Chapter 2

Data Review

CHAPTER 2

DATA REVIEW

2.1 INTRODUCTION

This chapter provides an overview of information used in preparing the Needs Assessment Report for the Town of Chatham. Section 2.2, provides a brief summary of facilities plans, groundwater studies, Town planning documents, Town regulations and by-laws, and Cape Cod Commission documents, used in preparing the Needs Assessment. A list of maps and plan drawings related to this project is included in Section 2.3.

2.2 TECHNICAL REPORTS AND DATA

The following technical reports and data were reviewed in chronological order for this Needs Assessment Report.

A. Chatham Groundwater and Water Supply Studies

1. **"The Hydrogeology of the Mainland Parts of the Town of Chatham" February 1975, Metcalf & Eddy Engineers (M&E).** This report was written for the Town of Chatham to assess the Town's water resources and the availability of groundwater for existing and future use. The report did not evaluate Monomoy, Nauset Beach, or Strong Island as part of this study, but concentrated on the mainland parts of Chatham. The report discussed the hydrologic cycle, surface water resources, groundwater conditions, and future impacts on these conditions. The report also provided conservation and management guidelines regarding Town water usage. Excessive nitrate concentrations originating from on-site septic systems were sited as part of the groundwater degradation, with recommendations to expand the public water supply, and recommended a comprehensive water, sewer and land use master plan be developed.

2. **"Phase II of the Hydrogeologic-Land Use Project" June 1976, Metcalf & Eddy Engineers.** This report was developed as a follow-up to M&E's 1975 report. Phase II included an extensive groundwater quality sampling program, identification of potential public well locations, and an estimation of water demand based on current and future land development trends. Potential problem areas were identified and included:

- Private wells experiencing high concentrations of chemical constituents in groundwater.
- Lots less than 20,000 sq. ft. without public water or sewer connections.
- Lots less than 20,000 sq. ft. adjacent to environmental sensitive areas.

These identified areas were concentrated in South and West Chatham and Chatham Center. A land development plan was developed and included:

- Expansion of the public water service.
- Expansion of the sewer services (mostly south of Route 28).

3. **"A Land Use Inventory of Chatham's Indian Hill Well Zones of Contribution" March 1988, Cape Cod Planning and Economic Development Commission.** This report inventoried properties within four estimated zones of contribution for the Indian Hill Well. These zones were developed based on various pumping rates and changing water demands. The following zones were identified:

- Zone 1: 300 gpm - average winter pumpage.
- Zone 2: 420 gpm - average yearly pumpage.
- Zone 3: 500 gpm - average summer pumpage.
- Zone 4: 700 gpm - maximum safe yield pumpage.

Following the determination of the Zones of Contribution (ZOC) a site by site inventory was conducted in these ZOCs. The on-site investigations inventoried the number of on-site wastewater treatment systems, underground storage tanks (USTs), and commercial storage/use/disposal of toxic and hazardous materials inside each of these zones. This information was then used to evaluate the risks posed to the Indian Hill Well. The report predicted a conversion of seasonal homes within these zones could result in an exceedance of the 5mg/l nitrate-nitrogen limit. The report also identified six USTs at or over 20 years old and recommended replacement of these tanks, as there is a 50 percent chance of leakage after 20 years. Hazardous materials used by businesses inside the ZOCs were identified, along with three spills, which occurred in 1986 and were remediated.

4. **"Chatham Groundwater Study" April 1988, Barnstable County Health and Environmental Department.** This report was a result of the Town of Chatham Health Department requesting that the Barnstable County Health and Environmental Department conduct chemical analysis on selective wells within the Town. At two sites (OW# 9 and MW #4) chemical contamination was detected. Samples from Indian Hill Well (MW #4) had a small amount (3.4 ppb) of tetrachloroethene (PCE) but the origin was not identified and further investigation was recommended. Sample results from monitoring well OW# 9, downgradient of the landfill, detected 7.4 ppb of vinyl chloride, which exceeded the 2ppb MCL for this contaminate. It was recommended that more extensive groundwater monitoring be performed although no widespread impact was indicated.

