing initiatives:

- Review of water connection applications to evaluate system impacts;
- Regulations for underground lawn sprinklers; and
- Outdoor water use restrictions during high water useage periods.

It included other potential initiatives such as:

- Leak detection within the distribution system;
- Revision of the current water pricing structure;
- Water wise landscaping;
- Water saving fixtures; and
- Requiring developers to account for any net increase in water demand by providing reduction/conservation elsewhere in the system.

The Phase II Report also included measures the Town is taking regarding water conservation.

Waste Reduction

Measures for waste reduction include industrial pretreatment programs and pollution prevention initiatives. These programs aim at removing or decreasing the so-called "toxic pollutants" discharged into the municipal wastewater collection system. Toxic pollutants are, in general, defined as non-biodegradable wastes that will either interfere with the municipal wastewater treatment processes or will pass through treatment works and be harmful to the environment. In addition to pollution prevention for industry, improper disposal of hazardous wastes from residential sources can be eliminated through public education and implementation of hazardous waste pick-up programs.

E. DECENTRALIZED I/A TECHNOLOGIES

Existing property owners in the Needs Areas who now have on-site systems may continue to do so for the 20-year design life of this project. In the future, if a particular on-site system is not functioning properly, and replacement of the conventional Title 5 system would also be inadequate, the property owner may choose to evaluate an innovative/alternative option. These options include recirculating sand filters, peat systems, attached growth systems. fixed systems, sequencing batch reactors, and trickling filters. These technologies were discussed in the Phase II Report. Other I/A alternatives involve utilizing small decentralized wastewater treatment facilities and cluster systems to handle wastewater from a neighborhood, shopping area or office park. The Phase II Report included investigations into siting effluent disposal facilities in various areas of the Town and ruled out this possibility due to lack of suitable sites.

F. CONVENTIONAL VS. ALTERNATIVE SEWER SYSTEMS

Figure 3-1, which shows the preliminary routing of the sewer extension alternatives, indicates a largely conventional collection system, with gravity sewers, pumping stations and force mains. Due to the flows that are projected for the Needs Areas, and the composition of the majority of the projected flow being in predominately commercial and industrial areas, low pressure sewer systems are not feasible to serve an entire Needs Area, however, low pressure sewers were evaluated in some locations as depicted on Figure 3-1. As presented above, STEP systems were evaluated as an alternate to the conventional sewer systems.

G. RESIDUALS DISPOSAL

Since the Plan for the Town is to utilize the capacity in its IMAs to dispose of its wastewater at the LRWWU, residuals will continue to be processed at that location. It is assumed that the treatment facility has adequate current and future capacity to handle residuals from the Town that is operating within its IMA capacities.

H. LOCATION OF FACILITIES

Study Areas 1, 2, 3, 6, 7 8, 9, 10 and 11 may be recommended to receive sewer expansion. Wherever possible, the sewer lines will be constructed in existing roadways. Study Area 7 includes sewer lines that require crossing below the bottom of the Merrimack River via directional drilling. Several locations include pump stations due to the inability to maintain gravity flows. All locations will seek to minimize aesthetic problems. This new infrastructure will be located predominately outside of environmentally sensitive areas. Removing theses areas from failing Title 5 systems and connecting them to a municipal sewer system will serve to remove many pollutants from the local water bodies and serve to protect the groundwater. The Town will provide odor control where pumping stations are located near residential areas, and will include suitable landscaping around facilities located above ground.

I. PHASED CONSTRUCTION

A phased construction process will be used for the construction of the selected alternative. A phased construction process will allow the Town to spread out the cost of design, construction, and implementation of the selected alternative through several fiscal years. In addition, the selected capital improvement will be reviewed with the Town departments and committees, such as the Board of Sewer Commissioners, Board of Selectmen and Finance Committee to determine

the financial impacts of the recommended plans along with any other improvement projects such as roadway improvements and school. The Town is also in the process of determining the financing methods necessary to implement the recommendations detailed herein.

The CWMP/EIR is a long-term planning document, the Town has the opportunity to incorporate any additional information that is developed by Federal, State and/or Local authorities and/or private entities prior to the implementation of the recommendations and adjust the phased construction, if appropriate.

J. FLEXIBILITY AND RELIABILITY

All wastewater infrastructure will be designed in accordance with the Town of Tyngsboroughs design standards and construction specifications supplemented by the New England Interstate Water Pollution Control Commission's "Guide for the Design of Wastewater Treatment Works." The guide includes the design and construction criteria for collection systems, pump stations, and wastewater facilities. Design of facilities will be prepared such that the component parts are arranged for the greatest operating convenience, flexibility, and economy. The design and layout of the facilities will include provisions for future expansion or future upgrades.

K. IMPLEMENTATION CAPABILITY

Each of the recommended alternatives will be reviewed by the applicable federal, state and local governmental units for ability to implement via appropriate permitting agencies. As part of the MEPA process, Tyngsborough is required to provide the Secretary of Environmental Affairs and the public with a 30-day public review period, during which comments are solicited by the Secretary, reviewed and applied appropriately in the MEPA Certificate. In addition to the MEPA process, all of the plans and specifications for this project will be reviewed by the Department of Environmental Protection and will be subject to all required permitting regulations.

The Town of Tyngsborough is prepared to bear its local share of the cost of the selected alternatives through local appropriations, Town Meeting action, and through other funding methods as determined.

L. REGULATORY, DESIGN AND RELIABILITY REQUIREMENTS

As part of the MEPA process, Tyngsborough was required to file an EIR. The Secretary issued a Certificate containing a scope that provides a description of alternatives to be considered in the EIR, environmental impacts to be analyzed, and techniques to be used in the analysis. EIRs are subject to 30 days of agency and public comment after publication in the Environmental Monitor. This project is also subject to the rules and regulations of the State Revolving Fund (SRF). Plans and Specifications will be reviewed and approved by the Department of Environmental Protection and the project will be evaluated and subject to all required permitting regulations.

This plan will not implement any new technologies that have not already been approved by MEPA and the SRF program. The Town of Tyngsborough has worked closely with the DEP and MEPA in this process.

4.0 RECOMMENDED PLAN

A. INTRODUCTION

In previous sections of this Report, each study area determined by the Phase I Report to be a Need Area was evaluated in terms of possible solutions for wastewater need. This Section of the Report highlights the recommended plan for each study area as well as associated institutional impacts, environmental impacts, capital costs, and operation and maintenance costs.

B. RECOMMENDED PLAN

In Phase I of the CWMP, the Town was delineated into twenty three (23) study areas based on geographic location. Refer to Figure 1-1 for the study areas. In Phase I, these areas were analyzed for the need for wastewater disposal beyond the use of Conventional Title 5 on-site wastewater disposal systems. The Phase II Report identified the Needs Areas and Septage Management Plan (SMP) areas. The Phase III Report included the Draft Recommended Plan and the Phase IV Report includes the Final Recommended Plan.

Proposed Flow Allocations

As presented in Chapter 2, the projected buildout of current sewered areas and the Needs Areas exceeds the capacity available in the Intermunicipal Agreements (IMA). Based on the analysis of buildout flows for the current sewered areas and Needs Areas, the projected wastewater flow is the sum of 606,000 gpd and 1,169,200 gpd or 1,775,200 gpd which exceeds the current available total capacity of 1,430,000 in the IMA's. As noted in Chapter 2, the proposed flow allocations to account for existing flows, flows for buildout in the current sewered areas, and flows for buildout in the Needs Areas such that the flow to each IMA is not exceeded are required and are presented in Table 4-1.

TABLE 4-1
PROPOSED FLOW ALLOCATIONS TO INTERMUNICIPAL AGREEMENTS

IMA	Total IMA Capacity	Approximate Existing Flow	Estimated Available Capacity	Allocated Flow for Current Sewered Areas	Allocated Flow for Needs Areas
N. Chelmsford	350,000	56,000	294,000	184,000[1]	110,000
Dracut	1,000,000	382,000	618,000	171,585	446,415 [2]
Lowell	80,000	20,000	60,000	45,489	14,511[3]

1. Includes 154,000 gpd flow allocation as presented in Chapter 2.
2. Projected buildout flows in Needs Areas contributing to Dracut IMA from Merrimack East, Merrimack West, Middlesex North, Locust North, Norris Road, and Althea Lake.
3. Projected buildout of flows in Merrimack East Needs Area contributing flow to Lowell IMA.

As noted in Chapter 2, in addition to the flow allocations noted above, the following additional considerations are included in the Recommended Plan:

- Reevaluation of the Needs Areas and use of on-site systems for wastewater disposal in areas with low occurrences of septic system failures;
- Development of a control strategy, for example, establishment of Sewer Districts, to allow the Town to monitor and control connection of new wastewater flows to the existing and future collection system such that current IMA capacities are not exceeded;
- Infiltration/inflow removal;
- Water conservation measures; and
- New or renegotiated Intermunicipal Agreements with increased capacities.

Table 4-2 presents the Needs Areas where conventional sewer systems are recommended and the recommended Septage Management Plan Areas.

TABLE 4-2
STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE

	Long Term Wastewater Disposal Alternative	
Study Area	Conventional Sewer Systems Utilizing Current Intermunicipal Agreement Capacity	Septage Management Plan
1-Norris Road	**X,** See Note 3	**X**
2-Merrimack East	**X**	
3-Coburn Road		**X**
4-Sherburn North		X
5-Sherburn South		X
6-Althea Lake	**X**	
7-Merrimack West	**X**	
8-Middlesex North	**X**	
9-Locust North[2]	**X**	**X**
10-Locust South		**X**
11-Flint Pond	**X**	
12-Industrial North		X
13-Industrial South		X
14-Tyngsborough Road		X
15-Canon Gate		X
16-Red Gate		X
17-Bridge Meadow Brook		X
18-Westford Road		X
19-Scribner North		X
20-Scribner South		X
21-States Complex		X
22-Davis Road		X
23-Masspoag		X

1. Needs Areas shown in **Bold**.
2. The Locust North Area is divided into an area of wastewater need to the east of Route 3 and an area to be served by on-site systems to the west of Route 3.
3. The Sunset Park Area within the Norris Road Needs Area is recommended to be serviced by conventional sewer systems due to septic system failures in that area.

The following sections present the Recommended Plan for each of the 23 Study Areas.

Study Area 1 – Norris Road Needs Area

Although the evaluations presented in Chapter 3 indicated that conventional sewer systems were more cost effective for this Study Area, based on comments received on the Phase II report, the Norris Road Needs Area was re-evaluated. The Phase I recommendations were reviewed and the report did not indicate that there were issues with either development in the Zone II or that nitrogen or other contaminants were an issue impacting the aquifer. Since incidences of failures were reported as low, with the exception of the Sunset Park area located in the south central portion of the Needs Area, and due to the flow constraints with the current Intermunicipal Agreements, it is recommended that this area utilize the current on-site wastewater disposal systems with oversight from the Town under a Septage Management Plan with the exception of the Sunset Park area which will be served by conventional sewer systems. This will provide the Town with flow (approximately 55,000 gallons) that can be reserved for future use as needed.

Study Area 2 – Merrimack East Needs Area

The Merrimack East Needs Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan includes installation of approximately 33,826 linear feet of gravity sewers, 1,498 linear feet of force main, 3,563 linear feet of low pressure sewer, 37 low pressure sewer pumping systems, 1 pumping station, 13,950 linear feet of sewer for future development, and 4 brook crossings. The low pressure sewer pipe will range in size from 1-1/4 to 2 inch diameter pipe. The gravity sewers will range from 8 to 12-inches. A portion of the gravity sewer system in the northern portion of the study area on Frost Road and Mount Paul Road will flow to the existing gravity sewer on Phalanx Street. Flow on Phalanx Street is pumped by the Phalanx Street Pump Station to a gravity sewer on Lakeview Avenue. Flow in the central portion of the Study Area, between the intersection of Lamire Avenue and Frost Road and the intersection of Pawtucket Boulevard and Butterfield Road, will be conveyed to a new Pump Station located on Curtis Road. It is recommended that flow from this pump station be connected to the existing force main that presently serves the existing privately owned pump station on Patricia Road. It is recommended that flow from the private pump station be conveyed to the new pump station via a new gravity connection, and the private pump station decommissioned. Flow from this pump station discharges to an existing 8-inch sewer on Beech Street which will be required to be

upgraded to a 12-inch pipe to accommodate additional flows. For the southerly portion of the Needs Area, flows from the proposed sewers on Sherburne Avenue and Pawtucket Road, southeast of the Butterfield Road intersection are recommended to be conveyed to the existing sewer on Pawtucket Boulevard.

Refer to Figure 4-1 for the proposed collection system for this Study Area.

Study Area 3 – Coburn Road Needs Area

Although the evaluations presented in Chapter 3 indicated that conventional sewer systems were more cost effective for this Study Area, based on comments received on the Phase II report, the Coburn Road Needs Area was re-evaluated. The Phase I recommendations were reviewed and the report did not indicate that there were issues with either development in the IWPA areas or that nitrogen or other contaminants were an issue impacting the aquifer. Since incidences of failures were reported as low, and due to the flow constraints with the current Intermunicipal Agreements, it is recommended that this area utilize the current on-site wastewater disposal systems with oversight from the Town under a Septage Management Plan. This will provide the Town with flow (approximately 35,000 gallons) that can be reserved for future use as needed.

Study Area 6– Althea Lake Needs Area

The Althea Lake Needs Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan consists of installation of approximately 4,404 linear feet of low pressure sewer, 29 low pressure sewer pumping systems, and 563 linear feet of low pressure sewer for future development. The low pressure sewer system will discharge into the existing gravity sewer on Althea Avenue. Refer to Figure 4-1 for the proposed collection system for this Area.

Study Area 7– Merrimack West Needs Area

The Merrimack West Needs Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan includes installation of approximately 8,027 linear feet of gravity sewers, 619 linear feet of force main, 1,919 linear feet of low pressure sewer, 12 low pressure sewer pumping systems, 11,375 linear feet of sewer for future development, and 2 brook crossings. The study area will be serviced with predominately 8 and 10-inch sewers, with 12-inch sewer on Farwell Road and 15-inch proposed on Helena Drive. The low pressure sewer pipe will range in size from 1-1/4 to 2 inch diameter pipe. The gravity sewer system will flow to two pump stations located one located on Farwell Road and one located on River Road. In addition to conveying flows from this study area, the River Road Pump Station will also be required to be sized to convey flows from the portions of the Middlesex North Area and Locust North Area. Chapter 3 included the analysis of alternatives for conveying flows from River Road across the Merrimack River. The Recommended Plan includes the following:

- Construction of a twin (preliminary sizing 6-inch and 8-inch) force main via directional drilling below the Merrimack River to provide conveyance of flows from the new River Road Pump Station to the Phalanx Street Pump Station;
- Provision of 30,000 gallons of equalization storage at the River Road Pump Station; and
- Upgrade of the Phalanx Street Pump Station including increasing pump size to 75 BHP to increase flow capacity to 500 gpm and provision of 30,000 gallons of equalization storage such that the existing 6-inch force main can continue to be utilized.

Refer to Figure 4-1 for the proposed collection system for this Study Area and the proposed upgrades described above.

Study Area 8 – Middlesex North Needs Area

The Middlesex North Needs Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan consists of approximately 13,326 linear feet of gravity sewers, 1,343 linear feet of force main, 3,911 linear feet of low pressure sewer, 20 low pressure sewer pumping systems, 1 pumping station, 4,175 linear feet of sewer for future development, and 2 brook crossings. The low pressure sewer pipe will range in size from 1-1/4 to 2 inch diameter pipe.

The gravity sewer will be 8-inch to 12-inch. The northern portion of the gravity sewer system will flow to the River Road Pump and the southerly portion of the area will flow to the gravity system in the Flint's Pond Needs Area.

Refer to Figure 4-1 for the proposed collection system for this Study Area.

Study Area 9 – Locust North Needs Area

The easterly portion of Locust North Study Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan consists of installation of approximately 1,712 l.f. of gravity sewer, 2,400 linear feet of sewer for future development, and 1 brook crossing. The sewer system serving this area will discharge to the northern portion of the system in the Middlesex North Needs Area which ultimately discharges to the new River Road Pump Station .

Refer to Figure 4-1 for the proposed collection system for this Study Area.

Study Area 10 – Locust South Needs Area

Although the evaluations presented in Chapter 3 indicated that conventional sewer systems were more cost effective for this Study Area, the Locust South Needs Area was re-evaluated. The Phase I recommendations were reviewed and the report did not indicate that there were issues with either development in the IWPA areas or that nitrogen or other contaminants were an issue impacting the aquifer. Since incidences of failures were reported as low, and due to the flow constraints with the current Intermunicipal Agreements, it is recommended that this area utilize the current on-site wastewater disposal systems with oversight from the Town under a Septage Management Plan. This will provide the Town with flow (approximately 194,600 gallons) that can be reserved for future use as needed.

Refer to Figure 4-1 for the proposed collection system for this Study Area.

Study Area 11 – Flint Pond Needs Area

The Flint Pond needs Area was deemed unable for long-term sustainability with the current on-site wastewater disposal systems in the Phase I Report or simply a Needs Area. The recommended plan consists of installation of approximately 13,499 linear feet of gravity sewers, 2,892 linear feet of force main, 2,279 linear feet of low pressure sewer, 31 low pressure sewer pumping systems, 1 pumping station, 21,163 linear feet of sewer for future development, and 2 brook crossings. The low pressure sewer pipe will range in size from 1-1/4 to 2 inch diameter pipe. The gravity sewer will range in size from 8 to 12 inch diameter pipe and will discharge to a new pump station located on Middlesex Road near Westford Road. This pump station will be connected to the existing sewer system on Middlesex Road via a new force main.

Refer to Figure 4-1 for the proposed collection system for this Study Area.

Study Areas 4, 5, 9, and 12 through 23

Study Area 4, 5, the westerly portion of Study Area 9, and 12 through 23 were evaluated and determined as long-term sustainable with the current on-site wastewater disposal systems. Therefore, the recommended plan is continued use of on-site wastewater disposal systems with oversight from the Town under a Septage Management Plan.

Projected Wastewater Flow to New Pumping Stations

As described above in the designated Needs Areas, a total of four new pumping stations are proposed under the Recommended Plan. For the purpose of sizing and costing, wastewater flows at buildout to these pump stations were estimated based on the areas that these pumping stations would be servicing. As shown below in Table 4-3, these four pumping stations range from approximately 36,000 gallons per day and up to 345,000 gallons per day.

TABLE 4-3
PROPOSED PUMPING STATIONS
WASTEWATER FLOW ESTIMATES

Pump Station Location	Needs Area Location	Average Daily Flow (Buildout) (gpd)
Middlesex Road at Old Tyngsborough Road	11	310,000
Middlesex Road & Farwell	8	331,000
River Road Pump Station	7	345,000
Frost Road and Parker Lane	2	104,000[1]
Gloria Avenue	1	14,000

Notes:

1. Includes 50,000 gpd of existing flow from multi-family apartments presently connected to private pump station

The flowrates shown in Table 4-3 are based on buildout flowrates. During final design, it is recommended that the pump station designs incorporate pumping capacity for the current flows available in the IMA's as noted in Table 4-1, with provision for expansion of the pumping capacity if additional IMA capacity becomes available in the future. It is recommended that provision of equalization storage be considered during design at the larger pump stations to mitigate the effects of peak flows on the existing system.

C. PRELIMINARY DESIGN CRITERIA

1. Gravity Sewer System and Force Main

A gravity sewer system consists of sewer lines which allow residential, commercial, and industrial customers to discharge sanitary wastewater into a collection system consisting of pipes that flow downhill and are not pressurized. Gravity sewer systems operate by collecting the wastewater via continuously sloped pipe, typically eight inches minimum diameter, and transporting the wastewater to local low points in the collection system.

The design of a gravity sewer system is dependent on the velocity of the wastewater within the pipes. Minimum velocities are set to assure that suspended matter does not settle out in the conduit, while maximum velocities are set to prevent erosion of pipe material. Extremely flat or hilly terrain poses a problem to gravity sewer installations since the gravity sewers must continually slope downward. This results in the sewer becoming increasingly deep, or the need for a pump station. Pump stations are located at low points in the system to collect and transfer the wastewater to the next high point in the collection system, where the process continues.

2. Design Considerations and Materials of Construction

Gravity Sewers

The gravity sewers must be of sufficient size and slope to transport any object which could enter the system. The sizes and slopes of all gravity sewers will be designed to provide a minimum velocity of two feet per second (FPS) when flowing full. This velocity is required to prevent the deposition of solids and grit in the pipe. To facilitate the cleansing of the lines and preclude blockage, the minimum pipe size for gravity sewers and customer service connections will be 8 inches and 6 inches in diameter, respectively. Additional design considerations are contained in "Guides for the Design of Wastewater Treatment Works (TR-16)" by the New England Interstate Water Pollution Control Commission, and the "Design and Construction of Sanitary and Storm Sewers (MOP-9)" by the Water Pollution Control Federation, and other engineering manuals. Gravity Sewers are typically constructed of Polyvinyl Chloride (PVC).

Force Mains

Force Mains convey wastewater from pump stations into the gravity sewers. The sizing of force mains is dependent on many variables, including initial and design flows, minimum and maximum velocities, force main length, friction losses, installation costs, and power costs for the operation of the pump station. To facilitate the cleaning of the lines and preclude blockage, the minimum pipe size for force mains will be four inches in diameter. Force mains are typically constructed of either PVC or ductile iron (DI).

Sewer Service Laterals

The Town will utilize it existing design and construction standards and specifications for the Sewer Program. It is recommended that during the design phase of the Project, each service location be identified with regards to location and depth. This information, provided by the property owners, will be used to design the system. The use of this information during design will optimize the system and reduce the incidence of field changes during construction. It is recommended that the Contractors be required to install a service connection to the property line for each lot shown on the as-bid construction drawings. If the landowner does not identify the location of the sewer service lateral, it is recommended that the Town locate the sewer service lateral during construction or that the sewer service lateral be located at the lowest third of the lot. Sewer service laterals are typically constructed with PVC. Preliminary Design Data are presented in Table 4-4.

TABLE 4-4[1]
CONCEPTUAL DESIGN DATA FOR
GRAVITY SEWER SYSTEM AND FORCE MAIN

Item	Preliminary Design Data
Pipe Sizes	8, 10, 12 and 15-inches
Minimum slope, 8"	0.004 ft/ft
Minimum slope, 10"	0.0028 ft/ft
Minimum slope, 12"	0.0022 ft/ft
Minimum slope, 15"	0.0015 ft/ft
Pipe Material	PVC
Maximum Manhole Spacing	400 feet
Manhole Diameter	4 feet
Manhole Material	Precast Concrete
Minimum Force Main Size	4 inches
Force Main Material	Ductile Iron
Maximum Soil Boring Spacing	300 feet
Minimum Soil Boring Depth	1.5 times sewer depth

[1]All design data are preliminary and should be re-evaluated during the design stage.

Conceptual pipe alignment, including gravity sewers, pump stations, and force mains, were prepared for this study and are shown on Figure 4-1.

3. Low Pressure Sewers

The low pressure sewer system makes use of small diameter piping buried at a shallow depth following the profile of the ground. Low pressure sewers are fed by individual grinder pumps outside each home. A grinder pump may also serve two homes. If this alternative is selected, the opportunity for shared pumps will be further investigated as part of the design phase. Each grinder pump unit will be equipped with a 1 horsepower (hp) grinder pump, check valve, tank and all necessary controls. The units will be buried outdoors close to each home's existing septic tank or cesspool so that the connection to the existing service pipe exiting the house can be easily made. The low pressure sewer system is separated into branches of sewers of different sizes depending on the number of connections to each branch. The pressure main and service pipe are constructed of polyvinyl chloride (PVC) or high density polyethylene (HDPE) material. Standard manholes are not required in a low pressure sewer system. Instead, flushing connections/manholes are installed at the end of branches and where major changes in direction or size of pipe occur. Air relief valve manholes are installed at high points in the system to allow trapped air to escape. The grinder pump macerates the solids present in the wastewater to a slurry in the manner of a kitchen sink garbage grinder and discharges wastewater to the pressure sewer collection pipes. If a malfunction occurs, a high level alarm is activated. This alarm may be a light mounted on the outside of a house and an audible alarm, which can be silenced by the resident. The resident will then notify a service technician to come and make the necessary repair.

4. Grinder Pump Operation & Maintenance

Operation & Maintenance (O&M) of the grinder pump units may be implemented by two (2) methods: 1) Town operates and maintains units; and 2) homeowners operate and maintain units. If the Town elects to operate and maintain the grinder pump units, either with their own forces or through a contract with the wastewater treatment facility operator, easements and rights to access the property will have to be obtained. One advantage of a Town operated and maintained pressure sewer system is that the Town or its representative could carry several additional pumps to service any repairs in a timely fashion, as opposed to each individual homeowner contacting a service technician independently. Another advantage to a Town maintained system versus a Homeowner

maintained system is rather than training each individual homeowner for the operation and maintenance of the system, select technicians within the Town may be trained to oversee the complete system. Also, in the event of a prolonged power failure the Town has the resources to use a portable generator to pump out the grinder unit. The costs incurred by the Town acting as the operator and maintainer of the system would be covered by user charges. If the Town elects to have the individual homeowners maintain the grinder pump units, the homeowners would be required to handle all future service issues and associated costs.

5. Pumping Station

New and upgraded wastewater pumping stations will be required as part of this project. Wastewater from homes and businesses will flow into a system of pipes and manholes, which will collect and transport the flow by gravity. As the depth of gravity sewer increases, associated construction cost increases and wastewater pumping stations become cost effective. Wastewater pumping stations transfer the wastewater through a force main which discharges the wastewater into another gravity sewer located at a higher elevation. In addition, factors such as soil conditions, ground water elevation, and existing utilities can make it less feasible to install gravity sewers at greater depths.

Basic considerations for a wastewater pumping station consist of exterior appearance, type of superstructure, type of equipment, arrangement of equipment, and location of the pumping station. Typical equipment or components for a wastewater pumping station consist of pumps, electrical motors, emergency generator, electrical panels, alarm panels, odor control equipment and force main.

Design considerations for a wastewater pumping station include:

- The design of the pumping equipment will be determined by the hydraulic conditions required to transport the wastewater to a higher elevation
- The pumping equipment forces the wastewater through a force main, installed at a depth of approximately five (5) feet below ground elevation
- The depth of the wastewater pumping station below ground level will be determined by the depth of the incoming gravity sewers and/or soil conditions

- The type and elevation of the superstructure will be determined by the location and design of neighboring buildings, size of equipment, land use, and relative elevation to flooding.

As previously indicated, the draft recommended plan includes a number of pumping stations distributed throughout the proposed wastewater collection system. Table 4-5 summarizes Preliminary Design Data for these pumping stations.

TABLE 4-5[1]
PRELIMINARY DESIGN DATA FOR PUMPING STATIONS

Item	Preliminary Design Data
Minimum Number of Pumps	2
Max. Solid Size	3 inches
Minimum Force Main Size	4 inches
Minimum Force Main Velocity	3 feet/sec

[1]All design data are conceptual and should be re-evaluated during the design stage.

6. Type of Station

There are several different types of pump stations available to choose from: (1) wet pit/dry pit, (2) submersible, and (3) suction lift. The following are descriptions of the three typical types of pump stations:

Wetpit/Drypit Pump Station

A Wetpit/Drypit Pump Station typically consists of a concrete wetwell and a prefabricated steel, concrete, or fiberglass dry well to house non-clog centrifugal pumps, pipe, valves, and fittings. A wood frame or masonry building is usually constructed above the dry well to house items such as (but not limited to) the motor control center, emergency generator, pump control panel, or optional SCADA system, telemetry control panel, and odor control system. The exterior walls of the building are either painted/stained clapboard or faced with brick. The Wetpit/Drypit Pump Station is sited on a lot conforming to current zoning bylaws and planning board rules and regulations.

The site plan for the Wetpit/Drypit Pump Station typically includes plantings (trees and shrubs) for screening and visual appearance and a bituminous concrete driveway for access and maintenance.

Submersible Pump Station

A Submersible Pump Station typically consists of a concrete wetwell with submersible pumps, pipe and fittings located in a roadway right-of-way or small land taking. A valve/odor control chamber would typically be located adjacent to the wetwell, which would house piping, fittings, valves, and an odor control system. A control pedestal would be located above ground that would house items such as the pump control panel, telemetry control panel or optional SCADA system, power panel, transfer switch, and odor control vent. The Submersible Pump Station should be provided with bypass pump connections and an emergency generator with a weatherproof enclosure or allow for connection to a portable emergency generator.

Suction Lift Pump Station

A Suction Lift Pump Station typically consists of a fiberglass enclosure (or a complete walk-in enclosure) mounted adjacent to a concrete wetwell located in a roadway right-of-way or small land taking. The enclosure houses the suction lift pumps, piping, fittings, valves and pump control panel. Sometimes an odor control chamber is located adjacent to the wetwell to house the odor control system. Suction Lift Pump Stations are typically provided with bypass pump connections and an emergency generator with a weatherproof enclosure, or facilities to allow for connection to a portable emergency generator.

7. Pump Station Design Features

Architectural (above ground building)

Architectural considerations should be given to any pump station that has an above ground building. To the extent possible, the building should be designed and constructed to "fit" into its surrounding area. Manufacturers of suction lift pumping stations often have prefabricated buildings and/or enclosures available as an option. These options,

along with other custom structure options such as brick or clapboard, should be considered during the detailed design stage. Residents living in the vicinity of a proposed above-ground pump station may be involved at some level when architectural features are being determined.

Site Details (above ground landscaping)

As with the building, it is good policy for landscaping around pump stations to be designed and constructed to "fit" into the surrounding area. The site details to be considered consist of pump station layout, including setbacks or offsets; structure orientation; fencing; types of trees and shrubs; walkways; grass areas; safety items such as concrete bollards; and exterior lighting. Once the final pump station locations are determined, a site-by-site evaluation can be made and site details can be determined. Residents living in the vicinity of a proposed above-ground pump station may be involved at some level when site details are being determined.

Redundancy

All pump stations will be designed in accordance with current industry standards including TR-16. Design redundancy is defined as follows: when any one component is out of service, such as a pump, the remaining components (pumps) will have the capacity to accommodate the function of the non-working component. Redundancy of the major components of each pump station is required to ensure continuous operation. Major components typically consist of pumps, motors, and level controls.

Wetwell Design

All wetwells will be designed in accordance with current industry standards, including TR-16. In addition to the above, it is recommended that the following design features be incorporated into wetwell design:

- Paint the wetwell interior with a protective coating. This coating will provide protection against corrosion, reduce the potential for solids accumulating on the surfaces, and add an additional layer of protection against leakage.

- Provide an isolation valve on the influent gravity line to allow for isolation of sewage flow to the wetwell during maintenance.

Emergency Backup

Emergency generators are provided at pump stations to provide electrical power when the normal power supply is unavailable. Engine-driven pumps are also a proven standard in suction-lift pumping stations, to ensure continuous operation in the event of electrical power outages. Emergency backups can be installed within a weatherproof enclosure or be located within an above ground building. Emergency generators and engine-driven pumps are designed to turn on and off automatically, based on monitoring of the normal power supply and the use of an automatic switching. Emergency backup systems can be powered by diesel fuel, natural gas, or propane gas. Each of these fuel sources have various design considerations and code requirements. The sizing of the fuel supply tank is based upon the size of the emergency generator or engine, and the duration of the "normal" power outage. Typically the size of the fuel supply line or tank is based upon the fuel demand for the emergency backup system operating under full load for a period of two days. It is recommended that during the final design, a review of historical power outages in the area be performed in order to help determine the minimum size fuel supply required and to determine the initial settings for the various time delays/sensors which will activate the generator or engine.

There are three major factors to be considered when determining whether or not to provide a pump station with an emergency generator or engine: (1) volume of flow; (2) land availability; and (3) manpower constraints. However, the Massachusetts DEP will require that all sewage pump stations located within a Zone II (i.e. the aquifer protection area that may contribute water to a public water supply source) or near other sensitive areas be provided with emergency backup systems.

Bypass Pumping Connections

Pump stations should be provided with a by-pass pumping connection. This connection allows for flexibility with regards to repairs to force mains, pumping equipment, and emergency generators. Typically each wetwell is provided with two suction lines, which independently feed the pumping equipment. The by-pass pumping connection consists of the following:

- Provides a third suction line, which terminates three feet above grade with a quick disconnect

- Provides a connection point, with quick disconnect, into the force main with appropriate isolation valves.

If by-pass pumping is required, a portable pump is brought to the pump station where flexible hoses are connected onto the third suction line and onto the force main. This arrangement allows for bypassing of the pumping station.

In addition, we recommend that the force main connection point be arranged to allow for the launching of a "pig". The 'pig" is a mechanical bullet which scours the internal surfaces of a force main. Once the "pig" is launched into the force main, the normal pumping operation forces the "pig" through the force main. This operation removes the slime layer, which is the source of most odors generated in force mains. The force main terminal (pig receiving) manhole is fitted with a removable screen, which catches the "pig".

Odor Control Systems

It is recommended that some pumping stations (depending on sewage residence time in the pump station and/or force main) be provided with odor control equipment. Odor control systems are sized and designed according to the source and/or location of the odorous area to be treated. The following is a summary of various odor control systems that could fit the application:

- A small ozone generator is used to add oxygen in an air stream into the wetwell to inhibit the formation of odorous compounds such as hydrogen sulfide. In addition, this process maintains oil and grease in suspension and reduces corrosion of the wetwell. This type of system operates continuously, and is noisy during operation, but has proven to be reliable and requires minimal maintenance. It is recommended that this type of system be installed at all standard and custom pump station wetwells.

- Provide a refillable carbon filter on all vent lines from the pump station wetwells. Any odorous air, which is displaced in the wetwell by wastewater, will be forced from the wetwell, through the vent and carbon filter. This type of system is very cost effective, and since there are no mechanical and/or electrical components, this type of filter requires minimal maintenance yet provides a positive odor scrubbing system. It is recommended that this type of system be used on all pump station wetwell vent lines in conjunction with the primary type of odor control system previously recommended.

During final design, the Town should consider the need for an odor control system based upon the specifics of the installation and pumping station location.

Flow Measurement

Pump stations should be provided with a flow measurement device. Typically the flow measurement device will consist of a magnetic flow meter installed on the force main upstream of the point where it exits the pump station. The flow measurement device will be provided with a local readout and chart recorder. The flow measurement devices will allow for monitoring of flow fluctuations and scheduling of operation and maintenance.

8. Other Considerations

There are several parameters to pump station design that are integral to its success. The first is the proper location for the station. The entire area to be serviced by the station must drain adequately. The aesthetic quality of the pump station building should be carefully considered and blended with its surroundings. When the pump station is in an isolated area, the appearance of the building is less critical, but protection from vandalism becomes more important.

The depth of incoming sewers will determine the depth of the station below ground level. The level of the operating floor, type of superstructure, and exterior finish and trim will be influenced by surface conditions, neighboring buildings, land use, and relative elevations with reference to flooding. All stations will be designed to withstand floatation in the event of a flood.

9. Typical Details

There are several typical sewer collection system details, which will be used during the design and construction of the draft recommended plan. These typical details will be included with the Construction Contract Documents to assist the Contractor in understanding the extent of work and the requirements of the construction involved. The details will be provided either as plates within the specifications or on separate drawings within the Construction Contract Documents. These details fall into separate categories and include items such as:

- Gravity Sewer Details – Gravity Service Connections; Sewer Chimneys; Precast Manholes; Manhole Interior and Exterior Drops; Manhole Sleeves; Manhole Mid Level Platforms; Pig Launching Assemblies; Pig Catcher Screen Manholes; Concrete Encasements; and Weirs
- Force Main Details – Air/Vacuum and Air Release Valve manholes; Drain Manholes; and Thrust Block Sizing and Placement
- Traffic Details – Traffic Management Plans, Portable Barrier Fences; Portable Breakaway Barricades; and Reflectorized Drums
- Environmental Details – Single Haybale Barriers; Siltation Barriers, Temporary Stockpile Areas; Sedimentation basins; and Sedimentation Basins for dewatering Processes
- General Details – Trench Sections; Control Dams; and Resurfacing (Trench and Overlay of Municipal Streets.

These typical design and construction details will help provide a complete package to prospective contractors and help ensure that the sewer system will be constructed in accordance with the design, Construction Contract Documents and the requirements of the Town.

10. Design Standards

The project will be designed in accordance with the Town of Tyngsborough's standard specifications, the New England Interstate Water Pollution Control Commission Guides for the Design of Wastewater Treatment Works (TR-16), Water Pollution Control Federation Manuals of Practice – Wastewater Treatment Plant. Design (MOP-8) and

Design and Construction of Sanitary and Storm Sewers (MOP-9), and will conform to the requirements of the Massachusetts Department of Environmental Protection and the applicable program the Town chooses to fund the project. The gravity sewer collection system will be designed such that the minimum pipe diameter will be 8 inches; the sewer is deep enough to drain basement fixtures and to prevent freezing; the velocity within the sewer when flowing full is not less than 2 feet per second (FPS) or greater than 12 FPS at the specified minimum slope per pipe diameter as listed in TR-16; and the minimum diameter for manholes will be 48 inches with a minimum access diameter of 30 inches. These are examples of some of the design standards, which may be utilized.

11. Greenhouse Gases

During design, the Town will explore opportunities to reduce greenhouse gas emissions by evaluating equipment to optimize energy efficiency. This will include consideration of the use of premium efficiency motors and variable frequency drives as applicable for mechanical equipment such as pumps and HVAC/odor control fans.

D. ENVIRONMENTAL IMPACTS

1. General

When determining the recommended plan for each Study Area, it is important to take into consideration and identify and mitigate any environmental impacts. The following environmental impacts were noted:

2. Historical, Archaeological, Cultural, Conservation and Recreation

The proposed work described above is not anticipated to have any impacts on historical, archaeological or cultural resources. Based on National Register of Historic Places on-line database, the only listed site is the Colonel Jonathon House at 80 Tyngsborough Road. As reported in the Town of Tyngsborough CWRMP/EIR – Phase I, the Town does have interest in exploring the registration of additional properties, and the Merrimack River has been nominated as an American Heritage River. As such, there are likely sites of concern in the Town and near the proposed corridors. However, given that the pipelines will be installed within existing roadways, direct impacts to cultural sites will not occur, nor will the proposed action change the character of the area. Proposed pump stations do have the potential for impact, however, and as alternative sites are selected

they will be screened for culturally sensitive areas. Proposed siting location information will be provided to the Massachusetts Historical Commission for review and assessment.

The proposed work will impact conservation lands. Proposed work associated with the gravity sewers will occur in town roads near areas such as the Times Farm Area (Merrimack East Area of Need), the Lowell-Dracut-Tyngsborough State Forest (Althea Lake Area of Need), the Hunter Property town conservation area (Merrimack West Area of Need).

Article 97 Land Issues – River Road Pump Station

The work proposed for the River Road Pump Station will impact the conservation land on the Hunter property. In order to comply with the capacity limits of the North Chelmsford IMA, the Town's plan for sewering portions of the proposed system on the west side of the Merrimack River requires constructing a new pump station on River Road and conveying wastewater via a twin force main below the Merrimack River utilizing horizontal directional drilling construction methods to the existing Phalanx Street Pump Station on the east side of the Merrimack River to utilize capacity in the Dracut IMA. Figure 4-8 depicts the conceptual location of this pump station and force main. By locating the pump station on this property and at this location, it allows use of a right-of-way that the Town owns on the east side of the Merrimack River for the twin force main construction. Locating the pump station on other parcels (with the exception of any lots that directly abut the conservation land) on the west side of the Merrimack River would preclude the use of this right-of-way and would make the proposed force main crossing unfeasible because the force main alignment would have to be constructed below existing structures.

With the exception of the construction of the pump station and its appurtenances, the portions of the property that are temporarily impacted during construction will be restored. In order to comply with Article 97 Policy, during preliminary design, the Town will determine the permanent impact of the proposed construction on the conservation land and prepare a compensatory mitigation package that includes restoration of the disturbed areas, considers any active or passive recreational features that can be

incorporated into the design, and provides compensatory open space land at a minimum of 1:1 basis. Presently a vacant private parcel exists along the Merrimack River approximately 1,000 feet south of the proposed pump station location. The lot is approximately 1.25 acres in size. This lot could be purchased by the Town and provided with access easements along the river through current open space parcels between the Hunter Property and the proposed mitigation parcel, and protected as open space. Based on its size and the anticipated area required for the pump station (approximately 7,5000 to 10,000 square feet), it could provide mitigation greater than a 1:1 basis,. Figure 4-3 depicts the potential mitigation area. If it is determined during preliminary design that locating the pump station on the Town owned conservation land cannot be approved under Article 97, the Town will pursue the purchase of private property that abuts the Town owned conservation land to locate the pump station. This will allow the Town to utilize the right-of-way on the east side of the Merrimack River for the force main alignment.

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) show conservation related lands, mapped as Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife, as well as Certified and Potential Vernal Pools are shown on Figure 4-2. Needs Area 1 is not in any habitat area, but is near a Potential Vernal Pool (PVP) on Norris Road. Needs Areas 2, 3, 7 and 11 are in the habitat area mapped along the Merrimack River as well as some of its tributaries. Needs Areas 2 and 3 are both near PVPs. Study Area 6 is not in habitat or near identified vernal pools. Study Area 8 crosses a tributary to the Merrimack River and the tributary from Locust pond, both of which have mapped habitat, but no vernal pools. Finally, Needs Area 10 is not in mapped habitat or vernal pool areas, although the mapped area associated with Locust Pond is adjacent. The majority of the work in or near these mapped areas will consist of work in the roadways and will not impact the adjacent mapped areas. Proposed pump station locations in Needs Areas 2, 7 and 11 are potentially in habitat areas. The current estimated locations are on the periphery of the habitat areas and/or in areas that are already developed. As design advances, close attention will be paid to these locations to determine if the proposed stations can be moved outside of the habitat areas or that they are placed so as to avoid or minimize potential impacts. In addition, particular attention will be made to how stream crossings in habitat areas are accomplished at streams that

cross under roads along the proposed alignment. These locations are all within the 100 foot buffer zone and/or 200 foot Riverfront Area and, as such, will require filing with the Tyngsborough Conservation Commission under the Massachusetts Wetlands Protection Act (MAWPA). Coordination with NHESP will occur in advance of these filings to discuss siting and construction alternatives and determine levels of impact.

