

Revised Draft Report

Comprehensive Wastewater Management Plan and Draft Environmental Impact Report Phase III - CWMP/DEIR Tyngsborough, Massachusetts



A tyco International Ltd. Company

Prepared for:

Town of Tyngsborough
25 Bryants Lane
Tyngsborough, Massachusetts 01879

Prepared by:

Earth Tech, Inc.
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742

May 2008

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**Comprehensive Wastewater Management Plan and
Draft Environmental Impact Report
Phase III – Draft CWMP/EIR
Tyngsborough, Massachusetts**

Prepared for:

Town of Tyngsborough
25 Bryants Lane
Tyngsborough, Massachusetts 01879

Prepared by:

Earth Tech, Inc.
300 Baker Avenue, Suite 290
Concord, Massachusetts 01742-2167

May 2008

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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EXECUTIVE SUMMARY

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) with phased review of the required EIR. This procedure divides the planning process into four separate phases: (1) Phase I, Needs Analysis, (2) Phase II, Screening of Alternatives; (3) Phase III, Draft Comprehensive Wastewater Plan and Environment Impact Report; and (4) Phase IV, Final Comprehensive Wastewater Management Plan and Environmental Impact Report.

Phase I Summary

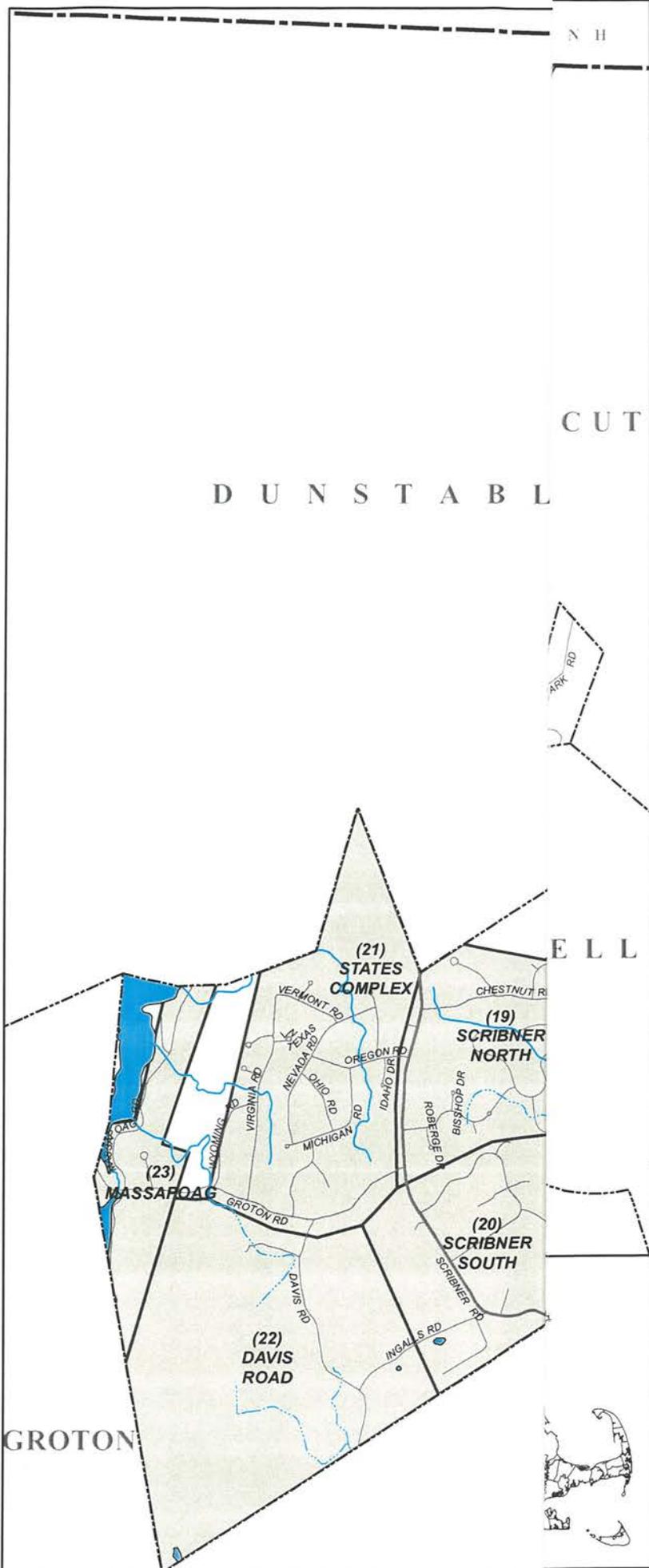
The Phase I – Needs and Growth Management identified existing conditions, evaluated current and future water demands, drainage conditions and projected future wastewater disposal needs for the Town. The study area was comprised of 23 study areas (Figure ES-1) and are identified below. For each of the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

Study Area	Long Term Wastewater Disposal Alternative	
	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	

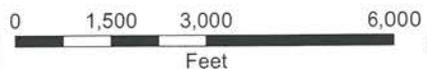
Study Areas

-  Area of Wastewater Need
-  Septage Management Plan



Base map data provided by MassGIS.

Figure ES-1
Study Areas
 Phase III CWMP/DEIR
 Town of Tyngsborough



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Study Area	Long Term Wastewater Disposal Alternative	
	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 EOEА 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

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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 is included in Appendix A of the Phase III CWMP/DEIR, and Appendix B includes the Response to Comments on the Phase II CWMP.

Phase III Summary

The Phase III CWMP/DEIR includes 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 includes evaluation of the environmental impacts, technical design, institutional factors, and project costs associated with each alternative and recommends the appropriate solution to wastewater disposal for each of the 23 Study Areas identified in Phase I.

Phase III 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,

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the Recommended Plan in the Phase III CWMP/DEIR 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

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 III Recommended Plan

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

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**PHASE III CWMP/DEIR 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 sewerred areas and the Needs Areas within the existing IMAs, the Phase III CWMP/DEIR 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

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The Phase III CWMP/DEIR 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 III CWMP/DEIR is \$42.4 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.

The Phase IV, Comprehensive Wastewater Management Plan/Final Environmental Impact Report (CWMP/FEIR) will be based on the final result of all comments received on the Phase III Report through the MEPA process as well as comments received during the public meeting process.

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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

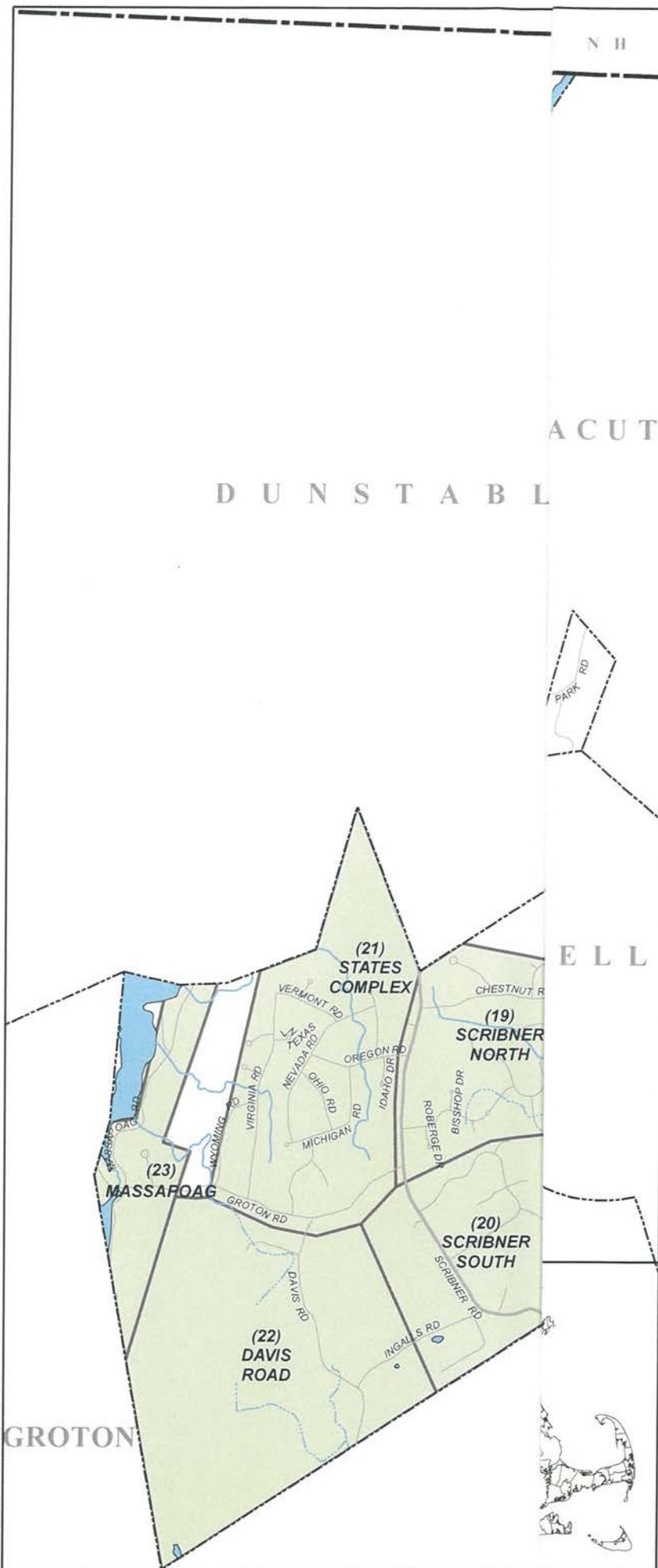
Each phase of the project is distributed for review according to MEPA regulations to provide an opportunity for public comment.

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.

Study Areas

-  Area of Wastewater Need
-  Septage Management Plan



Base map data provided by MassGIS.

Figure 1-1
Study Areas
 Phase III CWMP/DEIR
 Town of Tyngsborough



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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.

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**TABLE 1-1
STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE**

Study Area	Long Term Wastewater Disposal Alternative	
	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;

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- 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.

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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 of 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 sewerage 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. PURPOSE AND SCOPE OF PHASE III REPORT

The CWMP/DEIR Phase III report presents the selected alternatives in accordance with the scope that was approved by the Secretary of EOE. It includes 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. Specific recommendations by Study Area will take into account the appropriateness of utilizing: (1) innovative alternative systems; (2) communal systems;

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

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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.

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**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 area 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 Lakeview 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.

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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 then 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.

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**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 sewer 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.

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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.

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- 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:

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- “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 usage 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 usage 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.

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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.

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**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 sewer 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

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Based on the analysis of buildout flows for the current sewer 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 sewer 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 sewer 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.

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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 usage 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 sewer 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 usage, 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.

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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	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

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**TABLE 3-11
TOWN OF TYNGSBOROUGH
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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.

3.0 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 was 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 were 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 III 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;

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- 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 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. The site conditions on each property play a major role in the costing of I/A systems. It has been

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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. For the areas of wastewater disposal need where on-site I/A systems are being considered, the construction cost of a FAST® systems 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.

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

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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 = $(\text{Discount Rate} - \text{Inflation Rate}) / (1 + \text{Inflation Rate})$

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

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Operation and Maintenance Costs for On-Site Innovative/Alternative 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.

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 306 residential innovative/alternative systems and zero commercial/industrial innovative/alternative 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 35,113 linear feet of gravity sewers, 2,536 linear feet of force main, 1,513 linear feet of low pressure sewer, 7 low pressure sewer pumping systems, 2 pumping stations, 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 309 residential innovative/alternative systems and 4 commercial/industrial innovative/alternative 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, low pressure sewer systems would be located on individual private lots 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 205 residential innovative/alternative systems and zero commercial/industrial innovative/alternative 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 2,623 l.f. of gravity sewers, 1,780 l.f. of force main, 1 pumping station, and 563 linear feet of sewer for future development. 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 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 49 residential innovative/alternative systems and zero commercial/industrial innovative/alternative 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 9,946 linear feet of gravity sewers, 2,632 linear feet of force main, 2 pumping stations, 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 while the pumping station would require the purchase of land. 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 130 residential innovative/alternative systems and 89 commercial/industrial innovative/alternative 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 43 residential innovative/alternative systems and 105 commercial/industrial innovative/alternative systems. The approximate 128,100 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 1 residential innovative/alternative systems and 63 commercial/industrial innovative/alternative 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, 2 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 49 residential innovative/alternative systems and 109 commercial/industrial innovative/alternative 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 15,317 linear feet of gravity sewers, 5,876 linear feet of force main, 461 linear feet of low pressure sewer, 5 low pressure sewer pumping systems, 2 pumping stations, 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 28 residential innovative/alternative systems and 132 commercial/industrial innovative/alternative 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.

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**TABLE 3-1
TOWN OF TYNGSBOROUGH
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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	230	Each	\$40,000	\$9,200,000	\$11,040,000	\$161,000	\$13,719,040
	Upgrade	76	Each	\$30,000	\$2,280,000	\$2,736,000	\$53,200	\$3,621,248
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	\$95,000	\$0	\$0	\$0	\$0
	Upgrade	0	Each	\$70,000	\$0	\$0	\$0	\$0
	Total Innovative/Alternative Cost				\$13,776,000			\$17,340,288

¹ Estimated Project Cost includes Cost for Project Services.