5. **"Chatham Municipal Airport - Groundwater Management Plan, Field Work Plan" July 1988, Dufresne-Henry, Inc.** This Groundwater Management Plan was developed to satisfy federal sole-source aquifer requirements and requirements stipulated by the Commonwealth of Massachusetts Secretary of Environmental Affairs regarding proposed additions to the existing airport. This report described the following characteristics of the site:

- Geology.
- Groundwater Occurrence and Movement.
- Groundwater Quality.
- Water Supply Wells.
- Land Use.
- Utilities.
- Potential Sources of Contamination.

Based on this information a Groundwater Monitoring Plan was developed, identifying: well locations; and groundwater sampling and analysis methods.

6. **"Groundwater Management Plan" November 1989, Dufresne-Henry, Inc.** The purpose of this report was to serve as an Environmental Assessment (EA) to meet FAA requirements and as an Environmental Impact Report (EIR) for the Commonwealth of Massachusetts. The report summarized the existing conditions at the site, including: land use; hydrology; geology; and groundwater quality. The report recommended the development of the following procedures and protocols for:

- New and improved groundwater protection measures.
- Hazardous materials handling and disposal.
- Fuel storage systems.
- Accidental fuel spills.
- Groundwater monitoring programs.

7. **"Town of Chatham - Groundwater Study" 1989, Barnstable County Health and Environmental Department.** The purpose of this report was to detect and warn the Town of any potential contamination of public and private drinking water supplies. Groundwater sampling and analysis was performed and an area downgradient of the landfill, serviced by private drinking water wells, was identified as being impacted by landfill leachate. None of the wells exceeded the

currently established Maximum Contaminate Levels (MCL). It was recommended that the Town continue with the landfill study and perform further testing of residential wells in the vicinity of the landfill site.

8. **"Water Management Act Permit" November 1990, Whitman & Howard, Inc.** This document was prepared as an application for a Massachusetts Water Management Act Permit. The document included: Groundwater hydraulic analyses, copies of a Water Conservation Plan, the new source approval for Well #5 (Training Field Well, 05G), and letters to and from the Massachusetts Historical Society and Division of Fisheries and Wildlife regarding use of this site.

9. **"Final Environmental Impact Report - EOEA No. 6949 - Airport Improvements, Chatham Municipal Airport" January 1991, Dufresne - Henry, Inc.** This document summarizes the previous Groundwater Management Plan, Groundwater Management Policy and the Airport Master Plan Update for the Years 1984-2004. The appendix of this report also includes MEPA comments, Aircraft noise data, and the Natural Heritage Report.

10. **"Future Water Demands and Treatment Alternatives for Indian Hill Well" October 1991, Whitman & Howard, Inc.** This report was prepared for the Town of Chatham to address the Tetrachloroethylene (PCE) contamination detected at the Indian Hill Well. A permanent granular activated carbon (GAC) system was recommended to treat this well. The report outlines population and water consumption trends, sources of water supply, water quality data and analysis, and water treatment technologies.

11. **"Prolonged Pumping Test Results - Indian Hill Well" January 1993, Whitman & Howard.** The purpose of this letter report was to summarize the results from prolonged pumping of the Indian Hill Well to determine the extent and source of PCE. The PCE source was not identified and the PCE concentration exceeded the 5 ppb limit at two pump rates. Blending the Indian Hill Well water with water from the distant part of the distribution system was recommended to allow the Indian Hill Well to be used under peak water demands. Further study was recommended.

12. **"Groundwater Contamination Investigation - Indian Hill Well" October 1993, Whitman & Howard.** The purpose of this letter report was to identify, if possible, the source of the PCE contamination at Indian Hill Well. Several sites were investigated. One site was eliminated; one site is highly suspected of being the source; and other sites need additional study. This report was a follow up to the Prolonged Pumping Test letter Report prepared by Whitman & Howard. Further study to determine the lateral and vertical extent of the PCE was also recommended.

