

*DRAFT REPORT*



---

***WASTEWATER FACILITIES  
MANAGEMENT PLAN  
PHASE II: FACILITIES PLAN  
Town of Ledyard***

*A Report to: Ledyard Water Pollution Control Authority*

*April 18, 2014*

Prepared by: CDR Maguire Inc.  
2080 Silas Deane Highway  
Rocky Hill, CT 06067

# Wastewater Facilities Management Plan

## Phase II: Facilities Plan

### Table of Contents

---

<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>SECTION I. INTRODUCTION</b> .....	<b>3</b>
I-1    PURPOSE AND SCOPE.....	3
I-2    FACILITIES PLAN ORGANIZATION .....	3
I-3    PLANNING STUDY AREA BACKGROUND .....	4
<b>SECTION II. PLANNING OBJECTIVES</b> .....	<b>7</b>
II-1    PLANNING STRATEGY.....	7
II-2    WATER QUALITY MANAGEMENT .....	8
II-3    REGIONAL PLANNING.....	14
II-4    PREVIOUS WASTEWATER PLANNING EFFORTS.....	14
<b>SECTION III. EXISTING PLANNING AREA CONDITIONS</b> .....	<b>19</b>
III-1    LAND USE .....	19
III-2    TOPOGRAPHY AND GEOLOGY.....	22
III-3    WATER RESOURCES.....	27
III-4    FLOOD PLAINS .....	39
III-5    CULTURAL RESOURCES - HISTORIC LANDS OF SIGNIFICANCE .....	39
III-6    BIOLOGICAL RESOURCES-VEGETATION AND NATURAL RESOURCES .....	40
III-7    COASTAL RESOURCES.....	44
III-8    SOCIO-ECONOMIC ISSUES.....	44
III-9    OTHER ISSUES.....	45
III-10    DELINEATION OF STUDY AREAS .....	46
<b>SECTION IV. EXISTING COLLECTION AND TREATMENT SYSTEMS</b> .....	<b>49</b>
IV-1    UNSEWERED AREAS .....	49

IV-2	EXISTING COLLECTION SYSTEM .....	53
IV-3	INFILTRATION AND INFLOW ANALYSIS .....	56
IV-3	EXISTING TREATMENT SYSTEMS .....	57
IV-4	SUMMARY OF WWTF RECOMMENDED IMPROVEMENTS .....	70
IV-5	OPERATION AND MAINTENANCE PROGRAM.....	71
IV-6	EXISTING SEWER USE ORDINANCE.....	73
<b>SECTION V. FUTURE CONDITIONS .....</b>		<b>75</b>
V-1	INTRODUCTION.....	75
V-2	FUTURE DEVELOPMENT.....	75
V-3	POPULATION PROJECTIONS.....	76
V-4	WATER SUPPLY PROJECTIONS.....	77
V-5	WASTEWATER FLOW AND LOADING PROJECTIONS.....	79
V-6	FLOW REDUCTION.....	80
<b>SECTION VI. EVALUATION OF ALTERNATIVES .....</b>		<b>83</b>
VI-1	INTRODUCTION.....	83
VI-2	WASTEWATER NEEDS ASSESSMENT .....	83
VI-3	IDENTIFICATION AND SCREENING OF ALTERNATIVES.....	84
VI-4	SCREENING OF ALTERNATIVES.....	88
VI-5	DEVELOPMENT OF SOLUTIONS.....	96
VI-6	SEWER PLAN SELECTION .....	110
<b>SECTION VII. RECOMMENDED PLAN.....</b>		<b>111</b>
VII-1	INTRODUCTION.....	111
VII-2	ONLOT SEWAGE MANAGEMENT AREAS .....	111
VII-3	NEW SEWER SERVICE AREAS.....	111
VII-4	HIGHLANDS WWTF.....	112
<b>SECTION VIII. ENVIRONMENTAL ASSESSMENT.....</b>		<b>113</b>
VIII-1	INTRODUCTION .....	113

VIII-2 ANALYSIS OF DIRECT AND INDIRECT IMPACTS..... 113

**SECTION IX. PUBLIC PARTICIPATION..... 114**

IX-1 PUBLIC PARTICIPATION PROGRAM..... 114

# Wastewater Facilities Management Plan

## Phase II: Facilities Plan

### List of Figures

---

FIGURE I-1.	TOWN OF LEDYARD .....	6
FIGURE III-1.	ZONING.....	21
FIGURE III-2.	SOILS.....	24
FIGURE III-3.	TOPOGRAPHIC MAP .....	25
FIGURE III-4.	SURFICIAL MATERIALS.....	26
FIGURE III-5.	DRAINAGE BASINS.....	30
FIGURE III-6.	WATER QUALITY CLASSIFICATIONS.....	31
FIGURE III-7.	WETLANDS.....	37
FIGURE III-8.	PUBLIC WATER SERVICE AREAS.....	38
FIGURE III-9.	FLOOD PLAINS .....	41
FIGURE III-10.	SIGNIFICANT NATURAL COMMUNITIES .....	42
FIGURE III-11.	LEDYARD COASTAL BOUNDARY.....	43
FIGURE III-12.	STUDY AREAS.....	48
FIGURE IV-1.	FILE REVIEW SUMMARY .....	51
FIGURE IV-2.	EXISTING SEWER SERVICE AREAS.....	52
FIGURE IV-3.	HIGHLANDS COLLECTION SYSTEM .....	54
FIGURE IV-4.	HIGHLANDS WASTEWATER TREATMENT FACILITY .....	60
FIGURE V-1.	TOWN OF LEDYARD POPULATION HISTORY AND PROJECTIONS.....	77
FIGURE VI-1.	LEDYARD CENTER NO FULL BUILD-OUT SEWER SOLUTION .....	98
FIGURE VI-2.	LEDYARD CENTER FULL BUILD-OUT SEWER MIX 1.....	102
FIGURE VI-3.	LEDYARD CENTER FULL BUILD-OUT SEWER SOLUTION MIX 2.....	103
FIGURE VI-4.	LEDYARD CENTER FULL BUILD-OUT SEWER SOLUTION MIX 3.....	104
FIGURE VI-5.	LEDYARD CENTER FULL BUILD-OUT SEWER TOWN-WIDE 1 .....	105
FIGURE VI-6.	LEDYARD CENTER FULL BUILD-OUT SEWER TOWN-WIDE 2 .....	106