EARTH TECH | AECOM

- Community Groundwater Well
- Non-Transient Non-community
- Transient Non-Community
- Watershed Basin (HUC-12)
- DEP Wetland
- NHESP Certified Vernal Pools
- NHESP Estimated Habitats for Rare Wildlife
- NHESP Priority Habitats for Rare Species
- Coincident NHESP Habitats
- Area of Critcal Environmental Concern (ACEC)
- Approved Wellhead Protection Areas (Zone II)

Proposed Sewer

- Force Main
- Low Pressure
- Gravity Sewer
- Area of Need
- Needs Area to be Included in Septage Mangement Plan

Base map data provided by MassGIS.
13th Edition of the Massachusetts Natural Heritage Atlas.

Figure 4-2

Environmental Constraints

Phase IV CWMP/FEIR
Town of Tyngsborough

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Feet

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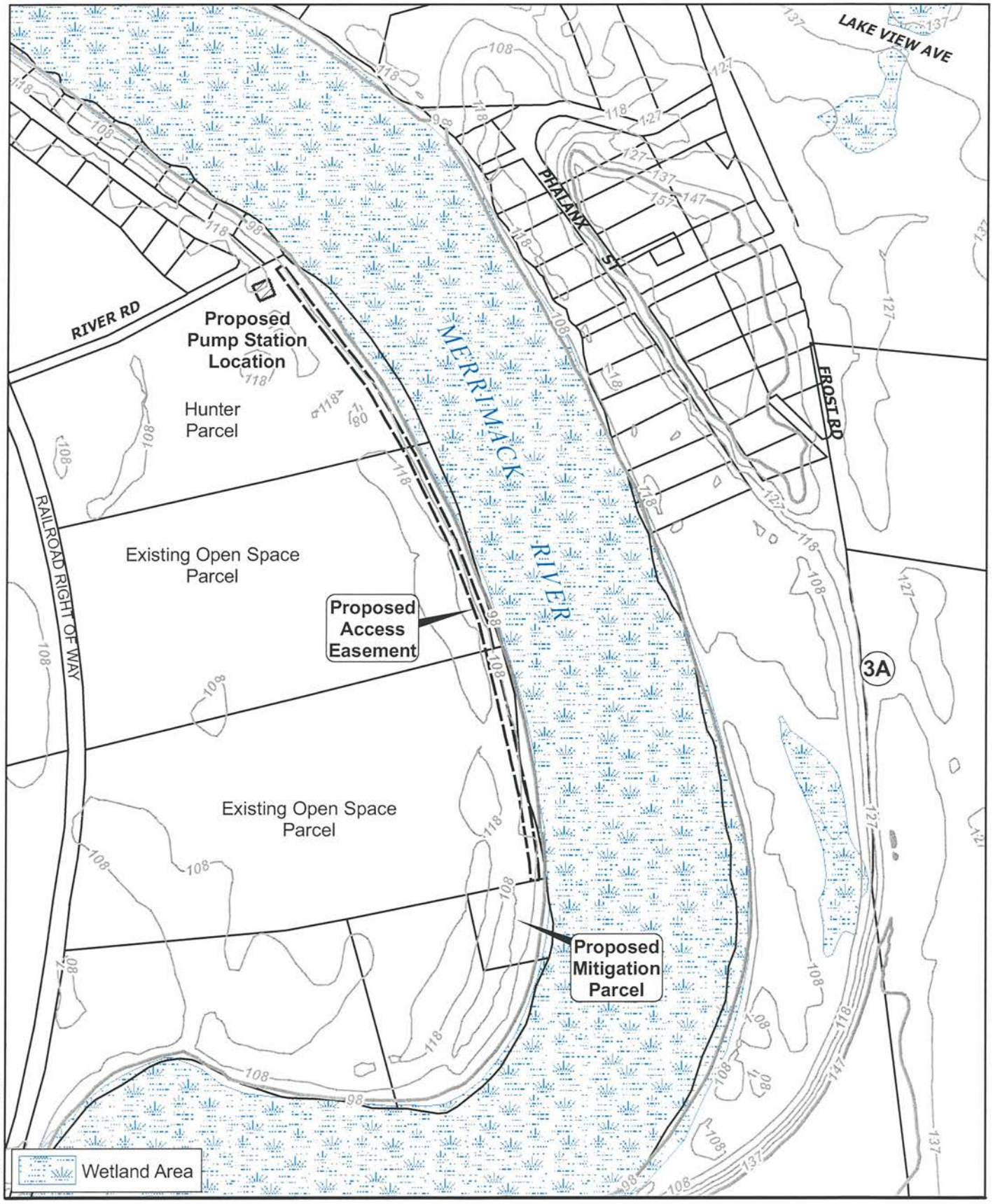

Figure 4-3
Article 97
Conceptual Mitigation Plan

3. Wetlands, Flood Plains, and Agricultural Lands

Figure 4-2 shows the wetlands in the Needs Areas, as per MassGIS. Some work in all eight of the Needs Areas will occur in the 100 foot buffer zone as regulated by the MAWPA. This work will have no direct impacts to protected resource areas, but there are elements of construction that will have to be reviewed for potential indirect impacts. First, the majority of work in these areas will occur in roadways and, as such, will have no direct impacts. However, disturbance of the road during construction could result in erosion or sedimentation into adjacent resource areas. Indirect buffer zone impacts may also occur during construction of the proposed pump stations and the placement of the pipe under the Merrimack River. All three of these types of activities would be mitigated by erosion control during construction and, for new impervious area associated with the pump stations, consideration of stormwater runoff. The Conservation Commission and the DEP will review all erosion control measures during the Notice of Intent process.

Direct impacts will occur within the 200 foot Riverfront Area from perennial streams. For the most part, this work will only be temporary in nature and will primarily consist of placing the pipe in the road alignments. The pump stations in Area 1 (Gloria Avenue) Area 2 (expansion of the Phalanx Street Station), Area 7 (new pump station at River Road on the west bank of the Merrimack River and twin force main crossing below the river), Area 8 (new pump station on Farwell Road near the intersection with Middlesex Road) and Area 11 (new pump station along Middlesex Road near Old Tyngsborough Road) will likely be in the Riverfront Area. The pump station located on Frost Road is not within the 200 foot Riverfront Area. Most of these areas are already disturbed, but as site design advances consideration will be given to moving the stations as far from the perennial stream as possible and managing stormwater runoff from new impervious areas in accordance with DEP standards. Figures 4-4 through 4-8 depict the proposed areas for the pump stations. It should be noted that the figures depict the general area where the pump stations are proposed to be located, the actual dimensions of the pump stations which will likely vary from a footprint of 20-feet by 20-feet to 40 feet by 40 feet. It is anticipated that the work in these areas will be within upland areas or within the buffer zones to resource areas. The areas of disturbance in the 100 foot Buffer Zone/Riverfront Protection Area to construct the pump stations are anticipated to be on the order of 2,500 to 10,000 square feet, depending on the location.

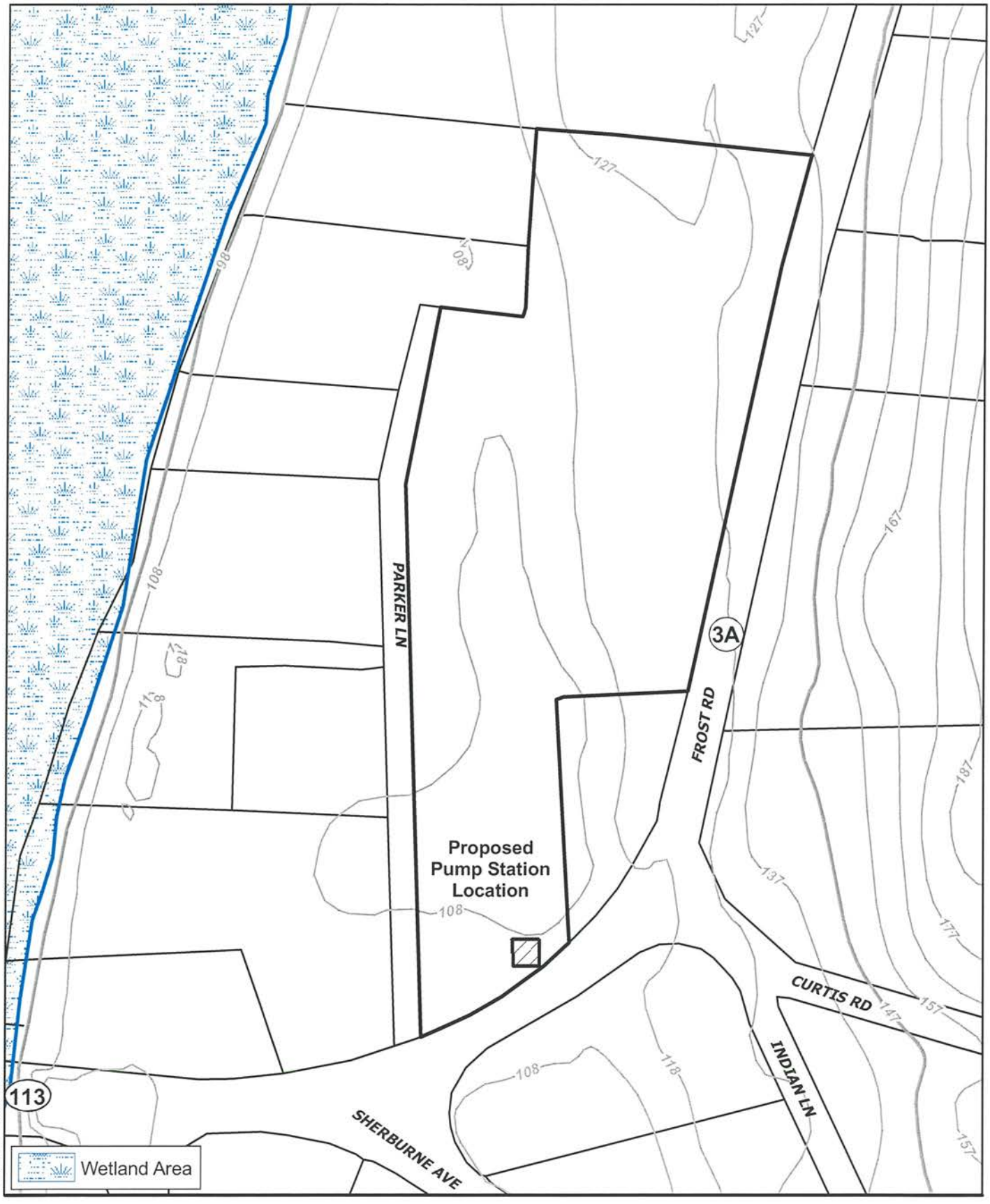

Figure 4-4
Frost Road
Proposed Pump Station Location

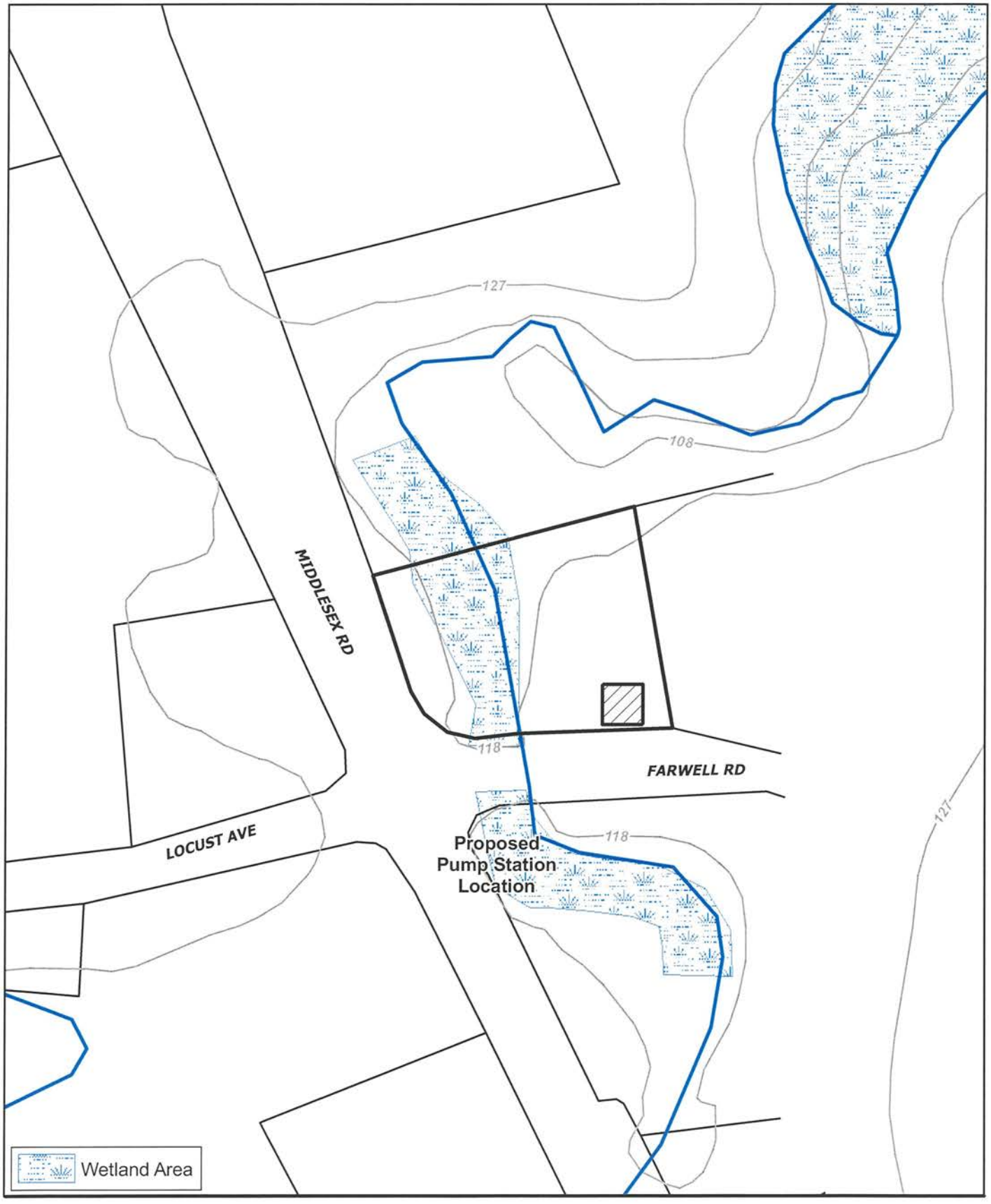

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Figure 4-5
Farwell Road
Proposed Pump Station Location

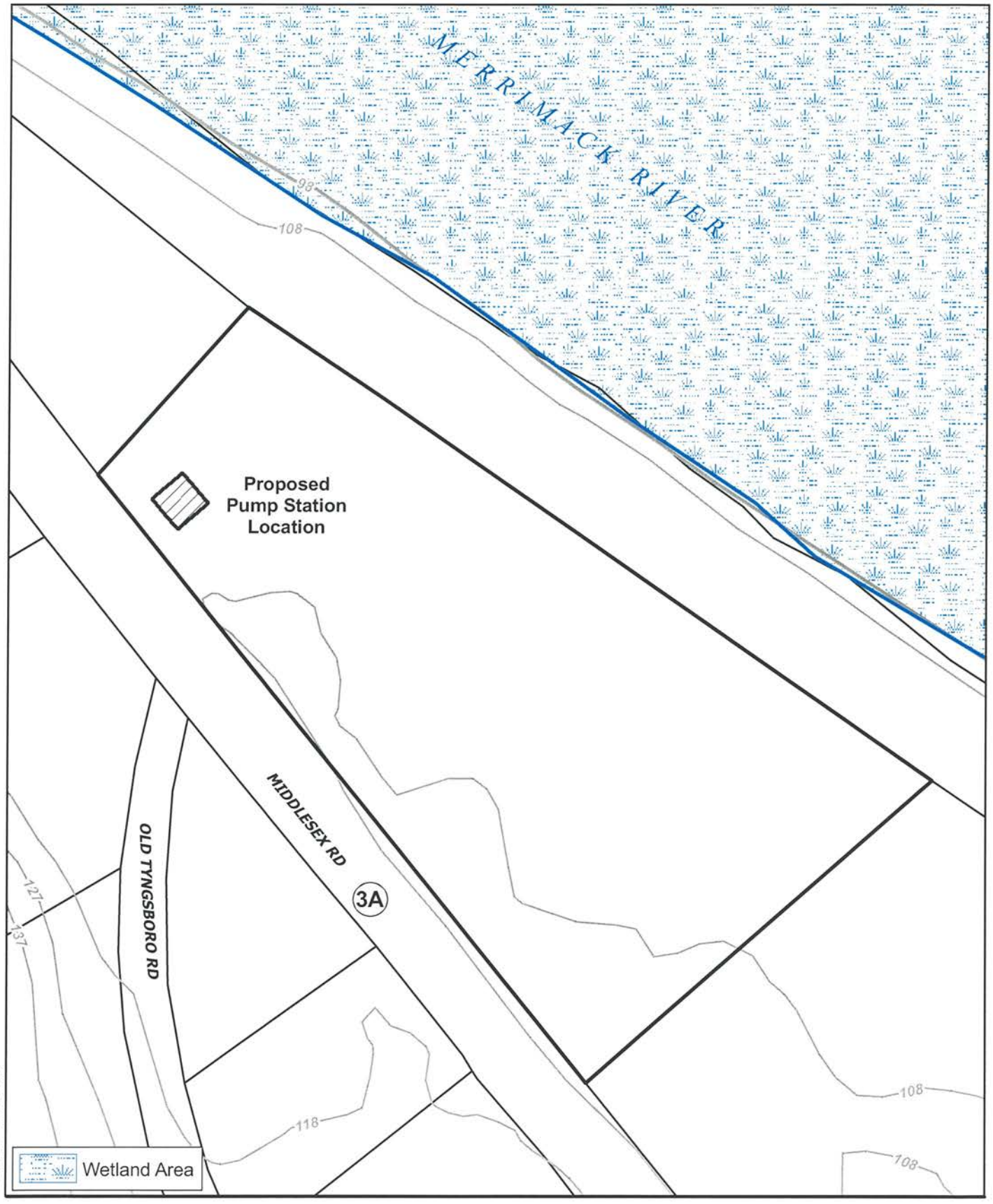
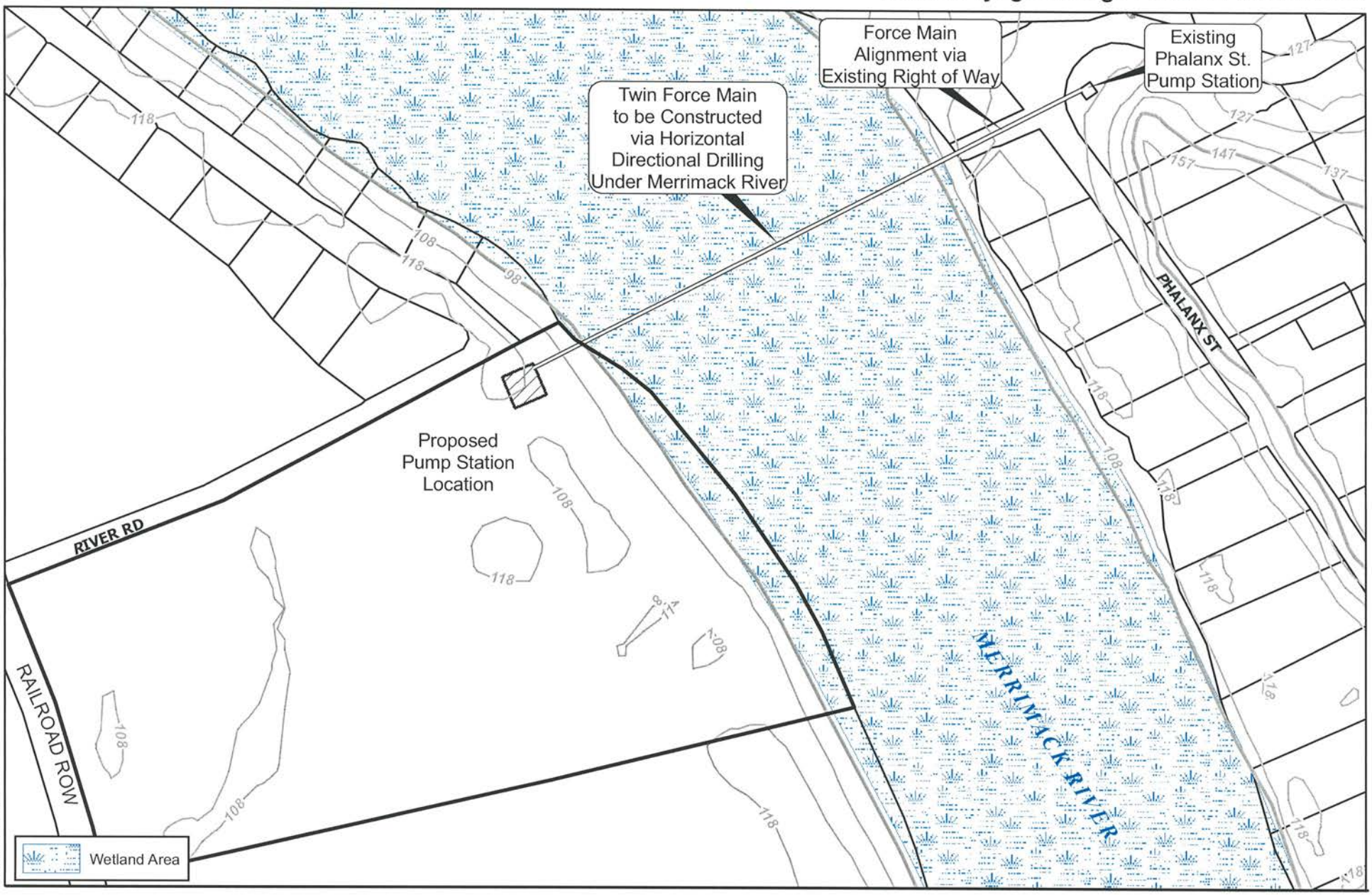


Figure 4-6
Middlesex Road
Proposed Pump Station Location

Figure 4-7
Gloria Avenue
Proposed Pump Station Location



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0 100 200 400
Feet

Figure 4-8
River Road
Proposed Pump Station
and Force Main Alignment

Several of the Needs Areas are proposed to be constructed with gravity and low-pressure sewers that are located in or near a 100-year flood plain. The design of these structures will include manholes with rim elevations that are at or above the 100-year flood elevation wherever technically possible. In areas where this is not feasible, manholes with watertight covers and frames, as well as waterproofing material around the corbel, chimney, and invert will be utilized. Should any of the pumping stations be located within the 100-year flood plain, their design will include watertight appurtenances and any potential infilling of the flood plain will be compensated in other locations as required.

Some of the Needs Areas include land that is currently, or has been previously, agricultural land. The installation of the pipes will not change the potential agricultural use of the land, and none of the pump stations are located in agricultural lands.

4. Zones of Contribution of Existing and Proposed Water Supply Sources

In regards to water supply, there are portions of sewer main extension within zones of contribution. The portions of the project will not negatively impact the areas of contribution, since the sewer main in this area of the project is within existing roadway right-of-ways. Further, the sewers in the Zone II areas will be designed in accordance with DEP requirements for such construction and will include stringent measures to guard against exfiltration of untreated wastewater. The project site will be restored to existing conditions and the water supply will not be impacted.

On-site systems in the Norris Road and Coburn Road Needs Areas, which are proposed for the Septage Management Plan, will be designed and constructed in accordance with the Town's Board of Health standards and Title 5 to ensure that there are no impacts to surface or groundwater resources in the Zone II Areas.

With regard to expansion of the sewer system and its effects on tributary stream flows to the Merrimack River, an evaluation of maintenance of the water balance is provided in Appendix C. In Addition, Figure H-1 in Appendix H identifies the portions of the sewer system that extend into any Zone 1 Areas. These sewer extensions are proposed within

existing street right of ways. These sewer extensions are proposed to eliminate existing and or future on-site wastewater disposal systems that may be sources of pollution. The design of sewers in these areas will consider measures to mitigate the potential for exfiltration including double wall pipelines and watertight sewer manhole covers.

5. Surface and Groundwater Resources

For those areas proposed for sewer extensions, none of the recommended plans are anticipated to negatively impact surface and groundwater resources.

It is not anticipated that the construction of wastewater collection systems and pump stations will impact surface or groundwater resources. As noted above, on-site systems in the Norris Road and Coburn Road Needs Areas, which are proposed for the Septage Management Plan, will be designed and constructed in accordance with the Town's Board of Health standards and Title 5 to ensure that there are no impacts to surface or groundwater resources.

6. Displacements of Households, Businesses and Services

None of the recommended plans will cause displacement of households or businesses.

7. Noise Pollution, Air Pollution, Odor and Public Health Issues Associated with Construction and Operation

There will be some temporary construction noise associated with any construction involved with the recommended plan. Limiting the hours and the days of construction will mitigate the construction noise impacts. Any impacts associated with these alternatives will be mitigated in the final design.

8. Violation of Federal, State or Local Environmental and Land Use Statutes or Regulations and Plans Imposed by Such Statutes and Regulations

None of the recommended plans will violate any of the Federal, State or Local Environment and/or Land Use Statutes or Regulations and plans imposed by any of the statutes and regulations.

9. Changes in Development and Land Use Patterns

Primarily, the sizing of facilities that are part of the draft recommended plan has been calculated based on wastewater flow estimates from existing developed lots and those designated as buildable in the future according to the current state land use codes and local zoning. In order to prevent changes in development and land use patterns the Town should regulate potential changes through Town policy and the Zoning Board. While the introduction of sewer infrastructure in itself does not serve to promote or deny growth, the local zoning and bylaws will. The intent of this CWMP/DEIR is to solve the problems of the existing development and existing environmental concerns, while at the same time not serving to promote sprawl or unchecked development.

10. Pollution Stemming from Changes in Land Use

There will be no pollution stemming from changes in land use.

11. Damage to Sensitive Ecosystems

There will be negligible damage to sensitive ecosystems as part of the recommended plans for any of the Study Areas as discussed in sections 2 and 3 above.

12. Socioeconomic Pressures for Expansion

Connecting the Needs Areas to the existing facilities may affect socioeconomics. Construction of the proposed project could cause pressure to extend the sewer system to areas of the Town that do not presently have the need for such service. This could cause additional residential development and therefore require increased budget need for school systems, maintenance of roadways, fire protection and other Town services. While introduction of sewer infrastructure in itself does not serve to promote or deny development, the Town should control the extent to which the sewer system is extended through Town policy, the Zoning Board and any other town entity having legal jurisdiction.

E. INSTITUTIONAL IMPACTS

1. General

The draft recommended plan for wastewater collection is currently being planned, designed, and constructed under the guidance and direction of the Town of Tyngsborough Board of Sewer Commissioners. In order to manage and operate the draft recommended wastewater collection facilities, the Town will need to implement several institutional and system management procedures. Chapter 3 included a review of the required institutional arrangements which are summarized below:

- Review of the Current Sewer Use Rules
- Develop a Cost Recovery Plan
- Review of Current Sewer User Charge System
- Review of Sewer System Expansion Control Policy
- Review of Sewer System Staffing and Operations Plan
- Review Regulations and Construction Standards
- Develop a Formal Septage Management Plan (additional detail for the recommended plan is provided in Section 3 below)
- Flow and Waste Reduction.

The Town of Tyngsborough's Sewer Department is presently governed by its Board of Sewer Commissioners. The Town has a wastewater collection system that consists of approximately 21.9 miles of sewer. All areas presently not connected to the Town wastewater collection system rely on individual on-site wastewater disposal systems, which are under the jurisdiction of the local Board of Health under state Title 5 rules and regulations at "310 CMR 15.000 - The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage, Effective 3/31/95." The planning, operation, and financing of existing on-site wastewater disposal systems are currently the property owner's responsibility. The

Board of Health is the regulatory authority for on-site wastewater disposal systems within the Town.

In 2004, the Tyngsborough Board of Sewer Commissioners prepared a town-wide Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR). In general, the objective of a CWMP/EIR is to identify areas within the Town with subsurface wastewater disposal problems and to develop a plan to mitigate or eliminate the problems.

The Town established a Special Procedure for review of this project. The Special Procedure consists of a four-phased review of the CWMP/EIR Document. The Document has been delineated into four (4) phases, whereby the scope of future phases is based in part on the results of the preceding phase. The first phase document is entitled, the Phase I, "Needs Analysis", the second phase document is entitled Phase II, "Screening of Alternatives", the third phase document is entitled Phase III, "Evaluation of Alternatives" which included the Draft Environmental Impact Report (DEIR) and this fourth phase document entitled Phase IV includes the final recommended plan and the Final Environmental Impact Report (FEIR).

The scope of the town-wide CWMP/EIR is twofold: (1) to determine the areas in Town with wastewater disposal problems that cannot be solved with a conventional, on-site wastewater disposal system; and (2) evaluate and make recommendations as to the most viable solution for wastewater disposal in each Needs Area based on environmental, technical, institutional and economic considerations. With the filing of the Phase IV, "Evaluation of Alternatives" document, both of these scope items have been determined and a draft recommended plan has been established.

The draft recommended plan for new and expanded wastewater collection facilities is being evaluated, and is proposed to be designed and constructed under the guidance and direction of the Tyngsborough Board of Sewer Commissioners. The Board of Sewer Commissioners will also seek input from other Boards in Town and the Advisory Committee.

In order to manage and operate the proposed wastewater collection facilities, the Town will need to implement institutional and system management procedures as noted above and described in Chapter 3, and the following additional procedures which are described in the following paragraphs.

2. Institutional and System Management Procedures

Establish Sewer and Septic Overlay Districts

In order to legally identify boundaries and set policies, it is recommended that sewer and septic overlay districts be considered. This will allow the Town to distinguish which properties have authority to connect to the municipal sewer system and, also, those that will be managed under a town-wide Septage Management Program. This will involve, at a minimum, acceptance at the Town level by Town Meeting vote and potentially by special legislative act of the general Court of Massachusetts for enactment and enforcement. The delineation and acceptance of sewer districts will add an additional layer to the Town's current by-laws.

A few Sewer District facts:

- A bounded sewer district can provide the "adjudged necessary for the public convenience or the public health" concept contained in Massachusetts General Law (MGL) Ch. 83, S1 with some rationale
- A bounded sewer district, based on a buildout analysis or other information helps both an owner and its engineer to quantify and correlate existing and future flow needs, which allows some degree of assurance when sizing interceptor sewer lines, pumping stations, force mains, treatment plants and effluent disposal sites (as applicable). Sizing has major impacts on site acquisition, plant structure and equipment sizing, reserve capacity, project costs and useful life projections
- A bounded sewer district requires adequately addressing the sewerage needs of properties outside of the district (septage management plan, zoning considerations such as the multiple dwelling unit concept, ability to site Title 5 subsurface disposal, and occupancy permits.).

A bounded sewer district allows a municipality to broaden cost recovery decisions that may change an ad valorem approach to include or substitute recovery techniques allowed

under MGL Chapter 83 and other sections of the MGL and/or special legislation (a capital recovery component of the user fee, betterments, or privilege fees).

There are numerous areas contained in the MGL dealing with the subject of Sewer Districts. For example, MGL, Chapter 41 provides for wastewater organizational options under "Powers and Duties of Cities and Towns".

The Massachusetts DEP Division of Water Pollution Control, with the approval of the Massachusetts Water Resource Commission, has the authority under MGL Chapter 21, Section 28, to (1) propose water pollution abatement districts, established after approval of the municipality(s), and (2) under exacerbating circumstances, to mandate the formation of said district. MGL Chapter 83, Sections 1, 3, 10, and 11 specifically define "service areas" under the municipal authority to designate and service.

Septic Districts would allow the Town to delineate those areas identified as long-term sustainable with on-site wastewater disposal systems. A dataset could be maintained of not only those properties deemed for long-term operation with on-site wastewater disposal systems, but also those systems located within designated Needs Areas until such time as municipal sewer infrastructure is operational in the area. This provides the Town with a complete dataset for a future Septage Management Plan for on-site pumping privileges through the Town owned and sponsored program. This also clearly defines those properties located outside of the Sewer District subject to the Town's rules and regulations regarding requirements for any future sewer allocations. A complete review and conference with Town Counsel would be appropriate for all the considerations noted above.

The Town is required by its Intermunicipal Agreements (IMA) to monitor flows. It is anticipated that when the Town reaches 75% to 80% of the flow capacity of the IMA's, the Sewer Commission will initiate the process to establish Sewer Districts to provide the regulatory framework to control future connections to the sewer extensions. The adoption of Sewer Districts will be enacted in compliance with all relevant Massachusetts General Laws.

Septage Management Plan

Chapter 3 briefly described the need for a Sepatge Management Plan (SMP) which is recommended for the areas of Town identified in the Phase I, "Needs Analysis" document as long-term sustainable with on-site wastewater disposal systems as well as those areas proposed for future infrastructure until such time as the recommended plan is operational in those areas. The goal of this SMP is to protect and maintain public health, ensure protection of surface and groundwater quality, provide sustainability of the Town's aquifers, maintain water resources as recreational, aesthetic and economic assets, improve the environment and prevent its deterioration, preserve and retain local control of on-site wastewater disposal systems without regulatory intervention and to protect private investments with regards to residential property values that is not only accepted locally but in accordance with all regulatory requirements. The long-term sustainability of on-site wastewater disposal systems is dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts. It is the intent for this SMP to operate in conjunction with the Town's municipal wastewater system for the proper collection and disposal of septage in Tyngsborough. It is recommended that the Sewer Department work in conjunction with the Board of Health in Town in order to develop a SMP and establish or reinforce, the form of government to regulate and oversee the SMP.

The successful long-term use of on-site wastewater treatment and disposal systems depends largely on receiving proper maintenance and care to prevent adverse health issues, environmental impacts and/or the occurrence of nuisance problems. Regular maintenance and care of on-site systems can be achieved through the development of a proper level of management of a SMP. This "management" shall consist of a set of rules and regulations related to the permitting and care of on-site wastewater management systems guaranteeing that the public health and environment is protected in accordance with not only local regulations but state regulations as well.

Benefits of a SMP are accrued by both the Town of Tyngsborough and individual property owners. This SMP shall not only serve to protect the public health and environment but also, the interests of the property owner by improving the regulation of design, construction, and repair of systems and by promoting regularly scheduled

maintenance. A SMP shall offer an opportunity to obtain the same level of service and aesthetics as the areas in Town serviced by the municipal sewer system, potentially at less cost, thus providing property appreciation and potential cost savings. When properly sited, sized, installed, operated, and maintained, on-site wastewater disposal systems are an effective way to treat and dispose of wastewater.

Other benefits of a SMP include:

- *Ground water conservation*-a well-managed on-site wastewater disposal system through a SMP shall contribute to groundwater recharge, which is a primary goal of the state's Watershed Initiative

- *Preservation of tax base*-a well-managed on-site wastewater disposal system through a SMP shall serve to prevent the Town of Tyngsborough from having to finance the high cost of extending municipal sewers into additional areas of Town

- *Life-cycle cost savings*-previous cases indicate that a well managed SMP has the potential to pay for itself in terms of lower Title 5 failure rates and premature system replacements

- *Preservation of growth control/Sprawl prevention*-a well managed SMP has the potential to provide the means with which to prevent areas in Town from over development due to the construction of infrastructure and utilities in areas previously not serviced by such as well as preserving the present community structure.

Public education shall be at the forefront of any SMP the Town chooses to implement. Probably the most important piece of the SMP, the Public Education and Training part will serve to provide property owners with a basic knowledge of how and why a system works and, also, about care and management of their systems. It will, also serve to reeducate and train the local governing jurisdiction. A combination of training and reorganization may be needed.

Successful on-site system operation and maintenance requires a complete understanding of how these systems function and what is required to properly maintain them. SMPs undertaken by local governments and their agencies require knowledge of not only state and local regulations governing these systems, but, also, institutional techniques and methods in order to achieve management objectives. The success of a SMP is dependent

on the relationship-building of a number of players, including the local governing jurisdiction establishing policy, informed agency staff, property owners all working together with a proactive approach to system management.

As part of a Town of Tyngsborough SMP, working in conjunction with the final Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR), a routine maintenance program of on-site wastewater system pumpouts could be coordinated and offered to those areas either identified as long-term sustainable with their current on-site wastewater disposal systems or areas deemed as Needs Areas until such time as municipal infrastructure is operational in their area. As part of the CWMP/EIR, the recommended plan includes municipal pumping and disposal for each unsewered property on an as determined basis. A typical Scope of Work for a SMP for the Town of Tyngsborough might include the following tasks. At the forefront of any SMP is the Public Education portion. It is the foundation of a successful SMP, no matter what management level is chosen.

- *Level of Management*

  Management levels range from the very basic System Inventory and Awareness, which is a minimum level of management to the rigid Management Entity Ownership, whereby the Town takes over ownership of all systems thereby removing the homeowner from any responsibility. In the middle of these two is the Management Through Maintenance Contracts model. The Town would need to establish an appropriate level of management for its SMP that is tailored to the Town's resources, management capabilities, and the level of protection necessary for protection of health, drinking water resources and other water resources

- *Planning Objectives*

  Set planning objectives. The Board of Health is responsible for coordinating program rules and regulations with state and local planning and zoning and other water related programs. The potential risks of wastewater discharge would be evaluated to limit environmental impacts on receiving environments during the rule making process.

- *Performance Requirements*

  Set performance requirements according to local rules and regulations. Right now, the Board of Health, along with Title 5 Regulations, is responsible for establishing system failure criteria to protect public health.

- *Site Evaluation*

  Set all site evaluation criteria. All site evaluations are currently performed according to state Title 5 and local rules and regulations governing site evaluations.

- *Design Criteria*

  Set any and all design parameters. All designs are currently in conformance of state Title 5 and local rules and regulations governing the design and construction of on-site wastewater systems.

- *Operation and Maintenance Requirements/Responsibilities*

  Set operation and maintenance requirements/responsibilities with guidance from public education materials.

- *Residuals Management (Pumping Requirements)*

  Set pumping requirements/responsibilities with guidance from public education materials.

- *Certification/Licensing/Jurisdiction*

  Set parameters through Board of Health.

- *Public Education and Training*

  Develop and implement a public education and training program. The local Board of health has initiated a public education and outreach program, which could be expanded.

- *Water Conservation*

  Develop and implement a public education program dedicated to water conservation benefits.

- *Corrective Actions/Enforcement*

  The Board of Health currently negotiates all compliance schedules with the owner for correcting documented noncompliance items and administers the enforcement actions taken. A program, including fines and or/penalties for failure to comply with compliance requirements, could be established.

- *Record Keeping and Reporting-Database Design and Implementation*

  All database record keeping is currently undertaken through the Board of Health. New programs could be administered with the use of the database pumping notices, for example.

- *Financial Assistance*

  The Board of Health currently administers a Community Septic Loan Betterment program. Additional funding opportunities could be explored.

- *Level of Consultant Involvement*

  A SMP could be developed with several levels of outsourced assistance from the consultant.

- *Required Town Meeting Action for Adoption*

  Rules and regulations, by-laws could be developed and adopted.

- *Required Legislative Review Procedures, if required*

  Rules and regulations, by-laws could be developed and adopted, such as: "Sewer Districts" and "Septic Districts" under Special Legislation.

- *Schedule of Implementation*

  A schedule of scope implementation would be developed.

- *Estimated Costs*

  A schedule of costs to implement and carry out the SMP would need to be developed based on the level and complexity of services offered.

- *Level of Conformance With Town Goals*

  Coordination with the CWMP recommended plan for example.

- *Identification of Required Permits and Potential Environmental Impacts*

  All necessary permits and environmental impacts would need to be discussed and identified.

A discussion with the governing jurisdiction, with coordination from other Town Departments will serve to promote a more stable and implementable plan. With the selection of a more aggressive management option, the Town of Tyngsborough has the

option to take a more proactive and assertive approach with the issues facing on-site wastewater disposal systems for the long-term sustainability of its natural resources. A well-managed SMP will serve to protect the public health and environment, but, also provide detailed insight and improvement with the overall regulating of system design, construction, and repair as well as promote regularly scheduled maintenance.

Presently, the Town, through the Board of Health, encourages "Best Practice" policies for its residents and commercial establishments with on-site wastewater disposal systems. This includes public awareness programs via mailings and articles in local community newspapers describing the components of a septic system and the need for owners to routinely have the septic tank contents pumped and inspected. It is anticipated that the Town will adopt a more formal Septage Management Plan during the initial phases of the implementation of the CWMP.

Water Conservation Program

The Town's water conservation efforts were included in the Phase II Report. Tyngsborough will continue to implement an overall water conservation program in order to reduce the amount of water consumed and discharged into both the existing on-site wastewater disposal systems and the proposed wastewater collection facilities. The Town will be limited as to how much wastewater it can send to the receiving wastewater treatment facility. Not only will the implementation of water conservation devices and programs result in lower operational costs to each user, but it will also result in reserve capacity at the receiving treatment facility should future areas of Need arise in Town.

Infiltration/Inflow and Sewer System Evaluation Survey (SSES)

The Town of Tyngsborough prepared an infiltration/inflow investigation in October 2002 that identified sources of extraneous flow. As a follow-up to that work, the Town prepared and submitted a CY2008 Project Evaluation Form to the Department of Environmental Protection in 2007 for financing for additional inflow/infiltration and sewer system evaluation survey investigations in their wastewater collection system. The PEF was approved and the project is included in the Intended Use Plan. An article for funding the project was approved at the May 2008 Town Meeting. An application for funding the project via the State Revolving Fund was submitted to DEP in October 2008.

The work will be performed system in accordance with "*Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey*" dated January 1993, as published by the MADEP.

The scope of work for these investigations will include the following activities to locate sources of infiltration and inflow:

- Manhole Inspections;
- Smoke Testing;
- Flow and Groundwater Monitoring and;
- Cleaning and Television Inspection.

The SSES will involve more extensive evaluation to confirm the findings of the 2001 and 2002 I/I Study that the Sewer Commission performed. The areas that the Town will investigate include Muscuppic Trail, Willowdale Avenue, and Elm Street. Upon completion of the field investigations, a report will be prepared to discuss the findings of the field work and flow metering analysis and recommendations for sewer rehabilitation work including estimated costs and priority rankings. Based on an authorization to start the work in February 2009, the preliminary schedule includes SSES field investigations between March 1 and June 30, 2009 and preparation of the Final Report in September 2009. The draft scope of work and schedule is included in Appendix D.