13. **"Groundwater Mounding Test at Existing WPCF Infiltration Beds" November 1993, Metcalf & Eddy.** This report summarizes Metcalf & Eddy's findings regarding the maximum "safe" discharge rate at the existing infiltration beds. A summary of previous M&E groundwater studies is provided in this report. The report details the evaluation of the impact of effluent discharge on groundwater flow patterns. A consent order was issued limiting the discharge at the WPCF to 100,000 gpd to prevent migration of treated effluent in unacceptable directions (namely to anywhere except south). This report was used to identify a more specific limitation to allow the full use of the infiltration beds without negative impacts to flow direction. M&E established that a "safe" rate could be as high as 120,000 to 135,000 gpd. Any discharge above those limits was determined to impact Goose Pond and the Zone II for Indian Hill Well. The report recommended the development of a numerical groundwater flow model and additional data collection to fill groundwater data gaps.

14. **"Monomoy Lens Groundwater Protection Project" December 1993, Cape Cod Commission.** The goal of this project was to develop a consistent and reliable water resource protection planning and protection strategies for each of the five towns (Chatham, Dennis, Harwich, Orleans, Brewster, and a portion of Yarmouth) that share the lens. The objectives of the project were to:

- Develop a land use and water resource Geographic Information System (GIS) for the entire lens.

- Establish a groundwater protection task force.

- Survey the existing water resource protection strategies.

- Evaluate opportunities for regional resource management and protection.

At the time of this report, every Town in the Monomoy Lens was in the process of developing a Local Comprehensive Plan (LCP). The project concluded that the LCP was the best and most efficient way for each town to meet these goals.

15. **"Potential Source Contamination Survey" March 1994, Whitman & Howard.** The purpose of this report was to identify potential sources of groundwater contamination inside Zone Is and IIs. Parts of Chatham and Harwich were surveyed to identify all potential sources of contamination to these areas. From this information a GIS Map was developed for the Zone Is and IIs. The GIS map compiled data regarding USTs, 21E Sites, Spills listed in DEP SERO, Wastewater facilities, RCRA facilities, leaking above and underground storage tanks, road salt, and other potential sources of contamination.

16. "**Zone II Delineation Indian Hill Well" November 1994, Whitman & Howard.** The purpose of this report was to establish the Zone II delineation for the Indian Hill Well. A regional hydrogeologic study was performed and a groundwater computer model was used to simulate groundwater flow patterns resulting from different aquifer conditions and pumping rates. Based on this information a Zone II delineation was developed. The report also identified potential sources of contamination inside the Zone II. Those listed were the Chatham Airport, the Mosquito Control Project, the landfill and several commercial facilities. The Chatham WPCF was noted to fall just outside the Zone II for this well.

17. **"Groundwater Modeling Study at the Water Pollution Control Facility"**

February 1995, Metcalf & Eddy. The report developed a groundwater model to further evaluate the impact of wastewater effluent discharge from the WPCF infiltration beds on the local hydrology. The report summarizes the previous studies regarding Chatham hydrogeology in the area, identifies data gaps, and outlines the additional work performed to reduce these gaps. This information was then used in the model development. The results indicated that current effluent discharge does not impact Goose Pond, and the groundwater flow direction is in a southward direction. Based on the Zone II delineation of Indian Hill Well at a maximum pumping rate of 800 gpm, effluent discharge from the WPCF would not be allowed to exceed 100,000 gpd. The report stated that if this pumping rate was reduced to 200 gpm, effluent discharge from the WPCF could be increased to 150,000 gpd without impacting the Zone II for Indian Hill Well.