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**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	35,113	L.F	\$225	\$7,900,522	\$11,060,730	\$0	\$11,060,730
	Grinder or Suction Lift Pumping Station	2	Each	\$500,000	\$1,000,000	\$1,400,000	\$40,000	\$2,065,600
	Force Main	2,536	L.F	\$100	\$253,630	\$355,082	\$0	\$355,082
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000	\$0	\$280,000
	Low Pressure Sewer	1,513	L.F	\$125	\$189,136	\$264,790	\$0	\$264,790
	Low Pressure Sewer Pumping System	7	Each	\$12,500	\$87,500	\$122,500	\$3,500	\$180,740
	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					\$18,157,353		\$18,881,193
2	Innovative/Alternative Residential							
	New	232	Each	\$40,000	\$9,280,000	\$11,136,000	\$162,400	\$13,838,336
	Upgrade	77	Each	\$30,000	\$2,310,000	\$2,772,000	\$53,900	\$3,668,896
	Innovative/Alternative Commercial/Industrial							
	New	3	Each	\$95,000	\$285,000	\$342,000	\$9,900	\$506,736
	Upgrade	1	Each	\$70,000	\$70,000	\$84,000	\$3,300	\$138,912
	Total Innovative/Alternative Cost					\$14,334,000		\$18,152,880

¹ Estimated Project Cost includes Cost for Project Services.

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**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	154	Each	\$40,000	\$6,160,000	\$7,392,000	\$107,800	\$9,185,792
	Upgrade	51	Each	\$30,000	\$1,530,000	\$1,836,000	\$35,700	\$2,430,048
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	\$95,000	\$0	\$0	\$0	\$0
Upgrade	0	Each	\$70,000	\$0	\$0	\$0	\$0	
Total Innovative/Alternative Cost					\$9,228,000		\$11,615,840	

¹ Estimated Project Cost includes Cost for Project Services.

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**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	2,623	L.F	\$225	\$590,207	\$826,289	\$0	\$826,289
	Grinder or Suction Lift Pumping Station	1	Each	\$500,000	\$500,000	\$700,000	\$20,000	\$1,032,800
	Force Main	1,780	L.F	\$100	\$178,044	\$249,262	\$0	\$249,262
	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	0	Each	\$50,000	\$0	\$0	\$0	\$0
	Sewer for Future Development	563	L.F	\$225	\$126,563	\$177,188	\$0	\$177,188
	Total Collection System Cost					\$2,092,738		\$2,425,538
2	Innovative/Alternative Residential							
	New	37	Each	\$40,000	\$1,480,000	\$1,776,000	\$25,900	\$2,206,976
	Upgrade	12	Each	\$30,000	\$360,000	\$432,000	\$8,400	\$571,776
	Innovative/Alternative Commercial/Industrial							
	New	0	Each	\$95,000	\$0	\$0	\$0	\$0
Upgrade	0	Each	\$70,000	\$0	\$0	\$0	\$0	
Total Innovative/Alternative Cost					\$2,208,000		\$2,778,752	

¹ Estimated Project Cost includes Cost for Project Services.

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**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	9,946	L.F	\$225	\$2,237,906	\$3,133,069	\$0	\$3,133,069
	Grinder or Suction Lift Pumping Station	1	Each	\$750,000	\$750,000	\$1,050,000	\$20,000	\$1,382,800
	Grinder or Suction Lift Pumping Station	1	Each	\$500,000	\$500,000	\$700,000	\$20,000	\$1,032,800
	Force Main	2,632	L.F	\$100	\$263,150	\$368,410	\$0	\$368,410
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000	\$0	\$280,000
	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	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					\$9,254,604		\$9,920,204
2	Innovative/Alternative Residential New Upgrade	98	Each	\$40,000	\$3,920,000	\$4,704,000	\$68,600	\$5,845,504
	Innovative/Alternative Commercial/Industrial New Upgrade	32	Each	\$30,000	\$960,000	\$1,152,000	\$22,400	\$1,524,736
	Total Innovative/Alternative Cost	67	Each	\$95,000	\$6,365,000	\$7,638,000	\$221,100	\$11,317,104
		22	Each	\$70,000	\$1,540,000	\$1,848,000	\$72,600	\$3,056,064
						\$15,342,000		\$21,743,408

¹ Estimate Project Cost includes Cost for Project Services.

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**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		
2	Innovative/Alternative Residential							
	New	33	Each	\$40,000	\$1,320,000	\$1,584,000	\$23,100	\$1,968,384
	Upgrade	10	Each	\$30,000	\$300,000	\$360,000	\$7,000	\$476,480
	Innovative/Alternative Commercial/Industrial							
	New	79	Each	\$95,000	\$7,505,000	\$9,006,000	\$260,700	\$13,344,048
Upgrade	26	Each	\$70,000	\$1,820,000	\$2,184,000	\$85,800	\$3,611,712	
Total Innovative/Alternative Cost					\$13,134,000			\$19,400,624

¹ Estimated Project Cost includes Cost for Project Services.

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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	1	Each	\$40,000	\$40,000	\$48,000	\$700	\$59,648
	Upgrade	0	Each	\$30,000	\$0	\$0	\$0	\$0
	Innovative/Alternative Commercial/Industrial							
	New	48	Each	\$95,000	\$4,560,000	\$5,472,000	\$158,400	\$8,107,776
Upgrade	15	Each	\$70,000	\$1,050,000	\$1,260,000	\$49,500	\$2,083,680	
Total Innovative/Alternative Cost					\$6,780,000		\$10,251,104	

¹ Estimated Project Cost includes Cost for Project Services.

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**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	2	Each	\$500,000	\$1,000,000	\$1,400,000	\$40,000	\$2,065,600
	Force Main	3,221	L.F	\$100	\$322,062	\$450,887	\$0	\$450,887
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000	\$0	\$280,000
	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					\$9,406,248		
2	Innovative/Alternative Residential							
	New	37	Each	\$40,000	\$1,480,000	\$1,776,000	\$25,900	\$2,206,976
	Upgrade	12	Each	\$30,000	\$360,000	\$432,000	\$8,400	\$571,776
	Innovative/Alternative Commercial/Industrial							
	New	82	Each	\$95,000	\$7,790,000	\$9,348,000	\$270,600	\$13,850,784
Upgrade	27	Each	\$70,000	\$1,890,000	\$2,268,000	\$89,100	\$3,750,624	
Total Innovative/Alternative Cost					\$13,824,000			\$20,380,160

¹Estimated Project Cost includes Cost for Project Services.

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**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	15,317	L.F	\$225	\$3,446,276	\$4,824,786	\$0	\$4,824,786
	Grinder or Suction Lift Pumping Station	1	Each	\$750,000	\$750,000	\$1,050,000	\$20,000	\$1,382,800
	Grinder or Suction Lift Pumping Station	1	Each	\$500,000	\$500,000	\$700,000	\$20,000	\$1,032,800
	Force Main	5,876	L.F	\$100	\$587,628	\$822,679	\$0	\$822,679
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000	\$0	\$280,000
	Low Pressure Sewer	461	L.F	\$125	\$57,615	\$80,660	\$0	\$80,660
	Low Pressure Sewer Pumping System	5	Each	\$12,500	\$62,500	\$87,500	\$2,500	\$129,100
	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					\$14,651,813		\$15,359,013
2	Innovative/Alternative Residential							
	New	21	Each	\$40,000	\$840,000	\$1,008,000	\$14,700	\$1,252,608
	Upgrade	7	Each	\$30,000	\$210,000	\$252,000	\$4,900	\$333,536
	Innovative/Alternative Commercial/Industrial							
	New	99	Each	\$95,000	\$9,405,000	\$11,286,000	\$326,700	\$16,722,288
Upgrade	33	Each	\$70,000	\$2,310,000	\$2,772,000	\$108,900	\$4,584,096	
Total Innovative/Alternative Cost					\$15,318,000		\$22,892,528	

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.

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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 length 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 be 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.

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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.

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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.

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**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

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**TABLE 3-11
TOWN OF TYNGSBOROUGH
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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							
	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.

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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.

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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
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SUMMARY OF MOST COST EFFECTIVE ALTERNATIVE**

Project Description
Collection
Study Area 1 - Norris Road – Conventional Sewer System and Low Pressure Sewers
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 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.

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.

Surface and Groundwater Resources

The I/A systems would potentially have negative impacts in the proposed sewer areas. While I/A systems provide a higher level of treatment than 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 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.

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

Description	Direct Impacts					Indirect Impacts					
	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

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TABLE 3-15
TOWN OF TYNSBOROUGH
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EXPANSION OF SEWER SYSTEM AND UTILIZATION OF IMA'S

Description	Direct Impacts					Indirect Impacts					
	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 includes the Draft Environmental Impact Report (DEIR). The fourth and final phase will be 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 III Report, all of these scope items have been determined and a draft recommended plan has been established.

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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 Tyngsborough'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.

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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.

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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 usage periods.

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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 these 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

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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.

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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.

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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.

Proposed Flow Allocations

As presented in Chapter 2, the projected buildout of current sewer areas and the Needs Areas exceeds the capacity available in the Intermunicipal Agreements (IMA). Based on the analysis of buildout flows for the current sewer 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 sewer 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.

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**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.

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**TABLE 4-2
STUDY AREA LONG TERM WASTEWATER DISPOSAL ALTERNATIVE**

Study Area	Long Term Wastewater Disposal Alternative	
	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 North²	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

- Needs Areas shown in **Bold**.
- 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.
- 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.

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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 35,113 linear feet of gravity sewers, 2,536 linear feet of force main, 1,513 linear feet of low pressure sewer, 7 low pressure sewer pumping systems, 2 pumping stations, 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 2,623 linear feet of gravity sewers, 1,780 linear feet of force main, 1 pumping station, and 563 linear feet of sewer for future development. The gravity sewer system will flow to a pump station located on Althea Avenue and will be pumped to the existing gravity sewer on Althea Avenue. Refer to Figure 4-1 for the proposed collection system for this Area.

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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 9,946 linear feet of gravity sewers, 2,632 linear feet of force main, 2 pumping stations, 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.

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The gravity sewer will be 8-inch and 10-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 linear feet 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.

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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 15,317 linear feet of gravity sewers, 5,876 linear feet of force main, 461 linear feet of low pressure sewer, 5 low pressure sewer pumping systems, 2 pumping stations, 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 10 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 ten 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 ten pumping stations range from approximately 1,000 gallons per day and up to 345,000 gallons per day.

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**TABLE 4-3
PROPOSED PUMPING STATIONS
WASTEWATER FLOW ESTIMATES**

Pump Station Location	Needs Area Location	Average Daily Flow (Buildout) (gpd)
South Flint Pond	11	310,000
Central Flint Pond	11	4,800
Farwell Road	7	2,500
Northern Merrimack West	7	153,000
Middlesex Road & Locust Avenue	8	331,000
River Road Pump Station	7	345,000
Northern Merrimack East	2	1,000
Curtis Road & Indian Lane	2	36,000
Pawtucket Blvd	2	18,000
Althea Lake	6	5,600

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. It is also recommended that during detailed design of the wastewater collection system, the design include re-evaluation of the conceptual sewer system and pump stations proposed at Farwell Road and Northern Merrimack East presented in the CWMP to evaluate if deeper sewers in these areas can accommodate flows by gravity such that the pump stations can be eliminated.

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.

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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).

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Sewer Service Laterals

The Town will utilize its 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 4-4¹
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

¹All 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

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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

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- 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 4-5¹
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

¹All 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.

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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,

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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.

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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:

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- 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.

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- 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

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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.