Staffing Needs

Chapter 3 described the requirement to evaluate present and future staffing needs to manage the Town's wastewater facilities. Presently, the town employs two full time operators to manage the Town's collection system, 12 pump stations, and 5 meter stations. In addition, The Town also has a contract with a private maintenance company who provides backup to the full-time operators during emergencies. The Town also has an office administrator that works for the sewer department. With regard to future staffing needs, it is anticipated that at the completion of Phase 2 (See Chapter 4, Section G for Phasing Plan), 1 additional operator will be required, and at the completion of Phase 4, an additional operator will be required.

F. CAPITAL, OPERATION AND MAINTENANCE COSTS

1. Capital Costs

The capital and annual operation and maintenance costs contained in this report represent planning level costs. The estimated capital cost for the recommended plan contained in this CWMP/DEIR is $39.1 million (Present Day Cost) based on an Engineering News Record (ENR) Construction Cost Index of 8,140 for May 2008. The costs presented in this report must be updated prior to each construction phase based the time of design and construction.

As presented in Chapter 3, this capital cost includes furnishing and installing gravity sewer pipes, manholes, services, low pressure sewer pipes, excavation and backfill, paving; dewatering, loam and seeding, pumping stations, engineering (design and construction), legal, fiscal, administrative, and contingency costs. Due to the connectivity of the systems on both the west and east side of the Merrimack River, a phased construction plan for the 20-year period has been developed and is presented in Section G below.

2. Operation and Maintenance Costs

In addition to the capital cost for designing and constructing the recommend plan contained in the CWMP/DEIR, there will also be an annual cost for the Town to both operate and maintain the new system. Chapter 3 presented costs for operation and maintenance of the new pumping stations which is estimated to be $2,000,000 (Present Worth Cost) for the Recommended Plan. The operation and maintenance cost does not include servicing pumps for low pressure sewers. In areas where low pressure sewers are part of the recommended plan, it is assumed that the Town will have the individual property owners operate and maintain the individual grinder pumps and will pay for annual operation and maintenance costs.

3. Cost Recovery and Funding Scenarios

The most user-friendly funding option for this project is public financing through the State Revolving Fund (SRF) Loan program which would finance the eligible capital cost. The SRF Loan Program is a modified continuation of prior Massachusetts Department of

Environmental Protection (DEP) financial assistance programs (grants) and allows communities to receive low interest loans with a payback period of up to 20 years.

This Program is financed through the Massachusetts Water Pollution Abatement Trust (Trust), which was established by Chapter 275 of the Acts of 1989 (The Hayes Act), as amended (Chapter 29C). Under Chapter 29C financial assistance is offered to public entities for eligible projects at one-half market rate. Currently, the General Court has authorized additional funding (contract assistance) to be paid to the Trust to buy down the interest to two percent. The present market rate for AA municipal bonds of approximately four percent. For wastewater treatment and collection projects, the actual planning and design engineering costs are not eligible for the SRF loan. Each year the DEP's Division of Municipal Services canvasses all of the state's, cities, towns, and districts for projects with a potential to receive financial assistance.

The Town of Tyngsborough must address the equitable apportionment of the capital costs amongst either the general population, the existing and future system users and/or a combination of the two. Typically, there are limited financial resources available to enable a community to undertake such projects. The following sources are frequently used in combination to arrive at a financing solution:

- Federal and/or state funding through grants and/or loans;
- Property taxes;
- Betterment assessments based on the fixed uniform rate (linear foot frontage and/or property area) or the uniform unit method (number of existing/potential sewer units);
- Special assessments such as connection charges, capacity reserve charges, privilege fees, user charges, interest, and fines; and
- Enterprise Zones

Funding Alternatives

As of the filing of this Document, the Town of Tyngsborough had not determined how to finance the recommendations of the CWMP/DEIR Project. This document includes an example of utilizing property taxes for the cost recovery for the sewer system expansion

projects into the Needs Areas. A discussion of the issues associated with betterments and user fees is provided below. The Town will need to evaluate the project costs in conjunction with potential funding mechanisms as current and future users are proposed to be connected to the new sewer system. In order to reduce the financial burden to the users, it is anticipated that the Town would apply for SRF funding.

Tax Rate

A potential method of cost recovery is through increases to the tax rate assuming that elements of the plan provide a general benefit to the Town by increasing the overall tax base due to future development and increased property values due to the availability of the sewer system. Based on a value of $38,4000,000 (2008 present day capital cost) and assuming an SRF Loan at 2 percent interest and a total assessed valuation of $1,500,000,000 for Tyngsborough, the tax increase would be approximately $180 per $100,000 of valuation in the initial years of borrowing.

Betterments

Massachusetts General Law, Chapters 80 and 83, describe the general procedure for allocation of costs of specific facilities (as opposed to the costs of general facilities) among property owners through a system of betterments (betterment assessments). If necessary, these betterment assessment schemes may be tailored to address particular needs of a community through the passage of special acts of the Legislature. When considering adoption of such special legislation, however, a municipality must take care to observe the principles of fairness and equity amongst property owners, to avoid challenges to the assessments.

A betterment plan/cost recovery program can be developed in order to recover the capital costs of any or all future sewer expansion projects. In developing such a plan, Tynsborough needs to address the problem of how to equitably apportion the capital costs among its system's new users. There are two systems available under Massachusetts General Law for the assessment of sewer betterments. One is the Fixed Uniform Rate, the other is the Uniform Unit Method. The Fixed Uniform Rate is based on the frontage and/or area of the parcel of land on a way or street where the improvement occurs. The Uniform Unit Method is based wholly upon "sewer units". One single-family residence constitutes one "sewer unit". Lands used for other than

single-family residences are converted to "sewer units" on the basis of "single family residential equivalents" based usually on water consumption in accordance with an adopted system.

The cost recovery for the planning, design, construction and implementation of Tyngsborough's future additional wastewater facilities and the cost(s) of capital outlay could be paid by a combination of property taxes and betterments. An equitable means of recovering these costs would be to recover the cost of any portion of the project that provides a general benefit to the entire community through municipal property taxes, and to recover the cost of public improvements that are of specific benefit to a particular area in the community by betterments. The Board of Sewer Commissioners must arrive at a financing solution that is fair, equitable, and politically acceptable, and codify it through a favorable Town Meeting Action.

Decisions to be made by the Board relative to betterments include:

- Methodology - Fixed Uniform Rate vs. Uniform Unit Method. This would encompass property usage, i.e. single family vs. multi-family, etc.
- Apportionment - general vs. specific
- Payment Plans (up to 20 years)
- Interest Rates [5 percent carrying charge for apportioned betterments or 2 percent above the cost of borrowing (permanent) for the particular project]
- Deferral and Recovery Agreement-elderly and low income provisions (MGL Ch. 80, Sec.13B)
- Tie-In Requirements
- Vacant Lands.
- Adoption of system at a Town Meeting
- Implementation of system (putting the program together)
- Actual assessment of "bettered" parcels (including public notification, filing the plans at the Registry, issuing the commitments, placing property liens and issuing tax bills)

- Development of Administrative System
    - ♦ System requirements and staffing
    - ♦ Collection of betterments and depository account set up
    - ♦ Abatement and deferral process
    - ♦ Proper investment and dispersal of funds.

User Fees

In addition to betterments, a user charge can be assessed to each sewer customer. The user charge will offset annual operations and maintenance costs of the new sewer system improvements. The operation and maintenance cost associated with the system primarily consists of costs to operate and maintain the wastewater collection system, pumping stations, force mains, maintenance on the mechanical pumping equipment, annual replacement costs, and power costs. In areas where low pressure sewers are part of the recommend plan, it is anticipated that the Town will have the individual homeowners operate and maintain the individual grinder pump units. Therefore, the homeowners will be required to handle all future service issues and associated costs.

Enterprise Zones

Enterprise Zones are designated areas of land which allow local officials to negotiate with businesses to encourage new business investment in the zone. Benefits to the Town include: providing a mechanism for the Town to assist local companies to become more competitive by offering incentives to expand or modernize; the Town can become more competitive in attracting new industry; and by attracting new businesses, the Town can increase local tax revenues and employment opportunities.

G. IMPLEMENTATION PLAN

1. Construction Phasing Plan

Projects the size of the draft recommended plan must be implemented over a significant period of time and involve multiple construction phases. In this section, a construction sequencing and phasing plan is proposed. In general, it is best to group construction phases in order of priority. That is, critical construction should be completed first, followed successively by lower priority elements of the draft recommended plan, taking into consideration geographical location and relative proximity of priority Needs Areas.

Figure 4-9 presents the phasing plan for the sewer extension program and Figure 4-10 presents the phasing schedule. Table 4-5 presents the elements of each phase and the estimated present day capital cost (May 2008, ENR = 8,140) for each phase.

The construction phasing indicated herein is preliminary. The Board of Sewer Commissioners is recommended to develop a more comprehensive sequencing and phasing plan after Town Meeting approval of the final recommended plan. After Town Meeting, phases can be tailored to the specific plan that is approved.

Figure 4-10
Town of Tyngsborough
Phase IV CWMP/EIR
Implementation Schedule

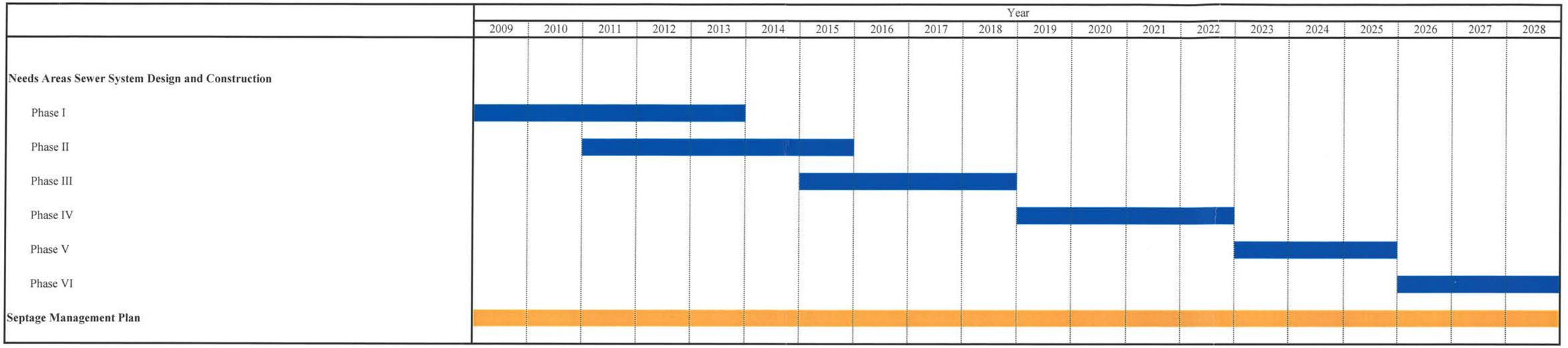


TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASES I THROUGH VI
ESTIMATED PROJECT COSTS

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]
Phase I	Gravity Sewer	21,336	L.F	$225	$4,800,654	$6,720,916
(2009-2012)	Grinder or Suction Lift Pumping Station	1	Each	$750,000	$750,000	$1,050,000
	Grinder or Suction Lift Pumping Station	1	Each	$500,000	$500,000	$700,000
	Force Main	4,359	L.F	$100	$435,906	$610,268
	Land Acquisition	2	Each	$100,000	$200,000	$280,000
	Low Pressure Sewer	2,279	L.F	$125	$284,899	$398,858
	Low Pressure Sewer Pumping System	26	Each	$12,500	$325,000	$455,000
	Brook Crossing	2	Each	$50,000	$100,000	$140,000
	Total Collection System Cost					**$10,355,042**
Phase II	Upgrade to Existing Collection System					
(2013-2015)	Railroad Crossing	1	L.S.	$165,000	$165,000	$231,000
	Merrimack River - Bridge Crossing Phase I					
	Borings	1	L.S.	$50,000	$50,000	$70,000
	Directional Drilling (Twin Force Mains)	1200	L.F	$400	$480,000	$672,000
	River Road Pump Station	1	L.S.	$750,000	$750,000	$1,050,000
	Phalanx Pump Station Upgrade	1	L.S.	$1,000,000	$1,000,000	$1,400,000
	Brook Crossing	1	Each	$50,000	$50,000	$70,000
	Proposed Work					
	Gravity Sewer	15,229	L.F	$225	$3,426,597	$4,797,235
	Grinder or Suction Lift Pumping Station	1	Each	$750,000	$750,000	$1,050,000
	Force Main	2,091	L.F	$100	$209,146	$292,804
	Land Acquisition	1	Each	$100,000	$100,000	$140,000
	Low Pressure Sewer	0	L.F	$125	$0	$0
	Low Pressure Sewer Pumping System	0	Each	$12,500	$0	$0
	Brook Crossing	4	Each	$50,000	$200,000	$280,000
	Total Collection System Cost					**$10,053,040**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASES I THROUGH VI
ESTIMATED PROJECT COSTS

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]
Phase III	Upgrade to Existing Collection System					
(2016-2018)	Gravity Sewer	1,475	L.F	$225	$331,875	$464,625
	Proposed Work					
	Gravity Sewer	15,567	L.F	$225	$3,502,593	$4,903,630
	Grinder or Suction Lift Pumping Station	0	Each	$500,000	$0	$0
	Force Main	1,936	L.F	$100	$193,582	$271,015
	Land Acquisition	0	Each	$100,000	$0	$0
	Low Pressure Sewer	2,514	L.F	$125	$314,234	$439,927
	Low Pressure Sewer Pumping System	37	Each	$12,500	$462,500	$647,500
	Brook Crossing	4	Each	$50,000	$200,000	$280,000
	Total Collection System Cost					**$7,006,697**
Phase IV	Gravity Sewer	9,524	L.F	$225	$2,142,936	$3,000,110
(2019-2021)	Grinder or Suction Lift Pumping Station	0	Each	$500,000	$0	$0
	Force Main	0	L.F	$100	$0	$0
	Land Acquisition	0	Each	$100,000	$0	$0
	Low Pressure Sewer	435	L.F	$125	$54,376	$76,127
	Low Pressure Sewer Pumping System	37	Each	$12,500	$462,500	$647,500
	Brook Crossing	1	Each	$50,000	$50,000	$70,000
	Total Collection System Cost					**$3,793,737**

[1] Estimated Project Cost includes Cost for Project Services.

TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASES I THROUGH VI
ESTIMATED PROJECT COSTS

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost [1]
Phase V (2022-2024)	Gravity Sewer	7,395	L.F	$225	$1,663,810	$2,329,334
	Grinder or Suction Lift Pumping Station	1	Each	$500,000	$500,000	$700,000
	Force Main	424	L.F	$100	$42,365	$59,311
	Land Acquisition	1	Each	$100,000	$100,000	$140,000
	Low Pressure Sewer	4,404	L.F	$125	$550,448	$770,627
	Low Pressure Sewer Pumping System	29	Each	$12,500	$362,500	$507,500
	Brook Crossing	2	Each	$50,000	$100,000	$140,000
	Total Collection System Cost					**$4,646,771**
Phase VI (2025-2027)	Gravity Sewer	4,621	L.F	$225	$1,039,678	$1,455,549
	Grinder or Suction Lift Pumping Station	0	Each	$500,000	$0	$0
	Force Main	47	L.F	$100	$4,672	$6,541
	Land Acquisition	0	Each	$100,000	$0	$0
	Low Pressure Sewer	5,830	L.F	$125	$728,776	$1,020,287
	Low Pressure Sewer Pumping System	32	Each	$12,500	$400,000	$560,000
	Brook Crossing	3	Each	$50,000	$150,000	$210,000
	Total Collection System Cost					**$3,252,376**

[1] Estimated Project Cost includes Cost for Project Services.

2. Project Implementation Timeline

The following are the tasks for implementation of projects for each year of the recommended plan in chronological order:

- Appropriate project funds at the Annual Spring Town meeting for the engineering services and construction;
- Execute a design and construction phase engineering contract, proceed with the engineering design and permitting, and prepare the SRF Loan funding application for construction in July.
- Prepare and submit a Project Evaluation Form (PEF) to the DEP. Currently, PEF's are due to the DEP by August 15 of each year. The PEF should include documentation that the Town has appropriated funds for the design and construction. The submittal of the PEF will allow the DEP to review and assign priority points to get the project on the calendar year "Priority List" for funding on January 1. Submittal of this CWMP to the DEP for approval will result in a higher rating for each project;
- Prepare and submit SRF Loan funding application and contract documents (plans and specifications) for construction of the project. Currently, loan applications and contract documents are due to the DEP by October 15;
- Submit required Permit Applications by October 15. Permits and environmental determinations should be in hand within 2 to 3 months from the date of submittal, depending on the review and approval by regulatory agencies. It is anticipated that a Conservation Commission Notice of Intent will be required for each project. In addition, it should be noted that completed contract documents are required for most permit applications. Such permits may consist of but not be limited to:
    - Step 1 Archaeological/Historical Reconnaissance Survey
    - Conservation Commission Notice of Intent
    - DEP Sewer Extension Permit
    - Massachusetts Highway Department for work on State Routes 3A and 113

  Appendix J includes a list of anticipated local, state, and federal permits.
- DEP approves the SRF application for funding and contract documents by December 31;

- Receive approval from DEP to advertise and publicly bid the project by February 1;

- Advertise and publicly bid the project (typically six to ten weeks depending upon on the size and type of project);

- Receive bids and prepare a SRF Part B for the project (typically two to four weeks to prepare Part B depending upon the size of project and completeness of the contractor information);

- Submit Part B to DEP for review and approval. Receive approval from DEP to award the project (typically up to six to eight weeks for DEP review and approval);

- Award to contractor (typically up to two months after bid opening dependent on DEP review and approval);

- Construction of project and SRF monthly draw-downs; and

- Complete record plans and do DEP SRF Closeout; (typically up to two months depending upon size of the project).

5.0 PUBLIC PARTICIPATION

A. GENERAL

As part of the scope of this Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR), the Town of Tyngsborough is conducting an extensive public education program. The purpose of this public education/participation program is to inform the public of the scope and progress of the planning study, to describe the results of the wastewater needs analysis and siting alternatives selection process, and to encourage public input throughout the entire planning process.

A Public Participation Work Plan was developed for the Town at the start of the Phase II CWMP, and was utilized in Phase III and will be utilized in Phase IV. This contains the proposed elements and schedule for public participation activities.

B. PUBLIC MEETINGS

The Town of Tyngsborough held a Public Informational Meeting on the results of the CWMP/DEIR Phase III Document on July 9, 2008 at the Town Hall on Bryants Lane. During the 30 day comment period for the Phase IV, Final CWMP/EIR, a public informational meeting will be held to present the Phase IV Final Recommended Plan and Final Environmental Impact Report and solicit comments for the public record.

Additional public meetings include Sewer Commission bi-weekly meetings and other departmental meetings as deemed necessary. Any meetings held with Town officials are posted as required in Town Hall.

C. RESPONSIVENESS SUMMARY

Earth Tech prepares and distributes a responsiveness summary after public meetings. The responsiveness summary identifies the public participation activities and documents significant questions, comments, concerns and suggestions by the public and responses by Town staff and Earth Tech/AECOM, including justification for rejection or incorporation of any comments into the document. The responsiveness summary is distributed to the active participants and the distribution list. Appendix K includes the Responsiveness Summary and Meeting Minutes from the Phase III Public Meeting.

D. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE MEPA PROCESS

The Town of Tyngsborough submitted the Phase III, CWMP/DEIR to MEPA on June 13, 2008. The comment period for Phase III CWMP/DEIR ended on July 25, 2008. On August 1, 2008, the Executive Office of Environmental Affairs (EOEA) issued the MEPA Certificate (EOEA No. 11788), which determined that the project adequately and properly complied with the Massachusetts Environmental Policy Act (G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00). A copy of the MEPA Certificate and the comment letters and responses can be found in Appendices A and B.

E. CIRCULATION LIST

MEPA Unit
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
(three copies)

Mr. Ron Lyberger
Department of Environmental Protection
One Winter Street, 5th Floor
Boston, MA 02108
(three copies)

Ms. Margo Webber
Department of Environmental Protection
627 Main Street
Worcester, MA 01603

Mr. Kevin Brander
Department of Environmental Protection
205BLowell Street
Wilmington, MA 01887

Ms. Brona Simon
Massachusetts Historical Commission
The Massachusetts Archives Building
220 Morrissey Boulevard
Boston, MA 02125

Massachusetts Highway Department
District No. 4
519 Appleton Street
Arlington, MA 02476
Attn: Environmental Reviewer

Mr. David Pincumbe
U.S. EPA - N.E. Region
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Town of Tyngsborough
Board of Selectmen
Town Hall
25 Bryants Lane
Tyngsborough, MA 01879

Mr. Allen Curseaden
Town of Tyngsborough
Sewer Commission
25 Bryants Lane
Tyngsborough, MA 01879
(5 copies)

Town of Tyngsborough
Board of Health
Town Hall
25 Bryants Lane
Tyngsborough, MA 01879

CIRCULATION LIST (Continued)

Town of Tyngsborough
Planning Board
Town Hall
25 Bryants Lane
Tyngsborough, MA 01879

Town of Tyngsborough
Conservation Commission
Town Hall
25 Bryants Lane
Tyngsborough, MA 01879

MassWildlife
Natural Heritage and Endangered
Species Program
North Drive
Westborough, MA 01581

Massachusetts Audubon Society
208 South Great Road
Lincoln, MA 01773

Ms. Michele Drury
Department of Conservation and Recreation
Office of Water Resources
251 Causeway Street, Suite 700
Boston, MA 02114

MEPA Reviewer
Department of Food and Agriculture
251 Causeway Street Suite 500
Boston, MA 02114

Ms. Kathleen Baskin, P.E.
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Mr. David Denommee
Tyngsborough Water District
87 Progress Avenue
Tyngsborough, MA 01879

Mark A. Young
City of Lowell Regional Wastewater Utility
451 First St. Blvd. (Rte 100)
Lowell, MA 01850

Sewer Commission
Town of Dracut Sewer Department
1196 Lakeview Avenue
Dracut, MA 01826-4791

Sewer Commission
Town of Chelmsford
50 Billerica Road
Chelmsford, MA 01821

Mario Leclerc, Superintendent
Division of Public Works NWTF
City of Nashua New Hampshire
Sawmill Road
Nashua, New Hampshire 03060

Doug Fainelli
The Gutierrez Company
One Wall St
Burlington, MA 01803

Ms. Isabel Tourkantonis
Camp Dresser and McKee
50 Hampshire Street
Cambridge MA 02139

Thomas French, Ph.D.
Commonwealth of Massachusetts
Division of Fisheries and Wildlife
One Rabbit Hill Road
Westborough, MA 01581

Northern Middlesex Council of
Governments
Gallagher Terminal, Floor 3B
115 Thorndike Street
Lowell, MA 01852-3308

Ashraf Gabour
Department of Environmental Protection
One Winter Street, 5th Floor
Boston, MA 02108

Jo-ann Taylor
Martha's Vineyard Commission
PO Box 1447
Oak Bluffs, MA 02557

6.0 STATE REVOLVING FUND LOAN ADMINISTRATION

A. GENERAL

As part of the scope of this Town-wide Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR), Earth Tech/AECOM submitted to the Massachusetts Department of Environmental Protection (DEP) a Calendar Year (CY) 2006 Project Priority List/Intended Use Plan (IUP) Project Evaluation Form (PEF) on August 15, 2005.

On March 1, 2006 the "Calendar Year 2006 Intended Use Plan and Project Priority List" was finalized by the Massachusetts Department of Environmental Protection, and the Town-wide Comprehensive Wastewater Management Plan Project – Phases III and IV was identified on the Intended Use Plan as a project (DEP/BRM Project Number CWSRF 2934) eligible for financial assistance from the State Revolving Fund effective January 1, 2007.

The Town approved the SRF package at Annual Town Meeting that took place on May 16, 2006 and continued on May 23, 2006.

On behalf of the Town of Tyngsborough and in accordance with the requirements of 310 CMR 44.00, et seq., and the SRF Planning Stage Application Instructions, Earth Tech/AECOM prepared and submitted on October 13, 2006 2 copies of the Town's SRF Application for the Comprehensive Wastewater Management Plan/Environmental Impact Report – Phases III and IV for DEP Division of Municipal Services and Water Pollution Abatement Trust review and approval.

The Project Approval Certificate (PAC) on this project was issued on December 29, 2006 as a restricted PAC. The Massachusetts Department of Environmental Protection restricted the PAC with the requirement that the scope of work for Phases III and IV be approved prior to the consultant's start of the work. Upon the Department's approval, the unrestricted PAC was issued on April 10, 2007.

B. GRANT/LOAN ADMINISTRATION

Grant/Loan administration services are being provided in accordance with DEP financial assistance guidelines and procedures. Liaison among the Town, DEP officials and Earth Tech/AECOM, and contract administration, are being carried out. Earth Tech/AECOM is assisting the Town in submitting (on average) monthly SRF drawdown requests to the DEP for reimbursement for costs incurred to undertake the study. Upon completion of the project, the Town and Earth Tech/AECOM will prepare and submit the required loan closeout documents.

The Town will then be responsible to budget for debt service payments to the Water Pollution Abatement Trust over the 20-year payoff period for this loan.

APPENDIX A
CWMP/EIR Phase III MEPA Certificate

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

August 1, 2008

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS

ON THE PHASE III: DRAFT EIR/FACILITIES PLAN

PROJECT NAME	: Comprehensive Wastewater Management Plan
PROJECT MUNICIPALITY	: Tyngsborough
PROJECT WATERSHED	: Merrimack
EOEA NUMBER	: 11788
PROJECT PROPONENT	: Town of Tyngsborough
DATE NOTICED IN MONITOR	: June 25, 2008

As Secretary of Environmental Affairs, I hereby determine that the Phase III: Draft Environmental Impact Report (EIR)/ Facilities Plan submitted for this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00). The Town may prepare and submit for review the Phase IV: Final Environmental Impact Report (EIR)/Facilities Plan.

Project Description

This project involves the development of a town-wide Comprehensive Wastewater Management Plan (CWMP) for Tyngsborough. The goal of the CWMP is to examine the full range of wastewater management needs and identify environmentally sustainable treatment and disposal alternatives that respond to the community's needs while meeting water quality and public health standards. The Town has identified alleviating non-point source pollution, protecting water quality, and promoting groundwater recharge as priorities. The Draft EIR/ Facilities Plan presents a recommended wastewater management plan that outlines how the Town of Tyngsborough will treat and dispose of its wastewater over the next 20 years.

Currently, one third of the Town's wastewater management needs are met through existing sewers in the areas of Mascuppic Lake, Dunstable Road and the southern end of Pawtucket Boulevard. The Tyngsborough Sewer Commission is responsible for administering, maintaining, and operating these sewage collection systems. Sewage is conveyed from Tyngsborough to the Lowell Regional Wastewater Utility (LRWU) for treatment via sewage collection systems Dracut, Chelmsford and Lowell. Wastewater flow limits are established through intermunicipal agreements (IMAs) with each of these communities. The remaining two thirds of the wastewater management needs are met through on-site systems located throughout the town. Seventy percent of the Town's water needs are met through local aquifers and, as noted previously, protection of groundwater resources is an important priority of the CWMP.

The Draft EIR concludes that the Town should manage present and future wastewater needs through a combination of sewer extensions and continued use of on-site disposal systems. The Town is proposing to extend sewers within seven of the Needs Areas, and convey wastewater flows to the LRWU for treatment and discharge, subject to the limitations contained in the IMAs. The plan includes construction of over 135,000 linear feet (lf) of sewers (gravity and low pressure), over 14,000 lf of force mains, 10 pump stations and 32 low-pressure pump stations. The cost of the plan is estimated at $42.4 million dollars. The construction of wastewater infrastructure is proposed in six phases from 2009 through 2028.

MEPA History

In the fall of 1998, the Town of Tyngsborough filed an Environmental Notification Form (ENF) for the CWMP. In December of that year, a Certificate on the ENF was issued defining a Special Review Procedure (SRP) for the CWMP and allowing a portion of the proposed plan, east of the Merrimack River, to proceed as Phase I prior to completion of the EIR for the overall project. On April 6, 2001, a Certificate was issued on a Notice of Project Change (NPC) granting the Town's request to add a section of sewers to the Phase I project to support the development of Sycamore Networks, a campus-style office park off Potash Hill Road.

The SRP required the Town of Tyngsborough to file four documents. Phase I: Needs and Growth Management Analysis included an assessment of existing conditions and an analysis of wastewater management needs. On May 15, 2003, a Certificate was issued on the Phase I document which indicated that it adequately and property complied with MEPA regulations and established the Scope for the Phase II document. Phase II: Screening of Alternatives included the development and screening of water resources and wastewater management alternatives to address the needs defined in the Phase I document. The report assessed 10 potential sites for locating wastewater management facilities and concluded that none of these sites were appropriate for one or several of the following reasons: soils (moderate to severe), land use restrictions (many sites are under conservation restrictions), water supply impacts (many are located within Interim Wellhead Protection Areas (IWPA)) or other environmental impacts (endangered species habitat, proximity to surface waters). On July 28, 2006, a Certificate was

issued on the Phase II document which indicated that it adequately and properly complied with MEPA, required the Town to re-evaluate some of the sites that were proposed to be sewered and directed the Town to prepare and submit the Phase III: Draft EIR/Facilities Plan. The Draft EIR further evaluates feasible options for wastewater management and presents a draft plan. The Phase IV: Final EIR/Facilities Plan will present the final proposed plan and incorporate and respond to any outstanding comments and issues.

Permits and Jurisdiction

The project is undergoing MEPA review and subject to preparation of a mandatory EIR pursuant to Section 11.03 (5)(a)(3) because it requires a state permit and will include construction of one or more new sewer mains ten or more miles in length. It will require sewer extension and connection permits from the Department of Environmental Protection (MassDEP) and review by the Natural Heritage and Endangered Species Program (NHESP). It may require Construction Access Permits from the Massachusetts Highway Department (MHD) and it may require review by the Massachusetts Historical Commission (MHC). Work proposed on conservation land may be considered a conveyance of an interest in land that would considered a land transfer and be subject to the Executive Office of Energy and Environmental Affair's (EEA) Article 97 Policy.

The project will require Orders of Conditions from the Tyngsborough Conservation Commission (and a Superseding Order of Conditions from MassDEP if the local Order is appealed). In addition, it may require National Pollutant Discharge Elimination System (NPDES) permits from the U.S. Environmental Protection Agency (EPA). Because the project will receive funding or financial assistance from MassDEP under the State Revolving Fund (SRF), MEPA jurisdiction extends to all aspects of the project that may cause Damage to the Environment.

Review of the Phase III: Draft EIR/Facilities Plan

The Phase III report further assesses alternatives for wastewater management, includes a draft wastewater management plan, identifies potential environmental impacts, identifies measures to minimize environmental impacts and includes responses to comments.

The report identifies sewer capacity available through existing intermunicipal agreements (IMAs) and describes associated flow limits. Total available capacity within existing IMAs is 1,430,000 gallons per day (gpd) and existing flows are estimated at 458,000 gpd. Remaining capacity for existing sewered areas and needs areas is 972,000 gpd. Projected wastewater flow based on full build-out is 1,775,200 gpd which exceeds the current available total capacity of 1.43 in the IMAs.

Based on the review of alternatives and technologies and the site selection analysis, the report identifies expansion of the existing sewer system for seven of the study areas and use of on-site wastewater disposal systems for remaining areas. Expansion of the sewer system is proposed for:

- Needs Area 1 – Norris Road;
- Needs Area 2 - Merrimack East;
- Needs Area 6 - Althea Lake;
- Needs Area 7 - Merrimack West;
- Needs Area 8 - Middlesex North;
- Needs Area 9 – Locust North; and
- Needs Area 11 - Flint Pond.

Based on comments on the previous document and in recognition of capacity constraints, extension of the sewer system is no longer proposed for Needs Area 3 – Coburn Road and Needs Areas 10 – Locust South. In addition, the extent of sewering has been minimized within Needs Area 1 - Norris Road and Needs Area 9 - Locust North. Corresponding flow allocations have been developed for each of the IMAs and are included in the following table:

Proposed Flow Allocations to Intermunicipal Agreements

IMA	IMA Capacity	Average Existing Flows	Available Capacity	Allocated Flow for Existing Sewered Areas	Allocated Flow for Needs Areas
North Chelmsford	350,000	56,000	294,000	184,000	110,000
Dracut	1,000,000	382,000	618,000	171,585	446,515
Lowell	80,000	20,000	60,000	45,489	14,511
TOTAL	**1,430,000**	**458,000**	**972,000**	**401,074**	**571,026**

To ensure that flow limits will not be exceeded, the Town will establish sewer districts and require monitoring and reporting of flows. The Town will develop and implement Septage Management Plans (SMPs) to effectively track and manage the construction, operation, and maintenance of these systems for areas that will continue to depend on them. The Draft EIR

describes the sewer districts and SMPs in general but does not identify specifically how these programs will be developed and implemented.

The Draft EIR indicates that the plan will be constructed in the following six phases: Phase 1: 2009 - 2013, Phase 2: 2011 - 2015, Phase 3: 2015 – 2018, Phase 4: 2019 to 2022, Phase 5: 2023 to 2025 and Phase 6: 2026 to 2028. The Draft EIR provides a general summary of potential environmental impacts associated with the project. It indicates that, because the majority of work will take place within existing roadways, environmental impacts will be minimized. Work is proposed within the buffer zone to wetlands, riverfront area, the 100-year floodplain and within rare species habitat. Phase 2 will include installation of a twin force main under the Merrimack River. To avoid and minimize impacts, the force mains will be installed with directional drilling. The EIR does not provide a detailed analysis of wetlands impacts nor does it quantify these impacts.

The Draft EIR indicates that installation of sewers will occur in roads near conservation land, including the Times Farm Area (Needs Area 2 - Merrimack East), the Lowell Dracut Tyngsborough State Forest (Needs Area 6 - Althea Lake) and the Hunter Property (Needs Area 7 - Merrimack West). In addition, the River Road pump station is proposed to be constructed within the Hunter Property.

Construction of proposed pump stations may impact historic and archaeological resources. The Draft EIR indicates that the Town will screen locations for impacts to historic and archaeological resources and will consult with MHC regarding review requirements. In addition, the Town will consult with NHESP to discuss siting and construction alternatives prior to filing related Notices of Intent.

To minimize extraneous clean water (Infiltration/Inflow (I/I)) within the system and to secure additional capacity, the Town is continuing efforts to study sources of I/I and develop a plan to eliminate sources of I/I. The Town has requested additional funds from MassDEP to build on its October 2002 I/I study and further evaluate I/I within the Long Pond area and the Mascuppic Lake area.

The Draft EIR includes a water balance impact analysis, as required. It indicates that under full build-out there will continue to be an export of water out of the Needs Areas within the Merrimack River watershed. The analysis notes that the Merrimack River watershed has been identified as a non-stressed basin and that the water will remain within the Merrimack River watershed. The analysis assumes that all developed and developable lots in Tyngsborough are or will become customers of the municipal water system.

Comments from MassDEP indicate that the proposed wastewater management plan is reasonable and appropriate and emphasize the importance of tracking flows and implementing I/I reductions and identify issues that should be addressed in the Final EIR. Comments from

NHESP identify areas that will be subject to its review and includes issues that should be addressed in more detail in the Final EIR.

Based on a review of the Draft EIR, consultation with state agencies and a review of comment letters, I hereby determine that the Draft EIR adequately and properly complies with MEPA and its implementing regulations. The Scope for the Final EIR is outlined below.

SCOPE

The Town should work with MassDEP to refine and finalize the Scope of Work for the Phase IV document. The Town should file the revised Scope of Work for the Phase IV: Final EIR/Facilities Plan document with the MEPA Office for publication of a Notice of Availability in the *Environmental Monitor*, and it should distribute copies of the revised Scope of Work to all commentors to the Phase III document.

Permitting and Consistency

The Final EIR should briefly describe each state permit required or potentially required for each phase of the project and it should demonstrate consistency with applicable performance standards.

Wastewater

As noted previously, MassDEP comments emphasize the importance of monitoring flows during the implementation phase of the recommended plan and ensuring that flows remain in compliance with the IMAs. Sewer extension permits will be required for implementation of each phase of the sewering work and MassDEP will review compliance with the IMAs at the time of application for each permit. MassDEP comments indicate its support for establishment of sewer districts and the development of SMPs. These programs and their implementation should be addressed in more detail in the Final EIR.

MassDEP also indicates that the SRF application should include a detailed Scope of Work for the I/I program and include a commitment to produce a final report and a schedule for implementation of the work. The Final EIR should summarize the findings of the I/I studies and provide a schedule for implementation.

The Final EIR should include plans at a readable scale that more clearly define proposed improvements, including installation of the force mains under the Merrimack River. The Town should consult with MassDEP regarding the level of detail of plans to be included in the Final EIR.

Wetlands and Rare Species

The Final EIR should identify the wetlands and buffer zones impacted by the project, quantify the impacts, describe the nature of the impacts (temporary or permanent), and show the areas of proposed construction in the vicinity of the wetlands on a site plan at a readable scale. The Final EIR should demonstrate consistency with performance standards in the wetlands regulations.

Comments from NHESP identify additional areas that are within Priority and Estimated Habitat as indicated in the 12th Edition of the MA Natural Heritage Atlas. NHESP indicates that Needs Areas 2, 3, 6, 7, 8, 9, 10, and 11 are located within Priority and Estimated Habitat. In addition, initial review of the working draft of the 13th Edition of the Massachusetts Natural Heritage Atlas indicates that Study Areas 3, 8, and 10 will likely not be mapped as Priority Habitat and that designated habitat within Needs Area 6 will likely be expanded. The Final EIR should provide an updated map and plans that clearly illustrates the location of mapped habitat in relation to proposed projects.

Comments from NHESP express concern that extension of the sewer system has the potential to affect the hydrology within the sub-basins of the watershed, which may affect state-listed species and their habitats, and identify the need for more information regarding water supply. These comments indicate that the Town should continue to explore alternatives to minimize potential impacts to water hydrology. The Final EIR should address NHESP comments regarding the impacts of hydrology on rare species and consider how the Town can minimize potential impacts through further reduction in sewering, through infiltration and/or through expanded water conservation strategies.

NHESP comments note that some portions of the project (e.g. work within existing roadways or within ten feet of an existing roadway) may be exempt from Massahusetts Endangered Species Act (MESA) review pursuant to 321 CMR 10.14. MassDEP comments note that permitting under the limited project provisions of the wetlands regulations (310 CMR 10.24 (7) (b)) will require confirmation from NHESP that proposed activities will not have an adverse impact on areas within Priority or Estimated Habitat of Rare Wildlife.

Article 97 Land

The Draft EIR indicates that the project may impact conservation land which is protected under Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts. These areas include the Lowell/Dracut/Tyngsboro State Forest, the Times Farm Area and the Hunter Property. The Final EIR must describe all impacts to Article 97 land and how these impacts will be mitigated. It should identify land ownership and the type (temporary or permanent) and extent of impacts. The Final EIR should include plans that show the areas of proposed construction within or adjacent to Article 97 land on a site plan at a readable scale. It

should include an analysis of the project's consistency with the EEA's Article 97 Policy and address the requirements for an alternatives analysis and compensatory parkland. I encourage the Town to consult with EEA's Division of Conservation Services (DCS) staff regarding the applicability of the Article 97 Policy to project elements.

Article 97 addresses the high value placed upon the preservation of existing protected open space lands. To further the Commonwealth's open space goals, EEA's Article 97 Land Disposition Policy requires that all feasible options to avoid the transfer/change in use of public land have been examined. The EIR should identify any alternative sites that would avoid or minimize impacts to Article 97 land and provide a detailed explanation as to why these other alternative sites would not be feasible.

If alternative sites prove infeasible, the Final EIR should include a proposed Article 97 mitigation package consistent with the EEA Policy identifying compensatory open space land and/or parkland (at a 1:1 basis, at a minimum, of replacement land to converted land) that could be permanently protected. The EIR should provide a detailed description of the land area(s) proposed as Article 97 compensation and should also discuss the value of the land in terms of the resources they provide and the opportunities for active and/or passive recreation they afford. I note that compensatory mitigation for previous projects has been at a higher than 1:1 basis (and as high as 7:1).

Water Supply

The proposed sewer alignments extend into public water supply recharge areas, including Zone IIs and Interim Wellhead Protection Areas (IWPAs). The Final EIR should identify any sewer extensions into Zone I areas for the public water supply wells and confirm that any extensions into Zone I areas are necessary to eliminate existing sources of pollution in accordance with 314 CMR 7.06(3). As noted previously, NHESP comments express concern about the export of water from watershed sub-basins and potential impacts on rare species. The comments note that plans for water supply will have a significant impact on the export of water from sub-basins. The water balance analysis assumes that all developed and developable lots in Tyngsborough are or will become customers of the municipal water system. The Final EIR should assess the accuracy of this assumption to assist NHESP in assessing the impact of proposed projects on rare species habitat.

Greenhouse Gases (GHG)

Consistent with this Administration's efforts to address climate change and promote clean energy and energy efficiency, MassDEP is revising its selection criteria for the SRF Program to include incentives for wastewater and drinking water projects that incorporate renewable energy and energy conservation measures. MassDEP's website (http://www.mass.gov/dep/energy.htm - massdep) identifies eligible project types including the use of energy efficient motors and pumps.

I strongly encourage the Town to evaluate opportunities to reduce greenhouse gas emissions by designing and selecting equipment to optimize energy-efficiency.

Mitigation

The Final EIR should include a separate section on mitigation measures, which should include draft Section 61 Findings for all state permits and a summary table of proposed mitigation. The Final EIR should provide a clear description of mitigation measures, identify the cost of measures, provide a schedule for implementation and identify parties responsible for funding and implementing the mitigation measures.

Responses to Comments

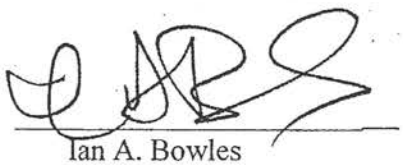
To ensure that the issues raised by commentors are addressed, the Final EIR should include responses to comments. This directive is not intended to, and shall not be construed to, enlarge the scope of the Final EIR beyond what has been expressly identified in the initial scoping Certificate or this Certificate. The Final EIR should include a copy of this Certificate and a copy of each comment letter received. I defer to the Town as it develops the format for this section, but it should provide clear answers to questions raised.