18. **"Revised Zone II Delineations, Indian Hill Well" February 1995, Whitman & Howard.** This was a supplementary report following the findings of the November 1994 Whitman & Howard report and the February 1995, Metcalf & Eddy report. Based on these reports the Town of Chatham wanted to further examine lower pumping rates at the Indian Hill Well, to allow for an increase in discharge from the WPCF. Pumping rates of 200 gpm, 300 gpm, and 400 gpm were examined, and all displayed a shift in the Zone II delineations. The report did not indicate if the 150,000 gpd discharge was feasible or not.

19. **"Chatham Public Water Supply Zone II Delineations for Existing Water Supply Wells" August 1995, Massachusetts Department of Environmental Protection.** The Massachusetts DEP issued a letter regarding the previous reports developed in 1994 and 1995 regarding the Zone II delineations and the WPCF effluent discharge. They recommended based on these previous studies that the Town of Chatham upgrade the WPCF so that the effluent meet drinking water standards. They also recommended that any future facilities planning studies and water supply planning be integrated, and that the Town consider a water supply demand evaluation for the year 2010.

20. **"Request for Site Exam" October 1995, Whitman & Howard.** This letter report

provides geologic cross sections, Zone II delineations, and summaries on water quality, land use and existing aquifer protection regarding three proposed test wells. The report was developed as a request for the Town of Chatham Division of Water Supply to examine these sites as potential future water supplies.

21. **"Comprehensive Site Assessment - Chatham Sanitary Landfill" June 1997, Weston & Sampson Engineers, Inc.** The purpose of this report was to:

- Determine if the landfill has impacted the environment.
- Identify and characterize the extent of any contaminants, which may be present.
- Determine the need for remediation of the landfill in addition to capping.

The CSA concluded that soils outside the limits of refuse do not appear impacted by the landfill, and landfill gasses do not appear to be migrating off site, although a landfill gas mitigation system was implemented. The groundwater flow direction was identified as south toward Cockle Cove Creek, but the contamination identified did not warrant remediation. The Town was recommended to proceed with groundwater, surface water, soil and gas sampling. A Corrective Action Alternative Analysis (CAAA) was not deemed necessary.

22. **"Prolonged Pumping Test - Test Well Site 19R-96." February 1998, EarthTech.** The purpose of this report was to evaluate the use of Test Well Site 19R-96 as a future water supply for the Town of Chatham. A temporary 8 inch well was installed near Lovers Lake and pumped for five days at 361 gpm. The report provides water quality results, safe yield, hydrogeologic conditions and Zone II delineations for this location. Water quality results were within drinking water standards.

23. **"Groundwater Monitoring Report(s)" September 1991 through February 1998, Metcalf & Eddy.** These reports were initiated in response to the Administrative Consent Order Docket No. 700, and a letter issued by the Massachusetts Department of Environmental Protection dated October 25, 1990. The reports were developed to investigate the extent of the effluent plume

from the WPCF and establish its seasonal dynamics. Groundwater measurements were taken in early October, January, April, July and late August from anywhere from 40 to 50 different well locations. Groundwater samples were collected and analyzed from eight wells during these same times except July. No significant plume migration was detected towards any of the existing public water supply wells in Chatham between 1991 and 1998. Two wells consistently exceeded the Massachusetts drinking water guidelines for sodium, and one or two of these wells exceeded the 10 mg/l limit for nitrate-nitrogen. The sampling results indicate that the groundwater nitrate nitrogen concentration has declined significantly since the modified Ludzack Ettinger process was started at the WPCF in early 1997.

B. Chatham Surface Water Studies

1. **"Baseline Water Quality Studies of Selected Lakes and Ponds in the Cape Cod Drainage Area", December 1984, Department of Environmental Quality Engineering.** This report provides a summation of pond characteristics for Goose Pond and Schoolhouse Pond in Chatham. Information on location, water sample results, vegetation, bathymetry, dissolved oxygen and temperature profiles, and morphometric data (i.e. maximum width, length, depth, area, volume and length of shoreline) was provided.

2. **"Wastewater Leachate Assessment - Ryders Hill Project Frost Fish Creek and Ryders Cove" January 1987, Sanford Ecological Services, Inc.** This report was developed to identify the potential impacts of wastewater discharge from on-site systems at the proposed Ryders Hill development. Seventeen individual on-site septic systems were proposed for this development.

