ConnecticutWater

WATER SUPPLY PLAN

(Approved by DPH)

NORTHERN REGION

SEPTEMBER 2006

WATER SUPPLY PLAN
NORTHERN REGION

TABLE OF CONTENTS

WATER SUPPLY PLAN
NORTHERN REGION

List of Figures and Tables

APPENDICES

Title	Reference Chapter(s)	Appendix
Franchise Agreements	1	A
Interconnection Agreements	2	B
Water Quality Data	2	C
Safe Yield Data	2	D
System Production Data	4	E
Financial Plan Exhibits	1	F
Water Conservation Plan	4	G
Emergency Contingency Plan	2	H
Supply and Land Use Maps	2, 3	I
Distribution System Maps	2	J

CHAPTER 1

COMPANY STRUCTURE
ASSETS AND FINANCIAL PLANNING

CHAPTER 1

COMPANY STRUCTURE AND ASSETS
FINANCIAL PLANNING

1.1 OWNERSHIP

The Connecticut Water Company (CWC) is a wholly owned subsidiary of Connecticut Water Service, Inc. Connecticut Water Service, Inc. is a chartered Connecticut corporation, also holding all assets of the former Crystal Water Company of Danielson; Gallup Water Service, Inc. and Unionville Water Company (which in 2006 all merged with CWC); New England Utility Services, Inc.; Connecticut Water Emergency Services, Inc.; and Chester Realty, Inc.

CWC is specially chartered by the General Assembly of the State of Connecticut as a public service company, and the rates and operations of CWC are regulated by the Connecticut Department of Public Utility Control (DPUC).

CWC supplies water for residential, commercial, industrial and municipal purposes in various areas in the State of Connecticut through five operating regions. Connecticut Water Service, Inc. and CWC represent the second largest investor-owned water system in Connecticut in terms of operating revenue and utility plant investment.

CWC supplies water and provides fire protection in all or portions of 41 towns in Connecticut. The service areas have an estimated residential population of approximately 280,000 people. The service area for the Northern Region is comprised of 13 towns with a residential population of approximately 111,000 people (based on 3.5 persons per customer). Each of the Company's operating Regions serves as separate franchise areas. Effective January 1, 1988, rates were equalized for all Regions (except for some satellite systems and the later Crystal, Gallup and Unionville acquisitions). The systems of the three operating Regions are not physically interconnected.

The agent for service and legal address of the Company is as follows:

Ms. Michele DiAcri
Corporate Secretary
The Connecticut Water Company
93 West Main Street
Clinton, CT 06413

1.2 OFFICERS OF CONNECTICUT WATER SERVICE, INC. AND THE CONNECTICUT WATER COMPANY

Marshall. T. Chiaraluce
Chairman and Executive Officer

Eric W. Thornburg
President and
Chief Executive Officer

David C. Benoit
Vice President
Finance/Chief Financial Officer and
Treasurer

Maureen P. Westbrook
Vice President
Administration and
Government Affairs

Terrance P. O'Neill
Vice President
Operations and Engineering

Thomas R. Marston
Vice President
Planning and Treatment

Peter J. Bancroft
Director Rates and Forecasting and
Assistant Treasurer

Michael G. DiAcri
Corporate Secretary

Daniel J. Meaney
Assistant Corporate Secretary

1.3 BOARD OF DIRECTORS OF CONNECTICUT WATER SERVICE, INC. AND THE CONNECTICUT WATER COMPANY

The Connecticut Water Service, Inc. is the parent company of The Connecticut Water Company. The Stockholders of CTWS vote each year to elect certain Board of Directors whose terms have expired.

Marshall T. Chiaraluce
Chairman and Executive Officer

Eric W. Thornburg
President and CEO

Mary Ann Hanley
Assistant to President, St. Francis Hospital and Medical Center

Marcia L. Hincks
Retired; former Vice President and Senior Counsel
Aetna Life and Casualty Company

Mark G. Kachur
President and CEO, CUNO, Inc.

Ronald D. Lengyel
Chairman of the Board of Naugatuck Valley Savings & Loan Association

David A. Lentini
Chairman, CEO, The Connecticut Bank and Trust Company

Robert F. Neal
Retired; former Senior Vice-President, SNET

Arthur C. Reeds
Retired; Trustee, US Allianz Variable Insurance Product Trust

Lisa Thibdaue
Vice President, Regulatory Affairs and Compliance
Northeast Utilities

Carol P. Wallace
President and CEO, Cooper-Atkins Corporation

Donald B. Wilbur
Retired; former Plant Manager
Unilever HPC, USA

Heather Hunt
Attorney

1.4 ORGANIZATIONAL STRUCTURE

The stockholders elect the Board of Directors, who decide major policy matters and declare dividends, if any.

Corporate planning, budget management, financial, human resources and operational planning are carried out by the President in conjunction with the appropriate officers and managers.

The Vice President of Planning and Treatment is responsible for the planning and protection of sources of supply, land management, implementing the aquifer mapping and diversion permit programs, and for the development and administration of policies, plans and programs related to water quality, supply, treatment, and distribution. The Director of Water Quality and Treatment coordinates functions relating to water quality, water treatment, and supply and demand issues and oversees operations along with the Water Quality Supervisor who directs the management and reporting of water quality records. The Vice President also acts as the Company Review Officer to investigate and review customer complaints as provided for in DPUC regulations.

The Vice President of Operations and Engineering is responsible for the supervision, planning, organization, and performance of all company operations, the design and construction of facilities, development of long-range facility construction programs and improvements and conventional engineering functions. The Manager of Operations and Field Services directly oversees the operations at the Northern Region office and coordinate these activities with the Operations and Field Services Supervisor as necessary. Functions such as metering, sanitary surveys, sampling, cross connection inspections, and customer inquiries are handled in accordance with policies and directions established by the corporate managers.

The Vice President of Finance directs financial planning, budget reporting, and accounting through the Controller. He is also the Treasurer and is responsible for cash management and insurance issues. Any rate request applications to the DPUC are coordinated through this office.

The Vice President of Administration and Government Affairs is responsible for all functions or activities related to public relations, customer communications and coordination with government agencies. Under her direction, the Director of Information Services and Business Services oversees all data processing operational responsibilities and the Manager of Purchasing and Building Services coordinates all company purchasing.

1.5 CERTIFICATION

Water Treatment and Distribution

Section 25-32 of the Public Health Code requires all community water systems to have at least one appropriately certified treatment plant operator and distribution system operator. Given the extent and complexity of CWC's service areas and distribution systems, it is necessary to have a number of people certified for treatment and distribution system operations. CWC currently has 50 certified treatment and distribution system operators on staff. The Company supports the certification program and is committed to providing ongoing training and certification of staff. The following list of certified staff is, therefore, continually changing as staff complete additional levels of certification.

CWC CERTIFIED OPERATORS

OPERATOR NAME	CERTIFICATION	CHIEF OPERATOR
Rockville WTP, Stafford WTP		
Chris Parison	Class IV Plant, Class III Dist.	Chris Parison
Robert Bell	Class IV Plant, Class III Dist.	
Ronald Bamforth	Class IV Plant	
Northern Region		
Michael Cunningham	Class II Dist.	Michael Cunningham
Adam Soltys	Class II Plant, Class III Dist.	
Paul Furlani	Class II Plant, Class III Dist.	
Robert Lessig	Class II Plant	
James Tarnowicz	Class II Plant	
Donald Brierley	Class II Plant, Class Dist. III	
Michael Blaine	Class IV Plant	
Mike LaBianca	Class II Plant	
Christopher Wojciak	Class III Dist.	
Herb Hakey	Class IV Plant	
Corporate		
Kevin Walsh	Class III Dist., Class IV Plant	
Tom Marston	Class IV Plant	
Dan Lesnieski	Class III Dist., Class II Plant	
Don Schumacher	Class II Dist., Class II Plant	
John King	Class II Dist.	
Steve Melanson	Class III Dist., Class II Plant	

CWC Certified Cross Connection Inspectors

Section 25-32-11 of the Public Health Code requires that each community water supply which serves 1000 or more persons shall employ at least one person who has completed and passed (1) a course on testing of back flow preventers and (2) a course on cross connection inspections; administered or approved by the Department of Public Health. The Company has the following certified inspectors/testers:

CWC CERTIFIED CROSS CONNECTION STAFF
GENERAL TESTER/ INSPECTORS

NAME	REGION
Raymond Adamaitis	Naugatuck
Steve Sirica	Naugatuck
Raymond Foster	Naugatuck
Bryan Cottrell	Naugatuck
Dan Starziski	Naugatuck
Gene Ely	Shoreline
Peter Ray	Shoreline
David Hines	Shoreline
Robert Sehl	Shoreline
Candace Cameron	Shoreline
Mike Garritty	Shoreline
Walt Miezejeski	Shoreline
Carlos Rodriguez	Shoreline
Mike Keating	Shoreline
Donald Brierly	Northern
Herbert Hakey	Northern
Jim Tarnowicz	Northern
Joe Donahue	Northern
Shorney Douet	Northern
Keith Larson	Northern
Barry Dawley	Eastern
Thomas Kearney	Eastern
Peter Pezanko	Eastern
Randy Kempain	Eastern

1.6 FRANCHISE RIGHTS AND CONSTRAINTS

In common with most water companies in Connecticut, CWC derives its rights and franchises to operate from special acts of Connecticut General Assembly, which are subject to alteration, amendment or repeal by the General Assembly and which do not grant exclusive rights to CWC in its service areas.

Subject to such power of alteration, amendment or repeal by the Connecticut General Assembly and subject to certain approvals, permits and consents of public authority and others prescribed by statute and by its charter, CWC has, with minor exceptions, valid franchises free from burdensome restrictions and unlimited as to time, and is authorized to sell potable water in or near the towns (or parts thereof) in which water is now being supplied by CWC.

In addition to the right to sell water as set forth above, the franchises of CWC include rights and powers to erect and maintain certain facilities on public highways and grounds, all subject to such consents and approvals of public authority and others as required by law. Under the Connecticut General Statutes, CWC, upon payment of compensation, may take and use such lands, springs, streams or ponds, or such rights or interests therein as the Connecticut Superior Court, upon application, may determine is necessary to enable CWC to supply potable water for public or domestic use in its franchise areas.

A summary listing of the acts and franchise agreements for the Company's Northern Region is provided below and included in Appendix A. While intended to be comprehensive, this list many not necessarily be all inclusive. It is not appropriate or practical to attempt to summarize these acts beyond the concise titles listed below. An abridgment or summary may lead to incorrect interpretations or unintentionally omit details which could be important to their understanding. The acts need to be considered in their entirety to fully understand their intent.

ACT - TITLE	DATE APPROVED
Incorporating the Broad Brook Company	1849
House Joint Resolution No. 53 Amending the Charter of the Broad Brook Company	March 19, 1885
Substitute for Senate Bill No. 119 An Act Amending the Charter of the Broad Brook Company	April 17, 1939
House Bill No. 3915 An Act Concerning Creation of the Broad Brook Water Company	June 16, 1959

ACT - TITLE	DATE APPROVED
House Bill No. 2869 An Act Amending the Charter of the Broad Brook Water Company	April 25, 1961
Incorporating the Rockville Aqueduct Company	June 27, 1866
Senate Joint Resolution No. 78 Incorporating the Rockville Water and Aqueduct Company	March 1, 1893
Senate Joint Resolution No. 96 Authorizing the Rockville Water and Aqueduct Company to Issue Bonds	May 5, 1893
Senate Joint Resolution No. 286 Amending the Charter of the Rockville Water and Aqueduct Company	May 18, 1893
Senate Joint Resolution No. 146 Amending the Charter of the Rockville Water and Aqueduct Company	April 17, 1901
House Joint Resolution No. 388 Amending a Resolution Authorizing the Rockville Water and Aqueduct Company to Issue Bonds	May 18, 1905
Substitute for House Bill No. 260 An Act Authorizing the Rockville Water and Aqueduct Company to Issue Bonds	April 19, 1923
House Bill No. 1964 An Act Authorizing the Military Department to Enter Into An Agreement with the Rockville Water and Aqueduct Company Concerning the Installation and Maintenance of a Water Main.	May 5, 1955
House Bill No. 2420 An Act Authorizing the City of Rockville to Purchase the Rockville Water and Aqueduct Company	June 17, 1957
Substitute for House Bill No. 3383 An Act Amending the Charter of the Rockville Water and Aqueduct Company	June 29, 1959

ACT - TITLE	DATE APPROVED
Senate Joint Resolution No. 133 Amending Charter of the Windsor Locks Water Company	April 25, 1887
Incorporating the Thompsonville Water Company	March 24, 1880
Incorporating the Stafford Springs Aqueduct Company	April 17, 1883
Incorporating the Windsor Locks Water Company	March 31, 1887
Amending the Charter of the Thompsonville Water Company	March 25, 1885
House Joint Resolution No. 68 Amending the Charter of the Thompsonville Water Company	March 24, 1887
House Joint Resolution No. 28 Amending the Charter of the Thompsonville Water Company	February 26, 1889
Substitute for Senate Joint Resolution No. 15 Amending the Charter of the Windsor Locks Water Company	February 28, 1889
House Joint Resolution No. 112 Incorporating the Village Water Company of Suffield	May 3, 1895
House Joint Resolution No. 192 Authorizing the Thompsonville Water Company to Increase Its Capital Stock	April 17, 1901
Senate Joint Resolution No. 49 Authorizing the Thompsonville Water Company to Increase Its Capital Stock	March 9, 1911
Substitute for Senate Bill No. 293 An Act Amending the Charter of the Thompsonville Water Company	May 19, 1915
An Act Extending the Time Within Which the Somers Electric Company May Organize and Amending the Charter of Said Company	May 10, 1915
An Act Incorporating the Suffield Water Company	May 19, 1915

ACT - TITLE	DATE APPROVED
Senate Bill No. 492 An Act Extending the Time Within Which the Suffield Water Company May Organize	April 16, 1917
Substitute for House Joint Resolution No. 318 Incorporating the Somers Water Company	June 30, 1905
Substitute for House Bill No. 942 An Act Changing the Name of the Somers Electric Company to the Somers Water Company and Amending the Charter of Said Company	May 7, 1917
An Act Incorporating the Ellington Water Company	April 1, 1915
House Bill No. 1087 An Act Amending the Charter of the Connecticut Water Company	May 22, 1957
Substitute for House Bill No. 3039 An Act Concerning the Territory of the Vernon Water Company	May 29, 1968

1.7 ASSETS

Water Company owned land and sources of supply are shown on the Supply and Land Use Maps in Appendix I. Sources of supply are summarized in Chapter 2. Storage, treatment, pumping, transmission and distribution facilities are shown on the distribution system maps, and are summarized in table form in Chapter 2, Section 2.1.