# Wastewater Facilities Management Plan

## Phase II: Facilities Plan

### List of Tables

---

TABLE II-1. CLASS B WATER QUALITY CRITERIA FOR INLAND SURFACE WATERS.....	9
TABLE II-2. CLASS B WATER QUALITY CRITERIA FOR INLAND SURFACE WATERS INDICATOR BACTERIA – FRESHWATER .....	10
TABLE III-1. AREAS OF LAND USE .....	20
TABLE III-2. GROUND WATER CLASSIFICATIONS AND CRITERIA CLASS GAA DESIGNATED USES AND CRITERIA.....	32
TABLE III-3. CLASS GA DESIGNATED USES AND CRITERIA .....	33
TABLE III-4. CLASS GB DESIGNATED USES AND CRITERIA .....	34
TABLE III-5. SELECTED POPULATION TRENDS .....	44
TABLE IV-1. HIGHLANDS WWTF HISTORICAL FLOWS (MGD).....	55
TABLE V-1. COMPARISON OF POPULATION PROJECTIONS .....	76
TABLE V-2. WASTEWATER FLOW PROJECTIONS.....	80
TABLE VI-1. PRELIMINARY WASTEWATER ALTERNATIVES MATRIX.....	95
TABLE VI-2. ECONOMIC COMPARISON OF SEWER SOLUTIONS .....	107
TABLE VI-3. COLLECTION, CONVEYANCE, TREATMENT AND DISPOSAL COSTS SUMMARY .....	108
TABLE VI-4. SUMMARY OF DESIGN FLOWS FOR SEWER SOLUTIONS.....	109

# **Wastewater Facilities Management Plan**

## **Phase II: Facilities Plan**

### **List of Appendices**

---

APPENDIX A. WASTEWATER FACILITIES MANAGEMENT PLAN PHASE 1: REVIEW OF OUTLYING AREAS

APPENDIX B. HIGHLANDS COLLECTION SYSTEM MAP

APPENDIX C. INFILTRATION AND INFLOW ANALYSIS REPORT

APPENDIX D. ON-SITE SEWAGE DISPOSAL SYSTEMS MODEL ORDINANCES

## Executive Summary

---

The purpose of this Facilities Plan is to evaluate the wastewater collection, treatment and disposal needs of the Town of Ledyard and determine the adequacy of wastewater facilities for a twenty (20) year planning period. The evaluation was conducted in two phases:

1. Phase I – Needs assessment of the outlying areas of town, including Aljen Heights, Avery Hill, Christy Hill, and Gales Ferry, and identification of preliminary wastewater facilities alternatives
2. Phase II – Review of the remaining areas of town, including Ledyard Center, and analysis of wastewater facilities alternatives identified for all study areas

The following is a brief description of the findings and recommendations of this Plan:

1. The discharge capacity of the Highlands Wastewater Treatment Facility is severely limited by seasonally high groundwater. Additional subsurface disposal capacity at the facility is not possible and the feasibility of significantly increasing discharge to Seth Williams Brook is questionable.
2. The Highlands facility was last upgraded in 1997 and is in need of significant improvements to replace aged and outdated equipment. Some components from the original 1962 construction are still in operation while the rest is currently abandoned. The total estimated cost of capital improvements to the facility is \$1.0 million.
3. The Highlands facility collection system is not subject to excessive infiltration and inflow (I/I), though there may be isolated significant sources of inflow. Continued monitoring of flows at the Highlands WWTF is recommended for any observed changes relative to I/I.
4. Public sewers are necessary for the economic health of the Town. Without having access to both public water and sewer, planning goals for the future Gales Ferry and Ledyard Center village districts will likely remain unrealized.
5. Two development scenarios for the future Ledyard Center have been identified: “full build-out” and a less developed “no full build-out.”
6. For economic viability and protection of public health and the environment, public sewers are recommended for the following areas of Town: Aljen Heights/Avery Hill, Gales Ferry/Christy Hill, and the greater Ledyard Center area.
7. The recommended public sewer alternative is connecting Aljen Heights/Avery Hill, Gales Ferry/Christy Hill, and the greater Ledyard Center area to the Town of Groton



wastewater collection system. The estimated capital construction cost of this alternative is \$93.2 million, inclusive of recommended improvements to the Highlands WWTF.

8. Existing site conditions in the Town are not conducive to large scale subsurface disposal of treated wastewater. The only area that may be supported by a community onsite treatment and subsurface disposal facility is Aljen Heights/Avery Hill.
9. The majority of the Town will remain unsewered and continue to rely on conventional onsite wastewater disposal systems. The Town should adopt an onsite wastewater management program to regulate inspection, maintenance, repair and replacement of all onsite systems to ensure protection of public health and the environment.

## Section I. Introduction

---

### I-1 PURPOSE AND SCOPE

This document was developed for the Town of Ledyard in response to a request by the former State of Connecticut Department of Environmental Protection, now known as the Department of Energy & Environmental Protection (DEEP), to prepare a Wastewater Facilities Management Plan (the Plan) for the study and evaluation of wastewater disposal needs within the Town and implementation of recommended improvements.