Existing groundwater studies indicated that groundwater flow from this property is in the direction of Frost Fish Creek, which flows into Ryders Cove. These waters were identified as Class SA waters by the Commonwealth of Massachusetts. Water samples were collected and analyzed and small increases in nutrient loading to the Creek were predicted, but did not appear to pose any threat to the water quality of Frost Fish Creek or Ryders Cove.

3. **"Monitoring Program of Tributaries to Pleasant Bay" December 1991, iEP, Inc.** The purpose of this monitoring program was to augment the amount of water quality data on Pleasant Bay, to include upstream creeks, ponds, and other natural drainage systems. The program included sampling of ten tributaries to Pleasant Bay, and stormwater runoff. The report identified Frost Fish Creek as having the largest impact on Pleasant Bay of all the tributaries, and recommended further study of this creek.

4. **"Comprehensive Harbor Management Plan" March 1992, Horsley Witten Hegemann, Inc.** The Harbor Management Plan for Stage Harbor was developed to address several issues, which threaten the fishing productivity and recreational assets of the Harbor system. These issues include:

- Public access to the waterfront.
- Harbor navigation.
- Maintenance of navigational depths.
- Harbor safety.
- Providing facilities for finfishing and shellfishing.
- Maintaining channels, piers and moorings for finfishing.
- Water quality and natural resource protection.
- Sources of pollution.
- Provisions of adequate recreational facilities.
- Pressures threatening the visual character of the shorefront.

5. **"Living Lakes Program Final Report - Schoolhouse Pond" March 1992, Living Lakes, Inc.** This report presented the results of lime addition to Schoolhouse Pond, to provide a less acidic environment suitable for stocking fish. The report summarizes the liming procedure, presents the results on water quality, and documents the results of annual fishery surveys. The liming of the pond resulted in water quality suitable for sustaining a recreational fishery.

6. **"Comprehensive Harbor Management Plan (CHMP) - Volume II" December 1993, Horsley Witten Hegemann, Inc.** The following passage from the report provides a concise summary of the CHMP:

> *The purpose of Volume II is to document the level of consistency between the Town's goals and policies for harbor management and the laws, regulations, and policies of the Massachusetts Coastal Zone Management (CZM), and state tidelands objectives and regulatory principles. In addition, the CHMP is intended to "amplify " (clarify) state waterway regulations for future permitting decisions by the Massachusetts Department of Environmental Protection (DEP). Harbor planning goals and policies and existing Town regulations that amplify state waterways regulation are described. Finally, approval is sought for Town substitution for minimum use limitations or numerical standards of the waterway regulations.*

7. **"Draft Coastal Embayment Technical Memorandum" October 1995, Cape Cod Commission.** This technical memorandum contains regional maps regarding watershed delineations for Cape Cod's coastal embayments. These recharge areas were proposed for adoption as Marine Water Recharge Areas for the Regional Policy Plan. The memorandum also describes two indices for use in assessing growth impacts and nitrogen loadings to sensitive embayments.

8. **"The Frost Fish Creek Water Quality Study" January 1995, Chatham Jr.-Sr. High School.** Two reports were developed to assess concerns on potential impacts to Frost Fish Creek from on-site treatment systems, pesticides, and stormwater runoff. Over a two year period the creek was analyzed for BOD, TDS, pH, DO, Turbidity, Nitrate, coliform and temperature. The students found pH, Nitrates, TDS, temperature, DO and BOD to be within expected limits for this marine environment. High coliform readings indicated possible threats to the water quality, and recommended further analysis of coliform at the creek.