1.8 PAST AND PRESENT FINANCIAL STATUS

To develop and implement a comprehensive water supply plan CWC must provide a clear and concise description of the current financial status of the utility.

All projections should be read with reference to the assumptions upon which they are based.

These enclosures include:

- The Connecticut Water Company's Annual financial statements for the years ending 2004 and 2005, see Appendix F, Exhibit A.
- Connecticut Water Service, Inc.'s Financial statements for the years ending 2004 and 2005, see Appendix F, Exhibit B.
- Revenue Analysis, page 413, of The Connecticut Water Company's Annual Report to The Department of Public Utility Control (DPUC) for the years 2005, 2004, and 2003, see Appendix F, Exhibit C.

1.9 REVENUE SOURCES OF FUTURE EXPENDITURES

The Company does not specifically finance capital improvements from a specific "revenue source". Financial resources that have been identified for funding sources include:

- Internal sources, including net income and depreciation net of dividends paid.
- Interim loans.
- Permanent financing including equity and debt financing net of repayments.

1.10 ALLOCATIONS OF REVENUE SOURCES

The Company does not allocate funds to specifically finance each major improvement constructed. The ability of the Company to construct, maintain and operate successfully is ultimately dependent on rates that the DPUC approves and the corresponding reaction to those rates by the financial markets in determining the cost of funds to invest in and loan to the Company and the Company's management's technical, managerial and financial expertise as factors leading to the Company's successful operation. If the Company does not maintain a stream of income and/or funds sufficient to support the pay back of principal and interest and dividend costs of the required future financing, the financial markets will be closed to the Company.

1.11 ASSESSMENT OF RATES

The Company was under the same rate structure since 1991. In 2006 the Company applied for a rate increase which was granted effective January 1, 2007. A copy of the Company's rates and a listing of the amounts of quarterly billings for different consumption levels are shown in Appendix F, Exhibit D.

1.12 BALANCE SHEETS

The Department of Public Utility Control (DPUC) has requested a pro forma balance sheet for two (2) consecutive years. A simplified balance sheet, including pro forma balance sheets for two consecutive years, is presented in Table 1.12.1.

Revised 6/07

Table 1.12.1 Connecticut Water Company -Simplified Balance Sheet

Balance Sheet
2002, 2003, 2004, 2005
(in thousands)

	2002 Actual	2003 Actual	2004 Actual	2005 Actual
Utility Plant - Net	$ 192,419	196,568	201,760	209,670
Other Assets	28,841	37,955	35,419	36,357
	$221,260	234,523	237,179	246,027
	=====	=====	=====	=====
Common Equity	$ 69,028	71,246	73,735	74,921
Long Term Debt	61,590	61,865	62,305	72,305
Total Capitalization	$ 130,618	133,111	136,040	147,226
Other Liabilities	$ 43,967	51,720	47,528	42,506
CIAC and Advances	$ 46,675	49,692	53,611	56,295
	$221,260	234,523	237,179	246,027
	=====	=====	=====	=====

The Company has a long-term target capital structure of 50% debt and 50% equity (±15%). The actual 12/31/05 debt to equity ratio is 49% debt and 51% equity.

The long-term capital structure will ultimately be achieved through some or all of the following actions:

1) Capital contribution from Parent;
2) Permanent financing of some or all of the advances from Parent;
3) General equity insurance of Parent;
4) Additional long-term financing against Company's assets.

1.13 PROPOSED FINANCING

The DPUC has requested "complete information on proposed financing arrangements associated with the above proposed capital budget should be given such as source of capital, type of instrument, interest rate, principal and interest payments, term, security and other covenants that may increase actual rate such as compensating balances. This should be done for both short term as well as long term arrangements."

The Statement of Cash Flows included in the Company's annual reports identify the amounts of external financing, including equity and long term debt, that is required to finance the capital budgets. Therefore, the sources of capital are identified.

The type of instrument is more difficult to project. Generally new issues of debt have been either promissory notes or First Mortgage Bonds, taxable or tax exempt. The specific alternatives cannot be projected at this time.

The other items requested, interest rate, interest payment, term, security and other covenants, cannot be accurately forecasted as they require the ability to forecast the requirement of financial markets.

CHAPTER 2

SOURCE DESCRIPTION/SYSTEM OPERATION
SAFE YIELD
INTERCONNECTIONS
OPERATION AND MAINTENANCE PROGRAM
EMERGENCY CONTINGENCY PLAN

CHAPTER 2

SOURCE DESCRIPTION/SYSTEM OPERATION
SAFE YIELD
INTERCONNECTIONS
OPERATION AND MAINTENANCE PROGRAM
EMERGENCY CONTINGENCY PLAN

2.1 SOURCE DESCRIPTION AND SYSTEM OPERATION

The Connecticut Water Company Northern Region is divided into three main noncontiguous systems: Western, Somers, and Stafford. The Western System is the largest system in the Northern Region and serves portions of the Towns of East Windsor, East Granby, Ellington, Enfield, South Windsor, Suffield, Tolland, Vernon and Windsor Locks. The Somers System serves a portion of the Town of Somers and the Stafford System serves a portion of the Town of Stafford. Two small consecutive water systems – Reservoir Heights and Crescent Lake – serve relatively small areas within the Towns of Vernon and Enfield, respectively. In addition, the Company owns and operates the Llynwood, Lakewood/Lakeview, and Nathan Hale satellite systems. These small, non-interconnected satellite systems serve isolated areas within the Towns of Bolton and Coventry.

Supply is provided by four active surface water reservoirs and forty-nine wells. An additional well is available for emergency use. The Crescent Lake and Reservoir Heights Systems are supplied by water purchased from the Towns of East Longmeadow, MA and Manchester, CT, respectively.

Active sources are DPH approved supplies for which water quality meets all applicable standards. They are permanently connected to the water supply system and may be year-round or seasonal supplies. Emergency sources may or may not meet water quality standards and require DPH approval prior to their use. The location of existing sources, surface water reservoir watershed areas, well initial setback, recharge and contribution areas, as determined by Level A and/or B Aquifer Mapping conducted pursuant to CGS Sec. 22a-354c, are identified in Appendix I, Supply and Land Use Maps.

Physical data for surface water and ground water sources are summarized in Tables 2.1.1 and 2.1.2, respectively. Pertinent information about water treatment facilities is summarized in Table 2.1.3.

A central station monitor is located in the Northern Region office, which receives telemetered information from pump stations, wells, treatment facilities and storage tanks. It allows the Region to monitor pumping rates, production rates and tank levels throughout the systems at a glance. The central station also receives alarm conditions for all facilities. Physical data relating to storage facilities are presented in Table 2.1.4 and 2.1.4a. Physical data for each pumping facility are summarized in Table 2.1.5.

Water quality data for the various supplies and distribution systems in the Northern Region for the period 2001 to 2005 are contained in Appendix C. The tables listing these data include quality standards established by the USEPA and the Connecticut Department of Public Health, minimum, maximum and, where appropriate, average values for individual water quality parameters, the number of samples collected and pertinent comments.

Much of the data contained in Appendix C is not regulated, such as heavy metal inorganic parameters for raw groundwater supplies. All regulated water quality testing is reported monthly to DPH in compliance with the Safe Drinking Water Act and the Connecticut Public Health Code. Due to its volume, this information is not included in this report but is available at the DPH or at the CWC Office in Clinton.

The water quality data section discusses areas where either non-compliance with existing standards or problems with non-regulated constituents are identified. Source protection information and customer complaint files were reviewed to identify existing or potential quality problems.

TABLE 2.1.1 EXISTING SURFACE WATER SOURCES

NAME	SURFACE AREA (ACRES)	INCREMENTAL WATERSHED AREA (SQ. MI.)	TOTAL STORAGE (MG)	USABLE STORAGE (MG)	99% SAFE YIELD (MGD)	AVAIL. SUPPLY (MGD)	MAX. SHORT TERM TREAT. CAPACITY (MGD)	INTAKE STRUCTURE SIZE (INCHES)	INTAKE STRUCTURE ELEVATION (USGS)	OPERATING STATUS

* COMBINED RESERVOIR SYSTEM

TABLE 2.1.2 EXISTING GROUND WATER SOURCES

NAME	TYPE OF WELL	DEPTH (FEET)	DIAMETER (INCHES)	TYPE OF PUMP	PUMP CAPACITY (MGD)	SAFE YIELD (MGD)	AUTHORIZED WITHDRAWAL (MGD) [1]	AVAILABLE SUPPLY (MGD)	OPERATING STATUS
WESTERN SYSTEM									

.xls

TABLE 2.1.2 EXISTING GROUND WATER SOURCES, CONTINUED

NAME	TYPE OF WELL	DEPTH (FEET)	DIAMETER (INCHES)	TYPE OF PUMP	PUMP CAPACITY (MGD)	SAFE YIELD (MGD)	AUTHORIZED WITHDRAWAL (MGD) [1]	AVAILABLE SUPPLY (MGD)	OPERATING STATUS

TABLE 2.1.3 Water Treatment Facilities

TABLE 2.1.4 Water Storage Facilities

TABLE 2.1.4a Small Water Storage Tanks

TABLE 2.1.5 Pumping Facilities

Western System

Surface Water Sources and Rockville Water Treatment Plant

Lake Shenipsit Reservoir serves as the sole surface water source for the Western System. Water is withdrawn for treatment and distribution at the Rockville Water Treatment Plant, a 6.0 MGD conventional filtration plant equipped with granular activated carbon filtration.

Treated water from the Rockville WTP has consistently met all DPH and EPA (primary) water quality standards including the SWTR filtration and disinfection performance standards.

A conceptual design for the expansion of the Rockville Water Treatment Plant exists and it is expected to be initiated within the 20 year planning period. Commensurate with the expansion of the plant, distribution improvements, to deliver the additional water throughout the system, will be required.

Ground Water Sources

The Hunt, Powder Hollow and Spring Lots Well Fields are the primary ground water supply sources for the Western System. Other active supply sources include the Windsor Locks, O'Bready, Mapleton, West Suffield, Vernon, Woodland Park, Pine Knob, Ellsworth and Torry Road wells. The Vernon No. 3 well is reserved for emergency use. All active supplies receive fluoridation, with the majority also receiving treatment for disinfection.

Due to water quality concerns, the Broad Brook Wells No. 1, No. 2 and No. 3, Farnham Estates Well, Windsor Locks bedrock well, and Torry Road Wells No. 1 & 2 are inactive sources of supply. The Ellington Well and Heritage Woods bedrock wells are also inactive sources with historic yield and/or water quality concerns. The Windsor Locks Gravel-Packed Well, Torry Road Well No. 4 and Kupchunos Well are potential future use supplies and, as such, inactive sources. Physical data for each ground water source are summarized in Table 2.1.2. Sources for which the Company has no plans for future use are identified in Table 2.1.1. It is the Company's intent to apply to DPH for their abandonment in accordance with CGS Sec. 25-37c.

System Hydraulics

Water Quality

Shenipsit Lake Reservoir

Shenipsit Lake Reservoir and its tributaries are rated as Class AA (Connecticut Water Quality Standards and Classifications, DEP, February, 1993). Lake Shenipsit Reservoir is considered a low hardness, low alkalinity water. The pH values ranged from 5.96 to 7.39 for the period, while raw water color averaged 28 color units and turbidity averaged 1.24 NTUs. Total coliform bacteria ranged from 0 to 1900 per 100 ml, with an average of 67 per 100 ml. Organic and inorganic compounds have been monitored in the raw water and remain below applicable MCLs. Sodium levels ranged from 1.0 to 10.9 mg/L and averaged 8.46.

Historically, the reservoir has experienced algae blooms and moderate levels of iron and manganese which can pose water treatment problems. Although not unusual for a lake classified as mesotrophic, these conditions are also associated with anoxic conditions or hypoxia in the deeper depths of the lake. Since 1987, CWC has been using hypolimnetic and layer aeration systems in the reservoir. This in-lake management technique adds oxygen to the lake to decrease soluble iron and manganese levels and minimize nutrients that might otherwise become available for algae growth. As a result, water quality conditions in the lake have gradually improved. This has resulted in less frequent algal blooms, which reduces the need to use copper sulfate for algae control and improved color, turbidity and transparency readings.

Western System Wells

There are 28 active wells in the Western System and, in spite of their geographic diversity, they share certain water quality characteristics; generally, they are moderate to high hardness waters with total hardness as $CaCO_3$ of 66 to 192 mg/L with an average of 145 mg/L. The average pH and alkalinity for the Western well supplies are 7.5 and 85 mg/L, respectively. The pH values typically range from 7.2 to 8.5. The finished water quality generated by the Western System wells and the Rockville WTP is generally non-corrosive in nature and has been deemed optimized for corrosion control under the EPA Lead and Copper Rule. This finding is based upon a corrosion control study conducted by an independent engineering consultant and approved by the DPH.