Facilities management planning is required for municipalities to obtain financial assistance from the DEEP for wastewater collection and treatment system improvements. The information contained in this Plan is consistent with State and Federal regulations regarding the Clean Water Fund (i.e. funding provided pursuant to the Clean Water Act and the Connecticut Environmental Protection Act) and the Plan of Study approved by the DEEP

The goal of facilities planning is to develop alternatives for managing wastewater collection, treatment and disposal needs projected over a 20-year period. The Plan substantiates the need for proposed wastewater facilities, identifies and evaluates the cost-effectiveness of feasible alternatives, demonstrates that the selected alternative is achievable from legal, institutional, financial, and management perspectives, and provides the basis for subsequent design and construction.

In addition to a comprehensive evaluation of existing facilities and future system needs within the study area, the Plan also evaluates existing and projected demographic characteristics, topographic, hydrologic, and institutional features of the study area and evaluates their impact on wastewater needs.

The future planning period includes the 20-year period beginning in 2015 and extending through the year 2035. It is within this timeframe that future wastewater needs are evaluated. This Plan outlines a number of wastewater facilities alternatives which have been identified and examined for reducing infiltration/inflow (I/I), meeting the Town's needs, and meeting State and Federal regulatory requirements during the future planning period.

### I-2 FACILITIES PLAN ORGANIZATION

This Plan has been organized such that it is compatible with the DEEP's Clean Water Fund (CWF) Checklist for Plans of Study and Scopes of Services Regarding General Planning. This document provides a comprehensive interpretation of the 1981 amendments to the Clean Water Act as it applies to wastewater treatment funding.

The Executive Summary is utilized to summarize the Town's future wastewater collection and treatment needs over the next twenty years. This study has also identified proposed projects

that need to be completed in order to accommodate the projected needs of the Town. Each section of this document discusses various components utilized in determining these needs.

Section I provides background information relative to the facilities planning process and the planning study area.

Section II evaluates the regulatory considerations and planning objectives specific to the Town. Complementary planning studies are also described in this section. This section also includes discussions of existing and future permitting requirements, the quality of the treatment plant effluent under existing treatment and flow conditions, facility permit compliance and regional Water Quality Management Planning programs.

Section III presents information relative to existing physical, environmental, and demographic conditions within the planning study area. This information is used in evaluating existing trends as well as projecting future conditions within the study area.

Section IV describes the existing wastewater collection and treatment facilities. System deficiencies, operational characteristics, and future system needs are identified as well. This section also includes the findings of the infiltration and inflow desktop analysis.

Section V discusses the projected conditions that ultimately affect the Town's wastewater needs over the 20-year planning period. Population trends are analyzed in order to understand and plan for the magnitude of development and corresponding increase in wastewater flows in the future. Areas of development are identified and discussed with regards to wastewater flow projections.

Section VI contains an evaluation of alternatives relative to the study area and the Highlands WWTF and reviews the wastewater needs within the existing sewer service area and nearby unsewered areas. The impact of future development with a build-out projection for the next 20 years was used to identify the feasibility of upgrades and/or expansion of the existing Highlands WWTF. The section also summarizes the alternatives analysis of the viable wastewater upgrade and/or expansion options required. These alternatives are evaluated with respect to technical feasibility and cost.

Section VII presents an overview of the recommended the plan and an implementation/phasing plan.

Section VIII discusses direct and indirect environmental impacts associated with the selected alternative(s).

Section IX is dedicated to the public participation phase of the facilities planning process.

### **I-3 PLANNING STUDY AREA BACKGROUND**

The Plan study area is the Town of Ledyard. The Town of Ledyard is a suburban community in New London County, located in southeastern Connecticut, and is bordered by the Town of Preston to the north, the Town of Groton to the south, the Towns of Stonington and North Stonington to the east, and the Thames River to the west (Figure I-1). The total area of the Town is approximately 39.2 square miles with elevations near sea level along the tidal Thames River to 475 feet on Ayer Hill in the northeastern corner of the Town.

The Town was incorporated in 1836 and is comprised of several neighborhoods, including two primary population centers of Ledyard Center and Gales Ferry (including Christy Hill Estates), as well as smaller communities of Aljen Heights, Avery Hill, Barrett Park, Colonial Manor, Cranwood Homestead, Highlands, Lakeside, Lantern Hill, Long Pond, Parsonage Hill Manor, Presidential Estates, Quaker Town, and Stonehenge. The Town also hosts the Mashantucket Pequot Tribal Nation (MPTN).

The major commercial roads providing access to Ledyard are Route 12, which is the main commercial corridor that runs north-south through the western side of the Town, and Route 2 in the northeastern section of the Town. Additional arterial roads include Route 214 running east-west through Ledyard Center, and Routes 117 and 27, which run north-south.

Major airlines can be accessed from Green Airport in Warwick, Rhode Island or from Bradley International Airport located in Windsor Locks, Connecticut.








Public water supply to the Town is by Groton Utilities and the Southeastern Connecticut Water Authority. The remaining areas of the Town are serviced by individual wells or small community water systems which serve individual subdivisions, mobile home parks and apartments.

A detailed description of existing conditions in the planning study area is presented in Section III.