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:

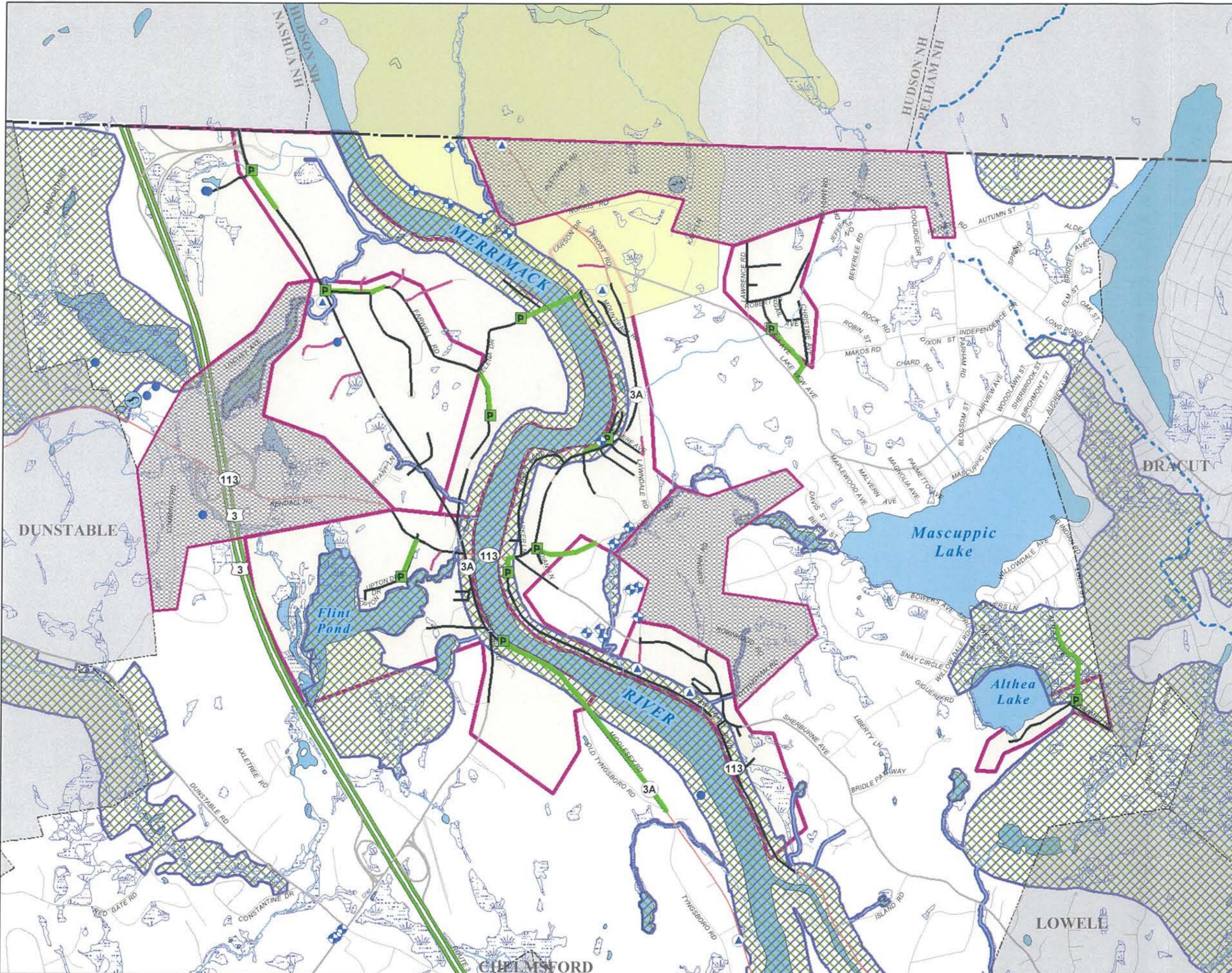
2. Historical, Archaeological, Cultural, Conservation and Recreation

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.

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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). The work proposed for the River Road Pump Station will impact the conservation land on the Hunter property. The design of the pump station will incorporate mitigation measures to minimize impact to the conservation land.

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.



- 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 Critical Environmental Concern (ACEC)
- Approved Wellhead Protection Areas (Zone II)
- Proposed Sewer**
- Force Main
- Low Pressure
- Gravity Sewer
- Pump Station
- Area of Need
- Needs Area to be Included in Septage Mangement Plan

Base map data provided by MassGIS.

Figure 4-2
Environmental Constraints
 Phase III CWMP/DEIR
 Town of Tyngsborough



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 2 (expansion of the Phalanx Street Station and the new station on Pawtucket Boulevard south of the Kendall Road bridge), Area 7 (new pump station at River Road on the west bank of the Merrimack River), Area 8 (new pump station on Farwell Road near the intersection with Middlesex Road) and Area 11 (new pump station along Middlesex Road to the south) will likely be in the 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.

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.

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.

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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

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- 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 retained Earth Tech, Inc. to prepare 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,

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“Screening of Alternatives”, the third phase document is entitled Phase III, “Evaluation of Alternatives” which includes the Draft Environmental Impact Report (DEIR) and the fourth phase document will include the 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 III, “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

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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.

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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.

Septage Management Plan

Chapter 3 briefly described the need for a Septage 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.

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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

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- *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.

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- *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.

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- *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.

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- *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.

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

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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

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 has been included in the May 2008 Town Meeting. 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:

- Smoke Testing;
- Flow Monitoring and;
- Cleaning and Television Inspection.

The areas that the Town will investigate include the Muscuppic Lake Area and Long Pond Areas. The draft scope of work is included in Appendix D.

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 \$42.4 million (Present Day Cost) based on an Engineering News Record (ENR) Construction Cost Index of 8,140 for May 2008. The

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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 \$3,900,000 (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

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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 the 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.

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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 \$42,400,000 (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 \$197 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, Tyngsborough 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.

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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)

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- 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 4-3 presents the phasing plan for the sewer extension program and Figure 4-4 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.

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**TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASE I AND II
ESTIMATED PROJECT COSTS**

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost ¹	
Phase I (2009-2013)	Gravity Sewer	23,155	L.F.	\$200	\$4,630,902	\$6,483,263	
	Grinder or Suction Lift Pumping Station	1	Each	\$750,000	\$750,000	\$1,050,000	
	Grinder or Suction Lift Pumping Station	2	Each	\$500,000	\$1,000,000	\$1,400,000	
	Force Main	7,302	L.F.	\$100	\$730,184	\$1,022,258	
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000	
	Low Pressure Sewer	461	L.F.	\$125	\$57,615	\$80,661	
	Low Pressure Sewer Pumping System	0	Each	\$12,500	\$0	\$0	
	Brook Crossing	2	Each	\$50,000	\$100,000	\$140,000	
	Total Collection System Cost						\$10,456,181
	Phase II (2011-2015)	Upgrade to Existing Collection System					
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		2	Each	\$750,000	\$1,500,000	\$2,100,000	
Force Main		3,100	L.F.	\$100	\$309,962	\$433,947	
Land Acquisition		2	Each	\$100,000	\$200,000	\$280,000	
Low Pressure Sewer		0	L.F.	\$125	\$0	\$0	
Low Pressure Sewer Pumping System		24	Each	\$12,500	\$300,000	\$420,000	
Brook Crossing	4	Each	\$50,000	\$200,000	\$280,000		
Total Collection System Cost						\$11,804,182	

¹ Estimated Project Cost includes Cost for Project Services.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR – PHASE III REPORT**

**TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASE III AND PHASE IV
ESTIMATED PROJECT COSTS**

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost ¹
Phase III (2015-2018)	Upgrade to Existing Collection System					
	Gravity Sewer	1,475	L.F	\$225	\$331,875	\$464,625
	Proposed Work					
	Gravity Sewer	16,854	L.F	\$225	\$3,792,173	\$5,309,042
	Grinder or Suction Lift Pumping Station	2	Each	\$500,000	\$1,000,000	\$1,400,000
	Force Main	1,936	L.F	\$100	\$193,582	\$271,015
	Land Acquisition	2	Each	\$100,000	\$200,000	\$280,000
	Low Pressure Sewer	1,078	L.F	\$125	\$134,760	\$188,664
	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					\$8,193,345
Phase IV (2019-2022)	Gravity Sewer	9,524	L.F	\$225	\$2,142,936	\$3,000,110
	Grinder or Suction Lift Pumping Station	0	Each	\$500,000	\$0	\$0
	Force Main	0	L.F	\$100	\$0	\$0
	Land Acquisition	1	Each	\$100,000	\$100,000	\$140,000
	Low Pressure Sewer	435	L.F	\$125	\$54,376	\$76,127
	Low Pressure Sewer Pumping System	11	Each	\$12,500	\$137,500	\$192,500
	Brook Crossing	1	Each	\$50,000	\$50,000	\$70,000
		Total Collection System Cost				

¹ Estimated Project Cost includes Cost for Project Services.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR – PHASE III REPORT**

**TABLE 4-6
TOWN OF TYNGSBOROUGH CWMP/DEIR
PHASE V AND PHASE VI
ESTIMATED PROJECT COSTS**

Phase Name	Description	Quantity	Unit	Unit Price	Extended Total	Estimated Project Cost ¹
Phase V (2023-2025)	Gravity Sewer	8,393	L.F	\$225	\$1,888,360	\$2,643,704
	Grinder or Suction Lift Pumping Station	2	Each	\$500,000	\$1,000,000	\$1,400,000
	Force Main	2,204	L.F	\$100	\$220,409	\$308,573
	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	2	Each	\$50,000	\$100,000	\$140,000
	Total Collection System Cost					\$4,632,276
Phase VI (2026-2028)	Gravity Sewer	6,540	L.F	\$225	\$1,471,421	\$2,059,990
	Grinder or Suction Lift Pumping Station	1	Each	\$500,000	\$500,000	\$700,000
	Force Main	1,051	L.F	\$100	\$105,107	\$147,150
	Land Acquisition	0	Each	\$100,000	\$0	\$0
	Low Pressure Sewer	3,911	L.F	\$125	\$488,919	\$684,486
	Low Pressure Sewer Pumping System	1	Each	\$12,500	\$12,500	\$17,500
	Brook Crossing	3	Each	\$50,000	\$150,000	\$210,000
	Total Collection System Cost					\$3,819,126

¹ Estimated Project Cost includes Cost for Project Services.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR – PHASE III REPORT**

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
- DEP approves the SRF application for funding and contract documents by December 31;

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR – PHASE III REPORT**

- 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 will be followed in Phase III. 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/EIR Phase II Document on July 13, 2006 at the Town Hall on Bryants Lane. As each successive phase of this CWMP/EIR is completed, a public informational meeting is held, with a Public Hearing to be scheduled after the filing of this Phase III Draft Environmental Impact Report. At the conclusion of the last and final phase, Phase IV, Final CWMP/EIR, a public informational meeting will be held to present the 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 SUMMARIES

Earth Tech prepares and distributes responsiveness summaries after public meetings. These responsiveness summaries identify the public participation activities and document significant questions, comments, concerns and suggestions by the public and responses by Town staff and Earth Tech, including justification for rejection or incorporation of any comments into the document. The responsiveness summaries are distributed to the Depositories, active participants and the mailing list.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

D. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE MEPA PROCESS

The Town of Tyngsborough submitted Phase II, Screening of Alternatives to MEPA on June 15, 2006. The comment period for Phase II, Screening of Alternatives ended on July 21, 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 MEPA Certificates as well as all 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, 5 th Floor Boston, MA 02108 (three copies)
Ms. Margo Webber Department of Environmental Protection 627 Main Street Worcester, MA 01603	Northern Middlesex Council of Governments Gallagher Terminal, Floor 3B 115 Thorndike Street Lowell, MA 01852-3308
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-includes Depositories)	Town of Tyngsborough Board of Health Town Hall 25 Bryants Lane Tyngsborough, MA 01879

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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 Denomme
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
Field Headquarters
North Drive
Westborough, MA 01581

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 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 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.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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, and contract administration, are being carried out. Earth Tech 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 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 II MEPA Certificate



The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

100 Cambridge Street, Suite 900

Boston, MA 02114-2524

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

STEPHEN R. PRITCHARD
SECRETARY



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

July 28, 2006

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ON THE SPECIAL REVIEW PROCEDURE

PHASE II: SCREENING OF ALTERNATIVES

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 21, 2006

As Secretary of Environmental Affairs, I hereby determine that the Phase II: Screening of Alternatives document submitted on 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 proponent may prepare and submit for review the Phase III: Draft Environmental Impact Report (DEIR)/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 result will be a comprehensive plan outlining how the Town of Tyngsborough will treat and dispose of its wastewater for the next 20 years.

One third of the community'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 in the towns of 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.

Procedural History

In the fall of 1998, the Town of Tyngsborough filed an 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 proponent'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 includes an assessment of existing conditions and an analysis of wastewater management needs; Phase II: Screening of Alternatives, which is the current document, includes the development and screening of water resources and wastewater management alternatives to address the needs defined in the Phase I document; Phase III: DEIR/Facilities Plan will evaluate the most feasible options and present a draft plan; and Phase IV: FEIR/Facilities Plan will present the final proposed plan and incorporate and respond to any outstanding comments and issues. On May 15, 2003, a Certificate was issued on the SRP: Phase I document indicating that it adequately and properly complied with MEPA regulations and establishing the Scope for the Phase II document.

Permits and Jurisdiction

This project is subject to the Mandatory EIR provisions of the MEPA regulations because it will likely involve construction of more than ten miles of new sewers and may exceed other Mandatory EIR thresholds. It will likely require sewer extension and connection permits from the Department of Environmental Protection (DEP), National Pollutant Discharge Elimination System (NPDES) permits from the U.S. Environmental Protection Agency (EPA) and an Order of Conditions from the Tyngsborough Conservation Commission. It may also require access permits from the Massachusetts Highway Department (MHD). Because the project will receive funding or financial assistance from DEP under the State Revolving Fund (SRF), MEPA jurisdiction extends

to all aspects of the project that may cause Damage to the Environment.