All production wells that are used routinely (in production most of the year) are fluoridated. Some wells receive pH adjustment and corrosion control treatment along with disinfection. Individual source treatment and quality concerns are detailed below.

Broad Brook Wells

The Broad Brook wells 1 and 2 are off-line due to EDB contamination identified in 1993. Treatment with GAC contactor units similar to those at O'Bready Well and Windsor Locks will be installed if and when use of the wells is needed. During the period of 1989 -1992, Trichloroethylene was detected in Wells 1 and 2 a total of 7 samples out of 34 samples collected. All of the results were below the MCL of 0.0050 mg/L. Well 3 has been off-line for several years due to iron bacteria problems. When the wells were operated they received chlorination and corrosion control treatment.

Ellsworth Estates Well

The Ellsworth Estates water system was acquired by CWC in 1993 and interconnected with the Western System. Well number 3 remains an active supply, while Wells 1 and 2 were abandoned due to elevated Nitrate levels.

The distribution system in Ellsworth Estates has some small diameter (4") plastic pipe and small diameter (1") galvanized pipe. Due to low flow conditions in the area, elevated levels of heterotrophic bacteria were detected in 1994. In response, CWC has taken all the atmospheric tanks and all but one hydropneumatic tank off line and flushes the system routinely. The system will continue to be monitored. Future plans include replacement of all galvanized pipe with properly sized ductile iron water main located in the public right of way.

Hunt Well Field

The Hunt well field includes six wells numbered 5 through 10. Well #10 was completed in 2000 and replaced Well #4, which was abandoned due to low yield. The wells have moderate to high levels of iron and manganese in the raw water. Well number 7 has the highest iron concentrations and is used infrequently. The well water is treated by green sand filtration (Five ferrosand filters) at the Hunt WTP, which was built in 1974. The raw water pH levels usually range from 6.4-8.2. Post filtration chemical addition includes hydrofluosilicic acid (fluoride), sodium hexametaphosphate and chlorine. The plant has a long history of very effective treatment of water from the Hunt well field.

Mapleton Wells

Mapleton Wells 1 and 2 in Suffield receive chlorination, fluoridation and corrosion control treatment at Mapleton Station. Treated water quality has consistently met all DPH and EPA primary water quality standards.

O'Bready Well

The O'Bready Well has been affected by Ethylene Dibromide (EDB) contamination and has required the installation of two Granular Activated Carbon (GAC) contactor units to treat the water to acceptable levels. The GAC contactor units were installed in 1993, and are operated in series. The raw water nitrate levels have ranged between 3.9-8.5 mg/L between 2001-2005 with an average of 6.34 mg/L. The well receives chlorination and fluoridation treatment.

Powder Hollow Wells

This wellfield consists of three wells numbered 1, 2 and 4. The combined wells receive treatment for pH adjustment and fluoridation. Well number 2 nitrate level averages are above 5 mg/L. Wells 1 and 4 have lower nitrate levels and the combined treated water is less than 5 mg/L. A potential source of contamination is located within the recharge area of the wells. Elevated levels of chromium have been historically detected in test wells which may be due to an auto-transmission garage which used to be located at the site. During 2001-2005, no chromium was detected at these test wells. Chromium has not been detected in the production wells. Treated water quality has consistently met all DPH and EPA primary water quality standards.

Spring Lots Well Field

The Spring Lots well field includes four wells now numbered 3, 5, 7, and 8. Well #7 was completed in 2003 to replace Well #1, which was abandoned due to low yield. Well #8 was completed in 2006 and replaced Wells #4 and 6. Formal abandonment of both former wells is required.

Active wells 3, 5, 7 and 8 are pumped to a new treatment/pumping facility constructed at the Spring Lots well field. The treatment station provides sodium hypochlorite and hydroflurosilic acid treatment prior to entering the distribution system. Treated water quality has consistently met all DPH and EPA primary water quality standards. Upon completion of the new pumping and treatment facility, the former Thompsonville Pump Station was decommissioned. The existing concrete basins and pump station will be abandoned.

Torry Road Well (Tolland Aqueduct)

This source of supply consists of a single bedrock well that can deliver up to 21,600 gallons per day to the system. This well receives pH adjustment with potassium hydroxide, disinfection with sodium hypochlorite and fluoridation.

Vernon Wells

There are four active wells in the Vernon well system numbered 1, 2, 4 and 5, with the main water production coming from well 5. Due to water quality concerns, Wells 3 is reserved for emergency use and Well 6 is inactive. All wells except 3 and 5 receive pH adjustment with potassium hydroxide for corrosion control and all wells receive fluoridation treatment. Sodium levels are the highest at Wells 1 and 2 and averaged 17.4 mg/L and 14.7 mg/L respectively for the period of 2001-2005. Treated water quality has consistently met all DPH and EPA primary water quality standards, although the water quality at Vernon Well #6 has deteriorated to the point where treatment is required for its continued use.

The system was acquired from the Town of Vernon in 1988, and prior to providing treatment for this source, certain outstanding diversion issues will likely need to be resolved.

West Suffield Well

This well is operated seasonally during periods of peak demand. Trace levels of synthetic organic chemicals (SOC's) have been detected historically in the raw water but have not been confirmed or substantiated. Ethylene Dibromide (EDB) has been detected at levels below the MCL in 1 of 7 samples collected over the 2001-2005 period. Water quality entering the distribution system has consistently met all DPH and EPA primary water quality standards.

Windsor Locks Wells

The four caisson wells at Windsor Locks were contaminated with Ethylene Dibromide (EDB) and required the installation of Granular Activated Carbon (GAC) contactor units to treat the raw water to acceptable levels. The GAC treatment was installed in 1988. The smaller capacity rockwell at the site is inactive. The well supply is treated at the Windsor Locks Pump Station and currently treatment includes fluoridation and chlorination. The Company is currently assessing whether continued operation and use of the caissons is practicable, and/or whether their replacement or disposition is warranted.

Woodland Park, Pine Knob and Farnham Wells

Trichloroethylene and tetrachloroethylene have been historically detected at the Woodland Park Well at levels below the MCL. During 2001-2005, VOC's have been detected at the well. VOC's have been largely undetected at Pine Knob Well. Both Woodland Park and Pine Knob wells receive fluoridation treatment. The Farnham well has never been used since the system was acquired more than 30 years ago.

Stafford System

Surface Water Sources and Stafford Water Treatment Plant

In the Stafford System, storage is provided by Reservoir No. 4 (a.k.a. Moore Pond) and Reservoir No. 3 (a.k.a. Mathews Pond). Water released from Reservoirs No. 4 and No. 3 flows to Reservoir No. 2 where it is diverted for treatment and distribution at the Stafford Water Treatment Plant, a 1.0 MGD complete conventional water treatment plant.

Water flows by gravity to the Stafford Springs WTP or can be pumped from the reservoir through a low lift pump station located at Reservoir No. 2. The low lift pump station has two variable speed drive pumps, each capable of

Treated water from the Stafford Springs WTP has consistently met all DPH and EPA (primary) water quality standards including the SWTR filtration and disinfection performance standards. The system is in compliance with the Total Trihalomethane standard in the distribution system. Asbestos monitoring was conducted in 2002 in the Stafford System. Sampling was done at 63 W. Main St., which is representative of areas with asbestos cement piping in the distribution system. Testing was performed by the CT State Department of Health Services Laboratory. Results were below the method detection limit of 0.12 MFL. The next scheduled round of asbestos monitoring will take place in 2011.

Ground Water Sources

There are no active ground water supply sources in the Stafford System; the three wells located on the raw water transmission line are currently inactive and reserved for future use.

System Hydraulics

The Stafford System distribution system consists of two separate pressure zones, with a single atmospheric storage tank providing treated water storage, in addition to storage provided by the treatment plant clearwells.

The high lift pump station on Rt. 190 boosts water from the treatment plant's two clearwells to the Ellen Street Tank. This station has a 15 hp, 420 gpm pump and a 20 hp, 600 gpm pump and is controlled by the water level in the Ellen Street Tank. The Forest Edge pump station has two 1 hp, 20 gpm pumps, which operate off local pressure. A hydraulic profile diagram of the

Stafford System is presented in Figure 2.1.2. This figure illustrates the relationship of the various system components.

Water Quality

Stafford reservoirs

The Stafford reservoirs are low hardness and alkalinity waters. Raw water pH ranged between 5.08 and 7.1 for the period. Color and turbidity vary significantly due to seasonal changes and are also affected by storm water runoff. Runoff from agricultural activities on the watershed also contributes to high levels of nutrients and coliform bacteria. Iron and manganese levels also fluctuate seasonally and are most pronounced during reservoir stratification and hypoxic conditions.

Somers System

Ground Water Sources

The Preston and Kerry Well Fields are the primary ground water supply sources for the Somers System. Other active supply sources include the Fuller Hurd and Ellis wells. The Gulf Road Well is a potential future use supply and, as such, an inactive source. Chemical treatment includes chlorination, pH adjustment and corrosion control. Physical data for each ground water source are summarized in Table 2.1.2.

System Hydraulics

The Somers System distribution system consists of a single pressure zone and storage tank located off Gulf Road. All wells are controlled by water levels in the Gulf Road tank. A hydraulic profile diagram of the Somers System is presented in Figure 2.1.3. This figure illustrates the relationship of the various system components.

Water Quality

Preston Wells #1 and #2

These wells are near the Somers Industrial Finishing Company. This site is a superfund site and has been remediated. Hydrogeologic investigations determined the groundwater flow at the Somers Industrial Finishing Company to be away from the Preston Wells. The Preston wells receive chlorination treatment, pH adjustment and a corrosion inhibitor for corrosion control. Elevated color and iron/manganese levels at Preston Well 1 have recently limited production from the well in order to avoid aesthetic finished water quality problems in the distribution system.

Fuller Hurd Well

Very low levels of Methyl-tertiary Butyl Ether (MTBE), a gasoline additive, were discovered in the fall of 1994. CWC continues to monitor for MTBE levels at the well, although it has not been detected since 1994. This well receives chlorination and corrosion control treatment.

Keery Well

During the five year period ending 2005, distribution system samples consistently met physical standards and there was only incidental detection of positive coliforms in the systems in 2001-2005. The lone exception is the Somer's system that had a Total Coliform MCL violation for the month of April, 2005. The cause of the incident was never determined but suspected to be the Keery Well. The well was taken off line, the system was chlorinated and flushed and the Keery Well was returned to service after having chlorination installed. No further positive coliform detections to date.

Ellis Well

Water quality has consistently met all DPH water quality standards. Asbestos monitoring was conducted in 2002 in the Somers System. Sampling was done at the Town Hall on Main St. This site is representative of areas with asbestos cement piping in the distribution system. Testing was performed by the CT State Department of Health Services Laboratory. Results were below the method detection limit of 0.12 MFL. The next scheduled round of asbestos monitoring will take place in 2011.

Crescent Lake System

Service to the Crescent Lake system is provided through an interconnection with the Town of East Longmeadow, Massachusetts. The contract for this service contains all restrictions currently operating in East Longmeadow. After the year 2002, East Longmeadow may discontinue service, but it is required to give CWC two years to find an alternate source of supply. In 2005 TTHMs exceeded the MCL of 0.080mg/L. Treatment was changed from the chlorine to the use of chloramines to reduce TTHMs to below the MCL.

A hydraulic profile diagram of the Crescent Lake System is presented in Figure 2.1.4. This figure illustrates the relationship of the various system components.

Reservoir Heights System

Service to the Reservoir Heights system is provided through an interconnection with the Town of Manchester. The agreement was modified in 1996 to allow for two automatic five year renewal options. CWC is responsible for the operation and maintenance of the interconnection.

Nathan Hale System

The Nathan Hale system was acquired by CWC in 1987 and serves customers in the Town of Coventry, southeast of Coventry Lake. Supply for this system consists of two bedrock wells with [illegible]

A hydraulic profile diagram of the Nathan Hale System is presented in Figure 2.1.5. This figure illustrates the relationship of the various system components.

Llynwood System

The Llynwood system was acquired by CWC in 1989 and serves customers in the Towns of Vernon and Bolton, near Bolton Lakes. Supply for

2.1.6. This figure illustrates the relationship of the various system components.

Lakeview Terrace and Lakewood Systems

The contiguous Lakeview Terrace and Lakewood Heights systems were acquired by CWC in 1986 and 1987, respectively, and serve customers in the Town of Coventry near Coventry Lake. Supply for the System consists of nine

generator.

Hydraulic profile diagrams of the Lakeview and Lakewood systems are presented in Figures 2.1.7 and 2.1.8, respectfully. These figures illustrate the relationship of the various system components.

2.2 SAFE YIELD

Safe yield is defined in this master plan as the maximum quantity of water which can be withdrawn daily during a drought period which recurs, on average, once in a hundred years.

Surface Water Sources

Mass balance analyses of reservoir safe yield were performed by Roald Haestad, Inc., in accordance with Milone and MacBroom's Reservoir Yield Analysis (1989), and as ultimately codified in Section 25-32d-4 of the RCSA. To assure the study results would be acceptable, DPH personnel reviewed the procedures and data used. DPH reviewed and approved rainfall, evaporation, minimum streamflow and leakage data used in the analyses. Stream gage selection was approved by the Department.