LEDYARD WASTEWATER FACILITIES PLAN

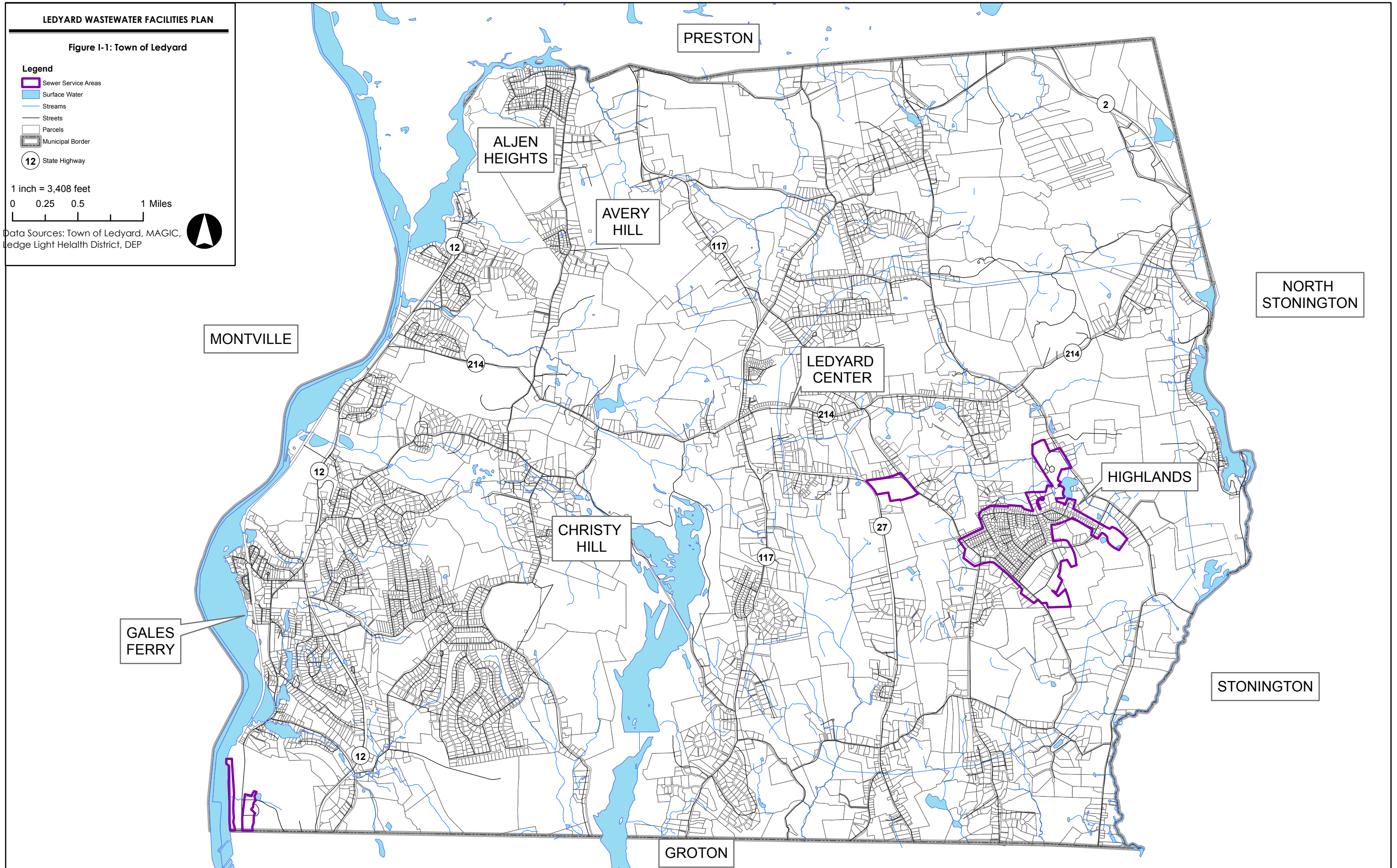
Figure I-1: Town of Ledyard

Legend

-  Sewer Service Areas
-  Surface Water
-  Streams
-  Streets
-  Parcels
-  Municipal Border
-  State Highway

1 inch = 3,408 feet  
0 0.25 0.5 1 Miles

Data Sources: Town of Ledyard, MAGIC,  
Ledge Light Health District, DEP



## Section II. PLANNING OBJECTIVES

---

### II-1 PLANNING STRATEGY

#### Plan of Study

Prior to the initiation of the facilities planning process, the DEEP was consulted regarding State planning objectives and regulatory requirements. A Plan of Study was developed by CDR Maguire and approved by the DEEP. The Plan was organized using a multi-phased approach. In Phase I, the outlying areas of the Town were evaluated for possible problem areas that may have the need for alternate sewage treatment or collection. Phase I focused on the western half of Ledyard and also included a preliminary review of the Highlands Wastewater Treatment Facility (WWTF). The Phase I report, dated September 29, 2010, identified and documented the need for alternative treatment practices or systems for the outlying areas and recommended further detailed study in Phase II. The Phase I report is included this Plan as Appendix A.

In reviewing the report for the initial phase, the DEEP suggested that the following alternatives also be evaluated as part of the Plan:

1. Flows from Aljen Heights and Avery Hill could be combined and pumped via Avery Hill Road west along Route 214 (Stoddards Wharf Road) to a small treatment facility which would discharge to the Thames River.
2. Flows from Aljen Heights and Avery Hill could be combined and flow to an interconnection with the Town of Preston at the former Norwich State Hospital site. This alternative could include the installation of a new treatment system at the Hospital site. For both neighborhoods, evaluate the cost of connecting to the Hospital site in Preston and pumping the wastewater to the Norwich Water Pollution Control Facility.
3. Possible reuse of wastewater discharges from Avery Hill and Aljen Heights at a large nursery on Route 2A in the Town of Preston.

These alternatives were added to the Plan of Study for Phase II which expands upon the information gathered from Phase I and integrates it with additional information of the eastern half of Ledyard to create a town-wide Facilities Plan.