Summary of Phase II: Screening of Alternatives

The Phase II report evaluates technologies and sites for their ability to address the wastewater needs of all study areas identified in the Phase I report as medium or high severity. Also, it responds to specific comments raised by DEP during review of the Phase I document. The report summarizes a broad range of wastewater alternatives and technologies including: on-site wastewater management; regional wastewater solutions; wastewater collection, disposal and treatment; and alternative technologies. The report assesses 10 potential sites for locating wastewater management facilities. It concludes that none of these sites are 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). The report does not provide much information regarding site selection and, although additional sites may have been considered, only publicly owned sites were included in the report.

The report identifies sewer capacity available through existing intermunicipal agreements (IMAs) and describes associated flow limits. It indicates that IMA's provide a total of 2.03 million gallons per day (mgd) in permitted capacity. Currently, the Town is using approximately .46 million gallons per day (mgd) of existing capacity and has 1.57 mgd additional capacity. The report identifies the potential for additional sewer capacity through connection to the Nashua, New Hampshire sewer system.

Based on the review of alternatives and technologies and the site selection analysis, the report identifies expansion of the existing sewer system for nine of the study areas and inclusion of development and implementation of Septage Management Plans (SMPs) for seven of the study areas. It notes potential secondary growth impacts related to this approach; however, it does not include a thorough assessment of this issue.

As required, the report provides a response to comments providing during review of the Phase I document report. It provides additional information on the only large (greater than 15,000 gallons per day) Title 5 system in the Town; summarizes results of the Inflow/Infiltration study (completed in October 2002), provides a revised estimate of wastewater flow rates for typical homes based on actual water use data and provides additional information on water conservation.

Scope for the Phase III: DEIR/Facilities Plan

The Phase II report contains a proposed scope for the Phase III DEIR/Facilities Plan. It will assess the costs, financing, environmental impacts (direct and secondary) and technical design criteria for wastewater systems. It will include a draft wastewater management plan, preliminary

plans and designs and identify appropriate measures to mitigate environmental impacts. It will assess the secondary impacts associated with sewer expansion and the coordination of the Town's Master Plan with the CWMP in more detail. In addition, it will respond to this Certificate and the comments provided on the Phase II document.

DEP and EPA have indicated that reconsideration of potential sites for wastewater facilities may be appropriate for two reasons: 1) some sites may have been overlooked or eliminated prematurely; and 2) available capacity appears to be lower than that identified in the IMA. Site screening for groundwater disposal is not normally limited to publicly owned sites as this analysis appears to be and, while protection of water supply should be and is an important consideration, DEP guidelines allow wastewater discharges in Zone II areas (although treatment standards are more protective) particularly in areas where the time of travel between the discharge and the well is more than two years. The DEIR should include additional, more detailed information regarding site selection and public water supply constraints.

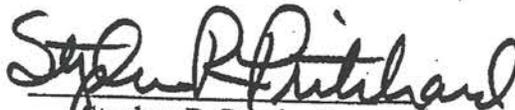
Comment letters provided by DEP and the Town of Dracut indicate that capacity provided through existing IMA's is lower than that identified in the Phase II report. The IMA between Tyngsborough and Dracut allows generation of 1.0 mgd of average daily flow and 2.1 mgd of maximum daily flow. The 1.6 mgd cited in the report refers to transmission capacity, not flow limits. Therefore, the Town has .97 mgd additional capacity, not 1.57 mgd. Both DEP and EPA have noted that it is unlikely that the Town can secure increases in permitted flow capacity because the City of Lowell is at or near the flow limitation in its NPDES permit. The DEIR should identify projected flows for the needs areas (both residential and commercial/industrial) to assess whether permitted capacity (1.43 mgd) is adequate to handle existing flows and projected growth. In addition, DEP has noted that the report should include Memorandums of Agreement (MOAs) or new/revised IMAs, as appropriate, to demonstrate the feasibility of the recommended plan.

Comments from EPA express concern that expansion of the sewer system may affect tributary stream flows and be inconsistent with the Massachusetts Water Policy. I note that the Scope of Work indicates that the maintenance of water balance within drainage sub-basins will be addressed.

The DEIR should include a copy of this Certificate, copies of the attached comment letters and should address the issues raised by each. The proponent should work with DEP to refine and finalize the Scope of Work for the Phase II document. The proponent should file the revised Scope of Work for the Phase II 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 II document.

July 28, 2006

Date


Stephen R. Pritchard

Comments received:

7/21/06 Department of Environmental Protection/Northeast Regional Office (DEP/NERO)
7/21/06 Division of Fisheries & Wildlife/Natural Heritage &
Endangered Species Program (DFW/NHESP)
7/17/06 United States Environmental Protection Agency (EPA)
7/26/09 Northern Middlesex Council of Governments
7/20/06 Town of Dracut

SRP/CDB/cdb



COMMONWEALTH OF MASSACHUSETTS
 EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 NORTHEAST REGIONAL OFFICE

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DB

MITT ROMNEY
 Governor

KERRY HEALEY
 Lieutenant Governor

STEPHEN R. PRITCHARD
 Secretary

ROBERT W. GOLLEDGE, Jr.
 Commissioner

RECEIVED

July 21, 2006

JUL 25 2006

Stephen R. Pritchard, Secretary
 Executive Office of
 100 Cambridge Street
 Boston MA, 02114

MEPA

RE: Tyngsborough
 CWRMP Phase II, Screening
 of Alternatives
 EOEA # 11788

Attn: MEPA Unit

Dear Secretary Pritchard:

The Department of Environmental Protection Northeast Regional Office has reviewed the report entitled: *Comprehensive Wastewater Management and Environmental Impact Report Phase II Screening of Alternatives*, submitted by the town of Tyngsborough to develop a municipal plan for improving on-site wastewater disposal systems (EOEA #11788).

The Department provides the following comments for consideration in the scope of the Comprehensive Wastewater Management/ Draft Environmental Impact Report (CWMP/DEIR) Phase III document. The focus of the Phase III CWMP/DEIR and Draft Facilities Plan will be evaluation of on-site disposal systems where conditions are favorable for their use. Where conditions are unfavorable, the report will assess a number of wastewater alternatives, including I/A systems, communal systems, and collection and conveyance facilities to the Lowell Regional Wastewater Utility (LRWWU) within the constraints of the inter-municipal agreements (IMA's).

General Comments

Currently, the town is in the midst of a four phase CWMP. The first phase developed a Needs and Growth Management report; the Phase II report is a screening of wastewater alternatives; Phase III will be a Draft EIR/Facilities Plan; and Phase IV will complete the process with a FEIR/Final Facilities Plan.

Flows

The Phase II alternatives screening has identified "regional" wastewater management solutions as the most favorable option for any new sewer extensions. The town of Tyngsboro has existing IMA's with Lowell, Chelmsford, and Dracut, which provide for conveyance and

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057. TDD Service 1-978-694-3492.

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treatment of additional wastewater flows to the LRWWU, where treated effluent is discharged to the Merrimack River.

The IMA with Lowell was increased on May 11, 2005 to allow an average daily flow of 80,000 gallons per day to Tyngsborough, and 350,000 gallons per day from Chelmsford. However, the IMA with Dracut needs to be clarified. The Phase II report indicates that Tyngsborough has been allotted a daily average of 1.6 million gallons per day (MGD) of flow, but this appears to be related to the 2025 *transmission* capacity, and not the (year 2000) allowed portion of the treatment capacity at the Lowell plant. MassDEP's understanding is that the town of Tyngsborough will be limited to a daily average flow of 1.0 MGD through connections to the Dracut system. The town should contact both the town of Dracut and the Lowell Regional Wastewater Utility to confirm the limitations in the IMA's. At this time, the city of Lowell is near or at the flow limitation in their NPDES permit, and they also are proceeding with an extensive combined sewer overflow (CSO) abatement plan that will have a long implementation period. Because the city must make substantial progress in abating CSO discharges before the treatment plant can handle more flow, it is extremely unlikely that there will be an increase in permitted flow capacity.

Currently, the total wastewater flow from the town is approximately 0.46 million gallons per day (MGD). If the Dracut IMA is limited to 1.0 MGD of flow, the town's total daily average wastewater flow allowance in the three IMA's would be 1.43 MGD. In addition, there might be an opportunity to connect to the Nashua, New Hampshire sewer system, if the facility in Nashua has capacity, and an IMA can be executed.

The Phase III report must develop projected flows for the needs areas (both residential and commercial/industrial). Without these projections, it is unclear whether the current allocation of flow under the IMAs, (as understood by the Department), is adequate to handle all the needs areas. This next report also must include appropriate Memorandums of Agreement (MOAs) or new/revised IMAs to demonstrate that any regional alternatives are feasible.

Alternatives

The Phase II Alternatives Screening included a lengthy description of on-site wastewater management technologies and technologies for larger groundwater discharge facilities. For the larger systems, the following four technologies were determined to be most favorable:

- Anaerobic/Anoxic Systems;
- Constructed Wetlands;
- Rotating Biological Contactors (RBC); and
- Sequencing Batch Reactors (SBR)

According to the Phase II report, the suitability of ten sites was assessed for siting a groundwater discharge facility. There is very limited information to explain how the sites were selected, and whether these ten sites were a subset of a larger pool of sites. A number of the candidate sites have severe issues with water supply impacts, conservation restrictions, or other environmental and institutional issues, which make them unfavorable. In the end, the town has concluded that none of these ten sites are feasible for constructing a groundwater discharge

facility. As a result, the town is proposing to use the allotted sewer capacity in its IMAs. Should the present IMA flow allotments be insufficient to accommodate the future sewerage needs in the community, the town will need to revisit the site screening and undertake a more rigorous analysis of potential sites for a community wastewater treatment plant (WWTP) with groundwater discharges.

The site screening only considered publicly owned sites. Screening also eliminated sites because they are in water supply recharge areas, and some of these areas have not clearly been shown to be within the Zone II of public water supplies. Typically, a site screening process for groundwater disposal sites does not consider only town-owned sites, particularly when many are conservation parcels. Moreover, the Department's reuse guidelines incorporate protective requirements for stricter treatment standards in order to allow wastewater discharges in Zone II areas, particularly in areas where the time of travel between the wastewater discharge and the well is more than two years. The town may want to reconsider potential sites for wastewater treatment, which are located within Zone II areas, especially if they have been eliminated only because the area provides recharge to the well.

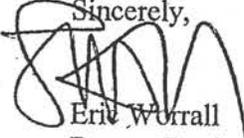
In view of the fact that the IMA with Dracut is likely to be more limiting than presented in the report, and that some sites may have been eliminated prematurely, the Department recommends that reconsideration be given to potential sites for in-town treatment and groundwater disposal to accommodate the flows from all the needs areas, where necessary, including future projections for planned commercial and industrial flow. MassDEP also recommends that Norris Road and Coburn Road areas, or other "medium" needs areas that need off-site solutions be included for reconsideration (see comment in the Specific Comments section below).

Specific Comments

- General The "Interim Basin Plan" is mentioned in numerous places in the IMA's. Relevant portions of the plan, or the entire document should be included in the Phase III report as an appendix, or it should be submitted to MassDEP.
- Norris Rd.
Coburn Rd. The report recommends off-site solutions for wastewater management, even though there is low incidence of on-site system failure, due to concerns about potential impacts within the interim wellhead protect areas (IWPA's). Unless there are issues with development in Zone I area, or documentation that nitrogen or other contaminants of concern are impacting the aquifer, on-site systems should remain in consideration for meeting long-term wastewater needs in this area.
- Water Use The calculated water use per household (320gpd) is high, and should not be used as a figure for projecting wastewater generation without considering whether this includes a large amount for summer outdoor watering or non-residential use and how much additional water conservation can bring down the number. A revised analysis of residential per capita wastewater generation should be done.

- I/I work The infiltration and inflow (I/I) report recommends, "sewer system rehabilitation and an ongoing operation and maintenance program to identify and correct sources of I/I." There is no indication that these measures have been put in place, however. This issue should be discussed thoroughly in the Phase III report.
- Page 1-3 The town should make every effort to coordinate the development of the Comprehensive Wastewater Management Plan with the town's Master Plan for growth. Relevant sections of the town's Master Plan should be referenced or included in the Appendix to the Phase III Report.
- Page 2-1 Based on the Phase I and Phase II reports, it appears that a substantial area of the town will remain served by on-site wastewater systems. The Phase III report should include an assessment of any additional management requirements for the town to effectively oversee the Title 5 and innovative/alternative (I/A) programs for these systems.
- Page 2-4 The IMA with Dracut, (and between Dracut and Lowell), includes design year flows for 2000 and 2025. As noted above, it is DEP's understanding that the year 2000 flow limitation, which is based on the capacity of the Lowell WWTP, is the relevant limit. This discrepancy should be corrected in the Phase III report.