9. **"Hydrodynamic and Tidal Flushing Study of Pleasant Bay Estuary, MA"**

October 1997, Aubrey Consulting, Inc. This report was prepared to study the tidal flushing for Pleasant Bay and several sub-embayments throughout the estuarine system. Data on tides, bathymetry of the bay, an analysis of tidal current patterns, and the effects of the New Inlet on tidal flushing. Results of the study indicated that the Pleasant Bay Estuary might be considered a rapidly flushing system, with over 50 percent of the water within the estuary being exchanged during a typical tidal cycle. Box culverts connecting Muddy Creek to Pleasant Bay have been identified as restricting flow and flushing characteristics to the Creek. This has been identified as significantly impacting this creek and resulting in the poorest flushing of the inland portions of the estuary.

10. **"Pleasant Bay Resource Management Plan" April 1998, The Pleasant Bay Technical Advisory Committee and Ridley & Associates, Inc.** The Resource Management Plan developed several goals including:

- Sustaining and regenerating the health and productivity of the Bay's ecosystem.
- Encourage recreational use of the Bay and watershed, which are comparable with the existing ecosystem.
- Provide greater public access to the Bay.
- Work to preserve the Bay's natural and cultural resources.

Some of the key findings of the management plan were the following:

- Water quality in Pleasant Bay is high, as a result of the increased flushing from New Inlet.
- The Bay's wildlife ecosystem is healthy, but some habitats have been loss due to the

increased flushing.

- A noticeable decline of shellfish, and finfish.

- Nutrient loadings from on-site treatment systems were identified as a major threat to the Bay. This finding is discussed in detail in Chapter 4.

C. Chatham Wastewater Treatment Facility Studies

1. **"Report on Proposed Sewerage System" September 1966, Whitman & Howard, Inc.** This was the original report regarding the existing WPCF. Developed prior to any centralized wastewater treatment facility or collection system, this report recommended the construction of secondary wastewater treatment facility to service the "Downtown" portion of Chatham. The report also briefly discussed the future connections of South and West Chatham. The report also outlined the wastewater treatment facility, and estimated costs and financing.

2. **"Facilities Plan for Wastewater Management - Volume I, Draft" June 1982, Metcalf & Eddy.** This report was developed to identify any additional wastewater treatment facilities necessary to alleviate problems with existing on-site systems or improve the existing WPCF. The report also included a hydrogeologic study for the WPCF site. The report identifies areas with on-site wastewater disposal problems, and proposes cost-effective ways to address these problems. The report also evaluated the WPCF's sludge disposal, grease disposal, and need for possible odor control facilities. Several areas of concern were identified throughout Chatham. Problems varied from poor soil conditions, high groundwater, and failed on-site septic systems. The report presented the following conclusions and recommendations:

- WPCF effluent plume flows towards Cockle Cove Creek.
- Nitrate-nitrogen from the WPCF exceeds 10mg/l downgradient of the site.
- Develop cluster disposal systems to address failed on-site systems.

- Improve on-site septic systems.
- Expansion of the public water supply system.
- Expansion of the sewer system.
- Various upgrade components to the existing WPCF.

3. **"Facilities Plan for Wastewater Management - Volume II, Draft" June 1982, Metcalf & Eddy.** This report represents Phase III of the Facilities Plan performed by Metcalf & Eddy. Phase III is the Environmental Information Document (EID) required by the National Environmental Policy Act (NEPA) for all federally funded projects. The purpose of this report was to identify potential impacts of the recommended plan, respond to public comments, and outline mitigation measures to reduce these impacts. The impacts that were evaluated included:

- Groundwater.
- Population, land use and zoning.
- Historic and archeological resources.
- Transportation.
- Air quality.
- Surface water resources.
- Natural wildlife resources and environmental sensitive areas.

The impact analysis found the following:

- Improved groundwater quality.
- Land use and recreation will have no major impacts.
- No major impacts on historical and archeological resources.
- Increase traffic during construction phases only.
- Short term impacts to surface waters and natural habitats as a result of construction.
- Reduced odors.