The safe yield of surface water supplies was computed using a computerized equivalent to the mass balance method. Using a spreadsheet format, historical stream flows were routed through the water supply systems to determine the maximum yield that could be sustained without emptying the reservoir(s). Area capacity curves, streamflow data, diversion capacities and rainfall and evaporation data were used to compute inflow, outflow and resultant reservoir levels. In determining safe yield, it was assumed the system would be operated in accordance with established operational procedures.

Streamflow. As discussed previously, gaging stations were selected in consultation with the DPH. After comparing watershed characteristics and storage calibration runs, wherein gaging station discharges were adjusted to each reservoir's watershed by multiplying the gaged discharge by a ratio of the study watershed to the gaged watershed and the resultant water levels compared to historical reservoir levels, the Nepaug River gage was selected for the Western System. Study watersheds were recalculated for every period to compensate for changing water surface areas.

Due to the absence of historical drought event data during which reservoir storage was depleted, calibration runs were not performed for the Stafford reservoir system. After comparing watershed characteristics and evaluating historical flows, the Safford Brook gage was selected for the Stafford System.

Evaporation. Net monthly evaporation for each reservoir was calculated by subtracting observed monthly rainfall values from evaporation rates published in the Reservoir Yield Analysis. The net evaporation was then multiplied by the reservoir surface area to determine volume of water lost or gained. Observed rainfall values matched streamflow record periods used in the analyses.

Critical Period. The critical period is defined as the period between the last date when each reservoir was at 100% capacity and the date when system storage reached depletion and began to refill.

At the start of the analysis, reservoirs were assumed to be at 100% capacity. To determine the critical period for a particular set of conditions, various draft rates were used to arrive at a rate which would completely utilize, but not exceed, available system storage. The draft rates computed for each system were the average annual rates of draft. These rates were varied on a monthly basis to simulate actual demand variations.

Safe Yield. Frequency analyses were performed using the Statistical Analysis of Time Series Data (STATS) computer program, as developed by the Corps of Engineers Hydrologic Engineering Center. Log Person Type III distribution analyses were performed for each of the selected gaging stations.

Streamflow adjustment factors were calculated using the ratio of average streamflow with a 1 in 100 year return frequency to the average unadjusted streamflow over the critical period. If the calculated adjustment was less than 1.0, the computer simulation was rerun with stream gage records adjusted for watershed size and multiplied by the adjustment factor. If the calculated adjustment factor was greater than 1.0, no additional adjustment was made.

The draft rate, as computed from this simulation, is the 1 in 100 year draft rate (99% safe yield).

System Analyses. The 99% safe yield for the Northern Region was evaluated with all surface supply operating concurrently and the maximization of individual sources. A safe yield of 9.8 and 0.7 MGD was calculated for the Western and Stafford Systems, respectively. 99% safe yield results are presented in Table 2.1.1.

System specific details, assumptions, operational criteria, and unadjusted and adjusted critical period storage curves are contained in Appendix C.

Ground Water Sources

Well safe yield for ground water sources in unconsolidated aquifers for water supply planning purposes is considered equal to the calculated well yield, determined from a minimum 72 hour pumping test, delivered in an 18 hour period. In the event such data are not available, the regulations allow for safe yield calculations derived from existing pump test and/or production data. Additionally, the regulations provide for assessments of maximum well yield attainable with pump replacement, modification, or increased capacity when sufficient available drawdown remains following a pumping event. It is anticipated well safe yield will also be verified as part of the Level A Aquifer

Protection Mapping program established pursuant to section 22a-354c of the Connecticut General Statutes.

Well safe yield from confined and bedrock aquifer sources is considered equal to 90% of the hourly yield of the well, determined from a pumping test performed in accordance with Sec.19-13-B51k of the Regulations of Connecticut State Agencies, delivered in an 18 hour day.

Well yield test data, construction logs, pump curves and production data are contained in Appendix C.

WESTERN SYSTEM

Hunt Well Field

The Hunt Well Field consists of six active stratified drift wells and treatment facility.

Hunt Well No. 5 was constructed in 1969 and yield tested at 524 and 692 gpm over a 20 hour period. Based on pumping test data, well safe yield was determined to be 350 gpm, or some 0.504 MGD.

Hunt Well No. 6 was constructed in 1972, yield tested at a constant 900 gpm for a duration of 72 hours and registered for a withdrawal of 500 gpm. Based on these data, the safe yield of Hunt Well No. 6 is 0.972 million gallons per day. Constrained by the existing registration to a withdrawal of 500 gpm, available supply for water supply planning purposes will be limited to 0.72 MGD.

Hunt Well No. 7 was constructed in 1976 as a replacement for Well No. 1. Well No. 7 was yield tested at 525 gpm for 72 hours and registered for 500 gpm. Based on these data, the safe yield of Hunt Well No. 7 is 0.567 MGD.

Hunt Well No. 8 was constructed in 1979, yield tested at 500 gpm for a 24 hour duration and registered for the same. Well safe yield is an estimated 0.540 MGD.

Hunt Well No. 9 was constructed in 1982 as a replacement for Well No. 2, yield tested at a constant 703 gpm for 24 hours and registered for withdrawals of 650 gpm. Well safe yield is an estimated 0.759 MGD.

Hunt Well No. 10 was constructed in 1998 as a replacement for Well No. 4 and yield tested at a rate of 475 gpm for a duration of 73 hours. Based on these data, the safe yield of Hunt Well No. 10 is 0.513 million gallons per day. Individual well available supply is considered equal to the 400 gpm (0.576 MGD) registered capacity transferred from failed Well 4.

Although the safe yield methodology suggests a combined well safe yield in excess of 3.0 MGD, operating experience and analyses of pumping test data limit maximum well field available supply to some 2.8 MGD.

Powder Hollow Well Field

The Powder Hollow Well Field consists of three active stratified drift wells and treatment facility.

Powder Hollow Well No. 1 was constructed in 1980, yield tested at a constant 703 gpm for a 72 hour duration in January, 1981, and registered for a withdrawal of 560 gpm. Based on these data, the safe yield of Powder Hollow Well No. 1 is 0.759 MGD.

Powder Hollow Well No. 2 was constructed in 1981 and yield tested at a constant 708 gpm for a 140 hour duration in August, 1981; Well No. 2 was pumped alone for 24 hours and concurrently with Well No. 1 for an additional 116 hours. Well No. 2 was registered for a withdrawal of 490 gpm. Based on these data, the safe yield of Powder Hollow Well No. 2 is 0.765 MGD. Constrained by the existing registration to a withdrawal of 490 gpm, available supply for water supply planning purposes will be limited to 0.706 MGD.

Powder Hollow Well No. 4 was constructed in 2001 as a replacement for Well No. 3 and yield tested at a rate of 1060 gpm for a duration of 72 hours. Based on these data, the safe yield of Powder Hollow Well No. 4 is 1.15 million gallons per day. Individual well available supply is considered equal to the 875 gpm (1.26 MGD) registered capacity transferred from failed Well 3.

Although safe yield methodology indicates a combined well safe yield of 2.7 MGD, maximum well field available supply is limited to some 2.4 MGD.

Spring Lots Well Field

The Spring Lots Well Field consists of four active stratified drift wells and treatment facility.

Spring Lots Well No. 3 was constructed in 1965 and pumping test data are not available. Well No. 3 was registered for withdrawals of 600 gpm or some 0.860 MGD.

Spring Lots Well No. 5 was constructed in 1971 and yield tested at 390 gpm for a 21 hour duration. Based on the test data, well safe yield was determined to be 350 gpm, or some 0.500 MGD. Well No. 5 was registered for withdrawals of 560 gpm.

Spring Lots Well No. 7 was constructed in 2002 as a replacement for Well No. 1 and yield tested at a rate of 876 gpm for a duration of 72 hours. Based on these data, the safe yield of Spring Lots Well No. 7 is 0.946 million gallons per day. While individual well use is considered equal to the 800 gpm (1.15 MGD) registered capacity transferred from failed Well 1, currently installed pump capacity limits available supply to 1.01 MGD.

Spring Lots Well No. 8 was constructed in 2003 as a replacement for the failing Wells No. 4 and 6, which had been constructed in the early 1970s and registered for a combined 600 gpm. Replacement Well 8 was yield tested at a rate of 710 gpm for a duration of 72 hours. Based on these data, the safe yield of Spring Lots Well No. 8 is 0.767 million gallons per day. Available supply is considered equal to the 800 gpm (1.15 MGD) registered capacity transferred from failed Wells 4 and 6.

While well age and condition previously limited well field available supply to approximately 2.0 MGD, recent improvements have reestablished lost capacity such that overall available supply is currently some 3.1 MGD.

O'Bready Well

O'Bready Well was constructed in 1975 and yield tested at a constant 350 gpm for a 72 hour duration. Based on these data, the safe yield of the O'Bready Well is 0.378. Operating experience and current treatment capacity limits available supply to 0.36 MGD.

Windsor Locks Well Field

The Windsor Locks Well Field consists of four active caisson wells and treatment facility.

The caisson wells were constructed by the Connecticut Light & Power Co. and yield test data indicate a combined stabilized pumping rate of 571 gpm. Based on these data, the safe yield of the Windsor Locks Caisson Wells is 0.617 MGD.

A bedrock well constructed onsite was yield tested in 1979 and had a stabilized withdrawal of 12 gpm after 144 hours of continuous pumping. Based on these data and the safe yield methodology for bedrock sources, well safe yield is 12,000 gpd. Once active, the well is presently inactive.

A gravel-packed well was constructed in 1979 and yield tested at a constant 75 gpm for a 57 hour duration. Based on these data, the safe yield of the Windsor Locks gravel-packed well is 0.081 MGD. This well is presently inactive.

Although well field safe yield is an estimated 0.6 MGD, current treatment capacity limits available supply to 0.28 MGD. Because of the age and condition of the caissons, the Company is exploring the feasibility of replacing one or more of the caissons with a conventionally-constructed gravel-packed well, or wells. In the event retaining or replacing the caissons is not practicable, the well field will be abandoned as a source of supply.

Mapleton Well Field

The Mapleton Well Field consists of two active bedrock wells with an estimated safe yield of 0.144 MGD. Pumping test data are not available. Production logs for calendar year 1988 indicate a peak monthly (June) production of 3,335 thousand gallons, for an average daily withdrawal of 0.111 MGD.

West Suffield Well

The West Suffield bedrock well has an estimated safe yield of 0.060 MGD. Pumping test data are not available. Production logs for calendar year 1988 indicate a peak monthly (June) production of 1,164 thousand gallons, for an average daily withdrawal of 0.054 MGD.

Broad Brook Well Field

The Broad Brook Well Field consists of three bedrock wells with an estimated combined safe yield of 0.19 MGD. These wells are currently inactive due to water quality concerns and will likely be abandoned.

Vernon Wells

The Vernon Wells consist of four active stratified drift wells and a single bedrock well. An additional stratified drift well is reserved for emergency use. The Vernon system was acquired from the Town of Vernon in 1987 and yield test data are limited.

Vernon Wells No. 1, No. 2, No. 4 and No. 6 are stratified drift wells constructed in 1958, 1962, 1965 and 1983, respectively, while Well No. 5 is a bedrock well constructed in 1967. Wells No. 1, 2 and 4 were originally yield tested at 200 gpm, 100 gpm, and 130 gpm, respectively, and each registered for withdrawals of 120 gpm. Well No. 5 was yield tested at 400 gpm for a 42 hour duration and registered for withdrawals of 300 gpm.

Vernon Well No. 6 was yield tested at a constant 250 gpm for 31 hours and 223 gpm for an additional 41 hour duration. Based on these data, the safe yield of Vernon Well No. 6 is 0.241. In 1987, the well was permitted for a five-year period for withdrawals up to 0.135 MGD. A permit renewal filed by the Company was rejected, and until such time that diversion issues are resolved and the source re-permitted, Well 6 will not be considered available for water supply planning purposes.

Operating experience suggests a combined safe yield and available supply of 0.69 MGD for the Vernon Wells, excluding Wells 3 and 6.

Woodland Park Well

Woodland Park Well was constructed in 1960, yield tested at a continuous 225 gpm for a 24 hour duration and registered for withdrawals of 175 gpm. Well safe yield, based on the approved methodology for bedrock sources and extensive operating history, is 0.219 MGD.

Pine Knob Well

Pine Knob Well was constructed in 1959, yield tested at a continuous 440 gpm for a 24 hour duration and registered for withdrawals of 450 gpm. Although well safe yield, based on the approved methodology for bedrock sources, is some 0.428 MGD, available supply, based on operating history, is limited to 0.33 MGD.

Ellsworth Estates Wells

The Ellsworth Estates System was acquired by the Company in 1993 and merged with the Western System. Supply consists of one active stratified drift well (Well No. 3). Yield test data are unavailable. Based on limited operating experience, Well No. 3 safe yield and available supply is an estimated 0.018 MGD.

Farnham Estates Well

The Farnham Estates Well is not utilized due to water quality concerns and the Company has no immediate plans for its use. Well safe yield is an estimated 0.5 MGD. The company has no plans for future use and plans to abandon this source.

Heritage Woods Wells

The Heritage Woods wells are not utilized due to water quality concerns and the Company plans to abandon these sources. Combined well safe yield is an estimated 0.01 MGD. The company has no plans for their future use and plans to abandon these wells.

Kupchunos Well

Kupchunos Well was constructed in 1957 and yield tested at 1,041 gpm. Although safe yield is an estimated 1.0 MGD, environmental concerns limit available supply to 0.5 MGD. The well is presently inactive.