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,

Eric Worrall
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission
 Kevin Brander, Nihar Mohanty MassDEP-NERO
 Ron Lyberger, MassDEP-Boston



MassWildlife

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

DB

July 21, 2006

RECEIVED

Wayne F. MacCallum, Director

Stephen R. Pritchard, Secretary
Executive Office of Environmental Affairs
Attention: MEPA Office
Deirdre Buckley, EOE # 11788
100 Cambridge St.
Boston, Massachusetts 02114

JUL 25 2006

MEPA

Project Name: Comprehensive Wastewater Management Plan and Environmental Impact Report Phase II—Screening of Alternatives
Proponent: Town of Tyngsborough
Location: Tyngsborough
Document Reviewed: Comprehensive Wastewater Management Plan/Environmental Impact Report—Phase II
EOEA #: 11788

Dear Secretary Pritchard:

The Natural Heritage & Endangered Species Program (NHESP) of the MA Division of Fisheries & Wildlife has reviewed the Comprehensive Wastewater Management Plan/Environmental Impact Report (CWMP/EIR) for Tyngsborough, and would like to offer the following comments regarding state-listed rare species and their habitats.

As noted in the CWMP-Phase II Report, several of the sites proposed for wastewater facilities or disposal are currently located within NHESP designated *Priority Habitats* or *Estimated Habitats* of Rare Wildlife. As noted in Figure 3-1 "Alternative Evaluation Sites" included with the filing, these sites are: Site 2, Frost Road, 20-93-0; Site 3, River Road, 19-35-0; Site 4, River Road, 19-50-0; Site 5, River Road, 19-51-0; and Site 9, 170 Frost Road, 18-7-0. These areas are described as "sensitive habitats" and it is presumed there is a "Severe Constraint" to development at these sites, as described on Page 3-8 of the Tyngsborough, Massachusetts CWMP-Phase II Report. The NHESP appreciates the consideration of such constraints during the site evaluation stage of this process. However, it is unclear why Table 3-3 (page 3-18) lists Sites 2 and 9 as having only "Moderate" or "Minimal" constraints regarding Sensitive Habitats, as they both appear to fall within *Priority Habitat* and *Estimated Habitat*. The Preliminary Site Identification section (Section B pages 3-11 through 3-15) also does not include notations that the sites listed above are within *Priority Habitats* of Rare Wildlife, or that sites 2 and 9 are within the NHESP 2005 *Estimated Habitats*.

The sites listed above are all along the Merrimack River which provides important wildlife habitat for a number of state-listed species including several dragonfly species listed as "Endangered", "Threatened",

Division of Fisheries and Wildlife

Field Headquarters, North Drive, Westborough, MA 01581 (508) 792-7270 Fax (508) 792-7275

An Agency of the Department of Fish and Game

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or "Special Concern" pursuant to the provisions of the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). The dragonfly species found in the Merrimack River inhabit rivers and riparian areas and as adults forage in the adjacent uplands. These species spend the majority of their lives as aquatic nymphs preying upon a variety of aquatic life within the river itself. In this aquatic stage, they are very sensitive to poor water quality and their populations can be impacted by pollution, changes in nutrient levels, erosion and siltation, and changes in water temperature and flow regimes. When ready to emerge, the nymphs crawl out onto exposed rocks, emergent vegetation, partially submerged logs, bridges, or the steeper sections of river banks, where they undergo transformation into adults. These adults then seek refuge in the vegetation of adjacent uplands where they feed and continue to mature before returning to their breeding habitat. Some of the dragonfly species found in the Merrimack River have been found only in the Merrimack and Connecticut Rivers, and nowhere else in Massachusetts.

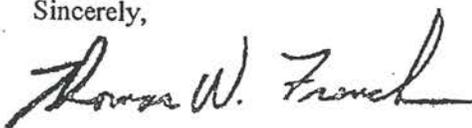
Additionally, it should be noted that the NHESP is currently re-evaluating the delineation of *Priority Habitat* in order to update the *Priority Habitat* map pursuant to the revised Massachusetts Endangered Species Act (MESA) regulations, effective July 1, 2005 (321 CMR 10.12(7)). The updated Edition of the *MA Natural Heritage Atlas* is expected to be available by the end of the summer or early autumn of 2006. A working draft of the new *Priority Habitat* maps indicates that Site 7, Route 3, 12-7-0 will also fall within *Priority Habitat* and will therefore be presumed to have "Severe Constraints" to development. This site will be mapped as a part of the habitat for the Blanding's Turtle (*Emydoidea blandingii*) which is state-listed as a "Threatened" species pursuant to the provisions of the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00).

Projects occurring within *Priority Habitat* require review through a direct filing with NHESP for compliance with the MESA (321 CMR 10.18). 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). Filing requirements are described in 321 CMR 10.20. For additional information about the MESA filing process, please see our website, www.nhesp.org (Regulatory Review tab).

Once the NHESP receives a MESA filing for a project or activity, the NHESP will determine whether or not the proposed project will result in the "take" of state-listed rare species. If the project is determined to result in a "take," then it may be possible to redesign the project to avoid a "take." If such revisions are not possible, the applicant should note that projects resulting in the "take" may only be permitted if they meet the performance standards for a "Conservation and Management Permit" under MESA (321.CMR 10.04(3)(b)).

We appreciate the opportunity to comment on this project. If you have any questions about this letter, please contact Sarah Haggerty at (508) 792-7270 ext. 306, (sarah.haggerty@state.ma.us).

Sincerely,



Thomas W. French, Ph.D.
Assistant Director

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

Buckley, Deirdre (ENV)

From: pincumbe.david@epamail.epa.gov
Sent: Monday, July 17, 2006 4:28 PM
To: Buckley, Deirdre (ENV)
Subject: EOE # 11788

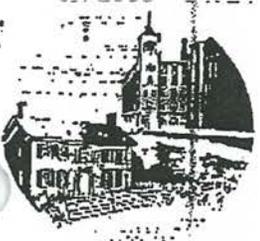
I have reviewed the Tyngsborough CWMP/EIR Phase II report and have the following concerns:

1. The report has not adequately addressed the impacts of sewerage on tributary stream flows necessary to support fishery communities consistent with the MA Water Quality Standards and the federal Clean Water Act. The cumulative impact of water withdrawals and stormwater diversions from impervious areas needs to be considered in conjunction with the impacts of sewerage. An inflow/outflow analysis of the subwatersheds within Tyngsborough may conclude that these are flow stressed watersheds. Contrary to the claim in the report, the MA Water Policy is intended to protect stream flows in the subwatersheds as well as the watershed as a whole.
2. The impact of additional sewerage on currently active combined sewer overflows should be evaluated.
3. Lowell currently exceeds its permitted flow volume. Ongoing I/I work and combined sewer overflow work may or may not result in compliance with the permitted flow limit. The preferred alternative needs to be evaluated relative to consistency with Lowell's permit requirements.
4. Any flow increase request for the Lowell discharge would be subject to an antidegradation review of alternatives to lowering water quality. An evaluation of decentralized options would be a component of any antidegradation alternatives review.
5. Only municipal owned properties were evaluated for wastewater treatment and disposal. The evaluation should consider all potential sites.

In summary, a true alternatives analysis, not just a cost effective analysis, needs to be completed. The preferred alternative must be able to demonstrate consistency with state and federal fishery requirements as well as the MA Water Policy.

Please contact me at (617) 918-1695 if you have any questions.

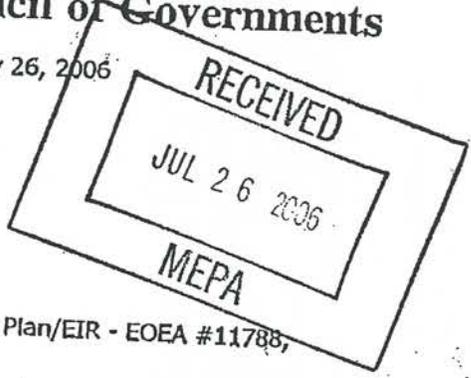
06



NMCOG

Northern Middlesex Council of Governments

July 26, 2006



Stephen R. Pritchard, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

ATTN: Deirdre Buckley, MEPA Unit

RE: Tyngsborough Comprehensive Wastewater Management Plan/EIR - EOE #11788, NMCOG #512

Dear Secretary Pritchard:

The staff of the Northern Middlesex Council of Governments has reviewed the *Comprehensive Wastewater Management Plan and Environmental Impact Report Phase II - Screening of Alternatives* for the Town of Tyngsborough. The Town submitted an ENF to MEPA in the Fall of 1998. The Secretary determined that the project required the preparation of an EIR and established a Special Procedure for the preparation and review of the EIR document. The Special Procedure entails a phased review comprised of four phases. Phase I- Needs and Growth Management, was submitted and approved by MEPA in 2003.

The Phase II document, now under review, serves as the Comprehensive Wastewater Management Plan and EIR, and evaluates available options for improving existing on-site wastewater disposal systems, re-evaluates the identified Need Areas from the Phase I report, screens alternatives, and responds to comments on the Phase I document. In addition, the Phase II document evaluates the viability of siting wastewater treatment facilities in Tyngsborough. As discussed within the Phase II report, all of the potential sites identified within town present constraints for wastewater use due to current land use, environmental conditions, soils, groundwater or other factors.

The Phase II document appears to sufficiently address the issues outlined in the Phase II Scope. Therefore, NMCOG staff does not foresee the need for further review of the Phase II CWMP/EIR under the MEPA process. Should you have any questions relative to the NMCOG staff comments please contact either myself or Beverly Woods.

Very truly yours,

Beverly Woods
Robert W. Flynn
Executive Director

- Cc: Tyngsborough
 - Town Administrator
 - Planning Board
 - Board of Health
 - Sewer Commission
 - Board of Selectmen
 - Conservation Commission
 - NMCOG Councillors
 - Economic Development Committee

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Town of Dracut

TOWN HALL
62 ARLINGTON STREET
DRACUT, MASSACHUSETTS 01826

Office of the Town Manager
(978) 452-1227
Fax: (978) 452-7924
Email: townmanager@dracut-ma.us

Dennis E. Piendak
Town Manager

20 July 2006

RECEIVED

JUL 24 2006

MEPA

Mr. Stephen R. Pritchard, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Attention: MEPA Unit
Boston MA 02114

RE: Comprehensive Wastewater Management Plan and Environmental Impact Report
Phase II Screening of Alternatives, Tyngsborough, Massachusetts
EOEA #11788

Dear Secretary Pritchard,

The Town of Dracut is providing comment on the above referenced Phase II report to provide a correction and clarification regarding the Inter-Municipal Agreement (IMA) between the Towns of Dracut and Tyngsborough for wastewater transmission and treatment.

For the purposes of allotting capacity to the Town of Tyngsborough, and consistent with the IMA between the Town of Dracut and the City of Lowell, the July 1977 IMA between Tyngsborough and Dracut drew a distinction between treatment facilities and transmission facilities. As correctly discussed in the above referenced Phase II report, the Town of Tyngsborough is allocated a total of 1.60 million gallons per day (mgd) of capacity in the Dracut and Lowell sewer systems for the transmission of sewage. However, the IMA limits Tyngsborough's capacity at the Lowell treatment facilities to 1.0 mgd on an average day and 2.1 mgd on a maximum day. Therefore, regardless of the transmission capacity included in the IMA, the total wastewater treatment capacity allotted to the Town of Tyngsborough is limited to an average flow of 1.0 mgd, and not 1.6 mgd as intimated in the Phase II report.

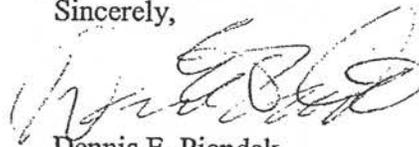
For your additional information, as part of our own long-term wastewater management planning efforts, the Town of Dracut had approached the City of Lowell to determine if additional treatment capacity could be purchased. Unfortunately, the City does not have any additional capacity to offer. The Town of Dracut's sewer needs projections anticipate requiring all of the net treatment capacity available to Dracut (Dracut's net average treatment capacity is 2.6 mgd, representing a gross average treatment capacity of

Page Two
RE: Comprehensive Wastewater Management Plan
20 July 2006

3.6 mgd less the 1.0 mgd allocated to Tyngsborough). Therefore, Dracut does not have any additional treatment capacity to offer Tyngsborough beyond the 1.0 mgd average capacity allocated to them in the July 1977 IMA.

We hope that these comments have been helpful in your review of the Tyngsborough Phase II report.

Sincerely,



Dennis E. Piendak
Town Manager

Cc Rosemary Cashman, Town Administrator

APPENDIX B

**Phase II CWMP/EIR MEPA Certificate
Response to Comments**

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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

1. Reconsideration of potential sites for wastewater facilities and consideration of private property and water supply constraints

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

2. Identification of current Intermunicipal Agreement flow capacities and projected flows for the Needs Areas.
3. Addressing expansion of the sewer system and maintenance of water balance within the Merrimack River subbasin.