4. **"Alternative Effluent Disposal Sites - Volume I, Draft" July 1988, Metcalf & Eddy.** This report was developed as a follow-up report to the 1982 Wastewater Management Facilities Plan by Metcalf & Eddy. The report was the result of the DEP (previously called DEQE) requiring a temporary halt to the facilities plan until a suitable discharge area could be found. The purpose of this report was to:

- Update the sewering needs, demographics and projected flows from the 1982 report.
- Evaluate alternative effluent discharge sites and recommend one for further study.

This report identified some additional areas needing sewers. Ten alternative disposal sites/methods were identified and evaluated including: ocean disposal; land disposal at various sites in town including the existing site, deep well injection, irrigation of golf courses, and discharge to Cockle Cove Creek. Four potential sites were identified, two land disposal sites, direct discharge to Cockle Cove Creek, and modification to the existing discharge site which included use of a slurry wall to direct groundwater flow to the south. Modifications to the existing WPCF were also recommended including sludge handling and disposal.

5. **"Alternative Effluent Disposal Sites - Volume II, Draft" July 1988, Metcalf & Eddy.** This report provides the Appendices for Volume I, including:

- The Administrative Consent Order.
- Selected Massachusetts Laws and Regulations.
- Sole Source Aquifer Designations.
- Metter Site - Stratigraphic Logs.
- Sludge Analysis.
- Public Participation.

6. **"Report on First Year of Operation" March 1992, Metcalf & Eddy.** The purpose

of this report was to evaluate the design criteria and operation of the new sludge dewatering building. According to the report the new facility was operating properly, with only minor adjustments to equipment. The report recommended further polymer testing to optimize belt filter press performance, and digester operation changes to also aid in the optimization.

7. **"Wastewater Treatment Facility Modifications" December 1995, Woodard & Curran.** This report was developed to identify and evaluate nitrogen removal options for the existing WPCF. The report examined five different treatment technologies including: Anoxic / Aerobic activated sludge; rotating biological contactors (RBCs); sequencing batch reactors (SBRs); submerged packed bed reactors; and constructed wetlands. Anoxic/Aerobic activated sludge method using the Modified Ludzack-Ettinger approach was the recommended method. The plan also included modifications to provide septage degritting using a vortex degritter and classifier.

8. **"One Year Certification Report - Wastewater Treatment Facility Modifications for Nitrogen Control and Septage Degritting" February 1998, Woodard & Curran.** This report summarizes the performance of the WPCF 1996 upgrade of the existing activated sludge process to the MLE process. First year results of the MLE process are as follows:

- BOD_5 average effluent concentration was 5.5 mg/l.
- TSS average effluent concentration was 6.2 mg/l.
- Effluent Total Nitrogen ranged from 11.89 mg/l to 0.4 mg/l.
- The facility averaged 85 percent removal of Total Nitrogen.
- Two exceedances of the 10 mg/l limit occurred in March and April.
- The average effluent nitrate-nitrogen was 3.2 mg/l down from 9.2 mg/l prior to the installation of the MLE process.

Based on these results the MLE process modifications were meeting the performance requirements of the design.

D. Chatham Sewer and Collection System Studies

1. **"Infiltration / Inflow analysis" September 1989, Metcalf & Eddy.** This report was developed as part of the Town of Chatham's compliance with the Administrative Consent Order No. 700 issued by the Massachusetts Division of Water Pollution Control on October 28, 1987. This order limited the effluent discharge from the WPCF to 36,500,000 gallons per year. The main goal was to identify and repair areas of I/I to reduce the treatment plant effluent discharge flows, which have almost reached the limit set by the consent order.

A peak hour I/I flow was identified as 123,000 gpd which exceeds the 100,000 gpd average discharge flow established by the consent order. A Sewer System Evaluation Survey (SSES) was recommended for the entire Chatham sewer system.

2. **"Sewer System Evaluation Survey" July 1992, Metcalf & Eddy.** This report was developed as a result of the Metcalf & Eddy 1989 I/I report. The report had the following recommendations:

- Periodical monitoring of WPCF flow rates to determine increased infiltration rates.
- Rehabilitation of all sewer manholes identified in report as requiring repair.
- Disconnect private inflow sources (i.e. sump pumps) from sewer system.