Tolland Aqueduct (Torry Road) Wells

The Tolland Aqueduct System was connected to the Western System in 1995. Wells associated with this former satellite system include two caisson wells and two bedrock wells. Both caissons were found to be under the influence of surface water and taken out of service. In 1987, the bedrock wells were yield tested at 23 gpm for a 36 hour duration. Based on these data, the safe yield of both bedrock sources is 23 thousand gallons per day (TGD). Because of interference effects between the wells, however, only one well is currently active. The two caisson wells and on inactive bedrock are no longer needed and will be abandoned.

SOMERS SYSTEM

Preston Well Field

Preston Well No. 1 was constructed in 1970, yield tested at 225 gpm for an eight hour duration and registered for withdrawals up to 0.324 MGD.

Preston Well No. 2 was constructed in 1986 as a back-up for Well No. 1 and yield tested at 100 gpm for a 72 hour duration. Based on these data, the safe yield of Preston Well No. 2 is 0.108 MGD.

Due to the presence of elevated color and iron/manganese levels at Preston Well 1, well production is currently limited to avoid aesthetic finished water quality problems in the distribution system. Consequently, Well 2 is operated as the primary well. Combined well field available supply is limited to 0.22 MGD.

Keery Well

Keery Well was yield tested in 1986 at a constant 93 gpm for a 72 hour duration. Based on these data and the approved methodology for bedrock sources, well safe yield is 0.09 MGD. Constrained by the existing registration to a withdrawal of 50 gpm, available supply for planning purposes is limited to 0.072 MGD.

Fuller Hurd Well

Fuller Hurd Well was acquired from the Broad Brook Water Company and yield test data are not available. Drilling log data indicate a yield of 20 gpm, however, operating experience limits available supply to 10 gpm, or some 0.014 MGD.

Ellis Well

Ellis Well was acquired from the Broad Brook Water Company and yield test data are not available. Drilling log data indicate a yield of 5 gpm, however, operating experience limits available supply to 3.5 gpm, or some 0.005 MGD.

Gulf Road Well

A bedrock well constructed at the Gulf Road tank site in 1986 was yield tested at 31.5 gpm for a 36 hour duration. Well safe yield is an estimated 0.031 MGD. The well is presently inactive and reserved for future use.

STAFFORD SYSTEM

Stafford Wells

The Stafford Caissons and 12 inch well were constructed ca. 1950 and acquired from the Connecticut Light & Power Co. Yield test data are not available. All three Stafford wells are currently inactive and will be reactivated as future needs dictate. *Yield and water quality testing will be undertaken at the time plans are made to move the wells to active status.* Combined safe yield is an estimated 0.200 MGD.

SATELLITE SYSTEMS

Llynwood

The Llynwood System is supplied by four active bedrock wells. Wells No. 2 and No. 3 were yield tested at 5.2 and 5.5 gpm, respectively. Wells No. 4 and No. 5 were constructed in 1988 and yield tested at 10 gpm each for a 72 hour duration. Based on these data and the approved methodology for bedrock sources, combined well safe yield is approximately 30 TGD. Due to water quality concerns, the company plans to abandon inactive Well No. 1.

Nathan Hale

The Nathan Hale System is supplied by two active bedrock wells. Yield test data on acquired Well 12 are not available; however, based on operating experience, well safe yield is an estimated 22 TGD. *At the first available opportunity, yield will be confirmed with a pumping test or through use of historical operating records.* A second well (Nathan Hale Well 2) was installed and placed in service in 2001. Pumped at 9 gpm due to setback criteria, the well has a calculated safe yield of 8 TGD. Two other bedrock wells are inactive; Well No. 11 and No. 5 are planned for abandonment.

Lakewood/ Lakeview

The Lakewood/ Lakeview System is supplied by 9 active bedrock wells. The systems were acquired in 1986 and yield test data are limited. *At the first available opportunity, yield will be confirmed with a pumping test or through the use of historical operating records.* Lacek Wells No. 1 and No. 2 were constructed in 1987 and tested at 14.8 and 9.8 gpm, respectively. The Scussel Well, also constructed in 1987, was tested at 3.5 gpm. Due to quantity concerns (i.e. low yield) the Lakeview Wells No. 1, 4, 4B and 9 are inactive sources of supply. Two new wells drilled on the Lacek parcel in response to a gradual diminishment in bedrock well capacity are also inactive. Based on these data and operating experience, system safe yield is currently estimated at 43 TGD.

Revised 6/07

2.3 INTERCONNECTIONS

An interconnection is any physical, hydraulic connection between two or more public water systems. The Western System has eleven existing interconnections with other water companies. Table 2.3.1 list data relevant to each interconnection, including their location, maximum hydraulic capacity and cooperating water utility. Interconnection locations are shown on the Supply and Land Use Maps.

CWC has contractual agreements for three interconnections with the Hartford's Metropolitan District Commission (MDC).

The Route 5 interconnection in South Windsor was installed in 1960 and is for emergency use only, following notification and operation procedures specified in the contract agreement. This interconnection provides emergency fire flow only to the CWC system. The interconnection consists of a check valve, which opens in the event of a substantial pressure drop in the CWC system. The interconnection has a maximum hydraulic capacity of 1.5 MGD. CWC did not purchase any water during the previous five years.

The Old County Road interconnection, located in the Town of Windsor Locks, was installed in 1975 and provides for the purchase of water at an unspecified quantity. The interconnection has a maximum hydraulic capacity of 1 MGD and is used to maintain storage tank levels during peak demand periods. In addition, the interconnection provides emergency fire flow to the CWC system. CWC purchased approximately 13 million gallons during the previous five years.

The Schoephoester Road interconnection is also located in Windsor Locks. The interconnection was installed in 1984 and is for emergency use only, following notification and operation procedures specified in the contract agreement. The interconnection provides emergency fire flow in either direction between the two systems, at an unspecified quantity. CWC did not purchase any water during the previous five years. CWC and MDC are responsible for maintaining their respective pipes, valves, pumps and interconnection meters for each of the interconnections.

CWC has a contractual agreement with the Town of Longmeadow, MA for an interconnection with the Crescent Lake system located in the Town of Enfield. The interconnection was installed in 1982 for the purchase of water at an unspecified quantity. The original agreement was amended in 1986 and again in 1994 to specify the number of customers served and provide for a maximum agreement duration of 70 years. It is anticipated this system will combine with the Western system within the 20 year planning period. The interconnection has a maximum hydraulic capacity of 0.75 MGD and CWC is responsible for its operation and maintenance. CWC purchased approximately 54 million gallons during the previous five years.

CWC has three contractual agreements with the Hazardville Water Company.

The interconnection on Elm Street in Enfield was installed in 1986 and is for emergency use only, following notification and operation procedures specified in the contract agreement. The contract allows for emergency fire flow in either direction between the two systems. The interconnection is for the purchase of water at an unspecified quantity during emergencies. The interconnection has a maximum hydraulic capacity of 1.00 MGD. CWC did not purchase any water during the previous five years.

The Four Bridges Road regional pipeline in Somers was installed in response to contamination problems in the Rye Hill Circle area in Somers from the State of Connecticut's Correctional Institution located in the town of Enfield. The pipeline was installed in 1994 and provides water to residents in the Rye Hill Circle area. The pipeline has a maximum daily capacity of 1.58 MGD. CWC sold approximately 39 million gallons during the previous five years.

The interconnection on Pease Road in East Windsor was installed in 2005 for the purchase/sale of water. A Water Service Agreement was signed in 2000 and allows for CWC to purchase 0.04 mgd to provide water to a small residential subdivision, located in East Windsor. CWC did not purchase any water during the previous five years. CWC and Hazardville Water Co. are responsible for maintaining their respective pipes, valves, pumps and interconnection meters for each of the interconnections.

CWC has two contractual agreements with the Town of Manchester for interconnections on Bridle Path Road to serve a residential subdivision (Reservoir Heights) and Buckland Road to serve two commercial facilities.

The Bridle Path Road interconnection was installed in 1988 and is for the purchase of water at an unspecified quantity. The agreement was modified in 1996 to allow for an automatic five year renewal option. CWC is responsible for the operation and maintenance of this interconnection. CWC purchased approximately 8 million gallons during the previous five years.

The Buckland Road interconnection was installed in 2000 and is for the purchase of water at an unspecified quantity. The town is responsible for the operation and maintenance of this interconnection.

CWC has an agreement with the Town of Tolland's Water Commission for an interconnection on Torry Road. The interconnection was installed in 1980 and is for the sale of water at an unspecified quantity to the Town. The town is responsible for the operation and maintenance of this interconnection. CWC also has an interconnection with Tolland to serve the Riversedge water system in Willington. As a consecutive water system, Riversedge receives 100 percent of its daily supply from Tolland.

CWC has identified a future emergency interconnection with the town of Tolland to be located at the intersection of Route 195 and Anthony Road. This interconnection will be installed as part of the regional pipeline project and allow for the transfer of water to Tolland under emergency conditions. The operation agreement executed by the municipal water commission and CWC in 2011 also allows for up to 0.05 mgd in incidental daily water sales to Tolland system customers served by the pipeline.

CWC has identified two future interconnections with the University of Connecticut. One interconnection will be located on Hunting Lodge Road in the Town of Mansfield for the sale of water to the University on an as-needed basis. An alternative location would be on Rt. 195 for the sale and potential purchase of water. Either or both interconnections will provide service to the University and surrounding areas.

TABLE 2.3.1 INTERCONNECTIONS

LOCATION	COOPERATING WATER UTILITY	STATUS	TYPE OF USE*	METER	PIPE SIZE	MAX. HYDRAULIC CAPACITY (MGD)	CONTRACTUAL AGREEMENT
<u>WESTERN SYSTEM</u>							
RT. 5 S. WINDSOR	MDC	E	P	YES	8	1.5	YES
OLD COUNTY RD. WINDSOR LOCKS	MDC	E	P	YES	12	1.00	YES
SCHOEPHOESTER RD. WINDSOR LOCKS	MDC	E	P, S	YES	8	_	YES
TAYLOR ROAD ENFIELD	E. LONGMEADOW WATER, MA	A	P	YES	8	0.75	YES
ELM STREET ENFIELD	HAZARDVILLE WATER CO.	E	P, S	YES	16	1.00	YES
PEASE ROAD EAST WINDSOR	HAZARDVILLE WATER CO.	A	P	YES	8	_	YES
RYE HILL SOMERS	HAZARDVILLE WATER CO.	A	S	YES	16	1.58	YES
BUCKLAND ROAD SOUTH WINDSOR	MANCHESTER WATER DEPT.	A	P	YES	12	_	YES
BRIDLE PATH ROAD VERNON	MANCHESTER WATER DEPT.	A	P	YES	8	_	YES
TORRY ROAD TOLLAND	TOLLAND WATER COMM.	A	S	YES	6	_	YES
S. RIVER ROAD TOLLAND	TOLLAND WATER COMM.	A	P	YES	12	_	YES
HUNTING LODGE RD MANSFIELD	UCONN WATER SYSTEM	F	S	_	_	_	_
RT 195 MANSFIELD	UCONN WATER SYSTEM	F	P, S	_	_	_	_

P = PURCHASE
S = SELL
E = EMERGENCY
A = ACTIVE
F = FUTURE

2.4 OPERATION AND MAINTENANCE PROGRAM

Water System Responsibility and Authority

The responsibility for the performance of all areas involving Northern Region operations is the responsibility of the Vice President of Operations and Engineering and the Vice President of Planning and Treatment. The responsibility for all areas involving customer service is overseen by the Vice President Administration and Government Affairs.

Day-to-day responsibility for distribution system operation is delegated to the Manager of Operations and Field Services and the Supervisor of Operations and Field Services. Day-to-day responsibility for operation of conventional water treatment plants is delegated to the Director of Water Quality and Treatment and the Water Treatment Supervisor.

Policies and procedures of the Company are detailed in a manual that is continually updated. Many of the elements of the manual are applied throughout the Company. Examples are:

1) "Our Jobs" - dealing with employment and employee matters.
2) Safety Operating Manual - dealing with safe work practices.
3) Affirmative Action Plan - dealing with equal employment opportunity goals for hiring and promotion.
4) Rules and Regulations - dealing with customer matters.
5) Accounting Procedures Manual
6) Regulations of Connecticut State Agencies

Other manuals of specific interest are prepared and updated as needed. Examples are:

1) Regional Operating Descriptions - updated annually

2) Dam Operating Manuals - updated as required
3) Water Treatment Plant Operations Manuals - updated as required.
4) Emergency Contingency Plan for The Connecticut Water Company- updated annually.
5) Chemical Safety Manual -updated as required.
6) Emergency Spill Response Plan- Updated annually.

The Company's Operations and Engineering Department prepares detailed maintenance manuals for each new facility. These manuals include detailed manufacturer's operation and maintenance data on each piece of equipment within the facility. Maintenance manuals are available in the facility, region Manager's office, and in the Operations Engineering Department at corporate headquarters for ready reference by all levels of personnel from station operators to top management.

System Operation and Maintenance

A general description of the system operation is described in Section 2.1 and in the manuals discussed above. Some operating matters are subject to change on a daily basis. Work orders and/or verbal instructions are issued daily by the Manager or Supervisor to meet the needs of an ever changing water supply system.

Guidelines for operation standards are prepared by the Operations and Engineering, Planning and Treatment and Customer Service departments. These guidelines are then implemented by the Region.

Examples are:

Compliance Guidelines for Water Treatment - Northern

These compliance guidelines are issued by the Director of Water Quality and Treatment and cover detailed chemical dosage requirements and treatment performance criteria. In the Northern Region it is the responsibility of the Chief Operator and Class II Plant operators to meet or exceed the performance criteria for the surface water treatment plant and groundwater sources, respectfully. Monitoring of performance, record keeping and reporting to the Department of Public Health as required by the Safe Drinking Water Act is done by the Water Quality Supervisor.