Below is a list of letters received by the MEPA Office during the public comment period for the Phase II "Screening of Alternatives" Report:

1. Department of Environmental Protection – Northeast Regional Office
2. Division of Fisheries & Wildlife/Natural Heritage & Endangered Species Program
3. United States Environmental Protection Agency
4. The Northern Middlesex Council of Governments.
5. Town of Dracut

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 comments and responses for the July 21, 2006 letter from Eric Worrall, Deputy Regional Director, Department of Environmental Protection:
 - a. *The site screening only included public sites and screening eliminated some sites because they are in a water supply recharge area.*

As noted in the Phase II report, none of the sites evaluated for wastewater disposal were determined to be feasible and were all eliminated from further consideration. The Town has proposed a Regional Solution, utilizing its existing Intermunicipal Agreement capacities, for wastewater disposal and treatment. Although some sites had soils that appeared conducive to groundwater disposal, their location within the areas for public water supply for both Tyngsborough and Dracut, and the quantity of wastewater that would potentially require treatment and groundwater disposal would have a greater potential environmental impact than the regional solution of utilizing the Intermunicipal Agreement capacities.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

With regard to private property site evaluation, Appendix G includes an analysis of private property areas for treatment and groundwater disposal.

b. Inclusion of the Interim Basin Plan in the Phase III Report

The Town does not have a copy of the Interim Basin Plan that is referenced in the Dracut Intermunicipal Agreement Section 6.5.

c. Reconsideration for Norris Road and Coburn Road Needs Areas for on-site systems for long term wastewater needs

The Phase III Report included evaluation of gravity sewer systems and innovative/alternative systems for the Norris Road and Coburn Road Needs Areas. Since the Town has limited capacity in its Intermunicipal Agreements, and that its overall wastewater management plan will include control of expansion of the sewer system based on available capacity, these areas have been reevaluated and determined to be areas where on-site solutions are utilized and included in the Town's overall Septage Management Plan.

d. Revised analysis of wastewater flow projections based on per capita wastewater generation

Chapter 2 includes the revised projection of wastewater flows for the Needs Areas based on current per capita water usage.

e. Implementation of infiltration/ inflow measures

The Town submitted a Project Evaluation Form for infiltration/inflow investigations in October 2007. The project was approved by DEP and included in the Intended Use Plan. The Town has included an article for this work in its May Town Meeting. Infiltration/inflow is also discussed in Chapter 2 and of the Phase III Report. A copy

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

of the Scope of Work for the infiltration/inflow investigation is included in Appendix D.

f. Coordination of the Wastewater Management Plan with the Master Plan

The Town's Master Plan was reviewed during the preparation of the Phase III Report and the projected wastewater flows are consistent with anticipated growth projections in the Master Plan. Excerpts from the Master Plan are included in Appendix F.

g. Septage Management Plan for Title 5 and /innovative/Alternative Systems

Chapter 4 includes a discussion of the Septage Management Plan for the Town.

h. Relevant flow limit for the Dracut IMA (Year 2000 vs. Year 2025)

The flow limit of 1.0 mgd average daily flow for the Dracut Intermunicipal Agreement has been used in the Phase III Report for the 20 year planning period.

2. The following summarizes the comments and responses for the July 21, 2006 letter from Thomas French, Assistant Director, Commonwealth of Massachusetts Division of Fisheries & Wildlife:

a. As noted in the Phase II Report, several of the sites proposed for wastewater or disposal are currently located within Natural Heritage & Endangered Species Program (NHESP) priority Habitats or Estimated Habitats of Rare Wildlife, including sites 2, 3, 4, 5 and 9. Projects occurring in a Priority Habitat require review through a filing with NHESP for compliance with MESA (321 CMR 10.18)

As noted in the Phase II report, none of the sites evaluated for wastewater disposal were determined to be feasible and were all eliminated from further consideration. The Town has proposed a Regional Solution, utilizing its existing Intermunicipal Agreement capacities, for wastewater disposal and treatment. The proposed work

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

associated with construction of gravity sewers, force mains and pump stations within the 100 foot buffer zone and/or 200 foot Riverfront Area will be filed 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 issues and to determine levels of impact. Section 4 includes an evaluation of the environmental impacts of the proposed sanitary sewer system.

3. The following summarizes the comments and responses for the July 17, 2006 electronic mail from David Pincumbe, Environmental Protection Agency:

a. The report has not adequately addressed the impacts of sewerage on tributary stream flows necessary to support fishery communities consistent with the MA Water Quality Standards and the Clean Water Act. An inflow/outflow analysis of the subwatersheds within Tyngsborough may conclude that these areas are stressed watersheds.

Appendix C includes the water balance analysis.

b. The impact on additional sewerage on currently active combined sewer overflows should be addressed.

It is understood that the City of Lowell is developing a Long Term Control Plan for its Combined Sewer System. The allowances for wastewater flows in the Phase III Report are based on the current capacity of the Intermunicipal Agreements. As the sewer system is expanded, the Town will continue to monitor and regulate its flow contributions to the IMA's such that its allotted flow capacities are not exceeded.

c. Lowell frequently exceeds its permitted flow volume. The preferred alternative needs to be evaluated relative to consistency with Lowell's permit requirements.

See Response to Comment 3b.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

- d. Any flow increase request for the Lowell discharge would be subject to antidegradation review of alternatives.*

Similar to the response above, the Phase III CWMP does not project an increase in the Intermunicipal Agreement capacities.

- e. Only municipal owned properties were evaluated for wastewater treatment and disposal. The evaluation should include all potential sites.*

See Response to Comment 1a. above.

4. The following summarizes the comments and responses for the July 26, 2006 letter from Robert W. Flynn Executive Director for the Northern Middlesex Council of Governments:

- a. The Phase II document appears to sufficiently address the issues outlined in the Phase II Scope.*

The comment is acknowledged.

5. The following summarizes the comments and responses for the July 20, 2006 letter from Dennis E. Piendak, Town Manager, Town of Dracut:

- a. The total wastewater treatment capacity allotted to the Town of Tyngsborough is limited to an average flow of 1.0 mgd, and not 1.6 mgd as intimated in the Phase II Report.*

The Phase III CWMP has utilized the 1.0 mgd average daily flow capacity as noted in this comment.

APPENDIX C
Water Balance

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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

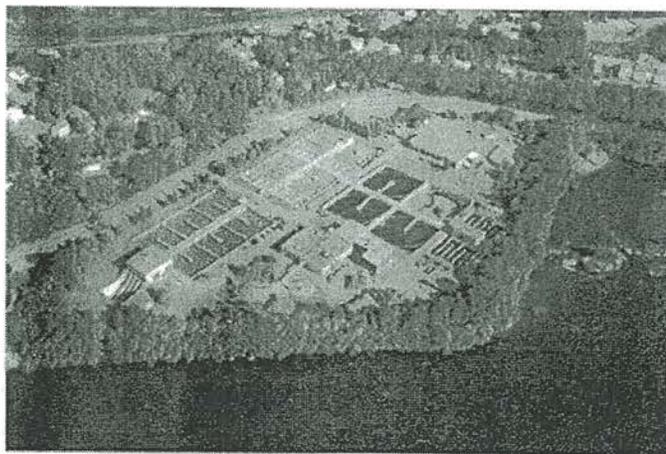
TYNGSBOROUGH, MASSACHUSETTS CWMP/DEIR - PHASE III REPORT

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.

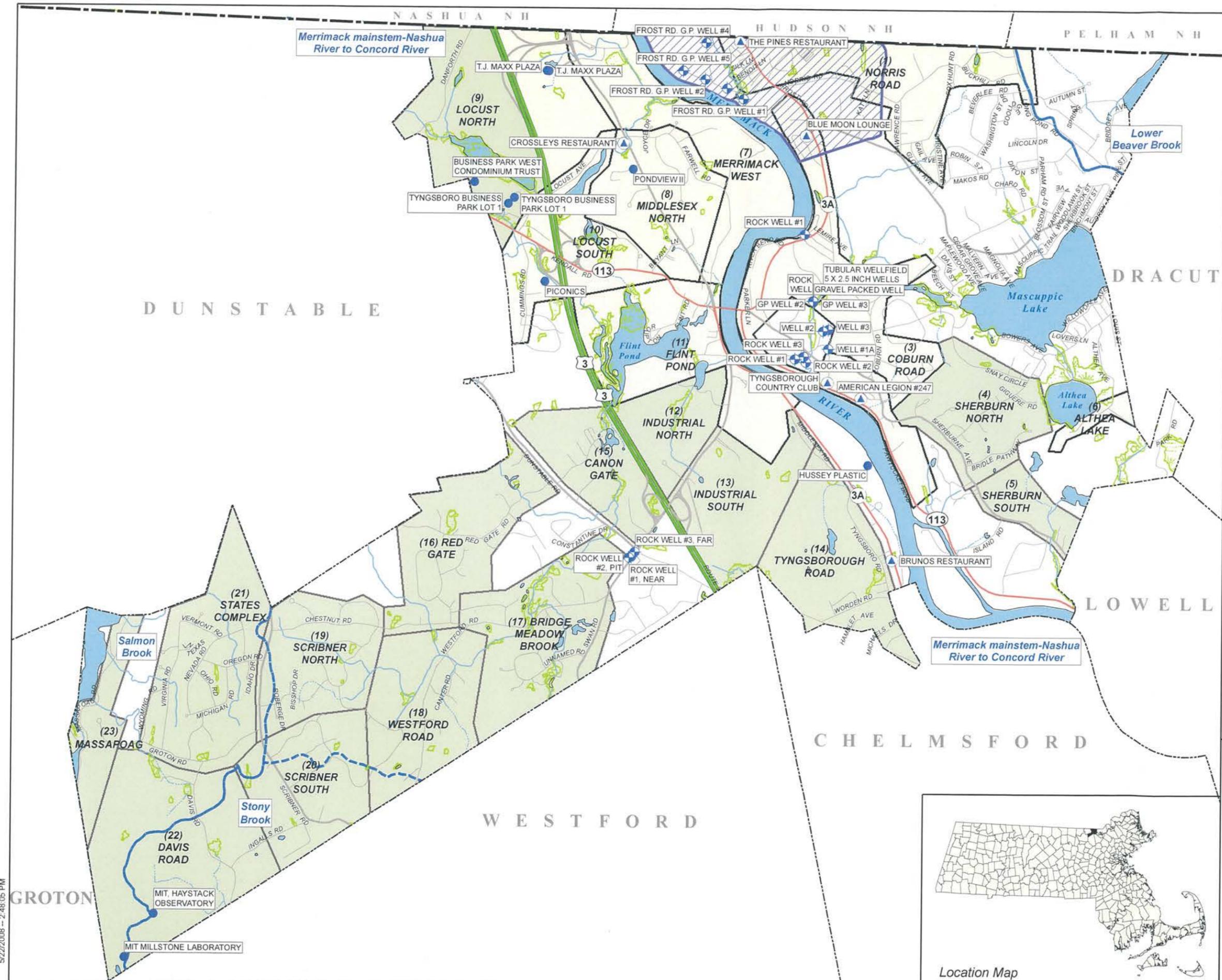
It is these principles that form the foundation of the Commonwealth of Massachusetts Watershed Initiative, which support the “watershed approach” to environmental planning and decision making in order to guarantee the citizens and inhabitants of the Commonwealth sufficient quantity and quality of water 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



- Public Water Supply Well**
- Community Groundwater Well
 - Non-Transient Non-community
 - Transient Non-Community
- Approved Wellhead Protection Area (Zone II)**
- 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 III CWMP/DEIR
 Town of Tyngsborough



**TYNGSBOROUGH, MASSACHUSETTS
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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:

$$\text{Water Balance} = (-) \text{ Amount withdrawn } (+) \text{ Amount distributed } (-) \text{ Amount collected}$$

The groundwater recharge is calculated by the following formula:

$$\text{Groundwater Recharge} = (+) \text{ Amount distributed } (-) \text{ Amount collected}$$

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 were 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.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP/DEIR - PHASE III REPORT**

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

SOURCE ID	Water Purchase, gallons	Well Name	Site Name	TOWN
Municipal 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				
Municipal 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 Well No. 2	400 Dunstable Road	Tyngsborough
3301033	893,660		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 Tyngsborough Water District

**TYNGSBOROUGH, MASSACHUSETTS
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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.

**TYNGSBOROUGH, MASSACHUSETTS
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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 sewerage 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

**TYNGSBOROUGH, MASSACHUSETTS
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LRWWU will provide higher quality water back to the Merrimack River compared to on site systems.

**TABLE C-2
TOWN OF TYNGSBOROUGH
CWMP/EIR
WATER BALANCE IMPACTS (2006)**

Basin (Sub Basin)	(-) Amount Withdrawn (Mgal/yr)	(+) Amount Distributed (Mgal/yr)	(-) Amount Collected (Mgal/yr)	Water Balance Impact (Mgal/yr)	Groundwater Recharge (Mgal/yr)
Merrimack River	513.73	89.58	80.62	-504.77	8.96
Merrimack (Lower Beaver Brook)	0.00	5.03	4.53	0.50	0.50
Merrimack (Stony Brook)	0.43	5.03	4.53	0.07	0.50
Merrimack (Salmon Brook)	0.10	15.10	13.59	1.41	1.51
Total	514.26	114.74	103.27	-502.79	11.47

Note: Evaluation only includes that portion of each subbasin located within the Town of Tyngsborough.