Circulation

The Final EIR should be circulated in compliance with Section 11.16 of the MEPA regulations and copies should be sent to any state agencies from which the Town will seek permits or approvals, to the list of "comments received" below, and to Tyngsborough officials. A copy of the Final EIR should be made available for review at the Tyngsborough public library.

As noted previously, the Town should file the revised Scope of Work for the Phase IV: Final EIR/Facilities Plan document with the MEPA Office for publication of a Notice of Availability in the *Environmental Monitor*, and it should distribute copies of the revised Scope of Work to all commentors to the Phase III document.

August 1, 2008
Date



Ian A. Bowles

Comments received:

7/25/08	Department of Environmental Protection/Northeast Regional Office (DEP/NERO)
7/23/08	Division of Fisheries & Wildlife/Natural Heritage & Endangered Species Program (DFW/NHESP)
7/25/08	Northern Middlesex Council of Governments
7/25/08	Town of Tyngsborough/Economic Development Committee

IAB/CDB/cdb

DB

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST REGIONAL OFFICE
205B Lowell Street, Wilmington, MA 01887 • (978) 694-3200

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

July 25, 2008

Ian A. Bowles, Secretary
Executive Office of
100 Cambridge Street
Boston MA, 02114

Attn: MEPA Unit

RE: Tyngsborough
Comprehensive Wastewater Management Plan
(CWMP) and Draft Environmental Impact
Report, Phase III, CWMP/DEIR
EEA # 11788

Dear Secretary Bowles:

The Department of Environmental Protection Northeast Regional Office has reviewed the *Comprehensive Wastewater Management Plan and Draft Environmental Impact Report Phase III,* submitted by the Town of Tyngsborough, which evaluates alternatives for wastewater disposal and presents a recommended municipal wastewater management plan for Tyngsborough (EEA #11788). Construction of wastewater infrastructure is separated into six phases between 2009 and 2028, for a total estimated cost of $42.4 million. The CWMP consists of four phases: the first phase developed a Needs and Growth Management Report, the Phase II Report was a screening of wastewater alternatives, Phase III is a Draft EIR/CWMP, and Phase IV will be an FEIR/Final CWMP. The Department provides the following comments.

General Comments

The major finding of the Phase III report is that the Town should manage present and future wastewater needs through a combination of sewer extensions and continued use of on-site disposal systems. For a number of the identified needs areas, the Town is proposing to extend sewers, and convey wastewater flows to the Lowell Regional Wastewater Utility for treatment and discharge, subject to the limitations contained in the Town's Intermunicipal Agreements (IMA) with Lowell, Chelmsford, and Dracut. The areas identified for sewer extensions are Merrimack West, Merrimack East, Middlesex North, Flint Pond, and Althea Lake. The remaining study areas are to continue to be served by on-site wastewater systems (pursuant to Title 5), including Coburn Road, Norris Road, and Locust Street North/South, which were previously identified in the Phase I Needs Analysis as targets for sewering. The Phase IV Report and Final CWMP will consider alternatives for implementing a septage management plan to effectively track and manage the construction, operation, and maintenance of these systems.

MassDEP has reviewed the recommended plan and finds that this combination of sewering and use of on-site systems is reasonable and appropriate, subject to the following comments, which should be addressed in the Final Phase IV CWMP/EIR.

Wastewater Flow

The Town must remain within the limitations included in the IMAs. As noted in MassDEP comments on the Phase II Report, it is extremely unlikely that any further capacity will be provided to the Town by Lowell, Dracut, or Chelmsford, since flows to the Lowell wastewater treatment plant are near or at their permit limit, and efforts to control flows to the plant through Lowell's combined sewer overflow (CSO) abatement plan that will have a long implementation period. Based on this constraint, the Town must monitor flows during the implementation phase of the recommended plan, and ensure that flows remain in compliance with the IMAs. MassDEP sewer extension permits will be required for implementation of each phase of the sewering work, and MassDEP will review compliance with the IMAs at the time of application for each permit.

Since managing flows will be so critical to implementation of the plan, the Town should proceed with an aggressive infiltration/inflow (I/I) program to identify and minimize these extraneous flows to the sewer system. Appendix D includes a draft scope of work for an I/I study. As noted in the report, the Town is eligible to receive financial assistance from the State Revolving Fund (SRF) Loan program for the I/I study under the Calendar Year 2008 program. At the time an SRF application is formally submitted, MassDEP NERO will conduct a formal review of the scope of work. The Town should put additional detail into the scope, and also include provisions for a final report and implementation timeframes for the work, as an element of their SRF application. The Final CWMP should include an update on the status of the work.

The report also notes that the Town will consider a sewer system expansion control policy and/or a sewer overlay district to establish a clear local regulatory framework for connections to the proposed sewer extensions. MassDEP supports this recommendation. The Final CWMP/EIR should include a final determination on the use of these management tools, and adoption of local requirements must be in compliance with all relevant Massachusetts General Laws.

Specific Comments

Page 3-3 While the needs analysis concludes that a number of the needs areas are unsuitable for long-term use of on-site systems, it is unrealistic to assume that all new and future on-site systems would require innovative/alternative systems in the analysis presented.

Page 3-31 The Final CWMP/EIR should discuss the need for any approvals or action under Article 97 (of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts) for work done in or near the Lowell/Dracut/Tyngsboro State Forest.

Page 3-32 The proposed sewer alignments extend into public water supply recharge areas,

including Zone IIs and Interim Wellhead Protection Areas (IWPAs). The Final CWMP/EIR shall specifically identify any sewer extensions into Zone I areas for the public water supply wells, and confirm that any extensions into Zone I areas are necessary to eliminate existing sources of pollution in accordance with 314 CMR 7.06(3).

Page 3-41 The Final CWMP/EIR should include at least a preliminary assessment of the present and future staffing needs to effectively operate, maintain, and manage the proposed wastewater management facilities.

Page 3-48 The Final CWMP/EIR should include a discussion of all required state, local, and federal permits for the recommended plan.

Wetlands

The Final CWMP/FEIR should identify the wetlands and buffer zones impacted by the project and show the areas of proposed construction in the vicinity of the wetlands on a site plan at a readable scale. It should be demonstrated that the performance standards in the wetlands regulations would be adhered to for alteration of each area near wetlands. If areas of impacts also are Priority or Estimated Habitat of Rare wildlife, it should be affirmed by the Natural Heritage Endangered Species Program that the project would not have any adverse impact, in order to be permittable under the limited project provisions in the wetlands regulations, 310 CMR 10.24 (7) (b). The Draft CWMP/FEIR addresses wetlands impacts in general terms only, suggesting that the potential impacts would impact wetlands buffer zones, Riverfront Areas, 100-year floodplains, as the result of directional drilling for two force mains across the Merrimack River, and construction of sewer lines, and pump stations.

Greenhouse Gas (GHG)

The MassDEP, Clean Water Act, State Revolving Fund (SRF) program will be revising its selection criteria to include incentives for wastewater and drinking water projects that incorporate renewable energy and energy conservation measures. As explained on the MassDEP website, http://www.mass.gov/dep/energy.htm - massdep, "(e)ligible project types may include: renewable energy sources such as wind power, micro-turbine systems, photovoltaic cells, fuel cells, digester gas use for power and or heat; green building (LEED Certification); new energy efficient equipment, (e.g., lighting, HVAC systems, motors, pumps, etc.); and/or energy conservation retrofits." Given that this sewer project will require new pump stations and equipment, the town is encouraged to evaluate opportunities to reduce greenhouse gas emissions by designing and selecting equipment to optimize energy-efficiency.

The town also should be aware that MassDEP, in collaboration with MEPA Office in the Executive Office of Energy and Environmental Affairs (EEA) and the Division of Energy Resources (DOER) is promoting water conservation measures, infiltration and inflow removal, and other off-site mitigation at water and wastewater utilities, when projects are subject to the MEPA Greenhouse Gas Policy and an environmental impact report (EIR) is required. Project host cities and towns can benefit from offsite mitigation by working with the state agencies and developers to ensure implementation of greenhouse gas reducing measures that are committed to

in EIRs. Additional information on the GHG policy requirements is available on the MEPA website: http://www.mass.gov/envir/mepa/secondlevelpages/currentissue.htm.

The MassDEP Northeast Regional Office appreciates the opportunity to comment on this proposed project. Please contact Kevin Brander at (978) 694-3236 for additional information on wastewater issues or Nancy Baker, MEPA Review Coordinator with general questions at (978) 694-3338.

Sincerely,

John D. Viola
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission
Kevin Brander, Rachel Freed, Nihar Mohanty, Jill Provencal, MassDEP-NERO
John Felix, Ron Lyberger, MassDEP-Boston
Mark Young, Executive Director, LRWWU
Michael Buxton, Dracut Sewer Division

Buckley, Deirdre (EEA)

From: Baker, Nancy (DEP)
Sent: Friday, July 25, 2008 11:14 AM
To: Buckley, Deirdre (EEA)
Subject: Tyngsborough CWMP comment attached

Attachments: 11788.DEIR-CWMP TYNGSBOROUGH Phase III 708.doc

For InterAgency Policy Deliberations

Hi Deidre,

Please recycle the unsigned copy when you get the original in the interoffice mail.

Regards,
Nancy

11788.DEIR-CWMP
TYNGSBOROUGH P..

MassDEP- Northeast Region
205B Lowell Street
Wilmington, MA 01887

Nancy Baker
Phone: 978/694/3338
Fax: 978/694-3499
Email: nancy.baker@state.ma.us

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

July 23, 2008

Ian Bowles, Secretary
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office
Deidre Buckley, EOEEA No. 11788
100 Cambridge St.
Boston, Massachusetts 02114

Project Name:	*Comprehensive Wastewater Management Plan*
Proponent:	*Town of Tyngsborough*
Location:	*Various locations throughout Tyngsborough*
Project Description:	*Comprehensive Wastewater Plan*
Document Reviewed:	*Draft Environmental Impact Report*
EOEEA #:	*11788*
NHESP File Number:	*06-20220*

Dear Secretary Bowles:

The Natural Heritage & Endangered Species Program (NHESP) of the MA Division of Fisheries & Wildlife has reviewed the Town of Tyngsborough's Comprehensive Wastewater Management Plan/Draft Environmental Impact Report (DEIR) for the above referenced project and would like to offer the following comments.

At this time, Study Areas 2, 3, 6, 7, 8, 9, 10, and 11 are located within *Priority* and *Estimated Habitat* as indicated in the 12th Edition of the MA Natural Heritage Atlas. Projects or activities proposed within Priority Habitat require review through a direct filing with NHESP for compliance with the Massachusetts Endangered Species Act (MESA 321 CMR 10.00).

The MESA is administered by the NHESP of the Massachusetts Division of Fisheries & Wildlife, and prohibits the "take" of state-protected species, which includes actions that "...harm...kill...disrupt the nesting, breeding, feeding or migratory activity... Disruption of nesting, breeding, feeding, or migratory activity may result from, but is not limited to, the modification, degradation, or destruction of Habitat" of state-listed wildlife species (321 CMR 10.02).

Priority Habitat boundaries are periodically updated to reflect the latest state-listed species records, understanding of species biology and habitat requirements, and GIS technology and data. Please note that the 13th Edition of the Massachusetts Natural Heritage Atlas will be available in October 2008. Initial review of the working draft indicates that Study Areas 3, 8, and 10 will likely not be mapped as Priority Habitat in the 13th Edition of the Massachusetts Natural Heritage Atlas and designated Priority Habitat areas located within Study Site 6 will likely be expanded.

Study Sites 2, 7 and 11 are mapped as Priority Habitat for the Cobra Clubtail (*Gomphus vastus*), A Clubtail Dragonfly (*Stylurus spiniceps*), the Umber Shadowdragon (*Neurocordulia obsoleta*), and the Riverine

Clubtail (*Stylurus amnicola*) which are all state-listed dragonfly species.. In addition, Study Site 11 is also mapped as Priority Habitat for the Blue-Spotted Salamander *(Ambystoma laterale)*. Study Sites 6 and 9 are mapped as Priority Habitat for the Blanding's Turtle *(Emydoidea blandingii)*. In addition, Study Site 9 is also mapped near habitat for the Blue-Spotted Salamander. The Merrimack River also provides habitat for a variety of state-listed species including fish, the Bald Eagle, invertebrates and plant species. These species are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00).

Dragonfly nymphs spend the majority of their lives as aquatic nymphs feeding upon aquatic life within the river. They are sensitive to poor water quality and can be impacted by pollution, changes in nutrient levels, erosion, and changes in water temperature and flow regimes. The Blue Spotted Salamander breeds in seasonal pools and swamps, usually in water less than 40 cm deep, and can travel fairly long distances from their breeding sites. Loss of forested uplands around breeding habitats and disturbances to those breeding sites can be detrimental to populations of this species. The Blanding's Turtle feeds, breeds, and overwinters within aquatic wetland habitats including shrub swamps, vernal pools, and marshes. Blanding's Turtles migrate over long distances (thousands of feet) as they move from wetlands to nest sites, and between patches of suitable wetland habitat.

The NHESP commends the Town of Tyngsborough for their effort to improve water quality. The DEIR outlines alternative options established for treating wastewater generated in each of the study areas. Alternative 1 includes connecting residential homes and commercial facilities to a regional wastewater treatment facility, where wastewater will be treated and discharged. It is unclear to the NHESP's if the Study Areas are currently serviced by private wells. The DEIR states that, "it is assumed that all developed or developable lots in Tyngsborough are or will be customers of the municipal water system". Alternative 2 includes upgrading existing septic systems with on-site innovative/alternative systems.

The NHESP is concerned that Alternative 1 may have the potential to affect the hydrology within the sub-basins of the watershed, which may affect state-listed species and their habitats. The DEIR states that no negative impacts are anticipated to surface and groundwater resources, although there will be an export of water from the Needs Areas. If private wells are abandoned and these locations receive municipal water this may not be a concern. Please note that any proposed public wells or increases in water withdrawal at existing wells, that are located within Priority Habitat, may also require review pursuant to the MESA.

The NHESP recommends that the proponent continue to explore alternatives to minimize potential impacts to water hydrology within the study areas while improving water quality. Such measures could include: treating and infiltrating wastewater within the sub-basin versus the water being treated and released outside of the sub-basins, the treated water could be pumped from the treatment facility back to the areas of concern for consumption and the private wells could be discontinued, a combination of both regional treatment and local infiltration could be utilized, and to continue to explore and implement measures of water conservation strategies.

The applicant is encouraged to consult with the NHESP concerning potential state-listed species concerns associated with the project. Please note that portions of Alternative 1 and Alternative 2 may be exempt from a MESA review pursuant to 321 CMR 10.14.

We appreciate the opportunity to comment on this project. If you have any questions about this letter, please contact Rebecca Skowron, Endangered Species Review Biologist, at (508) 389-6343.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Town of Tyngsborough
Earth Tech, Inc.
Tyngsborough of Board of Selectmen
Tyngsborough Conservation Commission
Tyngsborough Planning Board
DEP Northeastern Regional Office, MEPA Coordinator

DB

NMCOG

Northern Middlesex Council Of Governments
Gallagher Terminal, Floor 3B, 115 Thorndike Street, Lowell, MA 01852-3308
Tel: 978-454-8021, FAX: 978-454-8023, E-mail: mail@nmcog.org

TRANSMITTAL FORM

TO: Ian A. Bowles, Secretary
Executive Office of Env. Affairs

FROM: George Russell
Northern Middlesex Council of Governments

FAX #: 617-626-1181

DATE: July 25, 2008

NUMBER OF PAGES INCLUDING COVER SHEET: 2

MESSAGE:

The Northern Middlesex Council of Governments comments for EOEA#11788 Phase III Comprehensive Wastewater Management Plan (CWMP) Draft EIR(DEIR), Tyngsborough, MA is attached. Original will follow by mail.

If document is incomplete or illegible, please contact the sender listed above.

DB

NMCOG

Northern Middlesex Council of Governments

A Multi-Purpose
Regional Planning
District Serving:

Billerica
Chelmsford
Dracut
Dunstable
Lowell
Pepperell
Tewksbury
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Westford

James G Silva
Chair

Beverly A. Woods
Executive Director

Gallagher Terminal
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115 Thorndike Street
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01852-3308

TEL.#(978) 454-8021

FAX #(978) 454-8023

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Printed on Recycled Paper

July 25, 2008

RECEIVED
JUL 25 2008
MEPA

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office
100 Cambridge Street
Suite 900
Boston, MA 02114-2509

RE: EOEA #11788/NMCOG #512
Phase III Comprehensive Wastewater Management Plan (CWMP)/Draft EIR (DEIR),
Tyngsborough, MA

Dear Secretary Bowles:

The Northern Middlesex Council of Governments has reviewed the DEIR submitted by Earth Tech, Inc. for the Town of Tyngsborough for the above referenced project. The project builds upon the Phase I and Phase II reports and includes recommendations for wastewater management in those areas of the Town where on-site septic systems are inadequate.

NMCOG has reviewed the DEIR and would submit the following comments:

- The CWMP appears to be in compliance with DEP's policy of "no net loss" as well as the basic concepts of avoiding, minimizing and mitigating impacts on wetland resource areas.
- The Town has an ongoing I & I inspection program which will continue to help reduce overall flows.
- The positive environmental benefits of sewer installation in areas where septic systems are failing or inadequate have been well documented and far outweigh impacts associated with sewer construction.

If you have any questions regarding these comments, please feel free to contact me at 978-454-8021, extension 20.

Sincerely,

Beverly Woods

Beverly Woods
Executive director

cc: Town of Tyngsborough: Town Administrator
Board of Selectmen
Planning Board
Sewer Commission
Highway Superintendent
Conservation Commission
Board of Health
NMCOG Councilors
James Barsanti, P.E., Earth Tech, Inc.

[I:\mepa\tyngsboro\EOEA11788NMCOG512-07-25-08]

DB

TOWN OF TYNGSBOROUGH
Economic Development Committee
25 Bryants Lane
Tyngsborough, MA 01879
Tel: 978 649-2300 Ext. 100 Fax: 978 649-2320
E-mail: rcashman @ tyngsboroughma.gov

July 25, 2008

Secretary of Environmental Affairs
Executive Office of Environmental Affairs
Attention: MEPA Office
EOEA No. 11788
100 Cambridge Street, 9th Floor, Suite 900
Boston, MA 02114

RE: Town of Tyngsborough CWMP
Phase III – CWMP-DEIR

To Whom It May Concern:

The Economic Development Committee for the Town of Tyngsborough would like to go on record in strong support of the Phase III Draft CWMP/DEIR prepared for the Town of Tyngsborough by Earth Tech, Inc.

The plan coincides with the Town's Economic Development Plan and the Master Plan, and, as such is an important part of our environmental, economic, and developmental existing and future needs. In addition, we believe that the report adequately addresses the required parameters that were called for by the Phase III EIR.

We look forward to continuing on to the Phase IV Final CWMP as soon as possible.

Thank you.

Sincerely,

Rosemary Cahman
Town Administrator

cc: Sewer Commission
Board of Selectmen

APPENDIX B

Phase III CWMP/EIR MEPA Certificate Response to Comments

APPENDIX B – RESPONSE TO COMMENTS

The MEPA Certificate (EOEA No. 11788), issued by the Secretary of Environmental Affairs to the Town of Tyngsborough, requires the preparation of a Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR) for the Town and establishes a special procedure for review of this project. The special procedure is a phased review during which the scope for future phases is based in large part on the results of the preceding phase. A project description was included in the MEPA certificate. The Phase I is the" Needs and Growth Management". The Phase II scope is the "Screening of Alternatives". The Phase III scope is the "Draft CWMP and EIR" and the Phase IV scope is the "Final CWMP and EIR". Each phase of this project will be distributed for review according to MEPA regulations. Therefore, there will be opportunity for the appropriate public comment period for all interested parties to contribute to the outcome of this project.

The Town of Tyngsborough submitted an Environmental Notification Form (ENF) to MEPA in the Fall of 1998. The comment period for the ENF ended on November 14, 1998 and on December 1, 1998 the Executive Office of Environmental Affairs (EOEA) determined that the project required an Environmental Impact Report (EIR) and established a Special Procedure for review of the required EIR. The Phase I "Needs and Growth Management" Report, was submitted March 1, 2003, and on May 15, 2003 the EOEA determined that the Phase I Report adequately and properly complies with the MEPA regulations and the special procedure. Included in this section are the responses to the comments letter on the Phase I "Needs and Growth Management" Report. The Phase II "Screening of Alternatives" Report was submitted on June 15, 2006, and on July 28, 2006 the EOEA determined that the Phase II Report adequately and properly complies with the MEPA regulations and the special procedure. Included in this section are the responses to the comments letter on the Phase II "Screening of Alternatives" Report. The Phase III Comprehensive Wastewater Management Plan and Draft Environmental Impact Report was submitted on June 13, 2008 and on August 1, 2008 the EOEA determined that the Phase III Report adequately and properly complies with the MEPA regulations.

The Secretary requested that the following items be addressed in the Phase IV Report:

1. Brief descriptions of each permit required or potentially required for each phase of the project and should demonstrate consistency with applicable performance standards.
2. .Discussion of sewer districts and development of Septage Management Plan
3. Provide plans at a readable scale that more clearly define the proposed improvements, including installation of the force mains below the Merrimack River.
4. Identify wetlands and buffer zones impacted by the project, quantify the impacts and describe the nature of the impacts, and show the areas of proposed construction in the vicinity of the wetlands.
5. Provide updated habitat maps.
6. Address potential impacts to hydrology from sewer system extensions.
7. Identify alternative sites that would avoid or minimize impacts to Article 97 land and provide detailed explanation why the alternative sites are not feasible. If alternative sites are infeasible, provide compensatory area.
8. Identify any sewer extensions in Zone I areas and confirm that they are necessary to eliminate existing sources of pollution. Confirm assumptions of water balance estimates with respect to existing and projected customers of municipal water system.
9. Discussion of reduction of greenhouse gases.
10. Mitigation measures and draft Section 61 findings.

Below is a list of letters received by the MEPA Office during the public comment period for the Phase III Report:

1. Department of Environmental Protection – Northeast Regional Office
2. Division of Fisheries & Wildlife/Natural Heritage & Endangered Species Program
3. The Northern Middlesex Council of Governments.
4. Town of Tyngsborough/Economic Development Committee

Each letter includes a variety of issues and concerns, which are summarized in the paragraphs that follow. A response to the comments and issues immediately follow each item. The complete MEPA certificate with the comment letters is provided in Appendix A.

1. The following summarizes the general and specific comments and responses for the July 25, 2008 letter from John D. Viola, Deputy Regional Director, Department of Environmental Protection:

   a. *The Phase IV Report will consider alternatives for implementing a Septage Management Plan to track and manage the construction, operation and maintenance of these systems.*

      Section 4 of the Report describes the components of the Septage Management Plan. Presently, the Town, through the Board of Health, encourages "Best Practice" policies for its residents and commercial establishments with on-site wastewater disposal systems. This includes public awareness programs via mailings and articles in local community newspapers describing the components of a septic system and the need for owners to routinely have the septic tank contents pumped and inspected. It is anticipated that the Town will adopt a more formal Septage Management Plan during the initial phases of the implementation of the CWMP.

   b. *The Town must monitor flows during implementation of the recommended plan to ensure compliance with the IMA.*

      The Town has 5 metering stations that monitor and record flows to each of the IMA communities on a weekly basis and prepares reports that compile the flows against billing. Monitoring of flows during the implementation of the recommended plan will occur in a similar fashion.

   c. *Provide Scope of Work for Infiltration/Inflow Study*

      The Scope of Work and schedule for the Infiltration/Inflow Study is presented in Appendix D.

d. Provide additional detail regarding creation of a sewer overlay districts

Additional detail regarding the creation of Sewer Districts is presented in Chapter 4. The Town is required by its Intermunicipal Agreements (IMA) to monitor flows. It is anticipated that when the Town reaches 75% to 80% of the flow capacity of the IMA's, the Sewer Commission will initiate the process to establish Sewer Districts to provide the regulatory framework to control future connections to the sewer extensions. The adoption of Sewer Districts will be enacted in compliance with all relevant Massachusetts General Laws.

e. Page 3-3 - While the needs analysis concludes that a number of the areas are unsuitable for long-term use of on-site systems, it is unrealistic to assume that all new and future on-site systems would require innovative/alternative systems in the analysis presented

The needs analysis in Chapter 3 has been revised to include both conventional septic systems and innovative/alternative systems based on an assumption that 50% of the systems are conventional and 50% are innovative/alternative.

f. Page 3-31 - The Final CEMP/EIR should discuss the need for any approvals or action under Article 97 of the Articles and Amendment to the Constitution of the Commonwealth of Massachusetts) for work done in or near the Lowell/Dracut/Tyngsboro State Forest or on other conservation land

The pump station on River Road is proposed to be located on existing Town owned conservation land. In order to comply with the capacity limits of the North Chelmsford IMA, the Town's plan for sewering portions of the proposed system on the west side of the Merrimack River requires constructing a new pump station on River Road and conveying wastewater via a twin force main below the Merrimack River utilizing horizontal directional drilling construction methods to the existing Phalanx Street Pump Station on the east side of the Merrimack River to utilize capacity in the Dracut

IMA. Chapter 4, Figure 4-8 depicts the conceptual location of this pump station and force main. By locating the pump station on this property and at this location, it allows use of a right-of-way that the Town owns on the east side of the Merrimack River for the twin force main construction. Locating the pump station on other parcels (with the exception of any lots that directly abut the conservation land) on the west side of the Merrimack River would preclude the use of this right-of-way and would make the proposed force main crossing unfeasible because the force main alignment would have to be constructed below existing structures.

With the exception of the construction of the pump station and its appurtenances, the portions of the property that are temporarily impacted during construction will be restored. During preliminary design, the Town will determine the permanent impact of the proposed construction on the conservation land and prepare a compensatory mitigation package that includes restoration of the disturbed areas, considers any active or passive recreational features that can be incorporated into the design, and provides compensatory open space land at a minimum of 1:1 basis. Presently a vacant private parcel exists along the Merrimack River approximately 1,000 feet south of the proposed pump station location. The lot is approximately 1.25 acres in size. This lot could be purchased by the Town, accessed via new easements along the river, and protected as open space and could provide mitigation greater than a 1:1 basis. Chapter 4, Figure 4-3 depicts the potential mitigation area.

If it is determined during preliminary design that locating the pump station on the Town owned conservation land cannot be approved under Article 97, the Town will pursue the purchase of private property that abuts the Town owned conservation land to locate the pump station. This will allow the Town to utilize the right-of-way on the east side of the Merrimack River for the force main alignment.

g. *Page 3-32 – The proposed sewer alignments extend into public water supply recharge areas, including Zone IIs and Interim Wellhead Protection Area (IWPAs). The Final CWMP/DEIR shall identify any sewer extensions into Zone I areas for the public*

water supply wells, and confirm that any extensions are necessary to eliminate existing sources of pollution in accordance with 314 CMR 7.06(3).

Figure H-1 in Appendix H identifies the portions of the sewer system that extend into any Zone I Areas. These sewer extensions are proposed within existing street right of ways. These sewer extensions are proposed to eliminate existing and or future on-site wastewater disposal systems that may be sources of pollution. The design of sewers in these areas will consider measures to mitigate the potential for exfiltration including double wall pipelines and watertight sewer manhole covers. In addition, expansion of the wastewater system will be coordinated with any planned expansion of the water system.

h. *Page 3-41 – The Final CWMP/EIR should include at least a preliminary assessment of the present and future staffing needs to effectively operate, maintain, and manage the proposed wastewater management facilities.*

Chapter 4 includes the discussion on the present and future staffing needs. Presently, the town employs two full time operators to manage the Town's collection system, 12 pump stations, and 5 meter stations. In addition, The Town also has a contract with a private maintenance company who provides backup to the full-time operators during emergencies. The Town also has an office administrator that works for the sewer department. With regard to future staffing needs, it is anticipated that at the completion of Phase 2 (See Chapter 4, Section G for Phasing Plan), 1 additional operator will be required and at the completion of Phase IV, an additional operator will be required.

i. *Page 3-48 – The Final CWMP/EIR should include a discussion of all required state, local, and federal permits for the recommended plan.*

Appendix J includes a table of the required permits, and discussion of Section 61 findings and mitigation.

APPENDIX C
Water Balance

APPENDIX C - WATER BALANCE

A. WATER BALANCE IMPACTS

1. General

The Commonwealth of Massachusetts Watershed Initiative is a collaborative effort of state and federal agencies, conservation organizations, municipal officials and other interested parties working towards protecting and restoring natural resources and ecosystems on a watershed basis. Because watersheds are defined by natural hydrology, they represent the most logical basis for managing water resources.

The primary goals of the Watershed Initiative are to:

- Improve water quality;
- Restore natural flows to rivers;
- Protect and restore sensitive habitats;
- Improve public access and balance resource use;
- Improve local abilities to protect water resources; and
- Promote shared responsibility for watershed protection and management.

A significant change in the Commonwealth's approach to managing the state's water resources occurred in 1993 with the adoption of the Watershed Initiative, a strategy to implement integrated, watershed-based resource management by establishing collaborative efforts among individuals, groups, municipalities and agencies with local, regional, state and federal agencies in each watershed. The watershed is the primary focus for coordinating and resolving resource management issues such as water supply shortages, stream flows, fisheries and wildlife protection and wastewater assimilation.

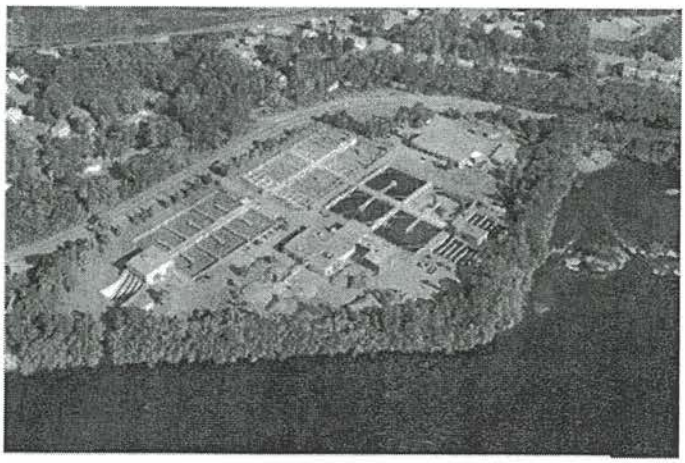
The 1996 update of the Massachusetts Water Supply Policy Statement recommends that action be coordinated with the watershed approach to strengthen local capability to develop and implement water resource management programs. In addition, the 1996 statement advocates that: (1) communities recognize the interconnection of groundwaters and surface waters in water supply management and planning; (2) local and regional

integration of planning and management of water supplies and wastewater treatment; (3) aggressive implementation of water conservation measures; (4) watershed protection to ensure both ground and surface water quality are protected and improved; (5) reduce the need for out of basin resources ("keep it local"); and (6) the updating of local zoning bylaws to protect and preserve the natural resources capacity while seeking to provide adequate water supply and wastewater treatment.

It is these principles that form the foundation of the Commonwealth of Massachusetts Watershed Initiative, which support the "watershed approach" to environmental planning and decision making in order to guarantee the citizens and inhabitants of the Commonwealth sufficient quantity and quality of water resources for the long-term.

An initiative of this CWMP/EIR is to evaluate the potential effects of the disposal of highly treated wastewater effluent, as a discharge to the Merrimack River at the Lowell Regional Wastewater Utility (LRWWU), in offsetting the replacement of on-site wastewater disposal facilities with sewers. The LRWWU consists of primary treatment (sedimentation), biological treatment (aeration), secondary treatment (clarification), and disinfection (chlorination) and is located at First Street Blvd. (Rt. 110), in Lowell, MA.

Figure 1: Wastewater Treatment Plant in Lowell



The primary focus of the evaluation centers on areas of Town that are designated "Needs Area" where there is a potential for sewers. The result of the water balance analysis is a definitive identification of the watershed subbasins where the volume of groundwater removed as water supply is greater than, equal to or less than the volume of groundwater

EARTH TECH | AECOM

Public Water Supply Well
- Community Groundwater Well
- Non-Transient Non-community
- Transient Non-Community

Approved Wellhead Protection Area (Zone II)

Sub-Basin Boundary

DEP Wetland

Area of Wastewater Need

Septage Management Plan

Base map data provided by MassGIS.

Figure C-2

Study Areas and Wastewater Collection System Service Areas

Phase IV CWMP/FEIR
Town of Tyngsborough

0 1,500 3,000 6,000
Feet

Location Map

Map Document: (L:\work\80764\GIS\Maps\FigC_2_StudyAreas2.mxd)
12/4/2008 -- 10:26:27 AM

recharge through wastewater disposal. The watershed subbasins and Study Areas where sewers exist or may exist in the future are shown on Figure C-2.

The effect on water balance analysis for Tyngsborough assumes that all developed lots obtain water supply from the municipal water system and that 90 percent of the metered water flow to each developed lot is discharged as wastewater to an on-site wastewater disposal system or to a sewer.

The water balance is calculated using the following formula:

Water Balance = (–) Amount withdrawn (+) Amount distributed (–) Amount collected

The groundwater recharge is calculated by the following formula:

Groundwater Recharge = (+) Amount distributed (–) Amount collected

2. Amount Withdrawn

The total amount of water withdrawn from each subbasin is the sum of the water withdrawn from the municipal water supply sources and all non-municipal water withdrawals by commercial/industrial entities that are required to report such data to the MassDEP. The municipal withdrawal volume data for 2006 was obtained from the Public Water Supply Annual Statistical Report submitted to the MassDEP by the Water Department. Well source tags where submitted to MassDEP and a file review was performed.

The actual municipal withdrawal volumes, non-municipal withdrawal volumes and the MassDEP registered and/or permitted withdrawal volumes for the year 2006 (year 2005 was substituted for year 2006 if not available) along with the projected volumes of withdrawal at build-out from these sources are shown in Table C-1. Those wells which were shown as inactive on the Public Water Supply Annual Statistical Report were not shown in Table C-1. Also some wells sources from MassGIS did not have a Public Water Supply Annual Statistical Report filed with MassDEP. These wells were assumed as inactive. Each registered and/or permitted water supply source was placed in its respective subbasin based on its longitude and latitude and confirmed with the data included in the MassDEP Water Management Act permit for each source.

TABLE C-1: TOWN OF TYNGSBOROUGH CWMP/EIR WATER WITHDRAWALS REPORTING YEAR 2006

SOURCE ID	Water Purchase, gallons	Well Name	Site Name	TOWN
Muncipal Supply				
3301000-01	9,410,000		Dracut Water District	Dracut
3301000-02	89,750,000		Lowell Water	Lowell
3301000-03	1,480,000		Pennichuck Water	Nashua
Total	100,640,000			

SOURCE ID	Water Withdrawal, gallons	Well Name	Site Name	TOWN
Municpal Supply				
3079000-04G	499,630,000	Tyngsboro Wells	Dracut Water District	Tyngsborough
Total	499,630,000			
Private Supply				
3301008-04G	598,170	WELL #2	Benchmark Estates	Tyngsborough
3301008-05G	612,130	WELL #3	Benchmark Estates	Tyngsborough
3301012-01G	171,550		The Pines Restaurant	Tyngsborough
3301018-01G	480		Hussey Plastice	Tyngsborough
3301020-01G	565,271	ROCK WELL #1	Coloney Heights	Tyngsborough
3301020-02G	565,271	ROCK WELL #2	Coloney Heights	Tyngsborough
3301020-03G	565,271	ROCK WELL #3	Coloney Heights	Tyngsborough
3301023-01G	429,800		MIT - Haystack Observatory	Tyngsborough
3301024-01G	166,444		Blue Moon Lounge	Tyngsborough
3301025-01G	232,200		Tyngsborough Country Club	Tyngsborough
3301027-01G	1,668,780	ROCK WELL #1, NEAR	400 Dunstable Road	Tyngsborough
3301033	893,660	Well No. 2	Bridge Crest Condo	Tyngsborough
3301034-02G	102,200		MIT - Millstone Laboratory	Tyngsborough
3301035-01G	1,161,360	ROCK WELL	Curtis Hill Condo	Tyngsborough
3301036-01G	1,716,580	ROCK WELL #1	Tyngsborough Camp Ground	Tyngsborough
3301037-02G	2,183,771		T.J. Maxx Plaza	Tyngsborough
3301037-03G	2,440,471		T.J. Maxx Plaza	Tyngsborough
3301038-01G	255,960		Tyngsboro Business Park Lot 1	Tyngsborough
3301043-01G	302,400		Pondview II	Tyngsborough
Total	14,631,770			

* Purchased by Tyngborough Water District

The projected water withdrawal at buildout was taken from the Executive Office of Environmental Affairs (EOEA) Water Assets Study Community Report for Tyngsborough dated June 2004. It is projected that the average daily withdrawal volume will increase from 0.22 MGD to 1.44 MGD or 6.5 fold increase. In the last five years, the non-municipal withdrawals increased 13%. Using a linear forecast, it is estimated the non-municipal withdrawals at buildout is assumed to increase approximately 70 percent.

3. Amount Distributed

It is assumed that all developed and developable lots in Tyngsborough are or will be customers of the municipal water system. The current amount of water distributed in Tyngsborough in 2006 was reported to MassDEP in the 2006 Public Water Supply Annual Statistical Report as 100.64 MG. This water was purchased by the Tyngsborough Water District from three neighboring water suppliers as shown in Table 1. The amount of water distributed over each subbasin of Tyngsborough is estimated from the recorded volume of water reported to MassDEP, as metered, to each category of municipal water customer. The difference between the volume of water delivered through the municipal water system infrastructure and the amount of water withdrawn at each supply source is unaccounted-for-water. The unaccounted-for-water component is distributed proportionally across the entire area of Town serviced by the municipal water system. Non-municipal withdrawals are added to the amount distributed in their respective subbasins.

4. Amount Collected

The amount of water collected is calculated by using the estimated quantity of wastewater delivered to the proposed municipal sewer system. It is assumed that for each municipal sewer system customer, 90 percent of the potable water supply metered to each developed lot is delivered to the municipal sewer system. It is also assumed that each developed and/or developable lots identified in the Phase I, CWMP Needs Analysis Document, as finalized in this document, will contribute wastewater flow to the municipal wastewater collection system at build-out. The total amount of wastewater collected is calculated for each subbasin located within the Town of Tyngsborough.

5. Summary

The baseline water balance impact analysis for the calendar year 2006 is presented in Table C-2. The result of this analysis shows that the water withdrawals will not exceed groundwater recharge for the four river basins, mainly due to the fact that the Tyngsborough Water District purchases their water. These four river subbasins and the recharge are summarized as follows:

- Salmon Brook Subbasin: 8.96 Mgal/yr
- Stony Brook Subbasin: 0.50 Mgal/yr
- Merrimack Subbasin: 0.50 Mgal/yr
- Lower Beaver Brook Subbasin: 1.51 Mgal/yr

The projected water balance impact analysis at build-out is presented in Table C-3. It was assumed that the District continued to purchase all of their water. The basin would continue to have a positive recharge as follows:

- Salmon Brook Subbasin: 41.82 Mgal/yr
- Stony Brook Subbasin: 2.63 Mgal/yr
- Merrimack Subbasin: 2.63 Mgal/yr
- Lower Beaver Brook Subbasin: 34.16 Mgal/yr

The overall water balance of the Merrimack Basin is shown as negative. This is due to the fact that the Dracut Water District withdraws water from the Merrimack Basin in Tyngsboro. It is feasible that much of this water from the Dracut Water District remains in the Merrimack Basin, just outside of the boundaries of the Town of Tyngsborough. It was chosen for this report to show this as an overall withdrawal out of the Merrimack Basin for Tyngsboro.

If it is assumed that the recommended town-wide wastewater management plan will include sewering as a long-term solution for wastewater disposal in the seven (7) identified Needs Areas, then the amount of potential recharge from on-site wastewater disposal systems will be reduced accordingly as shown in Table C-2 and C-3. However, all of the Needs Areas are in the Merrimack River watershed which has been identified as a non-stressed basin. While there is an export of water from the Needs Areas, the water will remain in the Merrimack River watershed and the expected treatment at the

APPENDIX D

Infiltration/Inflow Investigation Scope of Work

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INFLOW AND INFILTRATION SEWER SYSTEM EVALUATION SURVEY
DRAFT SCOPE OF WORK
October 15, 2008

BACKGROUND

The Town of Tyngsborough Sewer Commission will perform an Infiltration and Inflow (I/I) Analysis and sewer system evaluation survey (SSES) of the sanitary sewer collection system in accordance with "*Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey*" dated January 1993, as published by the Massachusetts Department of Environmental Protection (MADEP). This SSES and the possible, subsequent, cost-effective removal of I/I sources are important for maximizing the wastewater capacity available to Tyngsborough through the inter-municipal agreements (IMA) with the Town of Dracut and the City of Lowell.

The SSES will take place in the areas of town around the Mascuppic Lake and Long Pond. Focusing on these areas is important because they are prone to I/I due to high groundwater combined with being the oldest sewers in the Town (installed in the 1970s).

The SSES effort will involve more extensive evaluation to confirm the findings of the 2001 to 2002 I/I study the Sewer Commission performed. The findings of the study were summarized in a report titled, "*Inflow / Infiltration Study,*" dated October 2002 by SEA Consultants, Inc. The report describes the delayed inflow as being between 70 to 74 percent of the total inflow for the sewer sub-areas (Mascuppic, Willlowdale, and Lakeview) surrounding Mascuppic Lake and Long Pond.

In addition to the finding that delayed inflow from sump pumps is likely to be the primary source of extraneous wastewater flow, the study concluded the following:

- Infiltration was not found to be excessive (infiltration rate calculated between 600 and 1,600 gallons per day per inch diameter mile (gpd-in-mi) versus MADEP threshold for further evaluation of 4,000 gpd-in-mi).
- Groundwater elevations measured indicate that a portion of the sewers and manholes are below the groundwater level year round. Note that Woodard & Curran's understanding is that these sewers are primarily along streets abutting Mascuppic Lake.
- Sources of direct inflow are likely to be roof drains and manhole covers.
- Direct connections between storm water infrastructure and the wastewater collection system are not suspected to be major sources of direct inflow.