Supply/Demand Projections

The status of each source of supply is evaluated at least monthly, and more often during periods of high demand or drought conditions, by the Manager of Operations and Field Services and the Director of Water Quality and

Treatment. This information is reviewed and compared with past water demand records, adjusted for known or anticipated changes, and projected for a six-month period. This report guides management in the appropriate use of the available supply and forewarns of the need for implementation of contingency or conservation measures to meet projected demands. If contingency or conservation measures are deemed necessary, they will be implemented in accordance with the provisions in Appendix G, Water Conservation Plan and Appendix H, Emergency Contingency Plan of this document.

Transmission/Distribution Mains, Valves and Hydrants

The Company has inspection, maintenance and operation procedures to ensure that mains are not ignored once they are installed and buried. A valve maintenance program to identify, locate, turn and operate critical valves once every two years and other valves once every ten years enables proper and efficient daily operation of the water system. A similar program for fire hydrants includes inspection of hydrants after each use and at least once per year during the fall season to ensure their satisfactory operation. All of the Company's distribution systems contain mains that are a mixture of pipes of varying age and material. As discussed in Appendix G Section II.3, the Company has an ongoing program for the upkeep and replacement of old piping that does not meet today's standard. To help protect mains, it is important to comply with all applicable requirements of Call Before You Dig, reduce corrosion and perform stray current testing where applicable.

A company wide inventory of water supply, transmission and distribution mains (through 12/31/05) is presented in Table 2.4.1. Currently a breakdown of this inventory is not available by region and system. Over the past several years, the company has been converting its manual distribution mapping system over to an Auto-Cad electronic system. Once the Systems are in an electronic format, it can then be converted and upgraded into a GIS format. At that time it will be possible to provide a breakdown of mains by length and size. Existing mains are a mixture of varying sizes, ages and materials. Installation periods for the various types of mains varies greatly, an approximate breakdown is; asbestos cement, 1940's - 1950's; unlined cast iron, 1900 - 1950; cement lined cast iron, 1950 - 1970, copper tubing, steel, galvanized and brass, 1910 - 1940. Some mains in the satellite systems are plastic. The Northern Region has over 617 miles of main. Most distribution main installed or replaced since 1970 is cement lined ductile iron pipe.

The Company has developed and maintains calibrated hydraulic models for its major distribution systems. The use of hydraulic models, along with knowledge of the distribution system, is an important and valuable tool for sizing and identifying where main replacements are required, locating and sizing pumping facilities, evaluating fire flow availabilities along with analyzing the ability to transfer water across the distribution system or to another system.

TABLE 2.4.1 Inventory of Supply, Transmission and Distribution Mains - Company Wide

TYPE OF MAIN	SIZE (IN)	IN USE Y/E 2005 (FT)	TOTAL LENGTH (FT)
SUPPLY			
Cast Iron	4	1,893	
Ductile Iron	6	5,156	
Transite	8	3,465	
Concrete	10	5,923	
	12	7,195	
	16	17,677	
	20	10,086	
	24	3,850	55,245
TRANSMISSION & DISTRIBUTION			
Brass	3/4	1,138	
Galvanized Wrought Iron	1	9,011	
Steel	1 1/4	4,817	
Copper	1 1/2	9,067	
	2	31,094	
	2 1/4	808	
	2 1/2	4,803	
	3	10,529	
	4	20,350	
	5	540	92,157
Cast Iron	3/4	113	
Ductile Iron	2	14,541	
Concrete	2 1/4	2,410	
Steel	2 1/2	640	
Galvanized Wrought Iron	4	131,701	
Transite	6	726,225	
	8	2,453,749	
	10	204,306	
	12	1,313,330	
	14	31,069	
	16	283,012	
	18	220	
	20	31,705	
	24	29,609	
	30	95	5,220,925
Asbestos Cement	3	1,314	
	4	15,966	
	6	336,470	
	8	61,159	
	10	80,477	
	12	12,900	
	14	589	
	16	2,630	
	20	2,500	514,005
Plastic	3/4	2,051	
	1	1,265	
	1 1/4	88	
	1 1/2	2,850	
	2	9,100	
	3	6,261	
	6	9,380	
	8	640	31,635
			5,913,967 FEET
			1120 MILES

For the Western System, hydraulic modeling was utilized for selecting the proper main size for replacement on Thompsonville Road in Suffield, and also Grove Street in Rockville. It will also be utilized when the Western and Somers systems are tied together.

CWC is aware of Connecticut's prohibition on the use of asbestos-cement (AC) pipe for replacement and new installations. No new AC pipe has been installed since the date the law went into effect. The Company does not have a replacement program in place for water mains constructed of asbestos cement (AC) as there are no water quality or hydraulic reasons to replace them. In the event of an AC pipe failure, the company replaces the whole length of pipe from coupling to coupling with ductile iron.

Distribution maps, presented in Appendix J, show the location of all sources of supply, treatment and storage facilities, pumping stations, pressure zones, pressure reducing valves, water mains and fire hydrants and blowoffs.

There are a number of towns that currently have ownership of a portion of the public water supply system. CWC is responsible for all other water utility functions associated with these portions. These mains are treated as if owned by CWC, including operation, maintenance, repair/replacement, management and control. All customers connected in these portions are direct customers of CWC. Initial town ownership of these portions of the utility plant was required to accommodate certain funding requirements of the towns. Ownership of each of these portions by the towns has been approved by the DPUC. The footage of transmission and distribution mains in Table 2.4.1 does not include these portions of the Northern Region, they are as follows:

Town	Year in Service	Mains
South Windsor	1989	8" - 3,016 ft. 12" - 1,140 ft.
Suffield	1991	12" - 7,965 ft. 16" - 6,398 ft.
Somers	1994	16" -15,793 ft.
Ellington	1985	10" - 14,235 ft.
Enfield	1973	12" - 10,443 ft 16" – 5,191 ft.

Flushing Program

A flushing program has been developed by the Company to maintain adequate water quality and aesthetics. Along with hydrants, bleeders and blowoffs are used to flush the system. Flushing is performed from the source and proceeds outward into the distribution system. Blow-offs or dead ends are also flushed to prevent excessive build up at the end of a main. The area adjacent to the flow area is inspected prior to the flushing to ensure that water can be flushed safely and without property damage occurring. Flushing is performed on an annual basis and as needed to address water quality or distribution problems. Advance notification of our flushing schedule is provided to our customers.

Leak Detection Program

The Company has a mixture of mains, varying in age and material, that requires the dedication of a continuous water use audit and leak survey effort to maintain non-revenue and lost water at a minimum practical level. Through leak detection and repair, it is the Company's goal to maintain the level of non-revenue water at less than 15% and to reduce this level to 10% or less as a long term goal. The Company has an ongoing program for leak detection which includes a survey of each system every 3 to 5 years and additional efforts as priorities are identified.

Leak detection surveys are conducted as needed based on the results of the Company's ongoing water system audits when there is an indication of high production metering without corresponding matched consumption. Assistance is also provided in pinpointing the location on the main of leaks that reach the surface, locating leaks on customer service lines and locating non-metallic mains as needed. A leak detection survey for the Western System was completed between August 1998 and November 1999. Approximately 391 miles were surveyed and 47 leaks were repaired with an estimated cumulative loss of 85 gpm or over 122,400 gallons per day. A leak detection survey was performed for the Crescent Lake System in 1999. Approximately 2.4 miles were surveyed and no leaks were found. A leak detection survey was performed for the Stafford System in 2003. Approximately 14 miles were surveyed and 1 leak was repaired with an estimated cumulative loss of 13 gpm or over 18,720 gallons per day. A leak detection survey was performed for the Somers System in 2001. Approximately 15 miles were surveyed and no leaks were found. A leak detection survey was also performed in 2004 with approximately 15 mile surveyed with 3 leaks repaired with an estimated cumulative loss of 1.5 gpm or over 2,160 gallons per day. A leak detection survey was performed for the Lakeview/Lakewood System in 2001. Approximately 3.1 miles were surveyed and 2 leaks were found with an estimated cumulative loss of 8 gpm or over 11,520 gallons per day. A leak detection survey was performed for the Reservoir Heights System in 2004. Approximately 2.5 miles were surveyed and no leaks were found. A leak detection survey was performed for the Lynnwood System in 2004. Approximately 1 mile was surveyed and 1 leak was found with an estimated cumulative loss of 3 gpm or over 4,320 gallons per day.

Table 2.4.2 shows the actual leakage rate (lost water) and percent non-revenue water for 2005 for the systems within the Northern Region. The leakage rate for these systems compares favorably with the goal of 1,500 gpd per mile of main except for the Stafford System. Additional leak detection survey work will be necessary to reach the goal of 1,500 gpd per mile of main for this system.

It must be noted, however, that a leakage rate of 2,500 gpd per mile of main is less than two gallons per minute in one mile of water main. This leakage, if all in one location, is potentially discoverable using state of the art leak detection equipment. If, however, the leakage is the result of numerous drips and weeps at the many joints and fittings in that mile of main, then discovery and repair is highly unlikely. The use of cement lined ductile iron mains for the replacement of older mains and installation of extensions will reduce the leakage rate over time.

The Company's leak detection and repair program is further explained in detail in Appendix G, Water Conservation Plan, Section II.3.

Table 2.4.2

LOST WATER FOR 2005
NORTHERN REGION
(THOUSANDS OF GALLONS)

	STAFF.	SOMER	WEST	CRSLAK	LV/LW	LLYN	NATHAN	RES.HGT
1) MILES OF MAIN	13.6	17.8	583.8	2.4	3.15	1	0.6	2.5
2) TOTAL PRODUCTION	176,809	40,530	3,533,815	12,759	9,390	3,041	1,711	1,801
3) NON-REVENUE WATER	22,797	5,782	349,702	1,371	1,313	(168)	(196)	296
4) PERCENT NON-REVENUE WATER	12.9	14.3	9.9	10.7	14	-8.9	-11.5	16.4
5) UNMETERED USAGE	1,444	785	33,166	4	1	1	1	0
6) SERVICE METER CORRECTION	816	184	16,875	60	43	16	10	8
7) TOTAL ACCOUNTABLE NON-REVENUE WATER (LINE 5 + LINE 6)	2,260	969	50,041	64	44	17	11	8
8) UNACCOUNTED FOR WATER (LINE 3 - LINE 7)	20,537	4,813	299,661	1,307	1,269	(185)	(207)	288
9) PERCENT UNACCOUNTED FOR	12.1	12.3	9	10.7	14	-9	-11.5	16.40
10) ACTUAL LEAKAGE RATE (GPD) MILE OF MAIN	4,137	741	1,406	1,492	1,104	(507)	(945)	316
11) ACTUAL LEAKAGE RATE (GPM) MILE OF MAIN	2.87	0.51	0.98	1.04	0.77	-0.35	-0.66	0.22

Notes to Table 3.3: Glossary of Terms Used

1. 1, 2 and 3 are from CWC records.
2. PERCENT NON-REVENUE WATER- calculated as percent of Total Production.
3. UNMETERED USAGE- generated from "unmetered water usage" sheets prepared by each region.
4. SERVICE METER CORRECTION- .53 percent of total consumption; accounts for water undetected at low flow conditions by service meters. Based on 1981 meter test results from the Shoreline Region, and rate of flow data by AWWA.
5. TOTAL ACCOUNTABLE NON-REVENUE WATER= unmetered water + service meter correction.
6. UNACCOUNTED FOR WATER= non-revenue water - total accountable non-revenue water.
7. PERCENT UNACCOUNTED FOR- calculated as percent of Total Production.
8. ACTUAL LEAKAGE RATE= unaccounted for water (gpd)/miles of main.
9. ACTUAL LEAKAGE RATE= unaccounted for water (gpm)/miles of main.

Meter Program

In the Northern Region, production metering information for all sources is recorded daily on site and the production rate is telemetered to the Company's Northern Region Office.

All customer meters are read at least quarterly and large users are read on a monthly basis. Estimated bills for residential customers are rendered in accordance with the provisions of Section 16-3-102 of the Regulations of Connecticut State Agencies.

Periodic testing and repair of meters is done in accordance with the DPUC schedule provided in the regulations. The method and flow rate for conducting periodic and customer request tests is also done in accordance with the DPUC regulations. When a meter is tested, it is done with the meter in the condition it was found at the customer's premise. In 2005, 99.3% of meters tested in the Northern Region's periodic meter testing program were within the acceptable accuracy requirements set by the DPUC.

Tables 2.4.3 summarizes the number of customers metered and the percentage metered in each of the systems. For a detailed explanation of the Company's metering program, refer to Appendix G, Water Conservation Plan, Section II.1.