E. Chatham Town Planning Documents

1. **"Town of Chatham - Open Space and Recreation Plan" October 1985, Town of Chatham.** This plan provides a background on the Town of Chatham, its physical characteristics and an inventory of natural resources and recreational facilities. The plan also identifies the Town's goals to preserve these resources, identifying water supply and recreational needs. A five year action plan was also prepared as part of this report.

2. **"Growth Policy Plan" 1988, Long Range Planning Committee.** The growth policy plan identifies several goals with respect to wastewater treatment and discharge:

- To protect the quality and quantity of drinking water and provide for safe, effective treatment of wastewater.

- Protect the quality of Chatham's coastal and inland waterways and ponds for recreation, fishing and related uses.

- Provide safe, effective disposal and recycling of solid waste.

- Encourage a stable but diverse population base, providing the necessary services for a variety of income levels and age groups.

- Control the location and rate of residential and commercial development to protect natural, and cultural resources and the aesthetic character of Chatham.

3. "**Community Vision Statement" November 1994, Long Range Planning Committee.** The vision statement identified seven major concerns, which should be addressed in the Local Comprehensive Plan. These include:

- Increased automobile traffic and parking which undermine the Town character and present safety concerns in the village centers.

- Possible loss of the fishing industry.

- Increased population.

- Decrease in natural resources, especially along the waterfront.

- Decline in open space and scenic vistas.

- Increased pollution of estuaries, lakes, creeks and shellfish beds.

- Loss of historic and archeological sites.

4. **"Community Profile" December 1994, Town of Chatham.** Provides Town background, history and demographic information. This information includes Chatham's population, economy, geography, development, and community facilities.

5. **"An Economic Study of the Town of Chatham, Massachusetts" December 1996, Friends of Chatham Waterways.** This report presents information on Chatham's population, economic make-up and indicators of future growth. Some of the findings are listed below:

- Chatham's population has grown 41.7 percent between 1970 and 1990.
- More than one-third of Chatham's residents are 65 or over.
- Retirement income comprises a larger share of household income than for Massachusetts or the United States.
- Chatham is one of the east coast's most prosperous fishing ports.
- Residential properties account for 91 percent of the Town's tax base.
- Sixty percent of the residential properties are owned by out-of-town residents.

6. "**Monomoy Capacity Study" July 1996, Cape Cod Commission.** This report was

developed by the Cape Cod Commission to study growth impacts to the towns of Brewster, Chatham, Dennis, Harwich and Orleans. The study examines the impacts of growth on: water resources, transportation, natural resources, open space and fiscal impacts. Transportation and water supply were identified as the two issues to be impacted most by growth.

Nitrogen loadings from on-site septic systems, run-off, and other sources pose the greatest threat to water quality. The study predicted that growth under the current trend could lead to nitrate-nitrogen limits exceeding the 5ppm limit under buildout conditions. The report also indicated that many key natural resources are located outside existing protected open space.

Several recommendations to help deal with capacity constrains are as follows:

- Identification and protection of potential well sites.
- Use of enhanced wastewater treatment technologies.
- Changes in zoning regulations.
- Use of transit and travel demand management systems.
- Purchase of open space to reduce travel demand, protect water quality, and preserve valuable habitat.

2.3 MAPPING

The following maps were reviewed for this Needs Assessment Report:

- Chatham Quadrangle Topographical Map.
- Harwich Quadrangle Topographical Map.
- Monomoy Lens Water Resource Protection Map*.
- Town of Chatham Land Use and Existing Water Resources*.

The maps indicated with an asterisk (*) were prepared by the Geographic Information Service (GIS) Unit of the Cape Cod Commission through on-going work with the Town of Chatham. In addition to these maps, the Town of Chatham is in the process of developing their own GIS system, which will incorporate this information along with aerial photography data of the Town from the 1990 fly over.