AREAS OF INVESTIGATION

Three areas of investigation are identified for the SSES as follows:

1. Mascuppic Trail;
2. Willowdale Avenue; and
3. Elm Street.

These areas and five locations proposed for flow metering are illustrated on Attachment 1.

The subareas are refined from the subareas defined in the 2002 report to focus on streets that are in close vicinity to Mascuppic Lake and Long Pond where high groundwater conditions are expected to

exist. The quantities of pipe and manholes used for estimating the fee budget are based on the Sewer Commission's sewer plans as described in the following table.

Table 1: Quantities

Sub-Area	Length of Pipe (linear feet)	Manholes
Mascuppic Trail	14,114	73
Willowdale Avenue	8,575	45
Elm Street	4,307	22
Totals	**26,996**	**140**

TASKS

The SSES will consist of the following tasks:

Task 1 – Collection System Mapping

The existing collection system maps will be utilized for planning the field efforts and tracking the results. Woodard & Curran will provide hand marked-up system maps reflecting sewer or manhole configurations that are found to differ in the field from what is shown on the existing maps.

Task 2 - Continuous Flow Metering

Continuous flow meters will be installed and maintained at five locations for up to ten weeks. The flow meter locations were selected to isolate the wastewater flow within the areas of investigation for purposes of quantifying the I/I components. Flow metering will be done as follows:

- Data will be acquired utilizing doppler ultrasonic velocity sensors and pressure depth sensors recording data in 15 minute intervals.
- Equipment will be checked weekly to update flow data, obtain required calibration data, and perform required maintenance.

Task 3 - Rainfall Monitoring

- Installation and maintenance of a local rain gauge for up to ten weeks performed in conjunction with the flow metering. The gauge will be checked weekly.

Task 4 - Groundwater Monitoring

- Groundwater monitoring will be performed for a ten week period in conjunction with the flow metering.
- The groundwater level will be measured weekly utilizing a piezometeric tube installed within one of the manholes used for flow meter installation.

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Task 5 - Quantify I/I Components

Following the flow metering period, Woodard & Curran will tabulate the wastewater flow, rain and groundwater data and prepare hydrographs for each flow meter location for up to three storm events. Data from the permanent flow metering stations at Willowdale Avenue and Lakeview Avenue will also be used for the analysis. The hydrographs will be utilized to quantify I/I components into infiltration, direct inflow, and delayed inflow following the MADEP methodology. For this scope of work, Woodard & Curran assumes that sufficient dry weather with high groundwater conditions will exist during the metering program for determination of the infiltration component and that suitable rainfall will occur for determination of the inflow component. Woodard & Curran will advise the Sewer Commission if the persistence of unfavorable weather conditions is going to impact the scope and budget and we will make recommendations to modify the scope to fit the conditions encountered.

Task 6 - Manhole Inspections

Surface inspection of manholes will be performed in the designated areas of investigation to document the following information:

- Manhole cover type, number of holes in cover, whether cover is subject to ponding;
- Condition of manhole frame and number of manhole grade adjustments;
- Cracks or breaks in the walls, shelf, or invert;
- Infiltration observed, estimated in gallons per minute (GPM);
- Integrity of joints between barrel sections;
- Condition of pipe-manhole connections;
- Construction materials and condition;
- Manhole depth;
- High water mark:
- Condition of the corbel; and
- Condition of steps.

Woodard & Curran will coordinate the field effort, review the data collected and be on-site part time (12 hours) during the manhole inspections to direct the inspection crews and to check the findings of the inspections.

The fee budget is based on inspecting the number of manholes shown on Table 2.

Task 7 - Pipe Cleaning and Video Inspections

Preparatory sewer pipe cleaning and video inspection will be conducted in the designated areas of investigation.

Pipe cleaning will be performed utilizing a high velocity jet rod truck to remove grease deposits and open areas with root intrusion to permit the passage of the video inspection camera equipment. Varying levels of effort will be required for pipe cleaning depending on the conditions encountered. For estimating the fee budget, Woodard & Curran has assumed the following:

- Light cleaning; defined as up to two passes with the jet rodder, will be required in 80 percent of the sewer pipes inspected;

- Moderate cleaning; defined as three to four passes with the jet rodder, will be required in 10 percent of the sewer pipes inspected; and
- Heavy cleaning; defined as five or more passes with the jet rodder, will be required in 10 percent of the sewer pipes inspected.

Video inspection will be conducted by passing a closed circuit color television camera through the sewer line. The video inspection equipment will have pan and tilt capabilities to allow viewing of service connections and close inspection of defective joints and leaks. The inspections will be recorded on Digital Video Disc (DVD) format with audio narration. The video inspections will identify the following:

- Street location and manhole to manhole reach;
- Video camera's progress in linear footage through the line;
- Locations of service connections and if evidence of sump pump activity is encountered;
- Observations of pipe material and conditions; and
- Observations and approximate visual estimates of infiltration quantities encountered.

Woodard & Curran will coordinate the field effort, review the data collected and be on-site full time (40 hours) during the video inspection to direct the inspection crews and to check the findings of the inspections. The DVD recordings and a tabular log will be provided documenting the inspection of each line section.

The fee budget is based on cleaning and inspecting approximately 35 percent of the pipes in the areas of investigation. The quantities of pipe planned for cleaning and inspection are shown on Table 2.

Task 8 - Smoke Testing

Smoke testing will be conducted in the designated areas of investigation as follows:

- Smoke will be introduced into the sewer with a blower at lengths of no more than two manhole reaches. Smoke coverage will be confirmed by observing and recording house plumbing vents along the setup. Woodard & Curran will maintain a log of building addresses where smoke from plumbing vents is observed.
- Observations will be recorded including suspect sources and confirmed sources.
- It is noted that Woodard & Curran may not be able to obtain a definitive result for each building. For example, building traps may prevent smoke from entering the internal building plumbing.

Woodard & Curran will coordinate the field effort, review the data collected and be on-site part time (16 hours) during the smoke testing to direct the inspection crews and to check the findings of the inspections.

The fee budget is based on smoke testing the linear footage of pipe shown on Table 2.

Task 9 – Project Management and SRF Administration

The work of this task includes communications to update the Sewer Commission staff on project status, management of project budget and schedule, and administration of the SRF loan. The fee budget is based on providing bi-weekly update emails, preparing for and attending two meetings with Sewer

Commission staff, and preparing and processing SRF loan draw downs and SRF loan closeout documents.

PROJECT DELIVERABLES

A Final Report will be prepared that will discuss the following:

- A summary of the findings from the field investigations and data analysis for the tasks described above;
- A discussion on how the infiltration and inflow components were quantified;
- Recommendations on sewer rehabilitation work, including estimated costs and priority rankings.

The data from the metering and field inspections will be provided as appendices to the report including:

- Flow meter records, rain gauge data and groundwater data;
- Manhole inspections log sheets;
- Video inspection logs; and
- Smoke testing field logs.

FEE BUDGET

The Fee Budget for the above referenced scope will be on a labor and expenses basis not to exceed one hundred and fifty thousand dollars and zero cents ($150,000) in accordance with Table 2. The cost for field work will be billed on the actual quantities used. Woodard & Curran has included the cost for 200 hours of police detail time for traffic control at a rate of $50 per hour. The project will be invoiced on a monthly basis.

SCHEDULE

The field investigation work should take place between March 1 and June 30. We are prepared to begin field work in the Spring of 2009, provided we have authorization to proceed by February 1, 2009. Final deliverables would be provided by September 1, 2009 provided the field work is scheduled for the Spring of 2009.

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Table 2: Fee Budget

	Sub-Consultants				W&C Labor	Extended Total
Item	Quantity	Unit	Unit Cost	Sub-Total		
Update Mapping				$ -	$ 776	$ 776
Flow Metering	50	meter - week	$ 560	$ 28,000	$ 1,822	$ 29,822
Rain Gauge	10	week	$ 100	$ 1,000	$ -	$ 1,000
Groundwater Gauge	10	week	$ 420	$ 1,260	$ -	$ 1,260
Manhole Inspection	140	each	$ 45	$ 6,300	$ 3,063	$ 9,363
Pipe Cleaning and Video Inspection	9,500	linear feet		$ -	$ 9,924	$ 9,924
Light (8"-10")	4,050	linear feet	$ 1.30	$ 5,265	$ -	$ 5,265
Light (12"-15")	890	linear feet	$ 1.60	$ 1,424	$ -	$ 1,424
Light (18"-24")	2,640	linear feet	$ 1.80	$ 4,752	$ -	$ 4,752
Moderate (8"-10")	510	linear feet	$ 1.50	$ 765	$ -	$ 765
Moderate (12"-15")	120	linear feet	$ 1.80	$ 216	$ -	$ 216
Moderate (18"-24")	330	linear feet	$ 2.10	$ 693	$ -	$ 693
Heavy (8"-10")	510	linear feet	$ 4.40	$ 2,244	$ -	$ 2,244
Heavy (12"-15")	120	linear feet	$ 7.00	$ 840	$ -	$ 840
Heavy (18"-24")	330	linear feet	$ 14.50	$ 4,785	$ -	$ 4,785
Smoke Testing	27,000	linear feet	$ 0.42	$ 11,340	$ 7,029	$ 18,369
Quantify I/I Components				$ -	$ 10,160	$ 10,160
Report				$ -	$ 16,052	$ 16,052
Project Management				$ -	$ 12,040	$ 12,040
SRF Administration				$ -	$ 8,994	$ 8,994
Expenses				$ -	$ 1,210	$ 1,210
Police Details				$ 10,000	$ -	$ 10,000
Total				**$ 78,884**	**$ 71,070**	**$ 149,954**

APPENDIX E
Intermunicipal Agreements

COPY

Amendment to the Agreement dated November 13, 1995, between the City of Lowell, a Massachusetts municipal corporation within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as the "City" and the Town of Tyngsborough, an incorporated township within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as the "Town", acting by and through its Sewer Commission.

WHEREAS, the Town wishes to increase its capacity by an additional 60,000 gallons per day; and

WHEREAS, the City agrees to provide such increase capacity; and

WHEREAS, the Town agrees to pay any and all capital cost apportionment due under Article VI of the November 13, 1995 Agreement.

NOW THEREFORE, for mutual consideration, the parties agree as follows:

The Town's capacity is increased from 20,000 gallons per day to 80,000 per day upon the same conditions and terms as set forth in the November 13, 1995 agreement.

The schedule for this increase shall be:

20,000 Gallons upon execution of this Agreement;

20,000 Gallons on July 1, 2002; and

20,000 Gallons on July 1, 2005.

IN WITNESS WHEREOF, the City and the Town have caused their proper representatives to execute this Amendment.

Dated: 5/11/00

APPROVED AS TO FORM:

Asst. City. Solicitor

CITY OF LOWELL

By: Brian J. Martin
City Manager

APPROVED AS TO FORM:

Charles J. Zaroulis, Esq.
Tyngsborough Town Counsel

TOWN OF TYNGSBOROUGH

5-9-00

BY: CHAIR

Its Sewer Commission

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COPY

LOWELL-TYNGSBOROUGH AGREEMENT

AGREEMENT

THIS AGREEMENT, made and entered into this _____day of _____, 19__ by and between the CITY OF LOWELL, a municipal corporation within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as the "CITY", and the TOWN of TYNGSBOROUGH, an incorporated township within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as the "TOWN".

WITNESSETH:

WHEREAS, the Water Resources Commission, Commonwealth of Massachusetts, acting through the Office of the Director of the Division of Water Pollution Control, has found the TOWN to be discharging wastewaters into the surface waters of the Commonwealth in contravention of the water quality standards the Division of Water Pollution Control, and

WHEREAS, the CITY is authorized by law to enter into contracts and agreements with the TOWN for the purpose of aiding in the abatement of water pollution, and

WHEREAS, the TOWN has petitioned the CITY to purchase ~~ten~~ TWENTY thousand ~~five hundred~~ (~~10,500~~ 20,000) gallons of capacity from the CITY's wastewater treatment facility, and

WHEREAS the flow shall enter the CITY through a metering station to be placed on Pawtucket Blvd, and

WHEREAS, the CITY deems it to be in the public interest to enter into an Agreement with the TOWN whereby the CITY would receive, treat and dispose of the TOWN'S wastes through the CITY'S sewage system.

NOW, THEREFORE, in consideration of these premises and mutual benefits to be derived by the parties hereto, it is agreed as follows:

ARTICLE 1. DEFINITIONS

1.1 For the purposes of this Agreement, the following terms are defined:

1.1.1 "Average Daily Flow" shall mean the total annual flow as measured in gallons at metering stations plus agreed - to unmetered direct discharges to the CITY sewage system divided by the number of days in the year.

1.1.2 "Biochemical Oxygen Demand" (BOD_5) shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five(5) days at 20 degrees Centigrade(68 degrees Fahrenheit) expressed in milligrams per liter (mg/1) by weight.

1.1.3 "CITY" shall mean the City of Lowell, a municipal corporation of the Commonwealth of Massachusetts.

1.1.4 "Chloride Demand" shall mean the amount of chlorine expressed in mg/1 required to be added to water, sewage or other liquid to achieve a combined chlorine residual after fifteen (15) minutes contact of one (1) mg/1.

1.1.5 "Combined Sewer" shall mean a sewer receiving both surface runoff and wastewater.

1.1.6 "Industrial User" shall mean any a source of indirect discharge.

1.1.7 "Industrial wastewater" shall mean all water-carried wastes and wastewater excluding domestic wastewater and unpolluted water. Includes all wastewater from any producing, manufacturing, processing, testing, institutional, commercial, agricultural, or other operations where the wastewater discharged includes nondomestic wastes.

1.1.8 "Maximum Daily Flow" shall mean the maximum gallons recor at metering stations plus agreed-to allowances for dire discharges to the CITY sewage system during a 24-hour period during any calendar year.

1.1.9 "Operating Cost" shall mean the cost incurred by the CITY necessary for the proper and efficient operation and maintenance of the sewage works.

1.1.10 "Peak Rate of Flow" shall mean the maximum instantaneous rate of flow in gallons recorded at metering stations or measured in the direct discharges to the CITY sewage system during any calendar year.

1.1.11 "pH" shall mean a measure of the alkalinity or acidity of a substance, expressed in standard units.

1.1.12 Publicly owned treatment works or POTW shall mean the city-owned treatment works, as defined in Section 212 of the Act (33 U.S.C. 1292). This definition includes any sewers that covey wastewater to the POTW treatment plant, but does not include pipes, sewers, or other conveyances not connected to a facility providing treatment. For the purpose of this agreement, "POTW" shall also include any sewers that convey wastewater to the POTW from persons outside the city who are, by agreement with the Utility, users of the POTW.

1.1.13 "Replacement Costs" shall mean expenditures for obtaining and installing equipment, accessories or appurtenances which are necessary during the service life of the sewage works to maintain the capacity and performance for which said works were designed and constructed. Replacement costs shall be apportioned in accordance with ARTICLE VI.

1.1.14 "Sanitary sewer" shall mean a sewer which carries sewage and to which stormwater, surface water and groundwater are not intentionally admitted.

1.1.15 "Service Life" shall mean the period of time during which the sewage works or a component of a waste treatment management program will be capable of performing a function.

1.1.16 "Sewage System or Sewage Works" shall mean all facilities for collecting, conveying, pumping, treating and disposing of sewage.

1.1.17 "Suspended Solids" (TSS) shall mean solids that either float on the surface of, or are in suspension in, water, sewage, wastewater or other liquids and which are removable by laboratory filtering.

1.1.18 "Total Capitol Cost" shall mean construction costs, engineering and legal fees, capitalized interest costs during construction, amortization costs and land costs.

1.1.19 "TOWN" shall mean the Town of Tyngsborough, an incorporated township of the Commonwealth of Massachusetts.

1.1.20 "User Charge" shall mean a charge levied on a user of a sewage works for the cost of operation and maintenance, including replacement costs, of such works.

1.1.21 "Wastes" shall mean substances in liquid, solid or gaseous form that can be carried in water.

ARTICLE II. OBLIGATIONS AND RESPONSIBILITIES

2.1 The CITY shall receive, treat and dispose of the TOWN'S wastes, in accordance with all existing or future laws, regulations, existing or future CITY Sewer Ordinance, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the treatment and disposal of said wastes; provided, however, that the treatment of the TOWN'S wastes to be provided by the CITY shall be of such a type and degree as may be necessary to provide for the application of Best Practicable Waste Treatment Technology. The TOWN shall conform to all appropriate industrial wastewater pretreatment rules and regulations as established by the appropriate State and Federal regulatory agencies.

The TOWN, in regard to any violation in the TOWN, shall assist the CITY in meeting its obligations of adhering to and enforcing all existing and future laws, regulations, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the treatment and disposal of said wastewaters.

2.2 The TOWN will not connect any combined sewer or separate drains into the CITY'S sewage system and will not discharge into said sewage system any volume of sewage, substances or wastewater containing the following characteristics in excess of that agreed to herein:

2.2.1 Any Waters or wastes containing fats, wax, grease or oils, whether emulsified or not, in excess of one hundred (100) mg, or containing substances which may solidify or become viscous at temperatures between zero (0) and sixty-five(65) degrees Centigrade, (32 and 150 degrees Fahrenheit).

2.2.2 Any gasoline, benzene, naptha, fuel oil, or other liquid, solid or gas in sufficient concentration to be flammable or explosive.

2.2.3 Heat in the amounts which will inhibit biological activity in the POTW resulting in interference but in no case heat in such amounts that the temperature of the wastewater entering the POTW treatment plant exceeds 40_0C (104^0 F);

2.2.4 Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers, or other interference with the proper operation of the sewage works such as, but not limited to, ashes, cinders, sand, mud, straw, unground garbage, whole blood, paunch manure, hair and fleshings, entrails, paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders.

2.2.5 Any garbage not properly shredded.

2.2.6 Any wastes having a ph lower than 6.0 or higher than 9.5 or having any corrosive property capable of causing damage or hazards to structures, equipment or personnel at the sewage works.

2.2.7 Any pollutant that results in the presence of toxic gases, vapors or fumes within the POTW in any quantity that may result in worker health and safety problems.

2.2.8 Waters or wastes containing substances which are not amendable to treatment or reduction by the sewage treatment processes employed, or are amendable to treatment only to such degree that the sewage treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters.

2.2.9 Pollutants which create a fire or explosive hazard in the POTW, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Celsius using the test methods specified in 40 CFR 261.21;

2.2.10 Any pollutant, including oxygen demanding pollutants(BOD_5, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;

2.2.11 Any trucked or hauled pollutants, except at discharge points designated by the Executive Director.

2.3 All Measurements of volume and characteristics of the TOWN'S wastes shall be made at metering stations constructed, operated and maintained by the TOWN at all mutually agreed upon locations.

All flow measurements made at the metering stations will be submitted to the Lowell Regional Wastewater Utility. For small individual areas in the TOWN, which will be discharging wastewater directly into the CITY sewage system, measurements shall be based on either water consumption readings or some other mutually acceptable method. Industrial wastewater from the TOWN, as measured at metering stations, shall be judged by the same standards as are in effect within the CITY'S sewage system, notwithstanding the provisions of Paragraph 2.2 of this ARTICLE.

ARTICLE III. AGREEMENT TERM

3.1 The provisions of this Agreement shall run for a minimum period of Twenty(20) years from the date of initial treatment of the TOWN'S wastewater subject to the provisions of ARTICLE X.

ARTICLE IV. IMPLEMENTATION

4.1 The CITY agrees to provide a system for the collection and treatment, with a portion of the capacity allocated to handle wastewater from the TOWN.

ARTICLE V. USER CHARGES

5.1 User charges:

5.1.1 The TOWN shall develop, in accordance with the provisions of federal regulations ("Code of Federal Regulations, subpart I, 40 CFR 35.2122 and 35.2140, et seq."), an equitable User Charge System to assure that each recipient of waste treatment services within the TOWN'S service area will pay its proportionate share of the costs of operation and maintenance (including replacement) of all waste treatment services provided by the CITY.

5.1.2 The TOWN must obtain approval of the Massachusetts Water Resources Commission, Division of Water Pollution Control, and the Region 1 Office of the U.S. Environmental Protection Agency for its User Charge System for the above costs.

5.1.3 The TOWN, upon approval of its User Charge System, must incorporate said System in one or more municipal legislative regulations.

5.1.4 The regulation(s) must include provisions whereby the maintenance of said System and the collection of the revenues can be reviewed by any governmental authority having jurisdiction and/or the CITY.

ARTICLE VI. CAPITAL COST APPORTIONMENT

6.1 The TOWN shall pay to the CITY a sum which represents its full obligation of the Total Cost to the CITY for the capacity purchased, after deduction of all government grants for all sewage works in the CITY, required to receive, transmit and treat the TOWN'S wastewater.

The TOWN and CITY acknowledge that certain construction has previously been completed by the CITY to facilities which are and shall be used by the TOWN pursuant to this AGREEMENT and the TOWN agrees to pay to the CITY the TOWN'S proportionate share of said construction in one(1) payment which shall be due before there is a connection of any sewer line from within the boundaries of the TOWN to the CITY'S sewage system.

6.2 Records of the CITY's Total Cost are public information and will be on file with the CITY and available for review at any time during normal business hours by all responsible agencies. Copies of pertinent information and other requested information will be forwarded to the TOWN during the course of the projects.

6.3 Whereas, metering stations are solely for flows generated by the TOWN, all capital costs for these facilities will be borne by the TOWN.

Where other sewage works are constructed solely for flows generated by the TOWN, all capital costs for said works will be borne by the TOWN. The basis of payments by the TOWN for sewage works constructed by the CITY shall be established as follows:

6.4.1 Treatment Facilities (including EPA/State Project No. 1 C250251 01, Preparation of Treatment Facilities Site and Sewers and Raw Sewage Pumping Station):

TOWN Payment = C2 d/e

Where:

C2 = Total Cost including all interest accrued as of 9/30/95.

d = Average Daily Flow Rate requested by TOWN

e = Total Average Daily Flow Rate minus capacity allotted to the other Contributing Towns

$$\text{Town Payment} = 27{,}114{,}998.45 \times \frac{20{,}000 \text{ gals}}{21{,}130{,}500 \text{ gals}} = \$25{,}664.43$$

6.5 The CITY shall provide capacities in its sewage works for the wastewater from the TOWN. Capacities for the TOWN shall be as follows:

6.5.1 Treatment Facilities and Raw Sewage Pumping Station: Design Term 20 years

Transmission Facilities:

Design Term	50 years
Average Daily Flow	0.0200 mgd
BOD_5	41.7 lbs/day
TSS	41.7 lbs/day

6.6 The CITY has designed the sewage works to meet the present day Division of Water Pollution Control requirements and to provide for B[illegible] Practicable Wastewater Treatment Technology, defined by said Division as secondary treatment.

6.7 Should it be required by the appropriate State and/or Federal agencies to provide additional wastewater treatment, or in any way modify the POTW to conform to Federal and State mandates, the TOWN shall pay its proportionate share of the required sewage works based on the flows established under Paragraph 6.5 of this ARTICLE.

If the CITY'S sewage works require enlargement or other modifications because the total flows or total strength of the flow to the treatment facilities exceed the design, then the TOWN shall contribute only in [illegible] far as its wastewater have exceeded the limits called for under t[illegible] above referenced Paragraph 6.5.

ARTICLE VII. OPERATING COST APPORTIONMENT

7.1 The CITY shall maintain an adequate cost accounting system which shall be the basis for the determination and allocation of operating costs. This accounting system shall be subject to review by the TOWN.

The CITY shall maintain separate cost accounting records for the operation of those portions of their sewage works that are shared by the CITY and the TOWN and any other participants. Connection to the sewage works by the TOWN and any other participants will be made only at those points mutually agreed upon by the CITY and the TOWN. The annual cost of operating these sewage works shall be apportioned between the CITY, the TOWN and any other participants on the basis of their actual, annual flows, as determined from records at the respective metering stations.

7.2 The operating costs shall be apportioned against participants on the basis of average daily flows, providing that the established parameters from any participant are not exceeded. If either the average BOD_5 or TSS from any metering station exceeds 250 mg/l, then the TOWN shall pay a surcharge to the CITY for treatment of its wastewater. The surcharges will be based on the proportional extra cost incurred for the complete treatment of wastewater in excess of 250 mg/l for the period of time in violation.

7.3 Measured annual flows shall be determined for the TOWN from records at metering stations. Estimated flows from nonmetered, individual areas shall also be included, if not charged separately. Actual, annual flows shall be determined for the CITY from records at the treatment facilities.

7.4 The individual areas discharging directly into the sewer system, as described in paragraph 7.3, shall be assessed fees on the s[illegible] basis as the users of the CITY. This amount shall then be assess[illegible] to the TOWN for payment. It is the responsibility of the TOWN, not the CITY to collect such fees and to submit payment to the CITY as required in Section 7.8.

7.5 The waste strengths, BOD_5 and TSS, for each of the participants shall be determined from proportional, composite 24-hour samples obtained at the metering stations. The Average daily BOD_5 and TSS in pounds per day shall be determined from the average of the composite samples taken on a random basis.

7.6 When determining surcharges, the unit cost per pound of BOD_5 and TSS used shall be based on the previous year's treatment facili[illegible] operational costs divided by the total annual BOD_5 or TSS loadings. If the average of the concentration is over the established thresholds, the formula to determine the additional costs to the TOWN(over the operating cost) for that month will be as follows:

Lbs BOD_5 or TSS = Total Flow(MG) for month x (Actual BOD_5 or TSS - 250 mg/l) x 8.34 lbs/gal

Surcharge amount $ = Lbs BOD_5 or TSS x price per lb BOD_5 or TSS

7.7 Operating costs for the treatment facilities shall include the cost of sampling and analyzing wastewater discharged by the participants. It shall also include the cost accounting related to the distribution and invoicing of operating costs and any other applicable costs.

7.8 Operating costs shall be payable monthly, on a fiscal year basis, upon receipt by the TOWN of the CITY's invoice. Bills shall be paid within thirty(30) days. Any bills not received within this time frame shall be assessed a five percent(5%) late fee. It will be the TOWN's responsibility to pay all costs and expenses, including but not limited to, all attorney's fees paid or incurred by the CITY in the enforcing of this agreement.

Operating costs for the first eleven (11) months shall be determined by using the CITY'S approved yearly operation budget (reduced to a monthly cost) and apportioning the TOWN'S share on the basis of actual total monthly flow, as measured.

The final monthly invoice for the fiscal year shall be rendered by the CITY within fifteen (15) days or the end of the fiscal year and shall be determined on the basis of actual flows and expenditures. All previous monthly invoices shall be subject to adjustment and correction at the time of this final billing for the fiscal year. The CITY shall forward to the TOWN, on or before March first, the projected estimate of operating cost and other costs for such fiscal year, so that the TOWN may make necessary preparations for the final monthly invoice for the fiscal year.

ARTICLE VIII. ANNUAL COST REVIEW

8.1 The CITY and TOWN both agree that the apportionment of costs set forth in ARTICLE VII, shall be subject to review annually. After a review of the annual costs, if an adjustment to the costs appears to be necessary, said adjustment shall be made by the CITY in the forthcoming billing for services. The adjustment will be to both the CITY'S and TOWN'S mutual satisfaction.

Should arbitration be necessary, unless otherwise provided by law, both parties shall mutually agree as to the arbitration procedure.

ARTICLE IX. ADJUSTMENT CLAUSE

9.1 The TOWN reserves the right at any time to pretreat and/or to reduce the BOD_5 and TSS concentrations of its wastewater, or otherwise give preliminary treatment to its wastewater prior to discharge to the CITY sewage system. The TOWN agrees to notify the CITY as far in advance as possible of any significant increase or decrease in the quantity and/or quality of the wastewater to be discharged to the CITY sewage system.

9.2 Any separate agreement between the TOWN and adjacent communities must be reviewed by the CITY, but such separate agreements shall not be unreasonably disapproved by the CITY. The CITY's signature of approval will be required on any agreement of such nature. In any event, the TOWN shall in the aggregate be restricted to the waste parameters established under ARTICLE VI. Any increase in the allotted flow must be formally contracted for between the TOWN and the CITY.

ARTICLE X. TERMINATION CLAUSE

10.1 Any obligations under this Agreement are conditioned upon both the receipt and acceptance by the TOWN of construction grant funds from federal and/or state government agencies for sewage works necessary within the TOWN to transmit waste flows to the CITY sewage system and the receipt and acceptance by the CITY of construction grant funds from said agencies for the sewage works necessary within the CITY to convey and treat the TOWN'S wastewater.

10.2 Either party may terminate this Agreement by giving notice thereof to the other party in writing three(3) years prior to the termination date. Upon receipt of said notice, both parties will enter into discussion within thirty (30) days to assure proper termination of the Agreement.

Should the TOWN initiate the termination proceedings, it shall not have any right to the return of any of its initial capital investment under ARTICLE VI.

Should the CITY initiate the termination proceedings, it shall be obliged to return to the TOWN the unused proportionate share of the TOWN'S capital investment under ARTICLE VI.

10.3 The TOWN shall have the right to negotiate an extension of this agreement for the continued use of the CITY'S sewage works provided for, in part, by the TOWN'S capital investment under ARTICLE VI, beyond the twenty(20) years provided for in ARTICLE III, for as long as those sewage works remain in active use. The right shall be limited to the waste parameters established under ARTICLE VI.

ARTICLE XI. WASTEWATER ANALYSIS

11.1 The CITY and the TOWN both agree that the determination of character and concentration of wastewater will be in accordance with 40 CFR 136, or where there is no equivalent procedure, the latest edition of "Standard Methods for the Examination of Water and Wastewater", as proposed, approved and published jointly by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation, or any other method mutually agreed upon by the CITY and the TOWN, and subject further to the following:

11.1.1 Sampling at metering stations will be performed by the CITY. Determination of the character and concentration of the TOWN'S wastewater, for the purpose of checking waste parameters, shall be the responsibility of the CITY or its authorized agent. The TOWN shall be furnished copies of all such determinations.

11.1.2 Samples shall be collected by the CITY at metering stations in such a manner so as to be representative of the actual quality of the wastewater. The CITY shall have access to said Stations, as required, to conduct intermittent or continuous waste sampling. Access will be provided at all times as long as a one hour notice is given to the TOWN.

11.1.3 Portions of waste samples collected by the CITY, as part of a sampling and analytical program, will be made available to the TOWN at no cost and in adequate quantities for analysis by the TOWN for Characteristics and concentrations. In the event of discrepancy which cannot be satisfactorily resolved, the parties will submit the samples to a mutually acceptable, disinterested, qualified third party for determination of the waste characteristics and concentrations.

11.1.4 The metering station must be constructed so as to minimize the hazards of confined space entry.

ARTICLE XII. FLOW MEASUREMENTS

12.1 The CITY and the TOWN agree that flow measurements shall be made as follows:

12.1.1 The volume of flow used in computing the TOWN'S share of the operating costs shall be based upon readings obtained by suitable metering equipment of a type mutually acceptable to both the TOWN and the CITY. Such metering equipment shall be installed and maintained by the TOWN. The TOWN will provide the CITY with waste flow data for the preceding month, based upon meter readings, The CITY shall have access to said meters during normal business hours.

12.1.2 In the event the metering equipment is temporarily out of order or service for any reason, the TOWN'S estimated flow will be based on the average daily flow of the previous three months.

ARTICLE XIII RE-OPENER CLAUSE

13.1 In the event that Tyngsboro requests a greater flow allotment than provided in herein this contract, then the contract shall be re-opened and renegotiated. All negotiations and agreements must be finalized prior to the connection of any new sewer lines to the CITY's sewer system.

13.2 In the event that the City finds it necessary to modify its treatment facility, or in any other way adjust or improve either its treatment facility or collection system, resulting from Federal or State intervention, this contract shall be reopened for negotiation in regards to capitol costs and any other costs associated with said activities.

IN WITNESS WHEREOF, the CITY and the TOWN have caused their proper representatives on the day and year first above written.

FOR THE CITY OF LOWELL, MASSACHUSETTS

By _____

By _____

Approved as to form:

By _____ Asst. City Solicitor

FOR THE TOWN OF TYNGSBORO, MASSACHUSETTS

By Its Sewer Commissioners

_____

_____

_____

Approved as to form:

By _____

Town Counsel

ARTICLE XIV INDUSTRIAL SEWER USE ADDENDUM

This Agreement is entered into this ____ day of _____, 19__, between the C of Lowell(City) and the Town of Tyngsborough(Town)(hereinafter jointly referred to as the "Parties").

RECITALS

1. The City owns and operates a wastewater treatment system.

2. The Town currently utilizes this wastewater treatment system.

3. Facilities located in The Town currently contribute wastewater which includes industrial waste. These facilities are hereinafter referred to as industrial users.

4. The City must implement and enforce a pretreatment program to control discharges from all industrial users of its wastewater treatment system pursuant to the requirements set out in 40 CFR Part 403. In this Agreement the Town agrees to adopt an industrial sewer user rules and regulations that subjects the industrial users within its boundaries to the necessary pretreatment controls, and the City is authorized to implement and enforce that industrial sewer use rules and regulations.

AGREEMENT

1A. The Town will adopt a local industrial sewer use rules and regulations which is no less stringent and is as broad in scope as the City Sewer Use Ordinance, Chapter 18 Article III. The Town will forward to the City for review a draft of its proposed industrial sewer use rules and regulations within sixty(60) days of the date of this Agreement. The Town will adopt its industrial sewer use rules and regulations within thirty(30) days of receiving approval from the City of its contents. Until such time as the Town's industrial sewer use rules and regulations have been adopted, the Town must abide by the City Sewer Use Ordinance, Chapter 18 Article III.

B. Whenever the City revises its industrial sewer use ordinance, it will forward a copy of the revisions to the Town. The Town will adopt revisions to its industrial sewer use rules and regulations which are at least as stringent as those adopted by the City. The Town will forward its proposed revisions within sixty(60) days of receipt of the City's revisions. The Town will adopt its revisions within thirty(30) days of receiving approval from the City of the content thereof. Until the Town's revisions have been adopted, the Town must abide by the revisions to the City's sewer use ordinance.

C. The Town will adopt pollutant specific local limits which address at least the same pollutant parameters and are as stringent as the local limits enacted by the City within thirty(30) days of the date of this Agreement. If the City makes any revisions to its local limits, the City will forward to the Town a copy of such revisions

or additions within thirty(30) days of enactment thereof. The Town will adopt any such revisions or additions within sixty(60) days of receipt thereof. Until such time as the Town adopts its local limits or any revision to the local limits, the Town must abide by the City's local limits.

2A. The Town designates the City as the agent of the Town for the purposes of implementation and enforcement of the Town's industrial sewer use rules and regulations for industrial users located in the Town. The City may take any action under the Town's industrial sewer use rules and regulations that could have been taken by the Town, including the enforcement of the rules and regulations in courts of law.

B. The City, on behalf of and as agent for the Town, will perform technical and administrative duties necessary to implement and enforce the Town's industrial sewer use rules and regulations. The City will:

(1) update the industrial waste survey;

(2) issue permits to all industrial users required to obtain a permit;

(3) conduct inspections, sampling and analysis;

(4) take all appropriate enforcement actions as outlined in the Town's industrial sewer use rules and regulations;

(5) perform any other technical or administrative duties deemed appropriate.

In addition, the City may, as agent of the Town, take emergency action to stop or prevent any discharge which presents or may present an imminent danger to the health and welfare of humans, which reasonably appears to threaten the environment, or which threatens to cause interference, pass through or sludge contamination.

3. Before an industrial user located outside the jurisdictional boundaries of the Town discharges into the Town's sewer system, the Town and the City will enter into an agreement with the jurisdiction in which such industrial user is located. Such agreement will be substantially equivalent to this Agreement and must be entered into prior to a discharge from any such user.

4. The City will be responsible for all costs incurred by it in implementing and enforcing the Town's industrial sewer use rules and regulations. The City will bill the industrial users directly for sampling and related costs in accordance with Chapter 18 Article III of the Lowell City Code of Ordinances.

5A. If any term of this Agreement is held to be invalid in any judicial action, the remaining terms will be unaffected.

B. The Parties will review and revise this Agreement to ensure compliance with the Federal Clean Water Act(42 U.S.C.1251 et seq.) and rules and regulations(see 40 CFR Part 403) issued thereunder, as necessary, but at least once every five(5) years on a date to be determined by the Parties.

C. The Town will indemnify the City of Lowell for any costs incurred due to the failure of the Town to uphold any changes modifications as required within this Agreement.

6. If the Authority of the City to act as agent for the Town is questioned by the industrial user, court of law, or otherwise, the Town will take whatever action is necessary to ensure the implementation and enforcement of its industrial sewer use rules and regulations, including, but not limited to, implementing and enforcing its industrial sewer use rules and regulations on its own behalf and/or amending this Agreement to clarify the City's authority.

FOR THE CITY OF LOWELL, MASSACHUSETTS

By_____

By_____

Approved as to form:

By_____ Asst. City Solicitor

FOR THE TOWN OF TYNGSBORO, MASSACHUSETTS

By Its Sewer Commissioners

_____

_____

_____

Approved as to form:

By _____

Town Counsel

COPY

CHELMSFORD – TYNGSBOROUGH AGREEMENT

AGREEMENT

THIS AGREEMENT, made and entered into this 31ST day of May, 1989 by and between the TOWN OF CHELMSFORD, a municipal corporation within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as CHELMSFORD, and the TOWN OF TYNGSBOROUGH, an incorporated township within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as TYNGSBOROUGH.

WITNESSETH:

WHEREAS, CHELMSFORD is authorized by law to enter into contracts and agreement with TYNGSBOROUGH for the purpose of aiding in the abatement of water pollution; and

WHEREAS, CHELMSFORD deems it to be in the public interest to enter into an Agreement with TYNGSBOROUGH whereby CHELMSFORD would receive and transport TYNGSBOROUGH'S wastes through CHELMSFORD'S Sewerage System to the CITY OF LOWELL Sewerage System; and whereby the CITY OF LOWELL would receive, treat and dispose of the waste; and

WHEREAS, CHELMSFORD entered into an agreement with the CITY OF LOWELL on June 26, 1985, whereby LOWELL would receive, treat and dispose of CHELMSFORD'S wastes through the CITY OF LOWELL'S Sewerage System; and

WHEREAS, CHELMSFORD has designed and constructed or will design and construct a wastewater collection system with capacity to receive flow from TYNGSBOROUGH as outlined in this agreement; and

WHEREAS, the federal government is empowered under a Public Law 95-217, as amended, to make federal grants for the construction of public treatment works, and to impose conditions on the award of said grants;

WHEREAS, THE CITY OF LOWELL has accepted federal grants for the construction of public treatment works, and must abide by the applicable federal laws, rules and regulations; and

WHEREAS, THE CITY OF LOWELL, CHELMSFORD, AND TYNGSBOROUGH all intend to comply with the applicable federal laws, rules and regulations, including but not limited to user charge, and sewer use ordinance requirements; and

WHEREAS, the provision for wastewater treatment and disposal service is necessary to protect the public health, safety, and welfare; and

WHEREAS, CHELMSFORD AND TYNGSBOROUGH have determined to enter into this Agreement for aforesaid reasons.

NOW THEREFORE, in consideration of these premises and mutual benefits to be derived by this parties hereto, it is agreed as follows:

ARTICLE 1. DEFINITIONS

1.1 For the purpose of this Agreement, the following terms are defined:

1.1.1 "LOWELL" shall mean the City of Lowell, a municipal corporation of the Commonwealth of Massachusetts.

1.1.2 "CHELMSFORD" shall mean the Town of Chelmsford, an incorporated township of the Commonwealth of Massachusetts.

1.1.3 "TYNGSBOROUGH" shall mean the Town of Tyngsborough, an incorporated township of the Commonwealth of Massachusetts.

1.1.4 "Industrial Wastes" shall mean liquid wastes, other than sanitary sewage, resulting from commercial, manufacturing or industrial operations of processes.

1.1.5 "Sanitary Sewage" shall mean sewage discharging from sanitary conveniences such as toilets, washrooms, urinals, sinks, showers, drinking fountains, small laundries, kitchens, cafeterias and floor drains essentially free of industrial wastes or toxic materials.

1.1.6 "Biochemical Oxygen Demand" (BOD) shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five (5) days at 20 degrees Centigrade (68 degrees Fahrenheit) expressed in milligrams per liter (mg/l) by weight.

1.1.7 "Suspended Soils" (SS) shall mean solids that either float on the surface of, or are in suspension in, water, sewage, wastewater or other liquids and which are removable by laboratory filtering.

1.1.8 "pH" shall mean the logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

1.1.9 "Chloride Demand" shall mean the amount of chloride expressed in mg/l required to be added to water,

sewage or other liquid to achieve a combined chloride residual after fifteen (15) minutes contact of one (1) mg/l.

1.1.10 "Sewage System or Sewage Works" shall mean all facilities for collecting, conveying, pumping, treating and disposing of sanitary sewage and/or industrial wastes.

1.1.11 "Combined Sewer" shall mean a sewer receiving both surface runoff and sanitary sewage and/or industrial wastes.

1.1.12 "Wastes" shall mean the sanitary sewage, industrial wastes and infiltration from TYNGSBOROUGH'S sewerage system.

1.1.13 "Average Daily Flow" shall mean the total annual flow as measured in gallons at Metering Stations plus agreed-to direct discharges to CHELMSFORD'S sewerage system divided by the number of days in the year.

1.1.14 "Maximum Daily Flow" shall mean the maximum gallons recorded at Metering Stations plus agreed-to allowances for direct discharges to CHELMSFORD sewerage system during a 24-hour period during any calendar year.

1.1.15 "Peak Rate of Flow" shall mean the maximum rate of flow in gallons recorded at Metering Stations or measured in the direct discharges to CHELMSFORD'S sewerage system during any calendar year.

1.1.16 "User Charges" shall mean charges levied in proportion to the use of sewage works. As required by Section 204 (b) (1) (A) of Public Law 95-217, as amended, and by regulations promulgated by the U.S. Environmental Protection Agency, such charges must, to the extend possible, distribute operation and maintenance (including replacement) cost to each user in proportion to its contribution to the total loading of the sewage works, where construction of such works has been financed in part by a federal grant.

1.1.17 "Replacement Costs" shall mean expenditures for obtaining and installing equipment, accessories or appurtenances which are necessary during the service life of the sewage works to maintain the capacity and performance for which said works were designed and constructed.