## II-2 WATER QUALITY MANAGEMENT

The Clean Water Act is the key federal regulation controlling activities which affect surface water. The overall objective of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Sections 106, 205(j), 208, and 303 of the Act provide the basis for State and regional Water Quality Management. Water Quality Management is aimed at achieving the water quality goals of the Act through designation of Water Quality Standards, development of Wasteload Allocations, and initiation of non-point water quality studies.

The Water Quality Management planning process is implemented through a number of State and Federal environmental programs. The following components of the Clean Water Act are key to the Water Quality Management and planning process:

- 1. Development of Water Quality Standards (WQS) and regulations necessary to enforce them.**

Section 303 of the Federal Clean Water Act requires the state to adopt surface water quality standards and review and modify these standards at least every three years. Section 22a-426 of the Connecticut General Statutes further requires the Commissioner of Energy & Environmental Protection to adopt standards of water quality for all the State's waters. These standards are enforceable under a number of State regulations. The latest modification to the Connecticut's Water Quality Standards was made effective October 10, 2013.

Federal law defines surface water quality standards as the identification of water quality goals through the assignment of designated uses to be made of the water and by setting criteria necessary to protect those uses. Federal regulations state that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water.

The State's water quality classification, based upon the adopted WQS, establishes designated uses for surface and groundwater in Connecticut. The Seth Williams Brook in the area of the Highlands WWTF is Class B. Class B designated uses are habitat for fish and aquatic wildlife, recreation, navigation, and industrial and agricultural water supply. Tables II-1 and II-2 summarize the Class B water quality criteria for surface waters. The groundwater in the area of the Highlands WWTF is Class GB. Class GB designated uses are industrial process water and cooling waters and baseflow for hydraulically-connected water bodies and is presumed not suitable for human consumption without treatment.

**TABLE II-1. CLASS B WATER QUALITY CRITERIA FOR INLAND SURFACE WATERS**

**TOWN OF LEDYARD FACILITIES PLAN**

<u>PARAMETER</u>	<u>CRITERIA</u>
1. Aesthetics	Good to excellent.
2. Dissolved Oxygen	Not less than 5 mg/l at any time.
3. Sludge deposits - solid refuse floating solids - oil and grease scum	None except for small amounts that may result from the discharge from a permitted waste treatment facility and none exceeding levels necessary to protect and maintain all designated uses.
2. Color	None which causes visible discoloration of the surface water outside of any designated zone of influence.
5. Suspended & settleable solids	None in concentrations or combinations which would impair the most sensitive designated use; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of the bottom; and none which would adversely impact aquatic organisms living in or on the bottom sediments; shall not exceed 10 mg/l over ambient concentrations.
6. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredging activity or discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
7. Turbidity	Shall not exceed 5 NTU over ambient levels and none exceeding levels necessary to maintain all designated uses. All reasonable controls or Best Management Practices are to be used to control turbidity.
8. Indicator bacteria	See Table II-2 below.
9. Taste and odor	None that would Impair any usages specifically assigned to this Class.
10. pH	6.5- 8.0
11. Allowable temperature increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 85°F, or in any case raise the temperature of surface water more than 4°F.
12. Chemical constituents	None in concentrations or combinations which would be harmful to designated water use. Refer to 22a-426-4(a)(5); 22a-426-4(a)(9); 22a-426-4(a)(9)(B); 22a-426-4(a)(11); 22a-426-4(l); 22a-426-4(m); 22a-426-9(a)(3); 22a-426-9(a)(4) and 22a-426-9(a)(5) of the Regulations of Connecticut State Agencies
13. Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses.
14. Sodium	N/A
15. Biological condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a biological condition within the range of Connecticut Biological Condition Gradient Tiers 1-4 as assessed along a 6 tier stressor gradient of Biological Condition Gradient (See section 22a-426-5 of the Regulations of Connecticut State Agencies).

Source: 2011 Connecticut DEEP Water Quality Standards



**TABLE II-2. CLASS B WATER QUALITY CRITERIA FOR INLAND SURFACE WATERS INDICATOR  
BACTERIA – FRESHWATER**

**TOWN OF LEDYARD FACILITIES PLAN**

<u>Designated Use</u>	<u>Indicator</u>	<u>Criteria</u>
1. Recreation <sup>(1)(2)</sup> – Designated swimming <sup>(3)</sup>	E. coli	Geometric mean less than 126/100 ml Single sample maximum 235/100 ml
2. Recreation <sup>(1)(2)</sup> – Non designated swimming <sup>(4)</sup>	E. coli	Geometric mean less than 126/100 ml Single sample maximum 410/100 ml
3. Recreation <sup>(1)(2)</sup> – All other uses	E. coli	Geometric mean less than 126/100 ml Single sample maximum 576/100 ml

Notes

- (1) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with section 22a-426-4(a)(9)(E) of the Regulations of Connecticut State Agencies.
- (2) See section 22a-426-9(a)(2) of the Regulations of Connecticut State Agencies.
- (3) Procedures for monitoring and closure of bathing areas by state and local health authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protection and the Department of Public Health, May 1989, revised April 2003 and updated December 2008.
- (4) Includes areas otherwise suitable for swimming but which have not been designated by state or local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.

Source: 2011 Connecticut DEEP Water Quality Standards

**2. Formulation of State and area-wide Water Quality Management (WQM) plans, including comprehensive analysis of the actions necessary to meet the WQS.**

Water Quality Management Plans are required by the Clean Water Act to provide a basis for regulatory control and enforcement of water pollution abatement activities. In Connecticut, WQM Plans for specific river basins and other geographic planning areas generally take on the form of a wasteload allocation. A wasteload allocation translates water quality criteria into effluent limitations which are incorporated into a National Pollutant Discharge Elimination System (NPDES) permit. A wasteload allocation analysis ultimately dictates the level of treatment required of a municipality.