Table 2.4.3a

EXTENT OF METERING

FOR YEAR 2005

WESTERN SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential*	29,837	29,837	100%
Commercial	1,908	1,908	100%
Industrial	78	78	100%
Public Authority**	206	206	100%
Interconnections	6	6	100%
Total***	32,035	32,035	100%

General Comments:

* Includes apartments and condominiums

** Public Authority includes Institutional users

*** Total number of customers does not include 743 private and public fire customers not served by meters

Table 2.4.3b

EXTENT OF METERING

FOR YEAR 2005

SOMERS SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential*	378	378	100%
Commercial	31	31	100%
Industrial	0		
Public Authority**	9	9	100%
Interconnections	1	1	100%
Total***	419	419	100%

General Comments:

* Includes apartments and condominiums

** Public Authority includes Institutional users

*** Total number of customers does not include 7 private and public fire customers not served by meters

Table 2.4.3c

EXTENT OF METERING

FOR YEAR 2005

STAFFORD SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential*	931	931	100%
Commercial	68	68	100%
Industrial	6	6	100%
Institutional	0		
Public Authority**	9	9	100%
Interconnections	0		
Total***	1,014	1,014	100%

General Comments:

* Includes apartments and condominiums

** Public Authority includes Institutional users

*** Total number of customers does not include 16 private and public fire customers not served by meters

Table 2.4.3d

EXTENT OF METERING

FOR YEAR 2005

CRESCENT LAKE SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential*	159	159	100%
Commercial	1	1	100%
Industrial	0		
Public Authority*	1	1	100%
Interconnections	1	1	100%
Total	62	62	100%

General Comments:

* Public Authority includes Institutional users

Table 2.4.3e

EXTENT OF METERING

FOR YEAR 2005

LLYNWOOD SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential	73	73	100%
Commercial	0		
Industrial	0		
Public Authority	0		
Interconnections	0		
Total	73	73	100%

Table 2.4.3f

EXTENT OF METERING

FOR YEAR 2005

LAKEVIEW/LAKEWOOD SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential	182	182	100%
Commercial	0		
Industrial	0		
Public Authority	0		
Interconnections	0		
Total	182	182	100%

Table 2.4.3g

EXTENT OF METERING

FOR YEAR 2005

NATHAN HALE SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential	40	40	100%
Commercial	0		
Industrial	0		
Public Authority	0		
Interconnections	0		
Total	40	40	100%

Table 2.4.3h

EXTENT OF METERING

FOR YEAR 2005

RESERVOIR HEIGHTS SYSTEM

This form should be completed for the current year.

User Category	No of Service Connections or Customers	No. of Metered Connections	Percent Metered
Residential	23	23	100%
Commercial	0		
Industrial	0		
Public Authority	0		
Interconnections	1	1	100%
Total	24	24	100%

Watershed Inspection

In accordance with the requirements of the Public Health Code, the Company conducts annual sanitary surveys of the watershed lands of all its surface water supplies. The surface water supplies for the Northern Region are Stafford Reservoirs #2, 3, and 4 and Shenipsit Lake. Sanitary surveys include inspections of private properties on the watershed for potential sources of pollution such as failing septic systems, soil erosion problems, illegal dumps or other improper waste disposal, improper storage and handling of chemicals and gasoline/chemical spills or leaks. The Company's overall watershed inspection program is described in Chapter 3.

Cross Connection Inspections

The Company, in accordance with the provisions of the Connecticut Public Health Code, has an inspection and enforcement program in place to protect the drinking water supply from cross connection. CWC has eleven employees on staff who have been trained and certified by the State for cross connection inspections and testing. Depending upon the time of year and work load, up to five employees may be involved in cross connection inspections or testing at any one time. These employees, under the direction of a program supervisor, are responsible for the Company's cross connection control program in their respective regions. A listing of the certified inspectors is provided in Section 1.5.

CWC maintains a list of facilities for inspections and reports those inspections to the State Department of Public Health annually. CWC identifies and inspects facilities based on relative degree of hazard or category of concern. Those facilities known to have toxic or objectionable substances used in water solution (#2 category of concern) are inspected annually and other facilities, which meet the criteria listed in the Public Health Code (category #1,3,4 and 5), are inspected on a five year cycle. The Northern Region annual/five year cross connection report has evolved to cover approximately 1275 facilities.

Backflow prevention devises are required at facilities based on the particular condition and installation following the requirements of the Public Health Code and the guidance in the Cross Connection Control Manual. Customers are advised by our inspectors if additional devices must be installed or if existing devices need to be tested and/or repaired. Devises that fail the annual test and are not repaired, retested and passed, are reported as uncorrected devices in the annual report. Violations are reported by CWC to the local and/or state health officials for enforcement, as necessary. Any reported violations are tracked by our inspectors until they are corrected. CWC, through our Rules and Regulations, maintains the right to discontinue service to any customer who maintains a condition determined to be hazardous.

Reduced Pressure Backflow Prevention Devices (RPDs) and Double Check Valves are tested annually by certified inspectors to ensure that they are functioning properly and providing the necessary protection for the public water supply system. Though historically few customers have done so, CWC will accept test results from private testers, provided the tester is State certified and the results are reported to the Company for the annual cross connection report. The Company is required to spot check 5% of those tests conducted by private testers.

Efforts are made to educate our customers about cross connection concerns. Plans for new service applications are reviewed by the cross connection control staff so any necessary cross connection requirements may be addressed at the time of construction. Information on cross connection control is provided to customers by our cross connection staff at the time of the annual inspections. More general information has been provided in our customer communications and bill inserts. Through the ongoing inspection, testing and customer information program, we can better protect the quality of water delivered to our customers from potential contamination from cross connections.

Pump Station Operation and Maintenance

Proper operation and maintenance of system pumping stations is an important aspect in the total operation of a distribution system. Pumping stations that do not contain chemical feed equipment are visited and inspected three times per week. Those with chemical feed equipment are visited and inspected on a daily basis.

When monitoring a pump station, the pump and motor are checked to make certain abnormal vibration is not present, pumping capacity has not drastically declined and pressure and flow devices are operating properly.

Standby power equipment operation is an important part of the Company's pump station operations. The entire system (fuel storage, generator, transfer switch) are inspected regularly and the generator is exercised under load at least once per month.

Fire Flows

Fire flows, in any system, are dependent on the ability of the distribution system to adequately carry the required flows to areas where the flow is needed and the adequacy of storage to provide sustained flow for the period of time to fight a fire and also to protect properties. Both of these are dependent upon the population served and the value of the area served. Therefore, required flows could vary from around 500 gpm to several thousand gallons per minute depending on site specifics. Current Insurance Service Office (ISO) ratings for both the water system and towns are listed in Table 2.4.4.

Table 2.4.5 shows the most up to date ISO Hydrant Flow Summary sheets that are available to the Company. These data sheets tabulate the hydrant flow results along with both static and residual pressure recordings. District types are also noted on the summary sheet

The ISO provides insurance companies up-to-date and reliable information about a municipalities fire protection services. This helps the insurance companies to establish appropriate fire insurance premiums for residential and commercial properties. The ISO provides the insurance companies this information with their Public Protection Classification. This is done on a town by town or fire district basis, not on a water system by water system basis.

ISO is an independent advisory organization that serves the property and casualty insurance industry. It collects information on a community's public fire protection and then analyzes the data using their Fire Suppression Rating Schedule (FSRS). From this, ISO then assigns a public protection classification from 1 to 10. Class 1 represents the best and Class 10 indicates no protection.

The FSRS has three separate components that make up the overall grading. The first is "Fire Alarms". This is 10% of the overall grade and it is based on how well the fire department receives and dispatches fire alarms. The second component is "Fire Department" and represents 50% of the overall grade. The final component is "Water Supply" and it represents 40% of the overall grade.

The water supply survey focuses on whether or not there is sufficient water supply for fire suppression beyond what is used for maximum daily demand. When ISO does a survey of a town, all components of the water supply system are investigated including pumps, storage and treatment capacity. ISO also physically observes hydrant flow test at representative locations throughout the community to verify the rate of flow provided. ISO also considers the size, type, installation, maintenance and condition of the fire hydrants when determining the water supply portion of the grading.

When new hydrants are added to main extensions, their locations are first approved by the fire marshal or chief in each town. The Company maintains good communications with the local fire departments.

No fire flow standards are mandated by the ISO and CWC does not have any set standards, but uses the ISO information as a guideline.

TABLE 2.4.4 PUBLIC PROTECTION CLASS

Town	Year Surveyed	Water Supply Class	Town Class	Total Public Protection Class
East Windsor				
Broad Brook	2001	2	6	5
Warehouse Point	2001	1	6	5
Ellington	2003	1	6	5
Enfield				
Enfield	2003	2	4	4
N. Thompsonville	2003	1	4	4
Shaker Pines	2003	2	5	5
Thompsonville	2003	1	5	5
Somers	2001	4	6	5
South Windsor	1999	3	5	4
Stafford Springs	2002	3	7	6
Suffield	2002	3	6	5
Tolland	1982	5	6	5
Vernon	1999	2	5	4
Windsor Locks	1996	2	5	4

Source: ISO Commercial Risk Services, Inc.

2.5 EMERGENCY CONTINGENCY PLAN

The Company has developed a comprehensive emergency response plan to allow us to maintain service during emergency situations or restore service as quickly as possible if particular emergency conditions force a temporary interruption of water service.

The Company's emergency plan has evolved over a number of years with a variety of emergency situations. The plan is periodically reviewed and revised, including after any emergency incident or event. As new service areas, sources of supply and treatment, pumping and storage plant are added to the water system, appropriate revisions are made to the plan.

As directed by the Water Supply Plan regulations, the Emergency Contingency Plan was developed to reflect the uniqueness of the Company and its water systems, while addressing the requirements of the regulations.

The Company's Emergency Contingency Plan is included in its entirety in Appendix H.

CHAPTER 3

LAND USE
SOURCE PROTECTION
WATER COMPANY LANDS

CHAPTER 3

LAND USE
SOURCE PROTECTION
WATER COMPANY LANDS

3.1 CURRENT LAND USE AND ZONING PATTERNS

CWC has sources of supply or watershed/aquifer areas in the town of Windsor Locks, Suffield, Enfield, East Windsor, South Windsor, Tolland, Ellington, Vernon, Somers, Stafford, Union, Coventry and Bolton. Current zoning regulations, town Plans of Conservation and Development, and the State Conservation and Development Policies Plan for 2004-2009 are described below for each of the communities in which CWC has sources of supply or watershed/aquifer areas. Land use activities that have the most significant potential to contaminate CWC wellfields and reservoirs are shown in table 3.1.1. These sites are shown on the Supply and Land Use Maps.

<u>East Windsor</u>

CWC maintains two active well fields located in the central portion of town. The Level B initial setback and recharge area for the Hunt Wellfield is located in a residentially zoned area with minimum lot sizes of ½ to 2 acre lots. Commercially and industrial zoned districts are also located within the aquifer area to the south and east of the wellfield. Existing commercial uses include retail stores, service stations, and restaurants. Sanitary sewers are available to serve a portion of the aquifer area. Ellsworth Well #3, which is a sand and gravel well, is located in a residentially zoned area with ¾ acre minimum lot size. CWC also maintains three inactive wells (Broad Brook Wells) located in the north east area of town. These wells are off-line due to EDB contamination and are planned to be abandoned.

One land use activity, a vehicle maintenance facility has been identified with the most significant potential to contaminate the Hunt wellfield. Concerns with this facility include the storage and disposal of waste oil, antifreeze, solvents and potential undetected leak or major spill from an underground fuel storage tank. The potential threat to the wellfield is considered to be low due to the proximity to the wellfield. CWC is not aware if any know releases from this facility. CWC will monitor as necessary.

The town's Plan of Conservation and Development is currently being revised. The draft Plan recommends aquifer protection regulations be adopted once Level A mapping is completed. The State's Conservation and Development Policies Plan recommends the areas around these well fields be maintained as preservation conservation, and urban conservation areas. CWC also owns the Broad Brook wells which are currently inactive sources. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Ellington

CWC maintains the Ellington Well, an inactive bedrock well. This well is planned to be abandoned.

A portion of the Shenipsit Lake Reservoir and some of its watershed area is located within the town. The watershed is zoned mostly for rural agricultural residence and state forest with minimum one acre residential zoning. A small area within the watershed just to the southwest of Crystal Lake is zoned for commercial and planned commercial activities. Existing commercial uses include a service station and printing facility. Sanitary sewers are available to serve a portion of the watershed area.

The town's Plan of Conservation and Development is currently being revised. CWC will recommend the Plan address developing watershed protection regulations and to implement watershed protection controls as recommended in DEP's handbook[1]. The State's Conservation and Development Policies Plan recommends the watershed be maintained as preservation and conservation area. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Enfield

CWC maintains three well fields in the town. The Level B initial setback and recharge area of the Spring Lots Well Field is located in the northwestern portion of town in an area adjacent to several commercially and industrially zoned districts located west of the well field and densely developed residential areas to the north and south. Residential development in this area is zoned for 33,000 square foot lots. Existing commercial/industrial development includes professional offices, service stations, warehouses, manufacturing facilities, and retail stores. Sanitary sewers are available to serve the entire aquifer area. The O'Bready Well Field's Level A area of contribution and recharge area is located in the central portion of town. The majority of the aquifer area is zoned for industrial development with the remaining area zoned for 1 acre residential lots. Existing industrial development includes professional offices, warehouses, and town police station. The Level A area of contribution and recharge area for the Powder Hollow Well Field is located in the south-central portion of town. The

[1]Protecting CT's Water Supply Watersheds: A Guide for Local Officials, January 1993.

southern area is zoned mostly for 2 acre residential lots. Some commercial and industrially zoned areas are located in the aquifer area. Existing commercial/industrial development includes professional offices, service stations, light manufacturing, warehouses, and retail stores. Sanitary sewers are available to serve the entire aquifer areas.

Several land use activities have been identified with potential to contaminate the Spring Lots, O'Bready and Powder Hollow wellfields. For the Spring Lots wellfield one gasoline facility has been identified. Concerns with the gasoline service/ repair facility include the storage and disposal of waste oil, antifreeze, solvents, and underground fuel storage tank. Concerns with the underground fuel storage tank include undetected leaks or a major spill during filling of the tank. The potential threat to the wellfield is considered to be low to medium due to the proximity to the wellfield. For the O'Bready wellfield, one facility, a town garage, has been identified. Concerns with the town garage include the storage and disposal of waste oil, antifreeze and solvents. The potential threat from this activity to the wellfield is considered to be low to medium due to the proximity to the wellfield. This wellfield has been affected by EDB, and in 1993 a GAC contactor unit was installed to treat the wellfield. For the Powder Hollow wellfield, four activities have been identified including welding shop, machine shop, manufacturing facility and a gasoline station. Concerns with the welding and machine shop include the storage and disposal of solvents and other chemicals. Concerns with the gasoline station include undetected leaks in the underground fuel storage tanks and a major spill during filling of the tanks. Concerns with the manufacturing facility include storage and disposal of solvents and other chemicals. The potential threat to the wellfield is considered to be medium due to the proximity to the wellfield. CWC is not aware of any know releases from these facilities.