1.1.18 "Service Life" shall mean the period of time during which the sewage works or component of a waste treatment management program will be capable of performing a function.

1.1.19 "Industrial User" shall mean any non-governmental user of CHELMSFORD'S sewage works, which contributes industrial wastes, identified in the Standard Industrial Classification Manual, 1972 Edition, Office of Management and Budget, as amended and supplemented, under the following divisions:

Division A. Agriculture, Forrestry, and Fishing.
Division B. Mining.
Division D. Manufacturing.
Division E. Transportation, Communications, Electric, Gas, and Sanitary Services.
Division I. Services.

1.1.20 "Total Cost" shall mean construction costs, engineering and legal fees, capatilized interest costs during construction, amortization costs and land costs.

1.1.21 "Operation Costs" shall mean the cost incurred by CHELMSFORD necessary for the proper and efficient operation and maintenance of the sewage works.

ARTICLE II. GENERAL PROVISIONS

2.1 TYNGSBOROUGH understands and agrees to the following obligations, limitations, and commitments, made in return for CHELMSFORD'S agreement to permit connection by TYNGSBOROUGH to CHELMSFORD'S sewage works.

2.1.1 "Limitations of Rights." Nothing in this Agreement shall be construed as a grant by CHELMSFORD of any exclusive right of privilege. TYNGSBOROUGH agrees to comply in all respects with "the TOWN OF CHELMSFORD Sewer Use Regulations," as amended.

2.1.2 "Charges and Fees." TYNGSBOROUGH agrees to make prompt payment of all charges described in and pursuant to this agreement.

2.1.3 "Sewer Use By-Law." TYNGSBOROUGH agrees to adopt and enforce a by-law that embodies rules related to

use of TYNGSBOROUGH'S sewage works. Said rules shall include the Town of Tyngsborough Sewer Rules and Regulations adopted August 1981 and any amendments thereto that be required to be acceptable to federal and state authorities, to CHELMSFORD and to LOWELL. As a minimum, such rules shall prescribe conditions and requirements for use of TYNGSBOROUGH'S sewage works so as to comply with the limitations set forth in "TOWN OF CHELMSFORD Sewer Use Regulations," as amended.

2.1.4 "Interceptor Responsibilities." TYNGSBOROUGH shall be responsible for the design, construction, operation, maintenance, and costs incurred for its sewer program. A complete metering/sampling station shall be constructed by TYNGSBOROUGH, installed adjacent to the CHELMSFORD town line, to determine and to allocate CHELMSFORD'S costs for operation and maintenance to TYNGSBOROUGH for its wastewater volume and strengths.

ARTICLE III. OBLIGATIONS AND RESPONSIBILITIES

3.1 CHELMSFORD shall receive and transport TYNGSBOROUGH'S wastes, in accordance with all existing or future laws, regulations, existing or future CHELMSFORD Sewer Ordinance, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the transmission of said wastes; provided, however, that the

treatment of TYNGSBOROUGH'S wastes shall be of such a type and degrees as may be necessary to provide for the application of Best Practicable Waste Treatment Technology. TYNGSBOROUGH shall conform to all appropriate industrial wastewater pretreatment rules and regulations as established by the appropriate state and federal regulatory agencies.

3.2 TYNGSBOROUGH will not connect any combined sewer or separate drains into CHELMSFORD'S sewerage system and will not discharge into said sewerage system any volume of sewage, substances or wastes containing the following characteristics in excess of that agreed to herein.

3.2.1 Any waters or wastes contaminating fats, wax, grease or oils, whether emulsified or not, in excess of one hundred (100) mg/l or containing substances which may solidify or become viscous at temperature between zero (0) and sixty-five (65) degrees Centrigrade, (32 and 150 degrees Fahrenheit).

3.2.2 Any gasoline, benzene, naptha, fuel oil, or other liquid, solid or gas in sufficient concentration to be flammable or explosive.

3.2.3 A temperature higher than 65 degrees Centrigrade (150 degrees Fahrenheit).

3.2.4 Any garbage not properly shredded.

3.2.5 Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, wood, paunch manure, or other solid or viscous substances capable of causing interference with the proper operation of the sewerage system.

3.2.6 Any wastes having a pH lower than 5.5 or higher than 9.5 or having any corrosive property capable of causing damage or hazards to structures, equipment and personnel at the sewage works.

3.2.7 Any wastes containing a toxic or poisonous substances which constitute a hazard to humans or animals or to create any hazard in the receiving waters of the sewage works.

3.2.8 Waters or wastes containing substances which are amendable to treatment only to a degree such that the sewage treatment plant effluent cannot meet the requirements of any governmental authority having jurisdiction over discharge to the receiving waters.

3.2.9 Any noxious or malodorous gas or substance capable of creating a public nuisance.

3.2.10 Plastics, except those materials which have undergone complete reaction and whose size does not exceed 2.5 inches in its largest dimension.

3.2.11 Wastes character or concentration, as sampled at Metering Stations, in accordance with the provisions of ARTICLE VIII.

3.3 All measurements of volume and characteristics of TYNGSBOROUGH'S wastes shall be made at Metering Stations constructed, and maintained by TYNGSBOROUGH at locations acceptable to CHELMSFORD pursuant to this Agreement. Said acceptance by CHELMSFORD shall not be unreasonably withheld. All flow measurements made at the metering

stations will be transmitted to Southwellfield Pump Station in North Chelmsford and to the Duck Island Wastewater Treatment Plant in Lowell. For small individual areas in TYNGSBOROUGH'S sewerage system, measurements shall be based on a method acceptable to CHELMSFORD and TYNGSBOROUGH.

3.4 Industrial wastes from TYNGSBOROUGH, as measured at Metering Stations, shall be judged by the same standards as are in effect within CHELMSFORD'S Sewerage System, notwithstanding the provisions of Paragraph 3.2 of this ARTICLE.

ARTICLE IV. AGREEMENT TERM

4.1 The provisions of this Agreement shall run for a minimum period of thirty (30) years from the date of initial transport of TYNGSBOROUGH'S wastes subject to the provisions of ARTICLE XI.

ARTICLE V. IMPLEMENTATION

5.1 CHELMSFORD agrees to provide a sewerage system with a portion of the capacity allocated to handle wastes from TYNGSBOROUGH. Construction commencement and completion of said sewerage system shall be in accordance with the implementation schedule established by the Massachusetts Water Resources Commission, Division of Water Pollution Control. In the event TYNGSBOROUGH determines that it shall not use its entire capacity, CHELMSFORD shall have the right to purchase the unused flow. Unused flow will be based on capacities, described in Paragraph 7.3.1 of ARTICLE VII less actual meter readings at metering stations.

ARTICLE VI. USER CHARGES

6.1 User Charges:

6.1.1 TYNGSBOROUGH shall develop, in accordance with the provisions of federal regulations ("Code of Federal Regulations, Subpart I, 40 CFR 35.2122 and 35.2140, et seq."), as amended, an equitable User Charge System to assure that each recipient of waste treatment services within TYNGSBOROUGH'S service area will pay its proportionate share of the costs of operation and maintenance (including replacement) of all waste transmission services provided by CHELMSFORD and all waste treatment services provided by LOWELL.

6.1.2 TYNGSBOROUGH shall obtain approval of the Massachusetts Water Resource Commission, Division of Water Pollution Control, and the Region 1 Office of the U.S. Environmental Protection Agency for its User Charge System for the above costs.

6.1.3 TYNGSBOROUGH, upon approval of its User Charge System, must incorporate said system in one or more municipal legislative by-laws.

ARTICLE VII. PAYMENT OF CAPITAL COSTS

7.1 TYNGSBOROUGH shall, periodically, as set forth herein, pay to CHELMSFORD sums which in total represent its full obligation of the Total Cost to CHELMSFORD, after deduction of all government grants for all sewage works in CHELMSFORD, required to receive and transport TYNGSBOROUGH'S wastes.

CHELMSFORD and TYNGSBOROUGH acknowledge that certain construction has previously been completed by CHELMSFORD and LOWELL of facilities which are and shall be used by TYNGSBOROUGH pursuant to this AGREEMENT and TYNGSBOROUGH agrees to pay to CHELMSFORD, TYNGSBOROUGH'S share as determined by this agreement.

Payments of the full obligation, as determined by this agreement, by TYNGSBOROUGH to CHELMSFORD shall be due immediately upon notification from TYNGSBOROUGH of the commencement of transmission of sewerage from TYNGSBOROUGH to the Town of CHELMSFORD Sewerage System provided that no flow shall be accepted from TYNGSBOROUGH until payment is made.

7.2 The basis of payments by TYNGSBOROUGH for sewage works construction by CHELMSFORD shall be established as follows:

7.2.1 Lowell Facilities:

7.2.1.1 Duck Island Regional Treatment

$$\text{TYNGSBOROUGH payment} = C_1 \, a/b$$

Where:

C_1 = Total Local Share for North Chelmsford Regional Treatment

a = Average daily design flow rate requested by TYNGSBOROUGH

b = Total average daily design flow rate for the North Chelmsford Regional Area. This regional flow represents flows from TYNGSBOROUGH, WESTFORD, and NORTH CHELMSFORD.

7.2.1.2 Lowell Transmission Facilities

TYNGSBOROUGH payment = C_2 d/e

Where:

C_2 = Total Local Share of Lowell Transmission Facilities built to receive North Chelmsford Regional Flow.

d = Peak daily design flow requested by TYNGSBOROUGH

e = Total peak daily design flow rate of the North Chelmsford Regional Area.

7.2.2 Chelmsford Facilities:

7.2.2.1 Southwell Field Pump Station

TYNGSBOROUGH Payment = C_3 a/f

Where:

C_3 = Total local share of Southwell Field Pump Station

f = Total Average regional design flow for Southwell Field Pump Station

7.2.2.2 North Chelmsford Interceptor Sewer Project

TYNGSBOROUGH Payment = C_4 d/g + C_5 d/h

Where:

C_4 = Total Local Share of the 16" Force Main

C_5 = Total Local Share of the 24" Gravity Sewer

g = Peak daily regional design flow in the 16" Force Main

h = Peak daily regional design flow in the 24" Gravity Sewer

7.2.2.3 North Chelmsford Lateral Sewers - Tyngsborough Road

TYNGSBOROUGH Payment = C_6 d/i

Where:

C_6 = Total Local Share of the 15" Gravity Sewer

i = Peak daily regional design flow in the 15" Gravity Sewer

7.3 CHELMSFORD shall provide capabilities in its sewage works for the wastes from TYNGSBOROUGH'S service area, as defined by a boundary created by the CHELMSFORD Town Line, then northerly along the Merrimack River, then Southwesterly along Westford Road, then Southeasterly along Route 3 to the CHELMSFORD Town Line. Capacities for TYNGSBOROUGH shall be as follows:

7.3.1	Average Daily Flow	0.35 million gallons per day (mgd)
	Peak Flow	1.3 mgd
	BOD	740 lbs/day
	SS	800 lbs/day

7.4 Should it be required by the appropriate State and/or Federal agencies to provide additional waste treatment at Duck Island Regional Facilities, TYNGSBOROUGH shall pay its proportionate share of the required sewage works based on the flows established under Paragraph 7.3 of this ARTICLE. If LOWELL'S sewage works required enlargement because the total flows or total strength of the flow to the treatment facilities exceed the design, then TYNGSBOROUGH shall contribute only insofar as its wastes have exceed the limits called for under the above-referenced Paragraph 7.3 and the provisions of 7.3.

ARTICLE VIII. OPERATING COST APPORTIONMENT

8.1 CHELMSFORD and LOWELL shall maintain an adequate cost accounting system which shall be the basis for the determination and allocation of operating costs.

CHELMSFORD shall maintain separate cost accounting records for the operation of those portions of their sewage works that are shared by CHELMSFORD and TYNGSBOROUGH and any other participants. The annual cost of operating these sewage works shall be apportioned between CHELMSFORD, TYNGSBOROUGH and any other participants on the basis of their actual, annual flows, as determined from records at the respective Metering Stations.

8.2 The operating costs shall be apportioned against participants on the basis of the average daily flows, providing that the established parameters from any participant are not exceeded. If either the average BOD or SS from any participants exceeds 300 mg/l; then the participant shall pay a surcharge to CHELMSFORD and/or LOWELL for transport and/or treatment of its wastes. The surcharges will be based on the proportional extra cost incurred for the complete transport and/or treatment of wastes in excess of 300 mg/l for the period of time in violation.

8.3 Actual flows shall be determined for TYNGSBOROUGH from records of Metering Stations. Actual annual flow for CHELMSFORD, will be determined at Southwell Field Pump Station. Estimated flows from non-metered, individual areas shall also be included, if not charged separately. Actual, annual flows shall be determined for LOWELL from records at the treatment facilities.

8.4 The waste strengths, BOD and SS, for each of the participants shall be determined from proportional, composite 24-hour samples obtained at the participants Metering Stations. The average daily BOD and SS in pounds per day shall be determined from the average of not less than twelve (12) samples taken on weekdays at monthly intervals.

8.5 When determining surcharges, the unit cost per pound of BOD and SS used shall be based on the previous year's treatment

facility operational costs divided by the total annual BOD or SS loadings.

8.6 Operating costs for the treatment facilities shall include the cost of sampling and analyzing wastes discharged. It shall also include the cost accounting related to the distribution and invoicing of operating costs.

8.7 Operating costs shall be payable monthly, on a fiscal year basis, upon receipt by TYNGSBOROUGH of CHELMSFORD'S invoice. Bills shall be paid within forty-five (45) days. Operating costs for the first eleven (11) months shall be determined by using CHELMSFORD and LOWELL'S approved yearly operation budget (reduced to a monthly cost) and approportioning TYNGSBOROUGH'S share on the basis of actual total monthly flow, as measured.

The final monthly invoice for the fiscal year shall be rendered by CHELMSFORD within thirty (30) days of the end of the fiscal year and shall be determined on the basis of actual flows and expenditures. All previous monthly invoices shall be subject to adjustment and correction at the time of this final billing for the fiscal year.

CHELMSFORD shall forward to TYNGSBOROUGH, on or before March first, the projected estimate of operating cost and other costs attributable to TYNGSBOROUGH for such fiscal year, so that TYNGSBOROUGH may make necessary preparations for the final monthly invoice for the fiscal year.

ARTICLE IX. ANNUAL COST REVIEW

9.1 CHELMSFORD and TYNGSBOROUGH both agree that the apportionment of costs set forth in ARTICLE VIII, shall be subject to review annually. After a review of the annual costs, if an adjustment to the costs appears to be necessary, said adjustment shall be made by CHELMSFORD in the forthcoming billing for services.

ARTICLE X. ADJUSTMENT CLAUSE

10.1 TYNGSBOROUGH reserves the right at any time to pretreat and/or reduce the BOD and SS concentrations of its wastes, or to otherwise give preliminary treatment to its wastes prior to discharge to CHELMSFORD'S sewerage system. TYNGSBOROUGH agrees to notify CHELMSFORD as far in advance as possible of any significant increase or decrease in the quantity and/or quality of the wastes to be discharged to CHELMSFORD'S sewerage system.

ARTICLE XI. TERMINATION CLAUSE

11.1 Either party may terminate this Agreement by giving the notice thereof to the other party in writing three (3) years prior to the termination date. Upon receipt of said notice, both parties will enter into discussion within thirty (30) days to assure proper termination of the Agreement.

Should TYNGSBOROUGH initiate the termination proceedings, it shall not have any right to the return of any of its initial capital investment under ARTICLE VII.

Should CHELMSFORD initiate the termination proceedings, it shall be obliged to return to TYNGSBOROUGH the unused proportionate share of TYNGSBOROUGH'S capital investment under ARTICLE VIII.

11.2 TYNGSBOROUGH shall have the right to the continued use of CHELMSFORD sewerage works provided for, in part, by TYNGSBOROUGH'S capital investment under ARTICLE VII, beyond the thirty (30) years provided for in ARTICLE IV, for as long as those sewerage works remain in active use. The right shall be limited to the waste parameters established under ARTICLE VII.

11.3 Each party shall truly and faithfully perform its duties, all the undertakings covenants, terms and conditions of this agreement during the term of this agreement, and any extension thereof which may be granted by CHELMSFORD; and subject further to the following:

11.3.1 TYNGSBOROUGH shall assume the defense of and indemnify and hold harmless CHELMSFORD, including CHELMSFORD'S Sewer Commission, agents, servants, employees, and/or elected officials from and against all liability, damage, loss, claim, demands, and actions of any nature whatsoever which arise out of or are connected with, or are claimed to arise out of or be connected with any provisions, terms, and condition, etc. of this agreement, including, without limiting the generality of the foregoing thereto, all liability, damage, loss, claims,

demands and action on account of personal injury, death or property loss occasioned by CHELMSFORD, its Sewer Commission, its agents, servants, employees and/or elected officials, or any other persons, whether or not caused or claimed to have caused by active, or inactive negligence, or other breach of duty by the Town of TYNGSBOROUGH its agents, Sewer Commission elected officials and/or employees or any other person. TYNGSBOROUGH shall as its own expense investigate all such claims and demands against it, its Sewer Commission, agents and or employees, attend to claim settlement or other disposition, defend all actions based thereon and pay all charges or attorney's fees and all other costs and expenses of any kind arising from any such liability loss claims, demands, and actions.

11.3.2 CHELMSFORD shall assume the defense of and indemnify and hold harmless TYNGSBOROUGH, including TYNGSBOROUGH'S Sewer Commission, agents, servants, employees, and/or elected officials from and against all liability, damage, loss, claim, demands, and actions of any nature whatsoever which arise out of or are connected with, or are claimed to arise out of or be connected with any provision, term, and condition, etc. of this agreement, including, without limiting the generality of the foregoing thereto, all liability, damage, loss, claims,

demands and action of account of personal injury, death or property loss occasioned by TYNGSBOROUGH, its Sewer Commission, its agents, servants, employees and/or elected officials, or any other persons, whether or not caused or claimed to have caused by active or inactive negligence, or other breach of duty by the Town of CHELMSFORD its agents, Sewer Commission, elected officials and/or employees or any other person. CHELMSFORD shall at its own expense investigate all such claims and demands against it, its Sewer Commission, agents and/or employees, attend to claim settlement or other disposition, defend all actions based thereon and pay all charges or attorney's fees and all other costs and expenses of any kind arising from any such liability, loss, claims, demands, and actions.

11.4 TYNGSBOROUGH and CHELMSFORD shall, at all times be obligated to comply with the terms and conditions of this agreement. Any party in default and/or in breach of this agreement shall reimburse and repay to the non-breaching and/or non-defaulting party, its Sewer Commission, its agents, servants, employees and/or elected officials all expenses and other sums incurred by said non-breaching party and/or non-defaulting party for curing such default and/or breach. In the event TYNGSBOROUGH fails to make any payments as required in this agreement, CHELMSFORD may, but is not obligated to cure TYNGSBOROUGH default, and any sums

incurred by the Town of CHELMSFORD in regard to the same, shall be paid by TYNGSBOROUGH to CHELMSFORD within thirty (30) days from the expenditure by the Town of CHELMSFORD, its Sewer Commission, agents, agent servants, employees and/or elected officials.

11.5 This agreement will become null and void if within three (3) years of the date of this agreement CHELMSFORD does not receive notification from TYNGSBOROUGH of the commencement of transmission of sewerage and payment of TYNGSBOROUGH'S full obligation as required in Section VII.

ARTICLE XII. WASTES ANALYSIS

12.1 CHELMSFORD and TYNGSBOROUGH both agree that the determination of character and concentration of wastes will be in accordance with the latest edition of "Standard Methods for the Examination of Water and Sewage," as proposed, approved and published by the American Public Health Association and the Water Pollution Control Federation, or any other method established by CHELMSFORD, and subject further the following:

12.1.1 Sampling at Metering Stations will be performed by CHELMSFORD. Determination of the character and concentration of TYNGSBOROUGH'S wastes, for the purpose of checking waste parameters, shall be the responsibility of CHELMSFORD or its authorized agent. TYNGSBOROUGH shall be furnished copies of all such determinations.

12.1.2 Samples shall be collected by CHELMSFORD at Metering Stations in such a manner so as to be representative of the actual quality of the wastes. TYNGSBOROUGH shall have the access to said Stations, as required, to conduct intermittent or continuous waste sampling.

12.1.3 Portions of waste samples collected by CHELMSFORD, as part of a sampling and analytical program, will be made available to TYNGSBOROUGH at no cost in adequate quantities for analysis by TYNGSBOROUGH for characteristics and concentrations. In the event of discrepancy which cannot be satisfactorily resolved, the parties will submit the samples to a mutually acceptable, disinterested, qualified third party for determination of the waste characteristics and concentrations.

ARTICLE XIII. FLOW MEASUREMENTS

13.1 CHELMSFORD and TYNGSBOROUGH agrees that flow measurements shall be made as follows:

13.1.1 The volume of flow used in computing TYNGSBOROUGH'S share of the operating costs shall be based upon readings obtained by suitable metering equipment acceptable to CHELMSFORD. Such metering equipment shall be installed and maintained by TYNGSBOROUGH. TYNGSBOROUGH will provide CHELMSFORD with waste flow data for the preceding week, based upon meter readings. CHELMSFORD shall have access to said meters during normal business hours.

13.1.2 In the event the metering equipment is temporary out of order or service for any reason, TYNGSBOROUGH estimated flow will be based on the average daily flow of the previous three months.

ARTICLE XIV. CONFORMANCE TO LAW

14.1 TYNGSBOROUGH agrees to abide by, and conform to, all applicable laws of the United States and the Commonwealth of Massachusetts, together, with such rules and regulations as CHELMSFORD may promulgate from time to time with regard to its sewerage works.

IN WITNESS WHEREOF, CHELMSFORD and TYNGSBOROUGH have caused their proper representatives on the day and year first above written.

FOR THE TOWN OF TYNSBOROUGH, MASSACHUSETTS

By Its Sewer Commissioners

Approved as to Form

Town Counsel

FOR THE TOWN OF CHELMSFORD, MASSACHUSETTS

By ~~Its Sewer~~ Commissioners

Approved as to Form

Town Counsel

(C-1000)

COPY

DRACUT-TYNGSBOROUGH AGREEMENT

AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 1977, by and between the Town of Dracut, an incorporated Township within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as "Dracut", and the Town of Tyngsborough, an incorporated township within the County of Middlesex and the Commonwealth of Massachusetts, hereinafter referred to as "Tyngsborough".

WITNESSETH

WHEREAS, the Water Resources Commission, Commonwealth of Massachusetts, acting through the Office of the Director of the Division of Water Polluti Control, has found both Dracut and Tyngsborough to be discharging untreated wastewaters into the surface waters of the Commonwealth in contravention of the water quality standards of the Division of Water Pollution Control; and

WHEREAS, Dracut is authorized by law to enter into contracts and agreements with Tyngsborough for the purpose of aiding in the abatement of water pollution; and

WHEREAS, Dracut deems it to be in the public interest to enter into an AGREEMENT with Tyngsborough whereby Dracut would receive and transmit Tyngsborough's wastes through Dracut's sewerage system to the City of Lowell where the City of Lowell would receive, treat, and dispose of Tyngsborough's waste

NOW, THEREFORE, in consideration of these premises and mutual benefits to be derived by the parties hereto, IT IS AGREED, as follows;

ARTICLE 1. DEFINITIONS

1.1 For the purposes of this AGREEMENT the following terms are defined:

1.1.1 "Dracut" shall mean the Town of Dracut, an incorporated township of the Commonwealth of Massachusetts.

1.1.2 "Tyngsborough" shall mean the Town of Tyngsborough, an incorporated township of the Commonwealth of Massachusetts.

1.1.3 "City " shall mean the City of Lowell, a municipal corporation of the Commonwealth of Massachusetts.

1.1.4 "Industrial Wastes" shall mean liquid wastes, other than sanitary sewage, resulting from commercial, manufacturing or industrial operations or processes.

1.1.5 "Sanitary Sewage" shall mean sewage discharging from sanitary conveniences such as toilets, washrooms, urinals, sinks, showers, drinking fountains, small laundries, kitchens, cafeterias and floor drains essentially free of industrial wastes or toxic materials.

1.1.6 "Biochemical Oxygen Demand" (BOD) shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five (5) days at 20 degrees (°) Centigrade (68° Fahrenheit) expressed in milligrams per liter (mg/l) by weight.

1.1.7 "Suspended Solids" (SS) shall mean solids that either float on the surface of, or are in suspension in, water, sewage, wastewater or other liquids and which are removable by laboratory filtering.

1.1.8 "pH" shall mean the logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

1.1.9 "Chlorine Demand" shall mean the amount of chlorine expressed in mg/l required to be added to water, sewage or other liquid to achieve a combined chlorine residual after fifteen (15) minutes contact of one (1) mg/l.

1.1.10 "Sewerage System or Sewage Works" shall mean all facilities for collecting, conveying, and pumping of sanitary sewage and/or industrial wastes within the Town of Dracut.

1.1.11 "Treatment Facilities" shall mean all facilities for conveying, treating, and disposing of sanitary sewage and/or industrial wastes within the City of Lowell.

1.1.12 "Combined Sewer" shall mean a sewer receiving both surface runoff and sanitary sewage and/or industrial wastes.

1.1.13 "Wastes" shall mean the sanitary sewage, industrial wastes and infiltration from Tyngsborough's and/or Dracut's sewerage system(s).

1.1.14 "Average Daily Flow" shall mean the total annual flow as measured at Metering Stations plus agreed-to direct discharges to Dracut's sewerage system divided by the number of days in the year.

1.1.15 "Maximum Daily Flow" shall mean the maximum gallons recorded at Metering Stations plus agreed-to allowances for direct discharges to Dracut's sewerage system during a 24-hour period during any calendar day.

1.1.16 "Peak Rate of Flow" shall mean the maximum rate of flow recorded at Metering Stations or measured in the direct discharges to Dracut's sewerage system during any calendar year.

1.1.17 "User Charge" shall mean a charge levied on a user of sewage works for the cost of operation and maintenance, including replacement costs, of such works (Environmental Protection Agency definition).

1.1.18 "Replacement" shall mean expenditures for obtaining and installing equipment, accessories or appurtenances which are necessary during the

service life of the sewage works to maintain the capacity and performance for which said works were designed and constructed. Replacement costs shall be apportioned in accordance with ARTICLE VI. (Environmental Protection Agency definition).

1.1.19 "Service Life" shall mean the period of time during which the sewage works or a component of a waste treatment management program will be capable of performing a function (Environmental Protection Agency definition).

1.1.20 "Industrial Cost Recovery" shall mean the recovery by Dracut of that portion of a federal grant allocable to the collection, transmission and treatment of discharges from industrial users (Environmental Protection Agency definition).

1.1.21 "Industrial User" shall mean any non-governmental user of Dracut's sewage works, which contributes industrial wastes, identified in the Standard Industrial Classification Manual, 1972 Edition, Office of Management and Budget as amended and supplemented, under the following divisions (Environmental Protection Agency definition):

Division A. Agriculture, Forestry and Fishing

Division B. Mining

Division D. Manufacturing

Division E. Transportation, Communications, Electric, Gas and Sanitary Services

Division I. Services

1.1.22 "Total Cost" shall mean construction costs, engineering and legal fees, capitalized interest costs during construction, amortization costs, land costs, etc.

1.1.23"Operating Cost" shall mean the cost incurred by Dracut necessary for the proper and efficient operation and maintenance of the sewage works.

ARTICLE II OBLIGATIONS AND RESPONSIBILITIES

2.1 Dracut shall receive and transmit Tyngsborough's wastes in accordance with all existing or future laws, regulations, Dracut Sewer Ordinances, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the reception and transmission.

Tyngsborough shall assist Dracut in meeting its obligations of adhering to and enforcing all existing and future laws, regulations, Dracut Sewer Ordinances, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the reception and transmission of said wastes.

Dracut shall enter into a separate agreement with the City, wherein the City will agree to receive, treat and dispose of the wastes from Dracut (which will include Tyngsborough's wastes) in accordance with all existing or future laws, regulations, City Sewer Ordinances, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the treatment and disposal of said wastes; provided,however, that the treatment to be provided by the City of Dracut's wastes shall be of such a type and degree as may be necessary to provide for the application of Best Practicable Waste Treatment Technology.

Tyngsborough shall assist Dracut in assisting the City in meeting its obligations of adhering to and enforcing all existing and future laws, regulations, City Sewer Ordinances, water quality standards, and orders and decrees of any governmental authority having jurisdiction over the treatment and disposal of said wastes.

2.1.1Sewer pipe inverts at the connection points of Tyngsborough's sewer lines into Dracut's sewer system at the Town Line shall be at or above the following elevations:

a) Tyngsboro Road at Tyngsborough-Dracut Town line 150.60 USGS Datum

b) Willowdale Avenue at Tyngsborough-Dracut Town line 151.50 USGS Datum

2.2 Tyngsborough will not connect any combined sewer or separate drain into Dracut's sewerage system and will not discharge into said sewerage system any volume of sewage, substances or wastes containing the following characteristics in excess of that agreed to herein:

2.2.1 Any waters or wastes containing fats, wax, grease or oils, whether emulsified or not, in excess of one hundred (100) mg/l or containing substances which may solidfy or become viscous at temperatures between zero (0) and sixty-five (65) degrees Centigrade (32 and 150 degrees Fahrenheit).

2.2.2 Any gasoline, benzene, naptha, fuel oil, or other liquid, solid or gas in sufficient concentration to be flammable or explosive.

2.2.3 A temperature higher than 65 degrees Centigrade (150 degrees Fahrenheit).

2.2.4 Any garbage not properly shredded.

2.2.5 Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, wood, paunch manure or other solid or viscous substances capable of causing interference with the proper operation of the sewerage system and/or treatment facilities.

2.2.6 Any wastes having a pH lower than 5.5 or higher than 9.5 or having any other corrosive property capable of causing damage or hazards to structures, equipment and personnel at the sewage works and or treatment works

2.2.7 Any wastes containing a toxic or poisonous substance in sufficient quantity to injure or interfere with the sewerage system, and/or treatment facilities to consititute a hazard to humans or anirals or to create any hazard in the receiving waters of the treatment facilities.

2.2.8 Waters or wastes containing substances which are amenable to treatment only to a degree such that the treatment facilities effluent cannot meet the requirements of any governmental authority having jurisdiction over discharge to the receiving waters.

2.2.9 Any noxious or malodorous gas or substance capable of creating a public nuisance.

2.2.10 Plastics, except those materils which have undergone complete reaction and whose size does not exceed 2.5 inches in its largest dimension.

2.2.11 Waste character or concentration, as sampled at Metering Stations, in accordance with the provisions of ARTICLE VII.

2.3 All measurements of volume and characteristics of Tyngsborough's wastes shall be made at Metering Stations constructed, operated and maintained by Dracut at the following locations:

Metering Station No. 1 - Located on Tyngsboro Road at the Dracut-

Metering Station Number 2 - Located on Willowdale Avenue at the Dracut-Tyngsborough Town boundary.

2.4 Industrial wastes from Tyngsborough as measured at Metering Stations, shall be judged by the same standards as are in effect within Dracut's sewerage system; notwithstanding the provisions of Paragraph 2.2 of this Article.

ARTICLE III AGREEMENT TERM

3.1 The provisions of this AGREEMENT shall run for a minimum period of thirty (30) years from the date of initial treatment of Tyngsborough's wastes subject to the provisions of ARTICLE X.

ARTICLE IV IMPLEMENTATION

4.1 Dracut agrees to provide a sewerage system with a portion of the capacity allocated to receive and transmit wastes from Tyngsborough. Construction commencement and completion of said sewerage system shall be in accordance with the Implementation Schedule established by the Massachusetts Water Resources Commission, Division of Water Pollution Control.

ARTICLE V USER CHARGES AND INDUSTRIAL COST RECOVERY

5.1 User Charges:

5.1.1 Tyngsborough shall develop, in accordance with the provision of federal regulations ("Code of Federal Regulations, 40 CFR 35.925-11 and 35.935-13, et seq."), an equitable User Charge System to assure that each

recipient of waste treatment services within Tyngsborough's service area will pay its proportionate share of the costs of operation and maintenance (including replacement) of all waste treatment services provided by Dracut.

5.1.2 Tyngsborough must obtain approval of the Massachusetts Water Resources Commission, Division of Water Pollution Control, and the Region 1 Office of the U.S. Environmental Protection Agency for its User Charge System for the above costs.

5.1.3 Tyngsborough, upon approval of its User Charge System, must incorporate said System in one or more municipal, legislative enactments.

5.1.4 The enactment(s) must include provisions whereby the maintenance of said System and the collection of the revenues can be reviewed by any governmental authority having jurisdiction and/or Dracut.

5.2 Industrial Cost Recovery:

5.2.1 Tyngsborough shall annually inventory and survey all the industries in its service area. The survey should produce all pertinent information so that a determination can be made by Dracut and Tyngsborough as to which is an industrial user as defined in ARTICLE I.

5.2.2 Dracut shall develop in accordance with the provisions of federal regulation ("Code of Federal Regulations, 40 CFR 35.925-12, 35.928 and 35.935-13, et seq."), an equitable Industrial Cost Recovery System for all industrial users in its service area for the recovery of their portion of a federal grant amount allocable to sewage works constructed in Dracut.

5.2.3 Dracut must obtain the approval of the Massachusetts Water Resources Commission, Division of Water Pollution Control, and the Region I Office of the U.S. Environmental Protection Agency for its Industrial Cost Recovery System.

5.2.4 Dracut and Tyngsborough, upon approval of the Industrial Cost Recovery System, must incorporate said System in one or more municipal, legislative enactments as being their Industrial Cost Recovery System.

5.2.5 Dracut shall annually bill Tyngsborough for Industrial Cost Recovery for all industries within Tyngsborough's service area as determined by Dracut's System. Tyngsborough shall collect all revenues for Industrial Cost Recovery from industries within Tyngsborough's service area.

5.2.6 Tyngsborough shall annually pay to Dracut the invoiced billings for Industrial Cost Recovery plus the interest earned thereon on the collecte revenues at the time that the final payment for operating costs for each fiscal year is made in accordance with ARTICLE VII.

5.2.7 Tyngsborough shall provide Dracut with copies of all invoices and records pertinent to the assessing and collection of revenue for Industrial Cost Recovery.

5.2.8 Dracut shall review the Industrial Cost Recovery System annually, using Tyngsborough's annual industrial inventory and survey report.

5.2.9 Dracut shall keep a permanent file of all reports, invoices, and records relative to Industrial Cost Recovery subject to review by any governmental authority having jurisdiction.

5.2.10 Dracut shall retain, as presently permitted by federal regulation 50 percent of the amounts recovered from industrial users. Accurate records of the retained revenues, including acknowledgement of the source as well as

detailed cost accounts of expenditures of these funds, will be maintained so that Dracut and Tyngsborough will receive full credit and benefit in accordance with the terms of this AGREEMENT. All of the retained amounts recovered from industrial users in Tyngsborough's service area shall be used in accordance with federal regulation for sewage works in Dracut which will directly benefit Tyngsborough.

ARTICLE VI CAPITAL COST APPORTIONMENT

6.1 Tyngsborough shall, periodically, pay to Dracut sums which in total represent its full obligation of the Total Cost to Dracut, after deduction of all government grants for all sewage works in Dracut, of sewage works required to receive and transmit Tyngsborough's wastes to the City where the City would receive, treat and dispose of Tyngsborough's wastes.

Payments of the full obligation by Tyngsborough to Dracut for each applicable construction contract within the Town of Dracut shall be established and processed as follows:

> For each construction contract four (4) payments shall be made. The initial payment, equal to forty (40) percent of the estimated Total Cost of the contract, shall be made within sixty (60) days after notification by Dracut that the contract has been awarded and the government grant offers have been accepted by Dracut. Two (2) additional payments, based on the initial estimated Total Cost of the contract, shall be made at six (6) month intervals. A final payment, based on the adjusted Total Cost of the contract, when accepted by Dracut, shall be made by Tyngsborough. In no case shall the total payments by Tyngsborough to Dracut exceed the full obligation of Tyngsborough as computed under Paragraph 6.4 of this ARTICLE."

Payments of the full obligation by Tyngsborough to Dracut for each applicable construction contract with the City of Lowell

shall be established and processed as follows:

For each construction contract six (6) payments shall be made. The intitial payment, equal to twenty (20) percent of the estimated Total Cost of the contract, shall be madw within sixty (60) days after notification by the City and Dracut that the contract has been awarded and the governmeng grant offers have been accepted by the City. Four (4) additional payments, based on the initial estimated Total Cost of the contract, shall be made at six (6) month intervals. A final payment, based on the adjusted Total Cost of the contract, when accepted by the City, shall be made to Dracut. In no case shall the total payments by Tyngsborough to Dracut exceed the full obligation of Tyngsborough as computed under Paragraph 6.4 of the ARTICLE.

6.2 Records of the Total Cost are public information and will be on file with Dracut and available for review during normal business hours by all responsible agencies. Copies of pertinent information will be forwarded to Tyngsborough, as required.

6.3 Whereas, the Metering Stations listed in Section 2.1 are being constructed solely for flows generated by Tyngsborough, all capital costs for these facilities will be borne by Tyngsborough.

Whereas, other sewage works are constructed solely for flows generated by Tyngsborough, all cpaital costs for said works will be borne by Tyngsborough

6.4 The basis of payments by Tyngsborough for sewage works constructed by Dracut and the City shall be established as follows:

6.4.1 Gravity Sewer, Force Mains, Stewart St. Pumping Station, City Metering Station No. 1, and Raw Sewage Pumping Station:

$$\text{Tyngsborough Payment} = C_1 \frac{a}{b}$$

Where:

C_1 = Total Cost

a = Peak Rate of Flow requested by Tyngsborough

b = Design Peak Rate of Flow for facility as approved by the Massachusetts Water Resources Commission, Division of Water Pollution Control, and the Region 1 Office of the

6.4.2 Treatment Facilities at the Duck Island Regional Wastewater Treatment Plant (including EPA/State Project No. C250251 01, Preparation of Treatment Facilities Site):

Tyngsborough Payment = $C_2 \frac{d}{e}$

Where:

C_2 = Total Cost of the Duck Island Regional Wastewater Treatment Plant Upon Completion

d = Average Daily Flow rate requested by Tyngsborough

e = Total Average Daily Flow rate used for design of facility as defined in the approved "Interim Basin Plan"

6.5 Dracut shall provide capacities in its sewage works and in its Agreement with the City for the wastes from Tyngsborough's service area as defined in the approved "Interim Basin Plan". Capacities for Tyngsborough shall be as follows:

6.5.1 Treatment Facilities, Stewart Street Pumping Station, and Raw Sewage Pumping Station:

Design Year	2000
Average Daily Flow	1.0 million gallons per day (mgd)
Maximum Daily Flow	2.1 mgd
Peak Flow	3.5 mgd
BOD	2100 lbs/day
SS	2500 lbs/day

6.5.2 Transmission Facilities:

Design Year	2025	
	Average Daily Flow	Peak Flow
At Metering Station No. 1	1.15 mgd	4.0 mgd
At Metering Station No. 2	.45 mgd	1.8 mgd
At City Metering Station No. 1	1.60 mgd	5.2 mgd

6.6 Dracut shall design its sewage works to meet the present day Division of Water Pollution Control requirements.

As above, Dracut shall enter into a separate agreement with the City, wherei the City shall design its treatment facilities to meet the present day Division of Water Pollution Control requirements, and to provide for Best Practicable Wastewater Treatment technology, defined by said Division as secondary treatment.

6.7 Should it be required by any governmental authority having jurisdiction to provide additional treatment, Tyngsborough shall pay its proportionate share of the required sewage works based on the flows established unc Paragraph 6.5 of this ARTICLE. If the City's treatment facilitities and/or Dracut's sewage works require enlargement because the parameters of the flow to the treatment facilities and/or sewage works exceed the design, then Tyngsborough shall contribute only insofar as its wastes have exceeded the limits called for under the above-referenced Paragraph 6.5.

ARTICLE VII OPERATING COST APPORTIONMENT

7.1 Dracut shall maintain an adequate cost accounting system which shall be the basis for the determination and allocation of operating costs. This accounting system shall be subject to review by Tyngsborough.

Dracut shall maintain separate cost accounting records for the operation of the following portions of the sewage works and treatment facilities:

7.1.1 Double Brook Interceptor, Beaver Brook Interceptor, and Connecting Mains - The annual cost of operating these facilities shall be apportioned between Dracut, Tyngsborough, and any other participants on the the basis of their actual, annual flows, as determined from records obtained at the respective Metering Stations.

7.1.2 The Stewart Street Pumping Station - The annual cost of operating this facility shall be apportioned between Dracut, Tyngsborough, and any other participants on the basis of their actual, annual average daily flows, taken on a yearly basis and determined from records obtained at the respective Metering Stations.

7.1.3 North Bank Interceptor from the Point of Connect at Beaver Brook to the Raw Sewage Pumping Station - The annual cost of operating this sewage works shall be apportioned between the City, Dracut, Tyngsborough, and any other participants on the basis of their actual, annual flows, as determined from records at the respective Metering Stations. The costs of operating and maintaining the diversion chambers and other stormwater facilities shall be borne by the City.

7.1.4 Raw Sewage Pumping Station and Treatment Facilities (The Duck Island Regional Wastewater Treatment Plant) - The annual cost of operating these facilities shall be apportioned between the City, Dracut, Tyngsborough and any other participants, on the basis of their actual, annual average daily flows, taken on a yearly basis, and determined from records obtained at the respective Metering Stations. Dracut and Tyngsborough shall bear no costs associated with the collection and treatment of stormwater.

7.2 The operating costs shall be apportioned against participants on the basis of average daily flows, providing that the established parameters from any participant are not exceeded.

In the above mentioned separate agreement between Dracut and the City, if either the average BOD or SS from Dracut exceeds 300 mg/l, then Dracut shall pay a surcharge to the City for treatment of its wastes. The surcharges will be based on the proportional extra cost incurred for the complete treatment of wastes in excess of 300 mg/l for the period of time in violation. If it is ever determined that Dracut has exceeded the above limits and is, in fact, levied a surcharge, and if it is further determined that the excessive BOD or SS is in whole due to an excessive loading from Tyngsborough, then Tyngsborough shall totally reimburse Dracut. If the excessive loading is only in part from Tyngsborough, then Tyngsborough shall reimburse Dracut using a weighted average formula.