Wasteload allocations are typically developed for water quality limited surface waters (i.e. those water bodies which are not currently meeting their classification goal or which have limited amounts of water for assimilation purposes).

A wasteload allocation, as its name implies, allocates pollutant loadings and concentration limits to the major contributors of wastewater to a water body, up to the determined "Total Maximum Daily Loading" (TMDL). The TMDL is the maximum pollutant loading which a water body can receive and still achieve in-stream water quality conditions identified in the State's Water Quality Standards.

The major pollutants of concern for a municipal wastewater facility, and accordingly those for which TMDLs are usually determined, are biochemical oxygen demand, nutrients (nitrogen and phosphorus), and solids. Aesthetic quality may also be considered in this determination.

The TMDL is based upon "worst case" conditions in the river including drought flows and seasonally high water temperatures, since it is under these conditions that water quality will most likely be impaired. This philosophy is based on the premise that if the water environment is protected against worst case conditions, it will accordingly be protected under the more favorable conditions which frequently exist.

Computer modeling is a tool often used to simulate existing river water quality and to predict water quality under specified future conditions. In August 2008, the DEEP completed its water quality analysis and wasteload allocations for watercourses throughout Connecticut. Based upon the DEEP's mathematical computer model, TMDLs for flow, ammonia nitrogen, and biochemical oxygen demand were determined and allocated among the municipalities and industries which ultimately discharge treated wastewater to waters of the State.

The wasteload allocation for the Seth Williams Brook recommends the following wastewater discharge levels for the Highlands treatment plant:

Biochemical Oxygen Demand (5-day)	10 mg/l
Total Suspended Solids	10 mg/l
Ammonia (June 1 – October 31)	1.4 mg/l
Total Nitrogen	7 lb/d

### 3. Issuance of permits for point and non-point source discharges

Connecticut is delegated by the U.S. Environmental Protection Agency (EPA) to administer the National Pollutant Discharge Elimination System (NPDES) permitting program for wastewater discharges to surface waters in the State. This program is authorized under Section 402(b) of the federal Clean Water Act and Section 22a-430 of the Connecticut General Statutes. NPDES permits are typically issued for a five-year period and specify operating restrictions, physical and chemical discharge limitations, and monitoring and reporting requirements.

The Town of Ledyard Highlands WWTF is currently operating under NPDES Permit No. CT0101681 issued on July 31, 2009. This permit contains limits which are consistent with the DEEP’s wasteload allocation.

### 4. Provisions for federal funds to assist in the construction of municipal wastewater treatment works

The Clean Water Act of 1972 authorized EPA to provide grant assistance to municipalities for planning, design and construction of wastewater collection and treatment facilities. Funding was available following passage of the Act through Federal and State programs whereby 75% of the engineering and construction costs were absorbed by federal funding, 15% by State funding, and 10% by the municipality. This mechanism was in place until 1984 when certain amendments to the Clean Water Act became effective, decreasing Federal funding to 55% and leaving the municipalities with the burden of providing 30% of the costs associated with collection and treatment system planning, design, and construction. State funding remained constant at 15% during this time period.

#### *Connecticut Clean Water Fund*

In 1986, following the elimination of direct federal funding to municipalities, the State of Connecticut initiated the Clean Water Fund (CWF) to provide financial assistance for the planning, design, and construction of wastewater facilities. The EPA provides annual capitalization grants to the DEEP in support of the CWF. The DEEP administers a grant/loan program under the CWF for design and construction projects, whereby twenty (20) percent of eligible costs is funded by grant, and the remaining eighty (80) percent of eligible costs is covered by a low interest (2%) loan for a twenty (20) year payment period. This funding is offered with certain restrictions and is awarded based on a priority point ranking system (i.e. “Priority List”) which considers, among other

criteria, the impairment of classified uses of the receiving water body from municipal wastewater discharges.

The DEEP also offers other funding opportunities through a number of reserves under the CWF. Municipalities may receive fifty-five (55) percent reimbursement of eligible costs for planning projects, and the reserved funds are distributed on a first-come, first-served basis. This Plan was partially funded by the CWF. Until recently, the DEEP offered a 30% grant/70% loan program for the construction of treatment plant modifications related to nitrogen reduction on a first-come, first-served basis, regardless of priority points. As of the time of writing this report, the denitrification reserve is no longer available.

#### *United States Department of Agriculture*

The USDA Rural Development provides funding in the form of grants and loans to qualifying municipalities for developing water and wastewater systems. The financial assistance is available to rural areas and towns having a population of 10,000 or less. The Town of Ledyard is not eligible for this funding program, because the total town population exceeds 10,000.

#### *Connecticut Small Town Economic Assistance Program*

The Small Town Economic Assistance Program (STEAP) funds economic development, community conservation and quality of life projects for localities that are ineligible to receive Urban Action (CGS Section 4-66c) bonds. This program is administered by the Office of Policy and Management. Ledyard is an eligible STEAP Town.

Like Urban Action, STEAP funds are issued by the State Bond Commission and can only be used for capital projects. Programmatic expenditures or recurring budget expenditures are not eligible for STEAP or any other state bond program. However, some projects, while generally capital in nature, should not be funded with State bond money for various public policy reasons including but not limited to administrative improvements. Projects eligible for STEAP funds include:

- 1) economic development projects such as (a) constructing or rehabilitating commercial, industrial, or mixed-use structures and (b) constructing, reconstructing, or repairing roads, access ways, and other site improvements;
- 2) recreation and solid waste disposal projects;
- 3) social service-related projects, including day care centers, elderly centers, domestic violence and emergency homeless shelters, multi-purpose human resource centers, and food distribution facilities;

- 4) housing projects;
- 5) pilot historic preservation and redevelopment programs that leverage private funds;  
and
- 6) other kinds of development projects involving economic and community development, transportation, environmental protection, public safety, children and families and social service programs.