**TABLE C-3
TOWN OF TYNGSBOROUGH
CWMP/EIR
WATER BALANCE IMPACTS-BUILD-OUT**

Basin (Sub Basin)	(-) Amount Withdrawn (Mgal/yr)	(+) Amount Distributed (Mgal/yr)	(-) Amount Collected (Mgal/yr)	Water Balance Impact (Mgal/yr)	Groundwater Recharge (Mgal/yr)
Merrimack River	773.41	418.17	376.35	-731.60	41.82
Merrimack (Lower Beaver Brook)	0.00	26.28	23.65	2.63	2.63
Merrimack (Stony Brook)	0.43	26.28	23.65	2.20	2.63
Merrimack (Salmon Brook)	0.17	105.12	70.96	33.99	34.16
Total	774.02	575.85	494.61	-692.78	81.24

Note: Evaluation only includes that portion of each subbasin located within the Town of Tyngsborough.

APPENDIX D

Infiltration/Inflow Investigation Scope of Work

INFLOW AND SEWER SYSTEM EVALUATION SURVEY

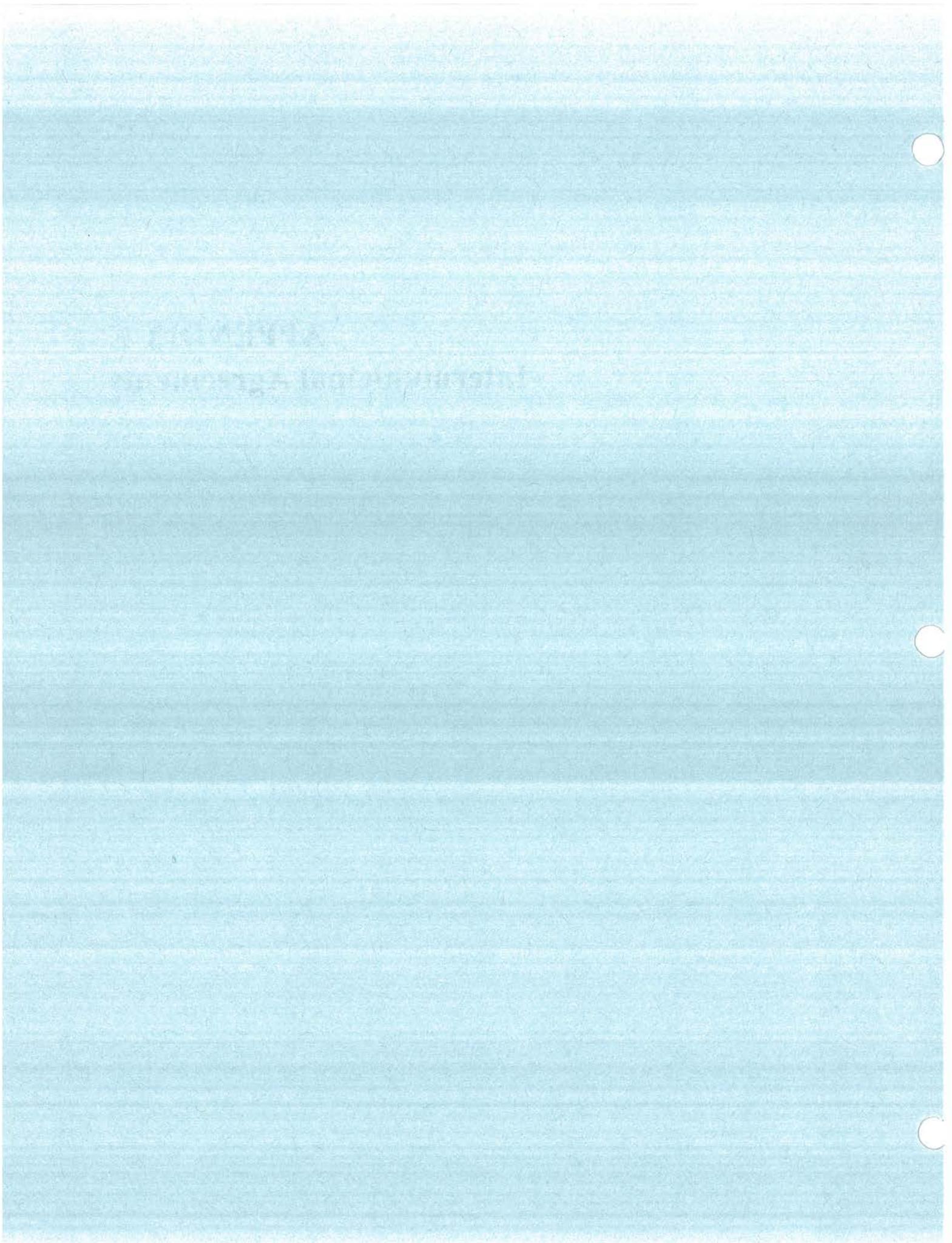
DRAFT SCOPE OF WORK

The Town of Tyngsborough will perform an Infiltration/Inflow (I/I) Analysis of the sanitary sewer collection system in two general areas; 1) Long Pond Area; and 2) Mascuppic Lake Area 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 (DEP).

1. General - The scope of work to locate sources of Infiltration/Inflow consists of the following tasks:
 - 1.1. Flow and Rainfall Metering/Monitoring
 - 1.2. Smoke Testing
 - 1.3. Cleaning and Television Inspection
2. Flow and Rainfall Metering
 - 2.1 Continuous flow meters and rainfall gauge will be installed during high groundwater conditions and periods of wet weather to collect flow data in to determine infiltration and inflow contribution to the collection system from tributary sewer catchments.
3. Smoke Testing
 - 3.1. Smoke testing will be performed to locate possible interconnections between the drain and sewer piping and possible sources of inflow on private property. This work will be performed during low groundwater conditions.
 - 3.2 The smoke testing procedure will consist of placing a smoke blower on open sewer manholes, lighting a smoke generating candle and forcing smoke through the drainage system and out through potential sources of Infiltration/Inflow.
 - 3.3 Approximately 24 hours (weekends excluded) beforehand, a notice will be circulated in the area to be smoke tested to advise residents of imminent testing.
 - 3.4 Prior to smoke testing, a meeting will be held with Fire Department, Police Department and other interested parties and Town personnel to review the purpose and nature of smoke testing.
4. Cleaning and Television Inspection
 - 4.1 In sewer line segments where extraneous flow has been isolated, cleaning and television inspection will be performed to pinpoint sources of infiltration and inflow within the segment. Where leaking sources are found, estimates of leakage rate will be performed. Television inspection will be the closed circuit, pan and tilt type. The camera used will either be self propelled or pulled through the pipe segment using a winch and pulley system.

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;

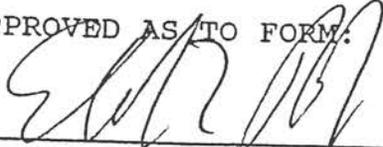
20,000 Gallons on July 1, 2002; and

20,000 Gallons on July 1, 2005.

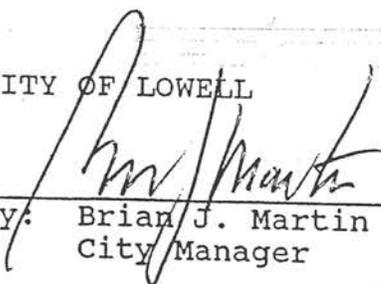
IN WITNESS WHEREOF, the City and the Town have caused their proper representatives to execute this Amendment.

Dated: 5/14/00

APPROVED AS TO FORM:


Asst. City Solicitor

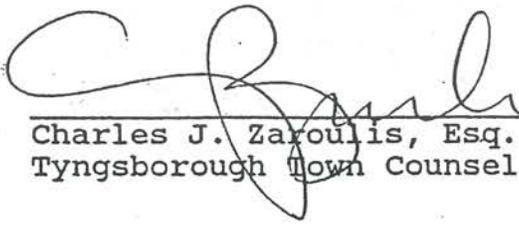
CITY OF LOWELL


By: Brian J. Martin
City Manager

APPROVED AS TO FORM:

TOWN OF TYNGSBOROUGH

5-9-00



 Charles J. Zaroulis, Esq.
 Tyngsborough Town Counsel

BY:

 CHAIR


 Its Sewer Commission

COPY

LOWELL-TYNGSBOROUGH AGREEMENT

ARTICLE I	DEFINITIONS
ARTICLE II	OBLIGATIONS AND RESPONSIBILITIES.....
ARTICLE III	AGREEMENT TERM.....
ARTICLE IV	IMPLEMENTATION.....
ARTICLE V	USER CHARGES & INDUSTRIAL COST RECOVERY..
ARTICLE VI	CAPITAL COST APPORTIONMENT.....
ARTICLE VII	OPERATION COST APPORTIONMENT.....
ARTICLE VIII	ANNUAL COST REVIEW.....
ARTICLE IX	ADJUSTMENT CLAUSE.....
ARTICLE X	TERMINATION CLAUSE.....
ARTICLE XI	WASTEWATER ANALYSIS.....
ARTICLE XII	FLOW MEASUREMENTS.....
ARTICLE XIII	RE-OPENER CLAUSE.....
ARTICLE XIV	INDUSTRIAL SEWER USE ADDENDUM.....

AGREEMENT

THIS AGREEMENT, made and entered into this ____ day of ____, 19__
nd 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 ^{TWENTY} ~~ten~~ thousand ~~five~~
~~hundred~~ ^{20,000} (10,500) 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" (BOD₅) 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.

1.1.3 "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/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.

- 1.1.5 "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 convey 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°C (104° 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 (BOD₅, 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 filed 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):

$$\text{TOWN Payment} = C2 \frac{d}{e}$$

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

BOD₅ 41.7 lbs/day

TSS 41.7 lbs/day

7.4 The individual areas discharging directly into the sewer system, as described in paragraph 7.3, shall be assessed fees on the same basis as the users of the CITY. This amount shall then be assessed 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, BOD₅ and TSS, for each of the participants shall be determined from proportional, composite 24-hour samples obtained at the metering stations. The Average daily BOD₅ 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 BOD₅ and TSS used shall be based on the previous year's treatment facility operational costs divided by the total annual BOD₅ or TSS loading. 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:

$$\text{Lbs BOD}_5 \text{ or TSS} = \text{Total Flow (MG) for month} \times (\text{Actual BOD}_5 \text{ or TSS} - 250 \text{ mg/l}) \times 8.34 \text{ lbs/gal}$$

$$\text{Surcharge amount \$} = \text{Lbs BOD}_5 \text{ or TSS} \times \text{price per lb BOD}_5 \text{ or TSS}$$

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 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 BOD₅ 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, 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 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 XIV INDUSTRIAL SEWER USE ADDENDUM

This Agreement is entered into this ____ day of _____, 19__, between the City 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

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Lowell and Tyngsborough

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.

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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.

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Lowell and Tyngsborough

- 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 Benjamin Martin

Approved as to form:

By Albert J. [Signature] ASSOC. CITY S. LIC. 822

FOR THE TOWN OF TYNGSBORO, MASSACHUSETTS

By Its Sewer Commissioners

David M. White

George M. [Signature]

Ronald A. [Signature]

Approved as to form:

By [Signature]

Town Counsel

CHELMSFORD - TYNGSBOROUGH AGREEMENT

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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 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 "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 extent 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 Centigrade, (32 and 150 degrees Fahrenheit).

3.2.2 Any gasoline, benzene, naphtha, 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 Centigrade (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

$$\text{TYNGSBOROUGH payment} = C_2 d/e$$

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

$$\text{TYNGSBOROUGH Payment} = C_3 a/f$$

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

$$\text{TYNGSBOROUGH Payment} = C_4 d/g + C_5 d/h$$

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

$$\text{TYNGSBOROUGH Payment} = C_6 d/i$$

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	<u>740 lbs/day</u>
	SS	<u>800 lbs/day</u>

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 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 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

Ronald V. Coombs
David M. White
Ronald A. Verrill

Approved as to Form

[Signature]
Town Counsel

FOR THE TOWN OF CHELMSFORD, MASSACHUSETTS

By Its Sewer Commissioners

[Signature]
Robert P. Joyce

Approved as to Form

James M. Harrington
Town Counsel

(C-1000)

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DRACUT-TYNGSBOROUGH AGREEMENT

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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 Pollution
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 agree-
ments 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 Tyngs-
borough'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

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.

2.1.1 Sewer 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 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, naphtha, 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 constitute a hazard to humans or animals 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 materials 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 collected 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 initial payment, equal to twenty (20) percent of the estimated Total Cost of the contract, shall be made within sixty (60) days after notification by the City and Dracut that the contract has been awarded and the government 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 capital 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:

$$\text{Tyngsborough Payment} = C_T \frac{a}{b}$$

Where:

C_T = 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):

$$\text{Tyngsborough Payment} = C_2 \frac{d}{e}$$

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	
	<u>Average Daily Flow</u>	<u>Peak Flow</u>
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, wherein 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 under Paragraph 6.5 of this ARTICLE. If the City's treatment facilities 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 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.

wastes, for the purpose of checking waste parameters, shall be the responsibility of Dracut or its authorized agent. Tyngsborough shall be furnished copies of all such determinations.