7.3 Actual, annual flows shall be determined for Tyngsborough from records at the Metering Stations within Dracut. Estimated flows from non-metered, individual areas shall also be included, if not charged separately. Actual, annual flows shall be determined for Dracut from records at the Metering Stations within the City.

7.4 The waste strengths, BOD and SS, for each of the participants shall be determined from proportional, composite 24-hour samples obtained at the participant's Metering Stations. The average daily BOD and SS in pounds per day shall be determined from the average of not less than twelve (12) samples taken on weekdays at monthly intervals.

7.5 When determining surcharges, the unit cost per pound of BOD and SS used shall be based on the previous year's treatment facility operational costs divided by the total annual BOD or SS loadings.

7.6 Operating costs shall include the cost of sampling and analyzing wastes discharged by the participants. It shall also include the cost accounting related to the distribution and invoicing of operating costs.

7.7 Operating costs shall be payable monthly, on a fiscal year basis, upon receipt by Tyngsborough of Dracut's invoice. Bills shall be paid within fifty-five (55) days after which a surcharge of 1½ percent per month shall be assessed.

Operating costs for the first eleven (11) months shall be determined by using Dracut's approved yearly operation budget including money from Lowell (reduced to a monthly cost) and apportioning Tyngsborough's share on the basis of actual, total, monthly flow, as measured.

The final monthly invoice for the fiscal year shall be rendered by Dracut within thirty (30) days of the end of the fiscal year and shall be determined on the basis of actual flows and expenditures. All previous monthly invoices shall be subject to adjustment and correction at the time of this final billing for the year.

ARTICLE VIII ANNUAL COST REVIEW

8.1 Dracut and Tyngsborough both agree that the apportionment of costs set forth in ARTICLE VII shall be subject to review annually. After a review of the annual costs, if an adjustment to the costs appears to be necessary, said adjustment shall be made by Dracut in the forthcoming billing for services. The adjustment will be to both Dracut's and Tyngsborough's mutual satisfaction. Should arbitration be necessary, unless otherwise provided by law, both parties shall mutually agree as to the arbitrator and the arbitration procedure.

ARTICLE IX ADJUSTMENT CLAUSE

9.1 Tyngsborough reserves the right at any time to pretreat and/or to reduce either or both the quantity and quality of its wastes, or to otherwise give preliminary treatment to its wastes prior to discharge to Dracut's sewerage system. Tyngsborough agrees to notify Dracut as far in advance as possible of any significant increase or decrease in the quantity and/or quality of the wastes to be discharged to Dracut's sewerage system.

9.2 Any separate agreement between Tyngsborough and adjacent communities must be reviewed by Dracut. In any event, Tyngsborough shall in the aggregate be restricted to the waste parameters established under ARTICLE VI. Any increase must be formally contracted for between Tyngsborough and Dracut.

ARTICLE X TERMINATION CLAUSE

10.1 Any obligations under this AGREEMENT are conditioned upon both the receipt and acceptance by Tyngsborough of construction grant funds from federal and/or state government agencies for sewage works necessary within Tyngsborough to transmit waste flows to Dracut's sewerage system and the receipt and acceptance by Dracut of construction grant funds from said agencies for the sewage works necessary within Dracut to receive and transmit Tyngsborough's wastes for treatment and disposal at the Duck Island Regional Wastewater Treatment Plant.

10.2 Either party may terminate this AGREEMENT by giving notice thereof to the other party in writing three (3) years prior to the termination date. Upon receipt of said notice, both parties will enter into discussion within thirty (30) days to assure proper termination of the AGREEMENT.

Should Tyngsborough initiate the termination proceedings, it shall not have any right to the return of any of its original capital investments under ARTICLE VI.

Should Dracut initiate the termination proceedings, it shall be obligated to return to Tyngsborough the unusued proportionate share of Tyngsborough's capital investment under ARTICLE VI.

ARTICLE XI WASTES ANALYSIS

11.1 Dracut and Tyngsborough both agree that the determination of character and concentration of wastes will be in accordance with the latest edition of "Standard Methods for the Examination of Water and Sewage", as proposed, approved and published jointly by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation, or any other method mutually agreed upon by Dracut and Tyngsborough and subject further to the following:

11.1.1 Sampling at Metering Stations within Dracut will be performed by Dracut. Determination of the character and concentration of Tyngsborough's

IN WITNESS WHEREOF, Dracut and Tyngsborough have caused their proper representatives on the day and year first written above:

For the Town of Dracut, Massachusetts

By Its Board of Sewer Commissioners

Approved as to Form

By: Edward C. Dweas

Town Counsel

For the Town of Tyngsborough, Massachusetts

By Its Board of Selectmen

Approved as to Form:

By:

Town Counsel

ADDENDUM

Addendum to Intermunicipal Agreement between the Town of Tyngsborough Middlesex County, Massachusetts, a municipal corporation, by and through its Board of Sewer Commissioners ("Tyngsborough") and the Town of Dracut Middlesex County, Massachusetts, a municipal corporation, by and through its Town Manager and Highway Surveyor ("Dracut") and by and through the Sewer Commission for the Town of Dracut ("Commission") dated May 18, 1988.

NOW, THEREFORE, the parties agree as follows:

1. The Intermunicipal Agreement between Tyngsborough, Dracut and Commission dated May 18, 1988, shall expire on May 18, 2018.

Witness our hands and seals this 13 day of September, 1988.

APPROVED AS TO FORM:

By: Edward Owens
Edward Owens
Town Counsel
Town of Dracut

APPROVED AS TO FORM:

By:
Charles J. Zaroulis
Town Counsel
Town of Tyngsborough

APPROVED AS TO FORM:

By: Edward Owens
Legal Counsel
Dracut Board of
Sewer Commissioners

TOWN OF DRACUT

By:

Town Manager
Town of Dracut

By: Paul E Dalton

Highway Surveyor

BOARD OF SEWER COMMISSIONERS
FOR THE TOWN OF DRACUT

TOWN OF TYNGSBOROUGH
By its BOARD OF SEWER
COMMISSIONERS

C/Adden4

AGREEMENT entered into this 18 day of May, 1988, by and among the Town of Tyngsborough, Middlesex County, Massachusetts, a municipal corporation, by and through its Board of Sewer Commissioners ("Tyngsborough"), the Town of Dracut, Middlesex County, Massachusetts, a municipal corporation, by and through its Town Manager and Highway Surveyor ("Dracut") and by and through the Sewer Commission for the Town of Dracut ("Commission").

WHEREAS, a Tyngsborough sewer main will be constructed through land situated in Dracut, being shown as Elm Street (also known as Elm Avenue) and to the property situated at 857 Nashua Road on Sheet 2 of 10 of Plans entitled "Proposed Lateral Sewers, Force Main, and Pumping Station, Tyngsborough, Mass.", MASS-WPC-Collection Systems Project No. 557-CS-213, Contract No. 87-1, dated August, 1987 and prepared by Whitman and Howard, Inc. of Wellesley, Massachusetts, and the plan is incorporated with this agreement and, further, the plan is to be recorded in Middlesex North District Registry of Deeds; and

WHEREAS, Tyngsborough, Dracut and the Commission wish to provide sewerage services to the properties situated on Elm Street in Dracut and to the property situated at 857 Nashua Road in Dracut; and

WHEREAS, Tyngsborough has requested and Dracut and Commission have granted permission to Tyngsborough to open said way and install, operate and maintain in perpetuity such sewer mains, lines and other appurtenances thereto and connections for said premises in Dracut and said Dracut and Commission have granted permission for the connection of said sewer project and mains into the Lowell Sanitary Sewer System through Dracut.

NOW, THEREFORE, the parties agree as follows:

1. The Commission agrees that it shall be responsible to Tyngsborough for payment of sewer use charges by Tyngsborough to said lots and associated user charges and user assessments.

2. Tyngsborough agrees that sewer use charges to the respective lots in Dracut shall be computed in the manner in effect at the time by Tyngsborough and consistent with the rates charged to Tyngsborough users. Said amount shall be paid semi-annually. The rate of payment hereunder is fixed only until such time as Tyngsborough deems an adjustment necessary. Such adjustment, if any, shall require a thirty (30) day advance written notice to the Commission and such new rates shall be constant with other similarly existing agreements.

3. The collection of the sewer use charges from the owners of the respective lots shall be the responsibility of the Commission.

4. This Agreement is intended to establish the rate of sewer use charges and collection procedures between the parties, but not to establish or restrict the sewer use charges between the owners of the respective lots and the Commission

5. Tyngsborough shall collect from the owners of each lot a betterment fee presently estimated to be in the amount of eight thousand ($8,000.00) dollars and a connection fee in the amount of two hundred and fifty ($250.00) dollars.

6. The use and connection of said premises to the Tyngsborough Sewer System shall be in accordance with the rules and regulations of Tyngsborough.

7. This Agreement contains the entire agreement between the parties and cannot be changed, modified, waived or cancelled except by an agreement in writing executed by all parties.

APPROVED AS TO FORM:

By: Edward Owens
Edward Owens
Town Counsel
Town of Dracut

APPROVED AS TO FORM:

By:
Charles J. Zaroulis
Town Counsel
Town of Tyngsborough

APPROVED AS TO FORM:

By: Edward Owens
Legal Counsel
Dracut Board of
Sewer Commissioners

TOWN OF DRACUT

By:

Town Manager
Town of Dracut

By:

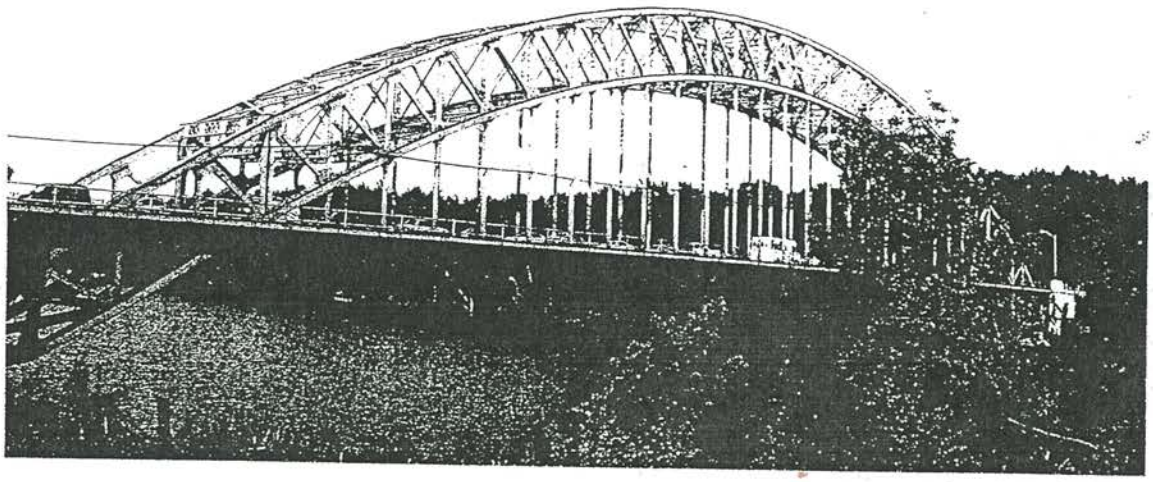
Highway Surveyor

BOARD OF SEWER COMMISSIONERS
FOR THE TOWN OF DRACUT

TOWN OF TYNGSBOROUGH
By its BOARD OF SEWER COMMISSIONERS

C/GEDDES/1-3

APPENDIX F
Master Plan Excerpts



Master Plan for Tyngsborough Massachusetts

Prepared for the

Tyngsborough Master Plan Committee

By

Brian K. Barber, City and Town Planning Consultant

In Association with

Daphne Politis, Optimal Solutions and

Bill Giezentanner, Giezentanner Associates

With financial assistance provided by

The Town of Tyngsborough, and the Commonwealth of Massachusetts through Executive Order 418, administered by the Massachusetts Department of Housing and Community Development, the Massachusetts Executive Office of Environmental Affairs, the Massachusetts Executive Office of Transportation and Construction, and the Massachusetts Department of Economic Development.

With the cooperation, review and participation of the Northern Middlesex Council of Governments.

May 2004

Westford Road	Creation of a trail system through open land connecting with proposed trails in Dunstable and Westford and the Scribner Hill area of Tyngsborough. Maintenance of the open character of the area. Sidewalks.
Scribner Hill	Maintenance of the open character of the area. Creation of trails connecting to and along Massapoag Pond and through the MIT Haystack Observatory property. Sidewalks. Improve roads.
Massapoag	Maintenance of the open character of the area. Creation of trails connecting to and along Massapoag Pond. Improve roads. Sidewalks

For reference to the trails and trail corridors and environmental features to be protected see Map 5-1 in the Open Space and Recreation Chapter (Chapter 5).

10.5 Build-Out Analysis of Tyngsborough's Land

An analysis of the extent to which Tyngsborough can grow, given its zoning, current state of development, land ownership patterns, and natural constraints to development such as wetlands was done by the Northern Middlesex Council of Governments in 2001, and supported by the Massachusetts Executive Office of Environmental Affairs. The analysis revealed that Tyngsborough could grow by an additional 5,166 residents in 1,700 housing units. Other summary data from the build-out are as follows.

	Population	Students	Households	Water Use Gal./Day
1990	8,642	1,349	2,823	
2001	11,081*	2,131	3,806*	249,540
Build-out	16,247	2,930	5,506	1,824,582

**2000 Census*

The impacts from the build-out are that all the developable land would be used up sometime around the years 2015 (according to current population forecasts by NMCOG), and that the following additional activities would be added to Tyngsborough's features.

APPENDIX G

Screening for Private Properties for Wastewater Treatment and Disposal

APPENDIX G
SCREENING OF PRIVATE PROPERTY AREAS FOR WASTEWATER TREATMENT AND/OR DISPOSAL

CRITERIA DEVELOPMENT

A. General

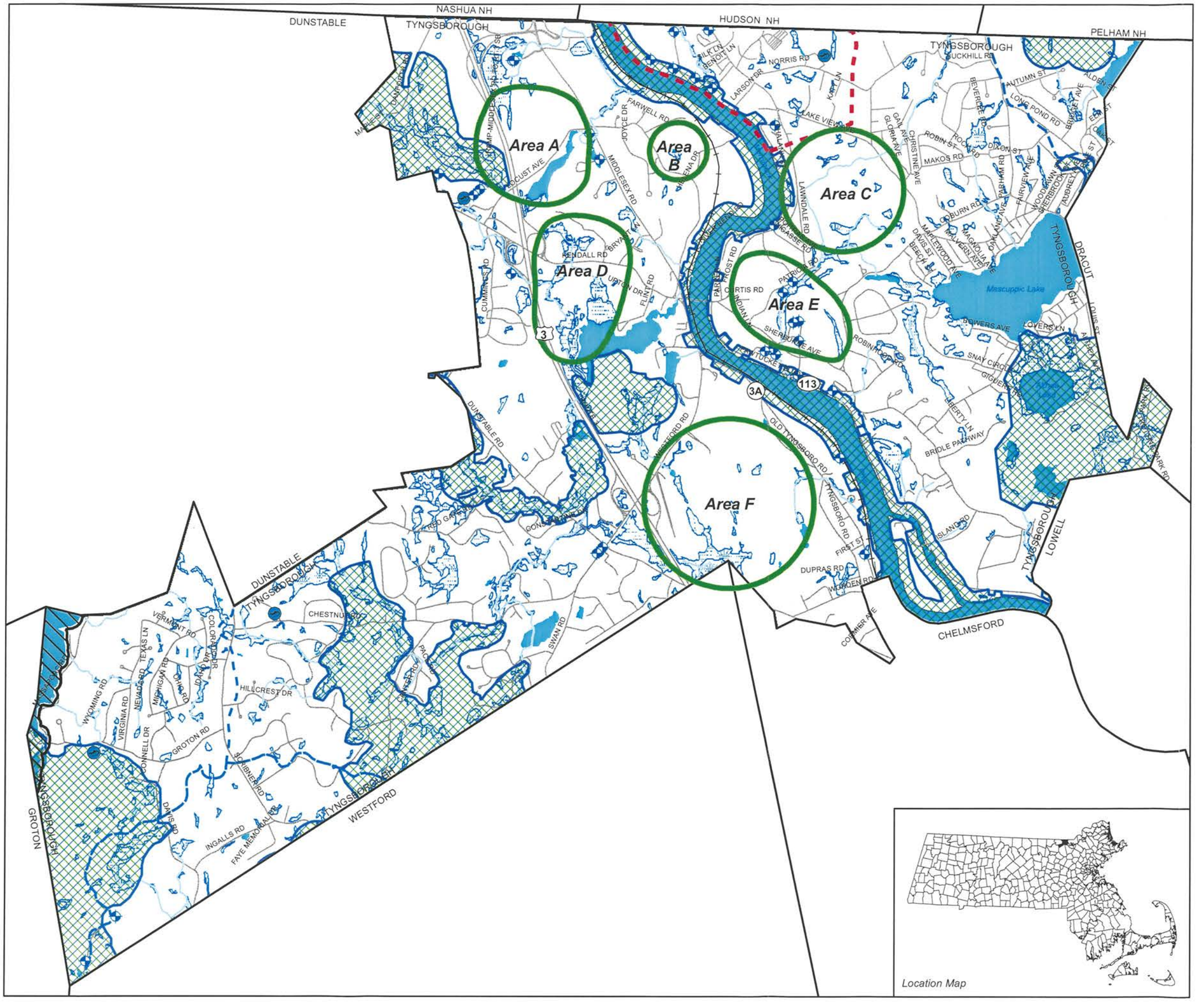
The screening criteria presented in this section were developed to assess the viability of several areas identified within Tyngsborough as potential wastewater disposal facility sites. In response to comments received from MEPA and MassDEP on the Phase II CWMP, a review of privately owned sites has been conducted. As part of this Report, approximately 20 privately owned properties were screened within six (6) areas, shown on Figure G-1. As with the screening of the publicly owned properties performed in Phase II, the screening criteria used to evaluate these potential project sites were based upon eleven environmental criteria. The environmental screening criteria were chosen based upon review by the Project Proponent and upon comments received by the Proponent in the Secretary of the Executive Office of Environmental Affairs Certificate on the ENF. The screening criteria chosen to evaluate the sites are: (1) wetlands; (2) soils; (3) drinking water supply and wellhead protection areas (Zone I and Zone II); (4) fisheries; (5) waterbodies (distance from surface water); (6) floodplains; (7) sensitive habitats; (8) park lands; (9) recreational resources; (10) historical interests and (11) in or adjacent to an Area of Critical Environmental Concern. A description of each of the screening criteria is given below and presented on Table G-1. These descriptions of the site criteria were previously provided in the Phase II CWMP report. For consistency, these criteria are provided below.

The criteria were also developed with respect as to whether or not there was an existing "Opportunity" or environmental "Constraint" for the site to be utilized as a disposal facility for Tyngsborough's wastewater. Although "Surface Water Discharge" is defined, any surface water discharges have been eliminated from consideration due to stringent regulatory requirements and for lack of suitable surface waters located within the Town's borders.

FIGURE G-1
ALTERNATIVE EVALUATION AREAS
PRIVATE PROPERTIES

PHASE IV
COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

TYNGSBOROUGH, MASSACHUSETTS



December 2008

Source: Selected Datalayers from MassGIS.
13th Edition of the Massachusetts Natural Heritage Atlas.

EARTH TECH | AECOM

Map Document: (L:\10764\GIS\Maps\Fig3-1_Sites_EnvConstraints.mxd)
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TABLE G-1
TOWN OF TYNGSBOROUGH
PHASE IV CWMP/FEIR
SCREENING CRITERIA

Screening Criteria	Facility	Surface water Discharge	Groundwater Discharge
Wetlands [a]	**Opportunity**-N/A **No Constraint**-if greater than 200 feet from wetlands **Minimal Constraint**-if within 200 feet of wetlands **Moderate Constraint**-if within 100 feet of wetlands **Severe Constraint**-if within wetland	**Opportunity** if wetlands present adjacent to Site **No constraint** if within 200 feet of wetlands **Minimal constraint** if between 200 and 400 feet from wetlands **Moderate constraint** if between 400 and 1000 feet from wetlands **Severe constraint** if greater than 1000 feet from wetlands	**Opportunity** - N/A **No constraint** if greater than 1000 feet from wetland **Minimal constraint** if between 400 and 1000 feet from wetlands **Moderate constraint** if between 100 and 400 feet from wetland **Severe constraint** if within 100 ft of wetland
Soils	**Opportunity**-N/A **No Constraint**-based on mapped soil type **Minimal Constraint**- based on mapped soil type **Moderate Constraint**- based on mapped soil type **Severe Constraint**-if within known documented hazardous soil area	**No opportunity, minimal, or moderate constraint** based on mapped soil type **Severe constraint** if within known hazardous area	**Opportunity** if mapped within sand/gravel deposits **No constraint** - N/A **Minimal constraint** - N/A **Moderate constraint** - if mapped within till/bedrock **Severe constraint** if mapped within known hazardous area
Drinking Water Supply	**Opportunity** - N/A **No constraint** if outside Zone II **Minimal constraint** if within Zone II Moderate constraint - N/A **Severe constraint** - N/A	**Opportunity** - N/A **No constraint** if greater than 1000 feet from Zone II **Minimal constraint** - N/A Moderate constraint if within Zone II and greater than 1000 feet from public well **Severe constraint** if within Zone II and within 1000 feet from public well	**Opportunity** - N/A **No constraint** if greater than 1000 feet from Zone II **Minimal constraint** - N/A Moderate constraint if within Zone II and greater than 1000 feet from public well **Severe constraint** if within Zone II and within 1000 feet from public well
Fisheries	**Opportunity**-N/A **No constraint** if facility is downstream or greater than 1000 feet of fish stocking area **Minimal constraint** if facility is located within 400 feet from fish stocking area **Moderate constraint** if facility is located within 200 feet fish stocking area **Severe constraint** if facility is located directly in fish stocking area	**Opportunity** - N/A **No constraint** if discharge is downstream or greater than 1000 feet of fish stocking area **Minimal constraint** if discharge within 400 feet from fish stocking area **Moderate constraint** if discharge within 200 feet fish stocking area **Severe constraint** if discharge directly into fish stocking area	**Opportunity** - N/A **No constraint** if discharge downstream or greater than 1000 feet of fish stocking area **Minimal constraint** if discharge within 400 feet from fish stocking area **Moderate constraint** if discharge within 200 feet fish stocking area **Severe constraint** -N/A
Waterbodies [a]	**Opportunity**-N/A **No Constraint**-if greater than 200 feet from water body **Minimal Constraint**-if within 200 feet of water body **Moderate Constraint**-if within 100 feet of water body **Severe Constraint**-if within wetland	**Opportunity** if adjacent waterbody present **No constraint** if within 200 feet of waterbody **Minimal constraint** if between 200 and 400 feet from waterbody **Moderate constraint** if greater than 400 feet from waterbody **Severe constraint** if greater than 1000 feet from waterbody	**Opportunity** - N/A **No constraint** if greater than 1000 feet from waterbody **Minimal constraint** if between 200 and 1000 feet from waterbody **Moderate constraint** if within 200 feet from waterbody **Severe constraint** - N/A
Floodplains [a]	**Opportunity** - N/A **No constraint** if outside of floodplain **Minimal constraint** -N/A **Moderate constraint** - if within floodplain **Severe constraint** N/A	**Opportunity** - N/A **No constraint** if outside of floodplain **Minimal constraint** -N/A **Moderate constraint** - N/A **Severe constraint** if within floodplain	**Opportunity** - N/A **No constraint** if outside of floodplain **Minimal constraint** -N/A **Moderate constraint** - N/A **Severe constraint** if within floodplain
Sensitive Habitat [a]	**Opportunity** - N/A **No constraint** if outside of sensitive habitat **Minimal constraint** - N/A **Moderate constraint** if within sensitive habitat and greater than 100 feet from wetland **Severe constraint** if within sensitive habitat and within 100 feet from wetland	**Opportunity** - N/A **No constraint** if greater than 200 feet from sensitive habitat **Minimal constraint** if within 200 feet of sensitive habitat **Moderate constraint** if within sensitive habitat and greater than 100 feet from wetland **Severe constraint** if within sensitive habitat and within 100 feet from wetland	**Opportunity**- N/A **No constraint** if greater than 200 feet from sensitive habitat **Minimal constraint** if within 200 feet of sensitive habitat **Moderate constraint** if within sensitive habitat and greater than 100 feet from wetland **Severe constraint** if within sensitive habitat and within 100 feet from wetland
Park Lands	**Opportunity** - N/A **No constraint** if greater than 200 feet from park lands **Minimal constraint** if abutting park lands **Moderate constraint** - N/A **Severe constraint** if within park lands	**Opportunity** - N/A **No constraint** if greater than 200 feet from park lands **Minimal constraint** if abutting park lands **Moderate constraint** if within park lands **Severe constraint** - N/A	**Opportunity**- N/A **No constraint** if greater than 200 feet from park lands **Minimal constraint** if within 200 feet of park lands **Moderate constraint** if within park lands **Severe constraint** - N/A
Recreation Resources	**Opportunity** - N/A **No constraint** if greater than 200 feet from recreation resource **Minimal constraint** if within 200 feet of recreation resource **Moderate constraint** if within recreation resource area **Severe constraint** - N/A	**Opportunity** - N/A **No constraint** if greater than 200 feet from recreation resource[b] **Minimal constraint** if within 200 feet of recreation resource **Moderate constraint** if within recreation resource **Severe constraint** - N/A	**Opportunity** - N/A **No constraint** if greater than 200 feet from recreation resource **Minimal constraint** if within 200 feet of recreation resource **Moderate constraint** if within recreation resource **Severe constraint** - N/A
Historic Interests	**Opportunity** - N/A **No constraint** if greater than 200 feet from historic interest **Minimal constraint** if within 200 feet of historic interest **Moderate constraint** if directly abutting historic interest **Severe constraint** if within historic interest	**Opportunity** - N/A **No constraint** if greater than 200 feet from historic interest **Minimal constraint** if within 200 feet of historic interest **Moderate constraint** if directly abutting historic interest **Severe constraint** if within historic interest	**Opportunity** - N/A **No constraint** if greater than 200 feet from historic interest **Minimal constraint** if within 200 feet of historic interest **Moderate constraint** if directly abutting historic interest **Severe constraint** if within historic interest
ACEC [a]	**Opportunity** - N/A **No constraint** if outside of ACEC **Minimal constraint** -N/A **Moderate constraint** - N/A **Severe constraint** if within ACEC	**Opportunity** - N/A **No constraint** if outside of ACEC **Minimal constraint** -N/A **Moderate constraint** – N/A **Severe constraint** if within ACEC [a]	**Opportunity** - N/A **No constraint** if outside of ACEC **Minimal constraint** -N/A **Moderate constraint** – N/A[a] **Severe constraint** if within ACEC [a]

(a) Based on available information, potential sites were located to avoid directly impacting wetlands, floodplains, ACEC (Site specific), sensitive habitat (Site specific) and waterbodies and are at least 100 feet removed.

(b) Assumes that receiving waters are not a recreational resource.

The designation of an "Opportunity" within the screening criteria reflects the positive aspects of the environment that could be used in a beneficial manner in siting these facilities. Similarly, the designation of environmental "Constraints" within the screening criteria reflects aspects of the site and environment that would not be beneficial in siting the disposal facilities. The "Constraints" are identified as "Minimal", "Moderate", and "Severe" depending on the extent and nature of the obstacles to developing each site and defined below.

- "Opportunity": the positive attributes associated with the criteria that could be a benefit to siting the facility (positive).
- "Constraint": the nature of the obstacles associated with the criteria that could negatively affect the siting of the facility.

    1. "No Constraint": the criteria do not have any positive attributes or impose any obstacles to the siting of the facility (neutral).
    2. "Minimal Constraint": the criteria impose the lowest degree of obstacles in the siting the facility.
    3. "Moderate Constraint": the criteria impose average obstacles to the siting the facility.
    4. "Severe Constraint": the criteria impose extremely difficult obstacles to overcome in the siting the facility.

1. Wetlands

The wetlands screening criteria is considered an important factor in siting both treatment facilities and effluent disposal facilities. It was determined that "No Opportunities" exist for constructing treatment facilities or effluent disposal facilities in wetlands. These facilities would need to be constructed in upland areas to avoid filling or alternation of wetlands. The wetland related "Constraints" are based on distances from the wetland. The wetland screening criteria is developed with the assumption that the potential facilities will be greater than 100 feet away from wetland areas.

The wetlands criteria for surface water discharge facilities is considered more constrained the further removed from the wetland, since the discharge of the treated effluent ideally should be directly into the receiving waterbody. Those sites located within 100 feet of a wetland are considered to present "Minimal Development Constraints" because the proximity of the treatment facility and the length of the treated wastewater effluent

discharge piping is minimized. Sites located distant (greater than 400 feet) from the wetland/surface water would pose "Moderate" and "Severe Constraints" since access to the discharge point is restricted.

2 Soils

Soil type is considered to have a greater influence on the selection of an effluent disposal/groundwater discharge site than on the selection of a treatment facility site due to the variable infiltration properties of soils. However, soil type is not as critical in selecting a treatment facility or surface water disposal site since construction is predominantly above ground. The only "Constraint" associated with soil type for the construction of treatment facilities or surface water discharge facilities is the presence of known hazardous materials on site. The soil properties and the presence of hazardous material on site are considered primary to the selection of potential groundwater discharge sites.

The Phase I Needs and Growth Management Report identified 77 soil units in Tyngsborough with varying degrees of limitations including poor filter, slow percs, depth to bedrock, slope, wetness, ponding, large stones, and flooding. Additionally, the Town was mapped according to subsurface geological features that identified areas encompassed with large surface waters, high yield aquifers, medium yield aquifers, floodplain alluvium, sand and gravel deposits and till and/or bedrock that were all based on the NRCS Soil Survey. Soils are classified as slight, moderate or severe according to its engineering properties for sanitary facilities capabilities.

Sites located within areas which are comprised of slight soil types are considered to provide the greatest "Opportunity", followed by sites located with moderate classifications. The last classification, severe, is not considered suitable for effluent disposal, therefore, sites with these soil types are considered to have "Severe Constraints".

3 Floodplains

Construction within 100-year floodplains is constrained by regulatory restrictions on development within floodplain areas for protection of flood storage and for protection of the constructed facility to flood hazards. This criterion was considered to present

"Moderate Developmental Constraints" with regard to siting of treatment facilities if located within a floodplain, and "No Constraint" if located outside of a floodplain.

Potential groundwater discharge sites located within the 100-year floodplain are restricted from being located in velocity zones and floodways in accordance with DEP regulations (310 CMR 15.213(2)). Therefore, the floodplain site selection criterion was considered to present "Severe Developmental Constraints for groundwater disposal facilities if the potential site is located within the floodplain. If the disposal site is outside the floodplain then "No Constraints" are present to development of a groundwater discharge facility.

Surface water discharge facilities located within a floodplain is a concern since the discharge flow would represent additional flow, which would have to be accommodated during the 100-year flood event. However, surface water discharges must be to a surface water. Most of the primary streams in Tyngsborough are associated with a floodplain. Therefore, potential flooding impacts could be buffered by the capability of the stream to handle slight increases in flow. Therefore, surface water discharges within a floodplain is considered to present a "Moderate Development Constraints". If the disposal site is outside the floodplain then "No Constraints" are present to development of a discharge site.

4 **Waterbodies (Distance from Surface Water)**

Proximity to waterbodies is considered a factor in the siting of surface water and groundwater discharge locations. The location and construction of treatment facilities should not impact waterbodies if the facility is located greater than 100 feet from the waterbodies. The screening criteria for waterbodies are not considered to present "Developmental Constraints" on treatment facility sites regardless of the location outside the resource.

Surface water discharge sites are required to be located proximate to a surface waterbody. Therefore, this site selection criteria is accorded substantial weight in the surface water discharge site selection process. Those sites located proximate to surface waterbodies are considered to present an "Opportunity" for development as long as other environmental constraints are not present. Those sites that are not located proximate to a waterbody are

considered to present extensive "Developmental Constraints" regarding the surface water discharge site selection process.

Groundwater discharge sites should be located a sufficient distance from a surface water to ensure the facility does not affect the water quality of the surface water. The proposed subsurface disposal of effluent may result in the creation of a groundwater "mound" beneath the disposal field. The system should be sited such that the outer edges of the mound do not significantly influence the hydrology or water quality of the adjacent surface water body. Therefore, it was conservatively assumed that a groundwater discharge effluent bed should be at least 500 feet from a surface water body to provide an adequate margin of safety to ensure preservation of surface water quality. Potential groundwater discharge sites located at least 500 feet from a surface water body are considered to present an "Opportunity" for development. If within 500 feet, the site is considered to present "Moderate Constraints" for groundwater disposal.

5 **Drinking Water Supply - Wellhead Protection Areas (Zone I and II)**

Treatment facility sites, without an associated discharge on site, located in Zone II areas are not scrutinized the same as groundwater discharge since the potential impacts to drinking water quality are minimal. Due to the importance of the Zone II resource areas, treatment facility sites located in Zone II areas are considered to present "Minimal Developmental Constraints" while those located outside these areas are considered to present "No Constraints". Treatment facility sites located in Interim Wellhead protection Areas are considered to present "Severe Developmental Constraints" while those located outside these areas are considered to present "No Constraints".

The proximity of surface water and groundwater discharge sites to public drinking water supplies is a significant criteria in the screening process due to the stringent regulatory restrictions which apply to siting these facilities within Zone I and II areas. This criteria is not given the same significance with respect to the siting of the treatment facilities since construction a treatment facility does not necessarily include a discharge of wastewater. The screening criteria was developed to coincide with the requirements of the Massachusetts Drinking Water Regulations and the designation of Zone I (400 feet > 100,000 gpd) and Zone II (contributes to the well under severe pumping and recharge conditions).

Siting an effluent discharge is prohibited within a Zone I area. The location of surface water or groundwater discharge within a Zone II area and greater than 1,000 feet from a public well is considered a "Moderate Constraint". In order to conservatively protect the Zone II areas, which are nitrogen sensitive, more stringent nitrogen discharge limitations have been established by DEP. Discussions with regulatory agencies regarding this matter suggest that an effluent discharge should not be located within a Zone II area unless all alternative options have been exhausted and a risk/benefit analysis has been performed. DEP is currently developing policy that will identify the specific criteria for consideration of a wastewater discharge within Zone IIs. Due to the numerous restrictions placed on siting wastewater discharge facilities within Zone IIs, a "Severe Constraint" is identified for a discharge within 1,000 feet of a drinking water supply well within the Zone II. Location of a facility outside of the Zone II is viewed as having "No Constraint" for either a treatment facility or a discharge facility.

6 Fisheries

The proximity of the potential facility site to fisheries resources and adjacent waterbodies is a factor in siting surface water and groundwater discharge facilities. It was assumed that the location and construction of treatment facilities would not impact fisheries, if the facility is located greater than 100 feet from the waterbodies supporting the fisheries. The screening criteria for fisheries is considered to present "No Constraints" to development on treatment facility sites regardless of the location outside the resource.

Surface water discharge facilities pose the greatest threat to the fishery resources since the discharge of treated wastewater is directly into the waterbodies which support the fisheries. Therefore, this criteria is considered to present a "Moderate Developmental Constraints" for a facility if it is located within 100 feet of a fish stocking area. If a site is located downstream or greater than 1,000 feet from a fish stocking area the site is considered to present "No Constraint" for the facility.

While groundwater discharges may impact fisheries, there is less risk of impact because the discharge is not directly into the surface waterbody, which contains the fisheries. Therefore, the criteria is only considered to present a "Minimal Constraint" for sites located within 400 feet of the fish stocking areas, and "No Constraint" for sites located greater than 1,000 feet from fish stocking areas. It was considered to be a "Moderate Constraint" if the facility site was located within 200 feet of the fisheries.

7 **Sensitive Habitats**

Sensitive habitats considered in the screening criteria include Estimated Habitats of Rare Wildlife, Certified Vernal Pools, Priority Sites of Rare Species Habitats and Exemplary Natural Communities, and Areas of Critical Environmental Concern. These habitats are sensitive to changes in the environment and are protected in both DEP Wetland Protection and Surface Water Quality Regulations. These regulations impose restrictions on development of any kind within the boundaries of these mapped habitats, and thus, for sites located within sensitive habitats, there is a "Severe Constraint" to development. Therefore, the "Constraints" to treatment facilities, surface water and groundwater disposal facilities is viewed to be equally restricted. The criteria identifies a "Severe Constraint" for those sites located within a sensitive habitat area, a "Minimal Constraint" if outside of, but abutting a sensitive habitat area, and "No Constraint" for those sites located a sufficient distance outside of a sensitive habitat area. Other sensitive habitats include park lands, recreational resources, and historical interests.

8 **Park Lands and Recreational Resources**

Land developed for recreational use or as park lands should be avoided in siting treatment facilities and disposal facilities (groundwater or surface water). If the existing land use of the potential site involves park or conservation lands or other recreational resources, construction of a treatment facility and/or disposal facility would represent an incompatible use conflict. Therefore, the presence of a park, conservation, or recreation land poses a "Severe Constraint" to development of a treatment facility. If the potential treatment facility site is located on property directly abutting the resources, then a "Minimal Development Constraint" exists on the site. If located greater than 200 feet from theses resource areas, the criteria is considered to present "No "Constraints" to development.

Groundwater and surface water discharge facilities do not impact these resources to the same extent the buildings and above ground structures associated with a treatment facility would, however certain deed restrictions may eliminate other uses entirely. Therefore, these wastewater disposal facilities are only considered to present "Moderate Developmental Constraints" for sites located within the resource areas, and "Minimal Constraints" if the sites are located outside the resource areas and "No Constraints" to development if located greater than 200 feet from these resource areas.

9 Historical Interests

Historic interests include historic structures and/or properties and archaeological resources. *The National Register of Historic Places* lists one property located at 10 Kendal Road, The Old Town Hall, *The Massachusetts Cultural Resource Information System* of the Massachusetts Historical Commission lists 162 properties of historical interest in Tyngsborough.

In screening the potential project sites, it was considered desirable to select sites, which do not impact these resources. The Massachusetts Historical Commission (MHC) must be notified of details of proposed projects in designated historic areas. The MHC will then determine whether State Register properties exist within a project's area of potential impact. If it is determined that the proposed project will have an adverse effect, the applicant will be required to present a comprehensive analysis of alternatives. By eliminating these sites, the project will preserve the resources and avoid potential administrative and regulatory burdens associated with development in these areas. Since the developmental regulatory "Constraints" associated with these resources apply with equal force to either treatment facilities or disposal facilities, independent of any specific characteristics associated with the facilities, this site selection criteria is considered to present the same "Constraints" for either facility. The criteria presents a "Severe Constraint" for those sites located within a historic resource area, a "Moderate Constraint" if directly abutting the site, a "Minimal Constraint" if within 200 feet a historic resource area and "No Constraint" for those sites located greater than 200 feet outside of these resource areas.

10 Areas of Critical Environmental Concern (ACEC)

Construction within the ACEC is constrained by regulatory restrictions, specifically 301 CMR 12.00, 301 CMR 21.00, 310 CMR 9.00, 310 CMR 10.00, 310 CMR 16.00 and further addressed in the MEPA regulations at 301 CMR 11.03 (11). Any construction within the ACEC is subject to MEPA review as has been noted in the Environmental Notification Form filed November 30, 2001 on behalf of this project. Construction within the ACEC was considered to present "Moderate Developmental Constraints" with regard to siting of treatment facilities if located within a designated ACEC and "No Constraint" if located outside of the ACEC.

Potential groundwater discharge sites located within the ACEC are restricted through 301 CMR 12.00, 301 CMR 21.00, 310 CMR 9.00, 310 CMR 10.00, 310 CMR 16.00 and further addressed in the MEPA regulations at 301 CMR 11.03 (11). Therefore, the ACEC site selection criteria was considered to present "Moderate to Severe Developmental Constraints" for groundwater disposal facilities, dependent on site specific details, if the potential site is located within the ACEC. If the disposal site is outside the ACEC then "No Constraints" are present to development of a groundwater discharge facility.

Surface water discharge facilities located within an ACEC is a concern since the discharge flow could potentially alter the unique natural, cultural ecosystem. Although there could potentially be a significant alteration the opposite could also be true. Therefore, surface water discharges within an ACEC is site specific and considered to present a "Moderate to Severe Development Constraints", dependent on site specific details. If the disposal site is outside the floodplain then "No Constraints" are present to development of a discharge site.

In screening the potential project sites, it was considered desirable to select sites, which do not impact these resources. The ENF filed on behalf of this CWMP serves as notice to all interested parties proposed projects details in designated ACEC areas. The ENF process will then determine whether ACEC properties exist within a project's area of potential impact. If it is determined that the proposed project will have an adverse effect,

the applicant will be required to present a comprehensive analysis of alternatives. The criteria presents a "Moderate to Severe Constraint" for those sites located within an ACEC area and "No Constraint" for those sites outside of these resource areas.

PRELIMINARY SITE IDENTIFICATION

General areas of the privately owned properties have been identified. These areas, six in total (designated Areas A through F), are shown on Figure 1. The following section provides a general description of each of the five areas for local or centralized treatment facilities and/or groundwater treated effluent disposal locations. As with the evaluation of the publicly owned properties, surface water discharges have been eliminated from consideration due to not only stringent regulatory requirements but also, the lack of suitable surface waters within the Town of Tyngsborough boundaries. Major waterbodies located within the Town are either classified as Class B Waters or designated from Mass Wildlife for fish stocking.

Area A

Several private properties were evaluated in this area. Results of the site evaluations indicate that wetlands are located on several of the sites. Soil types range from sands and gravels to till with bedrock. Some of the sites are in proximity to public drinking water supplies. These constraints would need to be considered if a wastewater discharge were to be considered. Other screening criteria that would need to be considered for placement of a wastewater discharge are proximity to water bodies and sensitive habitat. A list of the range of constraints for the properties evaluated in the vicinity of Area A are provided in Table G-2.

Area B

Several constraints were noted in the evaluation of properties within this area. There constraints are the presence of wetlands as well as soils. A shallow depth to the water table may also limit the capacity of a wastewater discharge. A list providing the range of constraints within this area is provided in Table G-2.

Area C

Most sites evaluated have minimal constraints for wetlands and water bodies. Discharge to properties in this area could indirectly flow towards Mascuppic Lake which is

considered suitable for fish stocking by Mass Wildlife. A range of constraints within this area is provided in Table G-2.