### II-3 REGIONAL PLANNING

The Town of Ledyard is part of the Southeastern Connecticut Council of Governments (SCCOG) regional planning agency. In addition to Ledyard, the planning organization region includes the Towns of Bozrah, Colchester, East Lyme, Franklin, Griswold, Groton, Lisbon, Montville, New London, North Stonington, Norwich, Preston, Salem, Sprague, Stonington, Voluntown, and Waterford, the City of Groton, and Stonington Borough. Affiliate members are the Mashantucket Pequot and the Mohegan Tribal Nations, and the U.S. Navy and U.S. Coast Guard are military liaisons.

The SCCOG coordinates regional planning strategies and activities and has published a number of documents and studies over the past several decades covering regional planning, economic development, transportation, housing, and emergency management, land use, and water supply planning. There has been no attempt to conduct regional wastewater facilities planning.

### II-4 PREVIOUS WASTEWATER PLANNING EFFORTS

#### Existing Wastewater Facilities Plans and Studies

A number of plans and studies related to wastewater facilities planning in the Town of Ledyard, both town-wide and localized, have been done over the years. Following is a selective listing of previous plans and studies with a brief description of the findings and recommendations.

- ***Town of Ledyard Facility Plan*** prepared by Hayden, Harding & Buchanan, Inc. for the Town of Ledyard (1985). The plan was completed in response to an order by the DEEP to develop a town-wide facilities plan to address all failing subsurface wastewater disposal systems and potential problem areas. The plan identified priority areas (including the Highlands WWTF, Aljen Heights, Bluff Road and Barry Drive areas in Gales Ferry, and Center Drive area) where serious problems existed and areas of concern (Avery Hill trailer park, Christy Hill and others) throughout the Town. The study recommended the following solutions:
  - 1) Community systems with stream discharge for Aljen Heights and Gales Ferry, community system with subsurface disposal for Center Drive area, and individual corrections to onlot disposal systems in remaining unsewered areas

2) Rehabilitation or modification to the Highlands WWTF

- **Ledyard Wastewater Treatment Plant Evaluation and Capacity Study** prepared by A-N Consulting Engineers, Inc. for the Town of Ledyard (November 1989). The study was produced in response to a pollution abatement order issued by the DEEP. The study evaluated the treatment and disposal capacities of the Highlands WWTF and provided recommendations for corrective action to achieve compliance with the discharge permit limits. The study also evaluated the feasibility of adding new connections and provided recommendations for investigating and rehabilitating I/I in the collection system.
- **Wastewater Feasibility Study Highlands Wastewater Facilities** prepared by Stearns & Wheler, Inc. for the Town of Ledyard (August 1991). This was a follow up study to the one by A-N Consulting Engineers and concluded that the Highlands WWTF was not able to meet the discharge permit limits of the time and could not accommodate projected future flows. The study also conducted field performance tests of the existing seepage beds and further concluded that additional subsurface disposal capacity could not be gained at the WWTF site. Recommendations were made for modifying the facility for stream discharge, forming the basis of the WWTF upgrade and expansion in 1997. The study also provided recommendations for a 5-year I/I investigation and rehabilitation program for the collection system.
- **Ledyard Center Sewer Feasibility Study** prepared by Weston & Sampson Engineers, Inc. for the Town of Ledyard (September 2006). The study developed a conceptual build-out plan of the Ledyard Center area, projected future wastewater flows ranging from 310,000 gpd to 754,000 gpd, and evaluated conceptual alternatives for wastewater collection and disposal:
  - 1) New “packaged” treatment facility with subsurface disposal in Ledyard center
  - 2) Conveyance to and disposal at the Highlands WWTF.

The study concluded that subsurface disposal in Ledyard Center would not be feasible and recommended connecting Ledyard Center to the Highlands WWTF.

- **Baldwin Hill Industrial Park Feasibility Study** prepared by Weston & Sampson Engineers, Inc. for the Town of Ledyard (September 2006). The study developed a conceptual build-out plan of the industrial park area, projected a future wastewater flow of 331,000 gpd, and evaluated conceptual alternatives for wastewater collection and disposal:
  - 1) New wastewater treatment facility with stream discharge to Long Cove
  - 2) New “packaged” treatment facility with subsurface disposal

### 3) Conveyance to and disposal at the Town of Groton

The study concluded that connecting to the Town of Groton's collection system was the most viable alternative. The study recommended that Ledyard continue planning the industrial park to better define the wastewater needs of the project.

- ***Baldwin Hill Industrial Park (Ledyard) Sanitary Sewer Connection to Groton Impact Analysis*** prepared by Fuss & O'Neill for the Town of Groton (February 20, 2008). An analysis was made of the hydraulic capacity of the downstream wastewater collection system in the Town of Groton. The analysis concluded that proposed build-out flows from potential new land development in Ledyard would exceed the capacity of Groton's collection system. This conclusion was based on future flows supplied by the Town of Ledyard ranging from 150,000 to 300,000 gpd average daily. The analysis also stated that the proposed land development project was inconsistent with the state's Conservation and Development Policies Plan (C&D Plan) in effect at the time and recommended that Groton not accept flows from the proposed project until inconsistencies are resolved.
- ***Effluent Disposal Fields Evaluation Ledyard Highlands Wastewater Treatment Facility*** prepared by Weston & Sampson Engineers, Inc. for the Town of Ledyard (June 4, 2008). A field investigation was performed to evaluate the suitability of a farm field adjacent to the Highlands WWTF property for additional subsurface disposal capacity. Due to the presence of seasonal high groundwater and surrounding wetlands, the evaluation concluded that the site was not suitable. The evaluation recommended evaluating increased discharge to Seth Williams Brook and a new discharge to the Thames River as potential alternatives for augmenting the wastewater disposal capacity of the Highlands facility.