11.1.2 Samples shall be collected by Dracut at Metering Stations within Dracut in such a manner so as to be representative of the actual quality of the wastes. Tyngsborough shall have access to said Stations, as required, to conduct intermittent or continuous waste sampling.

11.1.3 Portions of waste samples collected by Dracut, as part of a sampling and analytical program, will be made available to Tyngsborough at no cost and 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 XII FLOW MEASUREMENTS

12.1 Dracut and Tyngsborough agree that flow measurements shall be made as follows:

12.1.1 The volume of flow used in computing Tyngsborough's share of the operating costs shall be based upon readings obtained by suitable metering equipment of a type mutually acceptable to both Tyngsborough and Dracut. Such metering equipment shall be installed and maintained by Dracut. Dracut will provide Tyngsborough with waste flow data for the preceeding month, based upon meter readings. Tyngsborough shall have access to said meters during business hours.

12.1.2 In the event the metering equipment is temporarily out of order or service for any reason, Tyngsborough's estimated flow will be based upon the average daily flow of the previous three months.

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

Ellis M. [Signature]
Richard [Signature]
[Signature]

Approved as to Form

By: Edward [Signature]

Town Counsel

For the Town of Tyngsborough, Massachusetts

By Its Board of Selectmen

Richard E. [Signature]
Richard E. [Signature]
Roland A. [Signature]

Approved as to Form:

By: [Signature]

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

TOWN OF DRACUT

By: [Signature]
Town Manager
Town of Dracut

APPROVED AS TO FORM:

By: [Signature]
Charles J. Zaroulis
Town Counsel
Town of Tyngsborough

By: [Signature]
Highway Surveyor

BOARD OF SEWER COMMISSIONERS
FOR THE TOWN OF DRACUT

[Signature]
[Signature]
[Signature]

APPROVED AS TO FORM:

By: Edward Owens
Legal Counsel
Dracut Board of
Sewer Commissioners

TOWN OF TYNGSBOROUGH
By its BOARD OF SEWER
COMMISSIONERS

[Signature]
[Signature]
[Signature]

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

TOWN OF DRACUT

By: [Signature]
 Town Manager
 Town of Dracut

APPROVED AS TO FORM:

By: [Signature]
 Charles J. Zaroulis
 Town Counsel
 Town of Tyngsborough

By: [Signature]
 Highway Surveyor

BOARD OF SEWER COMMISSIONERS
 FOR THE TOWN OF DRACUT

[Signature]
[Signature]

APPROVED AS TO FORM:

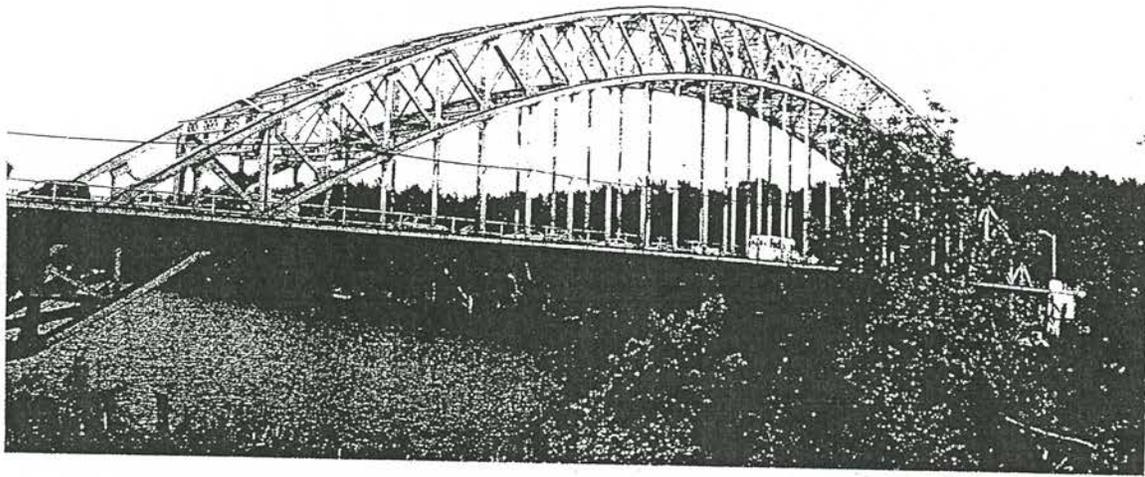
By: Edward Owens
 Legal Counsel
 Dracut Board of
 Sewer Commissioners

TOWN OF TYNGSBOROUGH
 By its BOARD OF SEWER COMMISSIONERS

[Signature]
[Signature]

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.

Table 10-3: Build-out Impacts

Additional Residents	5,166
Additional Residential Water Demand	387,505 gal./day
Additional School Children	799
Additional Commercial/ Industrial Water Demand	1,058,163 gal./day
Additional Residential Units	1,700
Additional Commercial/ Industrial Floor Area	14,108,838 sq ft.
Additional Solid Waste	
Recyclable	1,885 tons/yr.
Non-Recyclable	766 tons/yr.
Additional Roadway Needed	38.1 miles

It is unlikely that the commercial/industrial floor area figure will ever be achieved in the planning period, or even the reasonably foreseeable future. It would require 30,000 to 40,000 employees to use this much space. The build-out figure results from the abundant area now zoned for business and industrial activities. By 2025 total employment in Tyngsborough is forecast to be 5,950, up from the Year 2000 figure of 4,293.

Map 10-4 on the next page shows the location of developable land in Tyngsborough. The area in gray is vacant developable land.

APPENDIX G

**Screening for Private Properties for Wastewater
Treatment and Disposal**

**TYNGSBOROUGH, MASSACHUSETTS
CWMP-PHASE II REPORT**

**APPENDIX G
SCREENING OF PRIVATE PROPERTY AREAS FOR WASTEWATER
TREATMENT AND/OR DISPOSAL**

CRITERIA DEVELOPMENT

A. General

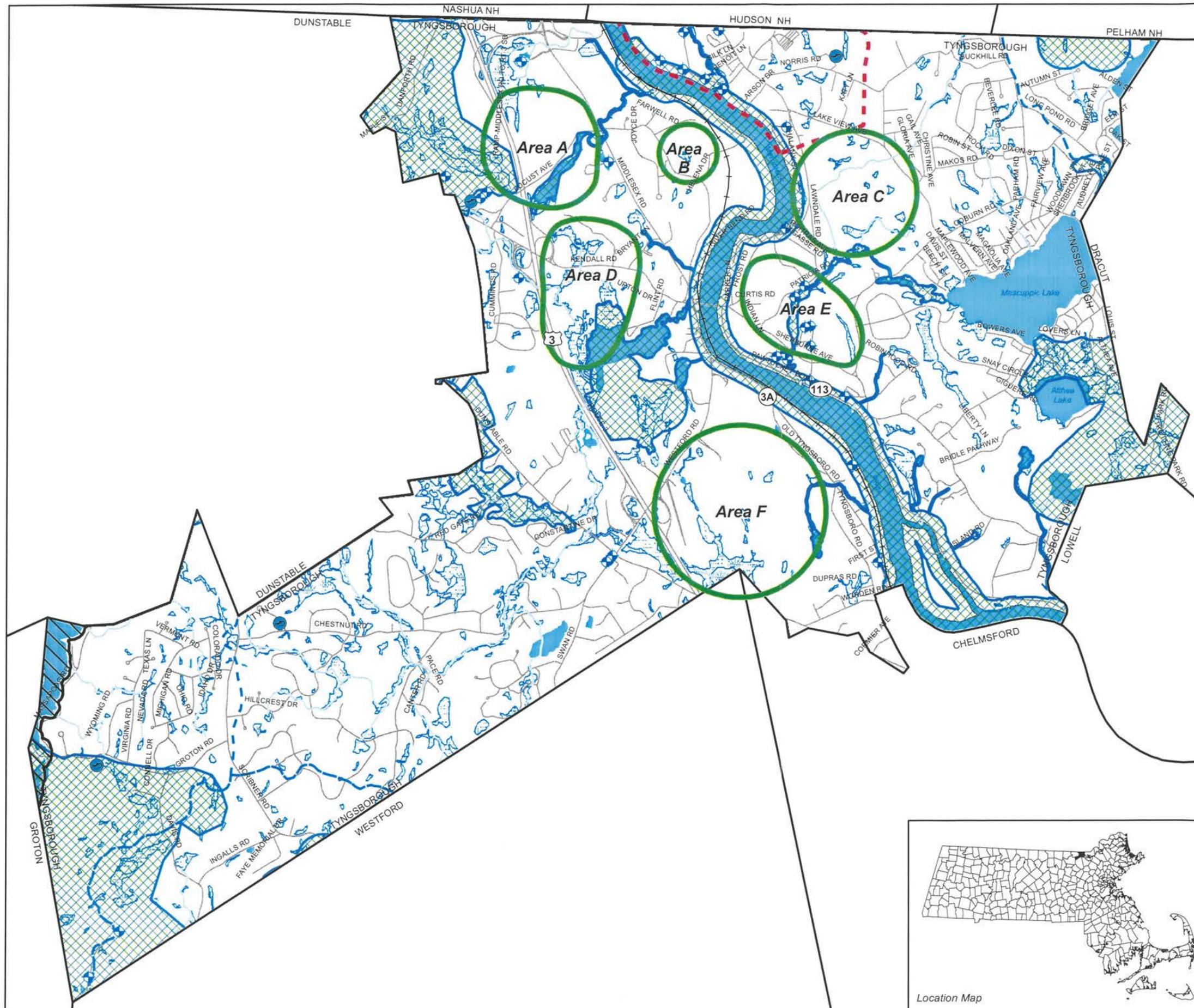
The screening criteria presented in this section were developed to assess the viability of several areas identified within Tyngsborough as potential wastewater disposal facility sites. In response to comments received from MEPA and MassDEP on the Phase II CWMP, a review of privately owned sites has been 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 AREA:
PRIVATE PROPERTIES

PHASE III
COMPREHENSIVE WASTEWATER
MANAGEMENT PLAN

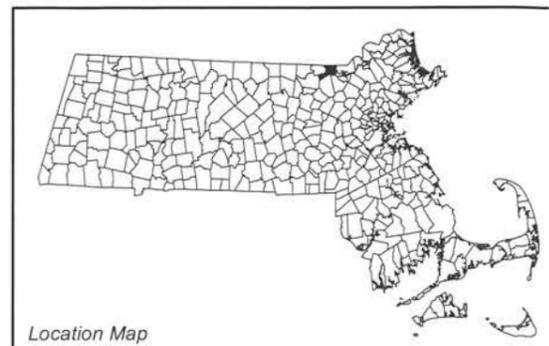
TYNGSBOROUGH, MASSACHUSETTS



- Public Water Supply
- NHESP Certified Vernal Pools
- Private Property Sites Evaluated
- Zone II Boundary
- Sub-Basin Boundary
- Areas of Critical Environmental Concern
- NHESP Estimated Habitats for Rare Wildl
- NHESP Priority Habitats for Rare Species
- Wetland



May 2008 SOURCE: Selected Datalayers from MassGIS.



Map Document: (L:\80764\GIS\Maps\Fig3-1_Sites_EnvConstraints.mxd) 5/22/2008 10:42:12 AM



**TABLE G-1
TOWN OF TYNGSBOROUGH
PHASE III CWMP/EIR
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.

**TYNGSBOROUGH, MASSACHUSETTS
CWMP-PHASE II REPORT**

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

**TYNGSBOROUGH, MASSACHUSETTS
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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

**TYNGSBOROUGH, MASSACHUSETTS
CWMP-PHASE II REPORT**

“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

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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).

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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.

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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 these resource areas, the criteria is considered to present “No “Constraints” to development.

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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.

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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,

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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 Mascuppick Lake which is

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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.

RELEAS

Area	Wetlands	Soils	Recreation Resources	Historic Interests	ACEC
Area A	Minimal to Moderate	Opportunity Moderate	No Constraint	No Constraint	No Constraint
Area B	Moderate	Moderate	No Constraint	No Constraint	No Constraint
Area C	Minimal	Opportunity	No Constraint	No Constraint	No Constraint
Area D	Minimal to Severe	Opportunity Moderate	No Constraint	No Constraint	No Constraint
Area E	Minimal	Opportunity Moderate	No Constraint	No Constraint	No Constraint
Area F	Minimal	Opportunity Moderate	No Constraint	No Constraint	No Constraint

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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. Conductive 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 III 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 III CWMP recommendations include infiltration/inflow removal, water conservation measures, and renegotiation of current IMA's to provide additional wastewater capacity. Reevaluation 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.