Area D

Constraints related to wetlands range from minimal to severe on several of the sites located within Area D. The soils appear to consist of sand and gravel deposits. Other screening criteria include proximity to water bodies and the potential for a shallow depth to the water table. A list with the range of constraints is provided in Table G-2.

Area E

The most serious site constraint within this area is proximity to drinking water supplies. The entire area is within the Zone II of the Town's drinking water supply. Other constraints that will need to be considered are the presence of wetlands and soils. Table G-2 provides a range of constraints for this area.

Area F

Soil constraints within this area range from minimal to moderate. A majority of the sites evaluated consist primarily of till with the potential for shallow bedrock. Portions of the sites also have wetland and water body constraints that will need to be considered. A list of the range of constraints is provided in Table G-2.

TABLE G-2
TOWN OF TYNGSBOROUGH
PHASE IV CWMP/FEIR
RESULTS OF PRELIMINARY SCREENING FOR WASTEWATER TREATMENT AND DISPOSAL – PRIVATE PROPERTY AREAS

Area	Wetlands	Soils	Drinking Water Supply	Fisheries	Waterbodies	Floodplains	Sensitive Habitat	Park Lands	Recreation Resources	Historic Interests	ACEC
Area A	Minimal to Moderate	Opportunity to Moderate	No Constraint to Moderate	No Constraint	No Constraint to Severe	No Constraint	No Constraint to Severe	No Constraint	No Constraint	No Constraint	No Constraint
Area B	Moderate	Moderate	No Constraint	No Constraint	Minimal	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area C	Minimal	Opportunity	No Constraint	Minimal	Minimal	No Constraint	No Constraint	No Constraint	No Constrain t	No Constraint	No Constraint
Area D	Minimal to Severe	Opportunity to Moderate	No Constraint	No Constraint	No Constraint to Minimal	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area E	Minimal	Opportunity to Moderate	Severe	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area F	Minimal	Opportunity to Moderate	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint

CONCLUSIONS

The information used to characterize the environmental conditions of these sites is viewed as conservative and appropriate for planning and screening purposes. The existing conditions for all potential project sites were characterized based on the screening criteria previously outlined.

Based on the evaluation and screening of approximately 20 sites within the six areas shown on Figure G-1, all of the areas had constraints that would need more detailed evaluations if the Town were to consider a groundwater discharge. Conducive soils were present on portions of many of the sites within the six areas, but some of these sites also contained areas of wetlands, sensitive habitats and proximity to public water supplies. Other sites were hampered with, poor soil and groundwater conditions.

The Phase IV CWMP recommends that a regional solution utilizing the available capacity in the Town's current Intermunicipal Agreements (IMA's) for the conveyance, treatment and disposal of wastewater. In addition to utilizing the available capacity in the IMA's, the Phase IV CWMP recommendations include infiltration/inflow removal, water conservation measures, and renegotiation of current IMA's to provide additional wastewater capacity. Revaluation of groundwater disposal options may be considered by the Town in the future as growth and expansion of the sewer system occurs and if additional capacity does not become available in the IMA's as a result of the recommendations noted above.

APPENDIX H
Zone I Areas Map

EARTH TECH | AECOM

- Community Groundwater Well
- Non-Transient Non-community
- Transient Non-Community
- Zone 1
- Approved Wellhead Protection Areas (Zone II)
- Interim Wellhead Protection Area
- Watershed Basin (HUC-12)

Proposed Sewer

- Force Main
- Low Pressure
- Gravity Sewer
- P Pump Station
- Area of Need
- Needs Area to be Included in Septage Mangement Plan

Base map data provided by MassGIS.

Figure H-1

Zone 1 Areas

Phase IV CWMP/FEIR
Town of Tyngsborough

0 1,500 3,000 6,000
Feet

Map Document: (L:\work\80764\GIS\Maps\Zone1Areas.mxd)
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APPENDIX I
Hydrologic Evaluation

APPENDIX I – HYDROLOGIC EVALUATION

Methodology and Analysis

By sewering the Needs Areas, there is the potential for water to be exported out of the Needs Areas as well as the watersheds that flow through these areas. For example, residential and commercial properties that have private wells and a septic system, there is no loss of water to the watershed. However, if the residential or commercial properties are connected to a sewer that exports wastewater out of the watershed there would be a net loss of water to the watershed. If on the other hand, the private well is abandoned and the residential or commercial is connected to a public water supply that draws its water from outside the watershed, there is no net loss to the watershed.

In order to estimate the loss of wastewater recharge to these watersheds, Earth Tech/AECOM performed the following steps:

1. Delineated the watershed boundaries using the USGS program StreamStats
2. Identified the watersheds that flow through the Needs Areas.
3. Identified the August Median flow for the identified watersheds using StreamStats,
4. Estimated the loss of wastewater flow to each watershed due to sewering (the square footage of the sub basin within the Needs Areas as calculated through GIS),
5. Compared the August Median flows to the loss of wastewater flows,
6. Assessed potential impacts of flow loss due to the proposed sewering of the Needs Areas.

The first three steps outlined above were performed using StreamStats. StreamStats is a program developed by the USGS to estimate streamflow under various conditions. When stream gauging stations are within the area of interest, historic data from the gauging station is used to calculate the stream flow. When there are no gauging stations within the area of interest, StreamStats uses watershed basin characteristics, (basin size, stream length, soils characteristics, etc) to estimate the stream flows.

Output from the StreamStats program includes a map showing the watershed boundary associated with a stream, pond or surface water. The output also contains a summary of several watershed characteristics as well as the stream flow under several predetermined conditions. The StreamStats program, along with detailed model documentation, is available at the following webpage:
http://water.usgs.gov/osw/streamstats/massachusetts.html

The first step above was to identify all watersheds flowing through the Needs Areas. By selecting the outlet to all streams flowing through the Need Areas, StreamStats delineated the watershed boundaries associated with that stream. In all, six watersheds were delineated; Locust Pond, Flint Pond, Upton Pond, Lawrence Brook, Unnamed Brook 1 and Unnamed Brook 2. These watersheds all flow into the Merrimack River which is part of the larger Merrimack Watershed. Figure I-1depicts the watershed boundaries and Needs Areas.

As noted on Figure I-1, more than one watershed flows through each Needs Area. It was therefore necessary to estimate the amount of flow loss from a Needs Area to each watershed. The watershed flow loss was estimated by determining the percentage of Needs Area within a watershed. For instance, if 60% of a Needs Area was within a watershed, 60 % of the projected flow loss was allocated to that watershed. The remaining 40% of the flow loss was allocated to the remaining watershed(s) within the Needs Area. Those areas not within the watersheds identified above, are within the Merrimack Watershed. Flow from these areas discharge directly into the Merrimack River. Table I-1 summarizes the Needs Areas, the watersheds in each Needs Area, and the he percentage of watershed within each Needs Area. The amount of wastewater loss to each watershed is summarized in Table I-2.

At present, all or a portion of the Needs Areas receives water through a public water supply. Since the supply for these water systems is located outside of the Locust Pond, Flint Pond, Upton Pond, Lawrence Brook, Unnamed Brook 1, and Unnamed Brook 2 watersheds, there was no watershed loss calculated for these areas of the Needs Areas. With both the water supply and wastewater discharge being located outside of these watersheds, there would be no net loss of water since water is being imported into and out of the watershed.

Once the watershed boundaries and loss of flow to each watershed had been calculated, the August Median flow for each watershed was compared to the project flow loss. The August Median flow is the average streamflow during what is historically the lowest flow month of the year. Because this watershed flow occurs at the end of what are usually the driest months of the year, these flows generally the lowest of the year baring a prolonged drought. The flow loss to each watershed was calculated by adding the loss of recharge from each of the Needs Areas. From this the percentage of watershed flow loss calculated. A similar calculation was performed for the Merrimack River watershed. In the case of the Merrimack watershed, all of the projected wastewater flow loss was used in the calculation.

For the purpose of this exercise, it was assumed that all commercial and residential properties not serviced by a public water supply, would not be served by a public water supply when the Needs Areas

are sewered. This is a conservative and unlikely assumption making these percentages of flow loss higher than if portions of these watersheds were to receive public water supply in the futures.

Results of the calculations are summarized in Table I-3. Overall, the flow loss ranged between 0% to just over 14%, however, the quantity of flow loss is relatively small. In the case of the Merrimack River Watershed, the loss of flow is relatively low and can be considered insignificant. It is also likely that portions of the Needs Areas that are presently on private well will eventually have public water supply, lowering the percentage of flow loss to the watersheds.

Summary and Conclusion

By comparing the amount of flow loss in each watershed to the August Median Flow of that watershed, potential impacts to stream flows during the driest month of the year could be estimated. As summarized in Table I-3, the percentage of flow loss is generally below 10%. In the case of the Merrimack River Watershed, the loss of flow is relatively low and can be considered insignificant.

Based on the data analysis, the amount of stream flow and the percentage of stream flows are relatively small, generally less than 10%, when compared to the total stream flows estimated by StreamStats. This is particularly true in with the wetlands bordering the Merrimack River, where the groundwater and surface water elevations are more dependent on flows from the entire basin than flows in any of the watersheds.

Table 1-1
Estimate of Watershed Area
Within Needs Areas Town of Tyngsborough
Phase IV CWMP

Needs Area	Watershed(s) Within Needs Area	Area of Watershed within Needs Area (Sq Ft)	Area of Basin(s) within Area (Sq Ft)	Total Area of Needs Area (Sq Ft)	Percentage of Needs Area Occupied by Basin
1 - Norris Road	Lawrence Brook	3,338,192	76.6	3,611,922	92%
	Merrimack	273,730	6.3		8%
2 - Merrimack East	Merrimack	11,970,230	274.8	17,335,783	69%
	Lawrence Brook	4,050,202	93.0		23%
	East Unnamed2	545,608	12.5		3%
	East Unnamed1	769,742	17.7		4%
6 - Althea Lake	Scarlet Brook	601,335	13.8	1,697,142	35%
	Lawrence Brook	1,095,806	25.2		65%
7 - Marrimack West	Merrimack	9,779,687	224.5	17,002,738	58%
	Locust Pond	6,820,611	156.6		40%
	Flint Pond	402,440	9.2		2%
8 - Middlesex North	Locust Pond	5,988,941	137.5	14,116,286	42%
	Flint Pond	4,429,529	101.7		31%
	Merrimack	3,697,817	84.9		26%
9 - Locust North	Locust Pond	9,170,894	210.5	9,170,894	100%
11 - Flint Pond	Merrimack	5,111,635	117.3	19,290,805	26%
	Uptons Pond	1,823,301	41.9		9%
	Flint Pond	12,355,869	283.7		64%

Table I-2
Estimate of Flow Loss to Watershed Area Within Needs Area
Town of Tyngsborough
Phase IV CWMP

Needs Area	Projected Buildout Wastewater Flow (gpd)	Watershed(s) Within Needs Area	Percentage of Needs Area Occupied by Watershed	Estimated Wastewater Flow Loss to Watershed (gpd)	Area Serviced by Tyngsborough Water District
1 - Norris Road	14,100	Lawrence Brook	92%	13,031	**40%**
		Merrimack	8%	1,069	**0%**
2 - Merrimack East	86,500	Merrimack	69%	59,728	2%
		Lawrence Brook	23%	20,209	N
		East Unnamed2	3%	2,722	N
		East Unnamed1	4%	3,841	N
6 - Althea Lake	7,600	Merrimack	35%	2,693	N
		Lawrence Brook	65%	4,907	N
7 - Marrimack West	170,000	Merrimack	58%	97,781	N
		Locust Pond	40%	68,195	Y
		Flint Pond	2%	4,024	N
8 - Middlesex North	109,000	Locust Pond	42%	46,244	50%
		Flint Pond	31%	34,203	50%
		Merrimack	26%	28,553	50%
9 - Locust North	123,000	Locust Pond	100%	123,000	Y
11 - Flint Pond	374,000	Merrimack	26%	99,102	Y
		Uptons Pond	9%	35,349	Y
		Flint Pond	64%	239,549	75%

Table I-3
Estimate of Flow Loss to Watersheds
Town of Tyngsborough
Phase IV CWMP

Watershed	Calculated August Median Flow (cfs)*	Calculated August Median Flow (gpd)	Estimated Wastewater Flow Loss to Watershed (gpd)**	Estimated Flow Loss to Watershed as a percentage
Lawrence Brook	0.650	420,106	32,935	7.8%
Locust Pond	0.470	303,769	23,122	7.6%
Uptons Pond	0.099	63,791	0	0.0%
Flint Pond	1.810	1,169,834	81,013	6.9%
East Unnamed 1	0.042	26,951	3,841	14.3%
East Unnamed 2	0.055	35,677	2,722	7.6%
Merrimack	2678.000	1,730,836,613	884,200	0.051%

* Flows are August Median Flows Calculated using USGS Streamstats Program
** Only Includes Needs Areas or Percentage of Needs Areas that are not Serviced by Public Water (Tyngsborough Water District)

TABLE G-2
TOWN OF TYNGSBOROUGH
PHASE IV CWMP/FEIR
RESULTS OF PRELIMINARY SCREENING FOR WASTEWATER TREATMENT AND DISPOSAL – PRIVATE PROPERTY AREAS

Area	Wetlands	Soils	Drinking Water Supply	Fisheries	Waterbodies	Floodplains	Sensitive Habitat	Park Lands	Recreation Resources	Historic Interests	ACEC
Area A	Minimal to Moderate	Opportunity to Moderate	No Constraint to Moderate	No Constraint	No Constraint to Severe	No Constraint	No Constraint to Severe	No Constraint	No Constraint	No Constraint	No Constraint
Area B	Moderate	Moderate	No Constraint	No Constraint	Minimal	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area C	Minimal	Opportunity	No Constraint	Minimal	Minimal	No Constraint	No Constraint	No Constraint	No Constrain t	No Constraint	No Constraint
Area D	Minimal to Severe	Opportunity to Moderate	No Constraint	No Constraint	No Constraint to Minimal	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area E	Minimal	Opportunity to Moderate	Severe	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint
Area F	Minimal	Opportunity to Moderate	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint	No Constraint

APPENDIX J

Section 61 Findings and Permit Requirements

APPENDIX J SECTION 61 AND PERMITTING REQUIREMENTS

Introduction

This section summarizes the permitting requirements and proposed mitigation measures for the Tyngsborough CWMP for use in the draft Section 61 Findings. Massachusetts General Laws Chapter 30, § 61 requires state agencies and authorities to review, evaluate, and determine that any project, or activities associated therewith, for which a state permit or approval is required, undertake all practicable means and measures to minimize and prevent damage to the environment. The finding required by Section 61 (M.G.L. c.30, § 62A) "shall be limited to those matters which are within the scope of the environmental impact report, if any, required…[on a project]".

This section summarizes the mitigation measures, responsibility and timing. Mitigation costs are not known at this time, due to the level of design. However, the construction cost estimates in the CWMP/DEIR include assumptions for mitigation for the project, the majority of which are expected to be typical for similar projects (i.e., soil erosion and sediment control, stormwater management, odor control etc). Funding for the project and the related mitigation will be the responsibility of the Town, which will have to appropriate project funds at the Annual Spring Town meeting prior to the implementation of each phase for the engineering services and construction costs. The Town of Tyngsborough and its construction contractor will be responsible for implementing the mitigation measures for each phase. It will be the responsibility of the Town to ensure that the contractor is carrying out the proposed mitigations. The construction projects will include the services of a resident engineer at the project site, who will act on behalf of the Town to assure that the contractor is adhering with the project design and specifications. The resident engineer will also monitor the mitigation measures carried out by the contractor and will inform the Town if they are not adequate. The mitigation measures described below will be further developed as specific plans are developed and impacts quantified. For the most part, these mitigation measures are part of standard industry practices (i.e., erosion control, traffic management, land acquisition, odor control etc), and no extensive mitigation is required. As such, the costs of these mitigation measures are already included in the overall project costs estimates.

Project Schedule

A construction phasing plan is provided in Section 4.G of the FEIR. This plan takes into account Town priorities including geographical location and relative proximity of priority Needs Areas. This phasing plan is preliminary and a more detailed sequencing and phasing plan will be developed after Town Meeting approval of the final recommended plan. The preliminary plan includes six construction phases (Phases I – VI) to occur over a twenty year period. Within each phase there are specific steps. These steps are presented in Section 4.G.2 of the FEIR.

Permit Requirements

The following table provides a summary of anticipated state agency actions. As design proceeds, the specific need for each of these permits will be developed. The schedule for each proposed phase includes time to secure permits and approvals.

Anticipated Permit Requirements

Level	Agency	Permit/Approval	Regulation	Comment
Federal				
	U.S. Army Corps of Engineers	Placement of Dredge and Fill Permit	Clean Water Act Section 404	If temporary wetland impacts become unavoidable, project may need a Programmatic General Permit.
	U.S. Environmental Protection Agency/MADEP	National Pollutant Discharge Elimination System Permit	Clean Water Act Section 402	Needed if land disturbance will exceed one acre
State				
	MADEP	Sewer System Extension and Connection Permit Program	314 CMR 7.00	For sewer extensions greater than 1,000 feet.
	MADEP	Chapter 91 License	310 CMR 9.00	Possible for work under Merrimack River
	MADEP	Water Quality Certificate	314 CMR 9.00	For work requiring fill in more than 5,000 square feet of bordering and isolated wetlands and waterways
	MADEP	Massachusetts Wetlands Protection Act Order of Conditions	310 CMR 10.00	For work in Riverfront Area, 100 foot buffer zone, floodplains etc; action required only if project is appealed or requires a Variance
	MassHighway	Access Permit	720 CMR 13.00	For road opening in state roadways

Anticipated Permit Requirements (Continued)

Level	Agency	Permit/Approval	Regulation	Comment
State				
	Massachusetts Historical Commission	Protection of Properties Included on the State Register of Historic Places Project Notification Form	950 CMR 71.00	For work potentially impacting historical resources
	MA Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program	Conservation Permit	321 CMR 10.00	For non-exempt work within mapped habitat areas
	Executive Office of Energy and Environmental Affairs	Article 97 Land Disposition Policy		For work requiring land conveyance of Article 97 lands (i.e., public lands)
Local				
	Tyngsborough Conservation Commission	Massachusetts Wetlands Protection Act Order of Conditions	310 CMR 10.00	For work in Riverfront Area, 100 foot buffer zone, floodplains etc;
	Tyngsborough Department of Public Works	Road Opening Permit	Local	For road and utility construction
	Tyngsborough Sewer Department	Sewer Connection Permit	Local	Connections to municipal sewer system
	Tyngsborough Water District, Dracut Water Supply District, North Chelmsford Water District (as applicable)	Water Connection Permit	Local	Connections to municipal water system

MEPA Review

An Environmental Notification Form (ENF) for the project was filed by the Town of Tyngsborough in the fall of 1998, with the Scope issued on December 1, 1998. The Executive Office of Environmental Affairs, now called the Executive Office of Energy and Environmental Affairs (EEA), determined that the project would require an Environmental Impact Report (EIR) with a Special Review Procedure (SPR) for phased review. The Certificate also allowed, as a Phase I Waiver, a portion of the proposed plan east of the Merrimack River to proceed prior to the completion of the EIR. On April 6, 2001 a Certificate on a Notice of Project Change (NPC) was issued granting the Town's request to add a section of sewers to the Phase I project to support the development of Sycamore Networks, an office park off Potash Hill Road. The SPR divided the process into four separate phases: (1) Phase I, Needs Analysis, (2) Phase II, Screening of Alternatives, (3) Phase III, Draft Comprehensive Wastewater Plan and EIR and (4) Phase IV, Final Comprehensive Wastewater Management Plan and EIR. The Phase I report was submitted March 1, 2003 and the Certificate issued May 15, 2003. The Phase II report was submitted June 15, 2006, with the Certificate issued July 28, 2006. The Phase III report

as submitted June 13, 2008, with the Certificate issued August 1, 2008. Section 1.0 of the Phase IV Report provides a summary of these reports and their findings.

Mitigation Measures

The following mitigation measures are proposed for the project. These measures include project specific measures, such as use of erosion control features during construction, as well as more town-wide measures that will help mitigate impacts on a larger scale that aren't necessarily totally related to this project, such as water conservation. It should be noted that removal of failing Title 5 systems from the area by connection to a municipal sewer system will in and of itself serve to remove pollutants from the local waterbodies and serve to protect groundwater.

Surface and Groundwater Resources

Direct impacts to surface waters are not anticipated. Placement of new mains will occur in roadways and will go under or over culverts or be attached to bridges without leaving the right of way. The required crossing of the Merrimack River will be accomplished by horizontal directional drilling under the river bed to avoid impacts. Potential indirect impacts to waterbodies will be mitigated through the use of Best Management Practices (BMPs) as governed by the Massachusetts Stormwater Management Regulations through the Tyngsborough Conservation Commission. Erosion and sedimentation controls will be installed prior to excavations and will be monitored and maintained until disturbed areas are stabilized. The majority of the work will occur in roadways and, as such, soil disturbances will be minimized. During trenching in potential over-land portions, excavated material will be placed on the upslope side of the trench to permit any erosion from the excavate to be captured by the trench. Construction will be staged in sections, with stabilization occurring frequently, so that cuts are not open for extended periods of time. Construction dewatering may be required. If necessary, dewatering discharge will be routed through appropriately designed control features such as sediment traps of hay bales.

New areas of pavement, such as the pump stations, will have specific stormwater management control features as required under the Stormwater Management Regulations. These areas are expected to be small and will not be a source of pollutants. Mitigation measures would include controls such as drainage swales, small basins, catch basins and operations and maintenance procedures, as applicable.

Groundwater resources will be protected by the implementation of the construction and operational stormwater controls described above. With regard to public water supplies, portions of the new sewer

xtensions will occur in Zone I and/or II areas, as described in Section 4.D.4 of the FEIR and Appeondix H. These sewers, however, will be placed in existing roadways and will be designed according to state standards to guard against exfiltration of untreated wastewater.

Wetlands and Floodplains

For the proposed new sewers, no direct wetland or floodplain impacts are expected as the work will occur in roadways. Potential indirect impacts will be controlled during construction by implementation of soil erosion and sediment control features, as described above.

None of the five proposed pump stations will occur in wetland areas. The River Road, Farwell Road and Gloria Road pump stations will be located in the 200 foot Riverfront Area from the Merrimack River, Locust Pond outlet and Lawrence Brook, respectively. During final site design, specific efforts will be made to locate these pump stations as far from the bank as possible, to minimize permanent disturbance to less than 5,000 square feet, to manage stormwater runoff and to restore the area following construction. The Middlesex Road pump station is also within the 200 foot Riverfront Area from the Merrimack River. While the proposed location is separated from the River by the railroad and will occur in a mowed area, impact minimization efforts will also occur here.

Installation of the new mains will not affect floodplain elevations, and as such no mitigation is required. The River Road pump station may be located in the 100-eyar floodplain. During final site design, all efforts will be made to locate the pump station outside of the floodplain. Should avoidance not be practicable, placement of fill will be minimized and compensatory storage provided as necessary. All structures within a floodplain will be specifically designed so that they would either be above the flood level (i.e., manhole rim elevations) or would be watertight.

Rare Species

The majority of the proposed work will occur in paved roads, lawns, landscaped areas or within ten feet of existing paved roads. As such, and pursuant to 321 CMR 10.14, those portions of the project would be exempt from the Massachusetts Endangered Species Act (MESA).

The River Road and Middlesex Road pump stations are on the periphery of Priority Habitat of Rare Species and Estimated Habitat of Rare Wildlife. Additional survey will be conducted at both of these sites as planning advances to determine if habitat areas are, in fact, present and if habitat areas can be avoided. This work will be done in conjunction with NHESP.

Historical and Archaeological Resources

Installation of sewers will not impact historical or archaeological resources as they will occur in paved areas and/or will be located underground and will not change the visual environment. It is not anticipated that any of the pump stations will have a negative effect on cultural resources. However, once siting of the pump stations has advanced, their locations will be coordinated with the Massachusetts Historical Commission to confirm that there is no adverse effect.

Displacement of Households, Businesses and Services

No displacements are proposed and, as such, no mitigation is required.

Air Quality and Noise

Construction Mitigation - Some localized noise and/or air quality impacts could occur during construction. Mitigation measures such as limiting hours and providing dust control will be implemented. Specific measures will be detailed in the final design for each phase.

Operational Mitigation - Proposed pump stations could have potential odor impacts. As mitigation, odor control systems will be designed for pump stations as detailed in Section 4.C.7 of the CWMP/FEIR Proposed pump stations would not be expected to have noise impacts as the equipment will be housed inside a structure and likely would be underground. As such, no specific mitigation is proposed.

Land Use

The proposed project will have limited land use impacts. The underground pipes will not change land uses. Sewering of the Needs Areas will not change land uses. The project has been designed to address existing wastewater flows and estimated flows from areas which may be built out in the future. The project does not change Town zoning or land use regulations. As such, no mitigation is required for most of the project. The pump stations will be designed with architectural considerations relative to the location. Landscaping will also be provided. Final measures will be considered during final design, but would include consideration of setbacks, structure orientation, fencing, tree and shrubs, and grassed areas.

Some of the Needs Areas include land that is currently, or has been previously, agricultural land. The installation of underground pipes will not change potential agricultural uses, and none of the pump stations are located in agricultural lands. As such, no specific mitigation is proposed. Although there is proposed work in town roads near conservation lands such as the Times Farm Area and the Lowell-Dracut-Tyngsborough State Forest, this work will be located in the roads and will be underground. As such, there will be no impact and no mitigation is required. The River Road Pump Station will be located on/near the Hunter Property town conservation land. During preliminary design, the Town will determine the permanent impact of the proposed

onstruction on the conservation land and prepare a compensatory mitigation package that includes restoration of the disturbed areas, considers any active or passive recreational features that can be incorporated into the design, and provides compensatory open space land at a minimum of 1:1 basis. Detailed discussion of the River Road Pump Station is presented in Section 4 of the CWMP/DEIR.

Traffic Management

A Traffic Management Plan (TMP) will be developed for each phase of the project in order to describe how traffic will be managed during trenching in roads. Mitigation would be expected to include items such as police details, advance signage/notification, closure of only one lane and detours. The TMP will also specify construction vehicle routing so as to avoid neighborhoods, unless necessary for access to the construction area.

Septage Management Plan

Chapter 4 of the CWMP/FEIR includes discussion of the Septage Management Plan. A Septage Management Plan (SMP) will be developed for the areas of Town proposed for continued long-term on-site wastewater disposal as well as those areas proposed for future infrastructure until such time as the recommended plan s implemented in those areas. This plan will provide mitigation for those continued on-site wastewater disposal ses. The goal of the SMP will be to protect and maintain public health, ensure protection of surface and groundwater quality, provide sustainability of the Town's aquifers, maintain water resources as recreational, aesthetic and economic assets, improve the environment and prevent its deterioration, preserve and retain local control of on-site wastewater disposal systems without regulatory intervention and to protect private investments with regards to residential property values. The continued use of the on-site systems will be "managed" by providing a set of rules relating to the permitting and care of the systems. Public education would be a key component of the SMP. Other issues the SMP would address are detailed in Section 4.E.2 of the FEIR. The SMP will provide the Town a tool for more proactive oversight of the on-site systems, particularly for the long-term sustainability of the Town's natural resources.

Water Conservation Program

As an effort to reduce flows, the Town has an ongoing a Water Conservation Program. While this measure is not a project specific mitigation measure, it will serve to mitigate potential loss of water from the watershed. The Town's efforts are described in the Section 3 of the CWMP/DEIR and include public education, leak detection and repair, metering, pricing, and water supply system management.

Infiltration/Inflow and Sewer System Evaluation Survey

Another flow reduction measure will include minimization of inflow and infiltration (I/I). The Town prepared n I/I investigation in October 2002 and has followed up with a request to MADEP for financing for additional survey investigations. Chapter 4 of the CWMP/FEIR includes a summary of the proposed Infiltration/Inflow investigations and the proposed Scope of Work is presented in Appendix K.

The following table summarizes the proposed mitigation measures and schedule for implementation.

Resource Area	Mitigation Measures	Implementation Schedule
Surface Water and Groundwater	Best Management Practices (BMPs) as governed by the Massachusetts Stormwater Management Regulations through the Tyngsborough Conservation Commission. Erosion and sedimentation controls installed prior to excavations. Construction staged in sections, with stabilization occurring frequently, so that cuts are not open for extended periods of time. Dewatering discharge routed through appropriately designed control features.	Prepare stormwater management plans during final design of each phase and implement during construction. Review plan during Notice of Intent review prior to construction.
Public Water Supply	Portions of the new mains in Zone I and II areas will be placed in existing roadways and will be designed according to state standards to prevent exfiltration of wastewater.	Include in final design of each phase.
Wetlands	No direct impacts. Control potential indirect impacts with erosion and sedimentation controls. Manage stormwater runoff from new impervious areas. Minimize work area.	Show wetland resources on final design plans of each phase and obtain Order of Conditions for all work in resource areas or buffer zones.
Floodplains	Limit amount of unavoidable fill. Provide compensatory storage as needed,	Note limit of floodplain on final design plans of each phase and obtain Order of Conditions for all work in resource areas or buffer zones. Include specifications for flood proofing as necessary.
Rare Species	Avoid and minimize work within habitat areas as much as practicable. Coordinate detailed final plans with NHESP.	Coordinate locations in final design with NHESP through the Notice of Intent process.
Historical and Archaeological Resources	No specific impacts identified to date.	Coordinate locations in final design with MHC.
Displacement	No displacements are anticipated and no mitigation is required	N/A
Air Quality	**Construction.** Provide dust control. **Operations.** Design odor control systems for pump stations which might have extended sewage residence times.	Include requirements for dust control as well as odor control systems in final design plans and specifications.
Noise	**Construction.** Limit hours of construction near sensitive receptors. **Operations.** Proposed pump stations would not be expected to have noise impacts as the equipment will be housed inside a structure and likely would be underground. As such, no specific mitigation is proposed.	Identify sensitive receptors on plans during final design and include work hour limits in specifications
Land Use	The pump stations designed with architectural considerations relative to the location. Landscaping provided. Consider setbacks, structure orientation, fencing, tree and shrubs, and grassed areas. Provide compensatory open space.	Design final measures during final design in conjunction with Town and abutters.

APPENDIX K
Public Participation

APPENDIX K - RESPONSIVENESS SUMMARY

A Public Meeting was held on July 9, 2008 at the Tyngsborough Town Hall to present the Phase III CWMP/DEIR. Representatives from the Sewer Commission, Sewer Department, and the Town's consultant Earth Tech/AECOM were in attendance at the meeting. Earth Tech/AECOM presented the Phase III CWMP/DEIR to those that were in attendance.

The following summarizes the public participation at the presentation:

- Town resident, Mr. Robert Jackson of 21 Makos Street, questioned Erath Tech/AECOM as to what criteria were used to determine the needs areas. Mr. Jackson also wanted to know if the economic development for the community was one of the criteria used in determining the needs areas. He is concerned that the areas appear to be in residential areas as opposed to areas where businesses could be established.

- Earth Tech/AECOM informed Mr. Jackson that the needs areas were established in the Phase I process. This was based on the condition of the soils to accept on-site waste water disposal systems vs. conventional sewer systems. In terms of areas economic development, Earth Tech/AECOM stated that the Middlesex North area up to the Locust North area, as well as the Middlesex Road and downtown area are all areas which are commercially zoned. These areas would benefit from the sewer being constructed.

A summary of the presentation is included in this Appendix.

TOWN OF TYNGSBOROUGH

PUBLIC HEARING

PHASE III COMPREHENSIVE WASTEWATER MANAGEMENT PLAN
DRAFT ENVIRONMENTAL IMPACT REPORT
PUBLIC MEETING MINUTES
Wednesday, July 9, 2008 at 7:00 P.M.

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1. Sign-in/Identification of Representatives at Meeting

Owner:	Town of Tyngsborough Richard Reault, (RR) Chairman, Sewer Commissioner Jeffrey Hannaford (JH), Sewer Commissioner Gerald Foley (GF), Sewer Commissioner Allen Curseaden, (AC) Superintendent Kerry Colburn-Dion, (KCD) Sewer Commission Administrator
Engineer:	Earth Tech, Inc. James Barsanti (JB), Project Manager Karla King (KK), Project Engineer Richard Jubinville (RJ), Principal
Office Solutions:	Elizabeth Tice (ET), Transcriptionist Maureen Cooper (MC), Transcriptionist

2. Opening of Meeting

RR began by calling the meeting to order at 7:00 p.m. He read aloud the Public Hearing Notice.

3. Presentation by James Barasanti

- JB outlined the order of the presentation.
- JB indicated the purpose of the public meeting was for participation and comments regarding the CWMP in the Town of Tyngsborough.
- JB informed the audience he would present both the project schedule and the project plan for the completion of the Phase III and Phase IV CWMP's.
- The CWMP is a town wide study conducted to address the Town's wastewater management needs over a 20 period.
- The purpose of the report is to determine all effective methods to capture, treat and dispose of wastewater within the town.
- The Town of Tyngsborough currently has its wastewater treated at the Lowell Regional Wastewater Treatment Facility through its current inter-municipal agreement.
- The Town of Tyngsborough has three inter-municipal agreements for the treatment of its wastewater for those portions of the town that currently have

sewerage. The agreements are with the towns of Dracut, North Chelmsford and Lowell.

a. Needs

i. JB explained the purpose of doing a Comprehensive Wastewater Plan is to provide the Town with a planning document for its Wastewater Infrastructure Management.

ii. The plan identifies the needs and solutions in areas of the community that are proposed to be served by either a traditional wastewater collection system or an onsite system.

iii. The plan provides a guide for future projects on a cost effective and environmentally sound manner.

iv. The plan will help assist the Town when making decisions for smart growth, community and economic development.

v. The plan will provide the Town with a tool to increase its economic development to improve its tax base.

vi. The plan is required to justify any increases in the capacity for wastewater disposal.

vii. The plan is also required to negotiate any new inter-municipal agreements or request modifications to any existing agreements.

b. Benefits

i. JB stated the plan is required if the Town should wish to acquire Federal and State funding for the Wastewater Management Improvements that are proposed.

ii. The plan provides the Town with the opportunity to safeguard its water supply in environmentally sensitive areas.

iii. The Plan provides the Town with a mechanism for economic growth and development for the future.

c. Phase I – Needs Analysis

i. JB stated the Phase I Needs Analysis was prepared in 2002.

ii. The study involved the collection and analysis of existing data within the community. This included the evaluation soils and groundwater information.

iii. The analysis evaluated the sewer department's existing data with regard to its wastewater collection system and its pumping stations. It also evaluated information obtained from the Board of Health, Assessors, Zoning and Wetlands divisions of the town.

iv. The document identified the areas of wastewater needs within the Town of Tyngsborough.

v. The Phase I document received its MEPA Certificate on July 1, 2002.

vi. It was determined that the Phase I report adequately complied with MEPA. MEPA concurred with the findings and gave the approval to proceed to Phase II.

vii. Phase II consisted of the screening of the disposal of wastewater within the Town.

viii. The needs areas identified in the Analysis are:
   a. The Westside of the Merrimack River;
   b. Flint Pond;
   c. Locust South;
   d. Middlesex North;
   e. Locust North; and
   f. Merrimack West.
   g. On the East side of the river, the Althea Lake;
   h. Merrimack East;
   i. Coburn Road; and
   j. Norris Road areas are all identified.

ix. There are some areas within the Town that are served by on-site wastewater systems. They will continue to be served by those systems.

d. Phase II – Screening of Alternatives

i. JB noted that within the Phase II document they responded to the Phase I comments and MEPA issues that were raised at that time.

ii. The alternatives that were screened were:
   a. Onsite wastewater systems and the innovative alternatives for onsite wastewater systems;
   b. Communal systems;
   c. Local wastewater disposal solutions; and
   d. Regional solutions.

iii. JB stated the Phase II Report identified preliminary sites for wastewater treatment facilities and groundwater disposal.

iv. It included a list of alternatives to be evaluated as part of the Phase III portion.

v. Ten potential alternative sites for wastewater treatment and/or groundwater discharge were identified.

vi. Site screening criteria were applied to each of those ten sites to evaluate the feasibility of wastewater treatment in those locations.

vii. Sites were evaluated based on technical factors. Those factors included site viability, land area and environmental factors.

viii. It was evaluated to see what impacts a wastewater treatment facility would have on the environment in a particular area.

ix. Those areas would include wetlands, surface waters, groundwater, resources, cultural resources, archeological resources, historical resources, etc.

x. Institutional factors were addressed to see how the construction of a wastewater treatment facility would affect the Town's present sewer department and staffing. This included operational and maintenance factors, as well as economic factors in terms of costs and benefits.

xi. The evaluation of these ten sites did not identify a feasible site for wastewater treatment and groundwater disposal.

xii. All of the sites had constraints, mostly environmental issues that precluded the ability to treat wastewater locally.

xiii. The Phase II report recommended that the Town utilize its capacity in its inter-municipal agreements for its wastewater treatment and disposal.

xiv. The Phase II Screening of Alternatives received its MEPA Certificate on July 28, 2006. It was found to be adequate and it properly complied with MEPA

xv. It was approved to prepare the Comprehensive Wastewater Management Plan and Draft Environmental Impact Report, which is Phase III of the project.

e. Phase III - CWMP/DEI

i. The elements of the Phase III, CWMP and DEIR, include evaluating the alternative solutions for wastewater disposal and treatment in the needs areas.

ii. This evaluation includes using onsite septic systems, innovative, alternative onsite disposal systems, traditional collection systems and pump stations.

iii. A cost effective analysis was performed on these alternatives to determine the most feasible alternative available.

iv. A draft recommended plan and a draft environmental impact report was prepared.

v. The Phase III document was prepared for public education and understanding of the proposed wastewater management plan that the Town would ultimately recommend and develop.

vi. The plan would provide an avenue to develop consensus on wastewater policies for the town over a 20 year planning period.

vii. The Phase III study areas were based on what was prepared in the Phase I and Phase II study.

f. Phase III – Major Elements

i. JB noted this phase included development of the estimated future wastewater flows based on the current flows being generated by the town today and potential growth and zoning in each of the areas.

ii. The capacities of the inter-municipal agreements were analyzed to determine what was available for future growth.

iii. Conventional sewer systems vs. on-site and innovative/alternative systems within each of the needs areas were analyzed.

iv. The environmental and institutional issues that were associated with each alternative and each of the needs areas were evaluated.

v. Cost estimates for each alternative were prepared.

vi. Based on this analysis, it was determined that the conventional sewer systems were more cost effective and have less of an environmental impact than on-site systems for the needs areas.

vii. The Phase III recommended plan was developed to include conventional sewer systems for the majority of the needs areas.

viii. Since the Town has capacity limitations with its inter-municipal agreements, it has been recommended that a portion of the Norris Road, and the Coburn Road and Locust South needs areas continue to use onsite systems for their long term wastewater disposal needs.

ix. A phasing plan was developed for the construction of the sewer systems within the needs areas and cost estimates were prepared for each phase.

x. This Phase III Plan presents the recommended plan for the conceptual sewer systems within the needs areas.

xi. JB summarized the collection systems serving the Flint Pond area which was proposed to be connected to the existing sewer on Middlesex Road which presently discharges to the North Chelmsford system.

xii. It is proposed that a portion of the Middlesex North area will also discharge to the North Chelmsford system.

xiii. It is proposed that the Merrimack West area discharge across the river via twin force mains to the Phalanx Pump station. This will also require a new pump station in the River Road area be constructed.

xiv. The Locust North area and Middlesex Road area would also be served by the new pump station on River Road.

xv. The flow to be conveyed across the river would ultimately discharge to the Town of Dracut via the Town's Inter-municipal Agreement.

xvi. The Locust South area is proposed for on-site wastewater management systems on the west side of the river.

xvii. It is proposed that the lower portion of the Merrimack East area be conveyed to the Lowell inter-municipal agreement.

xviii. It is recommended that the majority of the Norris Road area be serviced by on-site systems. However, the Sunset Park area would be provided with sewers.

xix. It is proposed that the Colburn Road area have on-site wastewater management systems.

- Enterprise Zones in which the Town can encourage development in the portions of the needs areas that are zoned for businesses.

j. Phase III Project Schedule

i. The Phase III Report was submitted to MEPA on June 15, 2008.
ii. The public comment period is from June 25 thru July 25, 2008.
iii. The MEPA Certificate is scheduled to be issued on August 1, 2008.
iv. Written comments should be submitted no later then July 25, 2008 to:
Secretary of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
Attention: MEPA Unit; EOEA No. 11788

k. Phase IV – CWMP/FEIR

i. The Phase IV activities will include:
- The receipt of the MEPA comments on the Phase III report.
- Preparation and submission of the Phase IV report to MEPA.

ii. A public meeting will be held to present the final recommended plan.
iii. The estimated completion of the Phase IV Plan is scheduled to be in the fall of 2008.

4. Public Participation

- Town resident, Mr. Robert Jackson of 21 Makos Street, questioned JB as to what criteria were used to determine the needs areas.
- Mr. Jackson also wanted to know if the economic development for the community was one of the criteria used in determining the needs areas. He is concerned that the areas appear to be in residential areas as opposed to areas where businesses could be established.
- JB informed Mr. Jackson that the needs areas were established in the Phase I process. This was based on the condition of the soils to accept on-site waste water disposal systems vs. conventional sewer systems.
- In terms of areas economic development, JB stated that the Middlesex North area up to the Locust North area, as well as the Middlesex Road and downtown area are all areas which are commercially zoned. These areas would benefit from the sewer being constructed.
- RR asked for further questions or comments from the public. There were none.
- The meeting was adjourned at 7:30 p.m.

EARTH TECH | AECOM

- Community Groundwater Well
- Non-Transient Non-community
- Transient Non-Community
- Zone 1
- Approved Wellhead Protection Areas (Zone II)
- Interim Wellhead Protection Area
- Watershed Basin (HUC-12)

Proposed Sewer

- Force Main
- Low Pressure
- Gravity Sewer
- P Pump Station
- Area of Need
- Needs Area to be Included in Septage Mangement Plan

Base map data provided by MassGIS.

Figure H-1

Zone 1 Areas

Phase IV CWMP/FEIR
Town of Tyngsborough

0 1,500 3,000 6,000
Feet

Map Document: (L:\work\80764\GIS\Maps\Zone1Areas.mxd)
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