#### Report of the Advisory Route 12 Tri-Committee (April 9, 2001)

The Advisory Route 12 Tri-Committee was formed in May 2000 and, together with the University of Connecticut School of Agriculture and Natural Resources, was charged with developing zoning regulations for the Route 12 corridor that will promote the economic health of the Town while retaining the character and atmosphere of a New England style village. Among the report's recommendations was installing sewers along Route 12 and considering connecting to the Town of Groton's collection system at Ohio Avenue.

#### Town of Ledyard Plan of Conservation and Development (2003)

At the time of this writing, the 2003 POCD is the latest comprehensive municipal plan in effect for the Town of Ledyard. The 2003 plan's goals with respect to wastewater management are:

- ***Protection of groundwater and surface water supplies through proper septic system design.*** Acknowledging the fact that developable areas within the Town are likely have site conditions that are limiting to subsurface disposal of wastewater (e.g. high groundwater, shallow bedrock, poorly drained soils, steep slopes and wetlands), this goal emphasizes the need for proper review of proposed land development plans and conformance with applicable Town and state Department of Public Health standards to ensure adequate protection of water supplies.
- ***Highlands wastewater treatment plant improvements & new tie-ins.*** This goal was partially fulfilled by connection of the Lakeside Condominiums complex. The Town had previously considered the Woodlands Project, a 165-unit age-restricted mobile manufactured home subdivision, to be served by the Highlands WWTF and potentially further expand the customer base. This goal also provides the requirement for new land development applications proposing to connect to the public sewer system to provide written documentation confirming the availability of capacity at the Highlands facility to accommodate the proposed projects. This goal further provides for priority given to projects that offer significant economic benefit to the Town, as well as special consideration given to servicing areas having existing or potential environmental need for sewerage.
- ***Enhance economic development opportunities in appropriately zoned areas through expanded infrastructure.*** Recognizing the fact that growth and development within the Town will be limited without having access to public infrastructure, this goal advocates expanding the public water and sewer systems to the Route 12 corridor and Ledyard Center to encourage commercial development and economic growth. Gales Ferry Village and Ledyard Center are designated as centers for growth and development in the Town by the POCD.

#### Ledyard Town Center Committee Report to the Town Council (September 12, 2007)

The Town Center Committee was formed in January 2006 and, together with the University of Connecticut School of Landscape, was tasked with developing recommendations for the future development of Ledyard Center. The LTCC reported the lack of municipal sanitary sewers as the greatest obstacle to any significant development of Ledyard Center. In order to bring sewers to Ledyard Center, the LTCC recommended that the Town partner with a private developer that would finance the cost of constructing the sewer infrastructure in exchange for assurances by the Town with regard to the developer's plans and use of Town-owned land by the developer. The sewers would ultimately be dedicated to the Town. The report also discussed a conceptual alternative, presented and estimated by a developer to cost \$10 million, to convey sewage from Ledyard Center down Stoddards Wharf Road to a new advanced treatment facility discharging to the Thames River.

#### Town of Ledyard Zoning Regulations (October 2012)



Aside from the commercial and industrial areas of the Route 12 corridor, the Ledyard Center Village District, and the resort commercial districts around the Mashantucket Pequot Tribal Nation, the majority of the Town is zoned for residential use (Figure III-1).

Section 5.0 of the Zoning Regulations governs Conservation and Open Space Subdivision Developments in the Town of Ledyard. The regulations provide opportunity for clustering in Conservation Subdivisions to preserve open space (minimum 40% of total land area) in the R-40, R-60 and R-80 zoning districts, but require a public or community water system and/or public or community sewerage system for such subdivisions in the R-40 district. Open Space Subdivisions for single-family homes only are allowed in all residential zoning districts. In these developments, at least 60% of the total land area of the parcel must be dedicated to open space. The maximum number of lots allowed in the subdivision is dictated by the minimum lot size of the underlying zoning district and an adjustment factor for the types of water supply and sewage disposal systems proposed.

Section 8.11 contains stipulations on allowable density for Multiple Family Dwelling complexes in public sewered and non-public sewered areas. This section also requires these complexes to be served by a community water or public water supply system.

#### State Conservation and Development Policies Plan 2013-2018 (June 2013)

The State of Connecticut Office of Policy and Management (OPM) updated the previous 2005-2010 State C&D Plan to reflect significant changes to the State's planning statutes. The updated C&D Plan defines "Priority Funding Areas" within the State as the basis for funding "Growth-Related Projects," as defined by the Connecticut General Statutes (CGS), which are consistent with OPM's six Growth Management Principles. If a growth-related project is not located within a priority funding area, an exception may be gained through a process which allows State funding for projects that are consistent with the municipal POCD and the written principles of the C&D Plan, and also have the support of the public.

The new C&D Plan also overhauls and redefines the intended use of its Locational Guide Map (LGM) which has been mistakenly relied upon in the past as being the sole basis for determining consistency of proposed projects with the C&D Plan. The C&D Plan is advisory to municipalities, since there is no statutory requirement for municipal plans to be consistent with the State C&D Plan and vice-versa. The new LGM shows Gales Ferry and Ledyard Center as priority funding areas in the Town of Ledyard.