The town's Plan of Conservation and Development discusses the need to protect aquifer areas with land within these areas being maintained as open space. The town is currently in the process of adopting the DEP's Land Use Regulations for the O'Bready and Powder Hollow Wellfields. The State's Conservation and Development Policies Plan recommends the aquifer areas for the three well fields be maintained as preservation, conservation and urban conservation areas. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Mansfield

CWC does not own or maintain any reservoirs or well fields in the town.

South Windsor

CWC maintains four wells within the town. The Farnham Well, an inactive bedrock well, is located in the north-central part of town adjacent to the East Windsor town boundary. The Kupchunos Well Field, which is also currently inactive, is located in the central part of town. The Pineknob and Woodland Park Wells, which are active bedrock sources, are located in the southeastern area of the town near the town of Vernon. The Level B initial setback and recharge area for the Kupchunos Well Field is residentially zoned with minimum residential lots of 1 acre along with some commercial districts. Existing commercial development includes business and professional offices. Zoning within the area of the Woodland Park and Pineknob Well Fields is residential with minimum lots of ½ to ¾ acres. This area is served by public sewers. The Farnham Well is planned to be abandoned.

The town's Plan of Conservation and Development recommends developing aquifer protection regulations which CWC supported. The State's Conservation and Development Policies Plan recommends the areas around the Kupchunos and Farnham Wells be maintained as preservation and conservation areas. The area round the Woodland Park and Pineknob well should be maintained as urban conservation areas. The town will need to develop aquifer protection regulations that are consistent with DEP's Land Use Regulations for the Kupchunos Wellfield. Although the three bedrock wells are not protected under DEP's Land Use Regulation, the town should develop regulations to include protection of the areas around these wells. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Suffield

CWC maintains two bedrock well fields in the town. The Suffield Well is located in the western central area of the town in an area zoned for business and planned development business activities. Existing commercial uses include business offices and dry cleaner drop-off. The Mapleton Wells are are located in the northeastern portion of town. The area is zoned for 1 acre residential development.

The town's Plan of Conservation and Development needs to include recommendations for the protection of groundwater supplies. The State's Conservation and Development Policies Plan recommend the areas around both of these wells be maintained as preservation and conservation areas. Although both of these wells are bedrock wells and therefore will not be regulated by the DEP's Land Use Regulations, the town should still develop aquifer protection regulations to protect these sources of supply. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Tolland

CWC maintains one active bedrock well (Torry Well #3), two inactive caisson wells (Tolland Wells), four inactive bedrock wells (Heritage Woods Wells) and a reservoir in the town. The Torry Well #3 is located in the central part of town in a residential area requiring one acre zoning. An area of commercial zoning is located to the west of this well. The Tolland Wells and Heritage Woods Wells are planned to be abandoned.

CWC maintains the Shenipsit Lake Reservoir which is partially located in the town of Tolland. The watershed area is located in the northwest area of town. The zoning in this area is singly family residence requiring 1 acre lots. The town's watershed protection regulations require 2 acre lots for parcels under 10 acres. Lot sizes for parcels over 10 acres must average ¾ to 1 acres in size. Open space can be used to calculate average lot sizes. CWC provided extensive comments during the review process of these regulations. A small area of the southern part of the watershed area is zoned for commercial development. Existing commercial uses include service stations, retail stores, and restaurants. Sanitary sewers are available to serve this small portion of the watershed area.

A horse farm has been identified with the most significant potential to contaminate the reservoirs. Concerns with the farm include storage and disposal of manure and erosion from turn out areas. CWC has worked with the farm to address manure storage/disposal practices and potential erosion concerns. The farm contains its manure in a storage bunker and turn out areas for the horses are kept to a minimum, on level ground near the barns to reduce erosion. CWC regularly inspects the farm and works with the owner and town to resolve any issues.

The town's Plan of Conservation and Development recommends the watershed area be zoned for single family residence. The plan recommends a watershed protection program be developed that incorporates recommendations from DEP's handbook[1]. The Plan also recommends incorporating recommendations from DEP's handbook [2] into the towns existing aquifer protection program. Although the Torry Road Well is not protected under DEP's Land Use Regulation, the town should amend their regulations to include protection of the area around this well. The State's Conservation and Development Policies Plan recommends the watershed be maintained as

[2] Protecting CT's Water Groundwater: A Guide for Local Officials, April 1997.

preservation and conservation area and the aquifer area as rural community center. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Vernon

CWC maintains four active wells, one emergency well, one inactive well and one reservoir within the town. The six Vernon Wells are located within the western portion of town with four of the wells located north of Route 84 and two of the wells located south of Route 84. The Level B initial setback and recharge area for all the wells are located in residentially zoned areas requiring 27,000 square foot lots. Several commercial and industrial zoned areas are located within the aquifer area. Existing commercial development in the aquifer areas include service stations, retail stores, restaurants and shopping centers. Sanitary sewers are available to serve the entire aquifer areas.

A portion of the Shenipsit Lake Reservoir and its watershed area are located within the northeastern area of the town. The watershed is designated as a restricted watershed area. Uses permitted are residential development with minimum lot sizes of 1 acre. Sanitary sewers are available to serve the watershed area.

The Town's Plan of Conservation and Development recommends protecting ground and surface water supplies through zoning regulations and open space preservation. The town developed aquifer protection regulations, however, the area that is regulated does not include the entire Level B aquifer areas for the Vernon well fields. The town will need to revise their aquifer protection regulations to be consistent with DEP' s Land Use Regulations. Although well 5, which is a bedrock source, is not protected under DEP's Land Use Regulations the town should include protection of this source in it's aquifer protection regulations. The town's watershed protection regulations should also be revised to be consistent with the DEP's handbook[1]. The State's Conservation and Development Policies Plan recommends the aquifer areas be maintained as urban conservation areas and the watershed area be maintained as a conservation areas. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Willington

CWC does not own or maintain any reservoirs or well fields in the town.

Windsor Locks

CWC maintains one well field in the town. The Level B initial setback and recharge area of the Windsor Locks well field is located in the southern portion of the town in an area zoned for residential, commercial and industrial development. Residential development in this area is zoned for 28,000 square foot lots. Existing commercial/industrial uses include service station, professional offices, hotel and warehouses. Sanitary sewers are available to serve the entire aquifer area.

One land use activity, a car dealership, has been identified with the most significant potential to contaminate the Windsor Locks wellfields. Concerns with this facility include the storage and disposal of waste oil, antifreeze and solvents. The potential threat to the wellfield is considered to be medium due to the proximity to the wellfield. CWC is not aware of any know releases from this facility. This wellfield has experienced DEB contamination, however the source has never been determined. CWC is currently assessing whether to continue operation of the wellfield and may dispose of this source.

The Town's revised Plan of Conservation and Development does not address the need to protect groundwater supplies. The town should expand the aquifer protection area to include the entire Level B area and will need to revise their aquifer protection regulations to be consistent with DEP's Land Use Regulations. The State's Conservation and Development Policies Plan recommends the Level B initial setback and recharge area be maintained as conservation and urban conservation areas. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Bolton

CWC maintains four active bedrock wells and one inactive bedrock well within the town. The Llynnwood Well field is located within the northeastern corner of town. Zoning within this area is residential requiring minimum lots of ½ acre. Llynwood Well # 1 is planned to be abandoned.

Although the four bedrock wells are not protected under DEP's Land Use Regulation, the town should develop regulations to include protection of the areas around these wells. The State's Conservation and Development Policies Plan recommends the area around this well field be maintained as rural land area.

Coventry

CWC maintains the Lakewood/Lakeview System in central Coventry. The well fields serving the two systems are interconnected. The two systems are located just south of Wangumbaug Lake in the Lake Residence Zone which requires minimum lot sizes of 1 acre. A special exception is required for all new lots in this area that do not meet the minimum lot size requirements. Sanitary sewers have been extended to serve this area. The State's Conservation and Development Policies Plan recommends the area around the well fields be maintained as urban conservation area.

CWC also maintains two active and two inactive wells within the Nathan Hale System located to the east of Wangumbaug Lake. Zoning within this area is residential requiring minimum lots of 1 acre. The State's Conservation and Development Policies Plan recommends the area around this well field be maintained as rural land area. Although the well fields serving both these systems are bedrock wells and therefore will not be protected under DEP's Land Use Regulations, the town should revise their current aquifer protection regulations to include the areas around these wellfields. The Town's Plan of Development recommends protecting aquifer areas by zoning restrictions and large lot sizes. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply. The two inactive wells are planned to be abandoned.

Somers

CWC maintains four bedrock wells within the town. The Fuller Hurd Well is located within an area zoned for business development. Existing commercial development includes service station, restaurants, and retail stores. The Keery Well and Ellis Well are located in a residential district which requires minimum 1 acre lots. The inactive Gulf Road Well is located in a residentially zoned area with minimum 1 acre lots. The Ellis Well is planned to be abandoned.

CWC also maintains two stratified drift wells at the Preston Wellfield located south of Route 190 and west of Route 83. The Level B initial setback and recharge area for this wellfield is located in a residentially zoned area with minimum 1 acre lots. Industrially and commercially zone districts are also located within the aquifer area to the north and west of the well field. Existing commercial uses include town garage, vehicle repair facilities, retail stores, and business offices.

Several land use activities have been identified with significant potential to contaminate the Preston wells, including an engine repair facility and a vehicle repair facility. Concerns with the engine repair and vehicle maintenance facilities include the storage and disposal of waste oil, antifreeze and solvents. The potential threat to the wellfield is considered to be low to medium due to the proximity to the wellfield. CWC is not aware of any known releases from these facilities.

The town's Plan of Conservation and Development recommends protecting groundwater resources. The CWC provided extensive assistance in helping the town develop Groundwater Protection Regulations and boundaries. The town's aquifer protection does not include the Level B area for the Preston Well. The aquifer protection regulations will need to be revised to be consistent with the DEP's Land Use Regulations after the Level A map has been developed. Although the four bedrock wells will not be regulated by the DEP's Land Use Regulations, the town should amend aquifer protection regulations to protect these sources of supply. The State's Conservation and Development Policies Plan recommends the areas around all the well fields be maintained as preservation conservation, and rural community centers. A small area of the Shenipsit Lake Reservoir Watershed area is located in the southeastern part of town. The watershed area is completely within the Shenipsit State Forest. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Stafford

CWC maintains three inactive well sites and one reservoir in the town. The Stafford Caisson Wells are located in the south eastern area of town. The Level B initial setback and recharge area for these wells are located in a residentially zoned area with minimum lot sizes of 1 to 2 acres. Stafford Well #3, which is a bedrock well, is located west of the caisson wells in a residentially zoned area with minimum lot sizes of 1 acre. The Stafford Reservoir #2 and its watershed area is located in the east-central area of town adjacent to the Union town line. Zoning within the watershed area is for 2 acre residential lots. The remainder of the watershed is state forest.

The town's Plan of Conservation and Development does not address the need to protect the watershed or aquifer areas. CWC will encourage the town to implement watershed protection controls as recommended in DEP's handbook[1]. The town will also need to develop aquifer protection regulations that are consistent with DEP' s Land Use Regulations. Although the Stafford Well #3 is not protected under DEP's Land Use Regulation, the town should develop regulations to include protection of the area around this well. The State's Conservation and Development Policies Plan recommends the aquifer and watershed areas be maintained as conservation and preservation areas. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply.

Union

CWC maintains two reservoirs, Stafford Reservoir #3 and Stafford Reservoir #4, within the town. Zoning within the watershed areas is low density residential, agriculture, and state forest land. Residential zoning requires a minimum lot size of 3 acres.

One land use activity, a dairy farm, has been identified with significant potential to contaminate the reservoirs. Concerns with the farm include storage and disposal of manure, milk room waste, waste oil, antifreeze, solvents and diesel/gasoline from an above ground fuel storage tank.
CWC has been working cooperatively with Bradway Farm to address water quality problems generated by dairy farming operations. A report was prepared by CWC's consultant recommending best management practices to improve the water quality of the runoff from farming operations. Some of these recommended practices (barn gutters, fencing) and other practices such as providing a one foot freeboard for the manure lagoon have been implemented on the farm. CWC continues to inspect the farm and work with Bradway Farm to resolve any water quality problems.

CWC recommended the town to implement watershed protection controls as recommended in DEP's handbook[1]. CWC continues to review and comment on proposed amendments to the town's planning and zoning and inland/wetland regulations and land use applications that may affect our sources of supply. The State's Conservation and Development Policies Plan recommends the watershed area be maintained as a conservation area.

TABLE 3.1.1 SIGNIFICANT LAND USE ACTIVITIES

TOWN IN WHICH WATERSHED/ AQUIFER AREA IS LOCATED	SOURCE OF SUPPLY	LAND USE ACTIVITY	POTENTIAL HAZARD	MITIGATIVE MEASURES
ENFIELD	SPRING LOTS WELL FIELD	(1) GASOLINE STATION/VEHICLE REPAIR	STORAGE/DISPOSAL OF CHEMICALS, UFST (POTENTIAL RELEASE). LOW/MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD.	CONSULT WITH DEP & DPH AS NECESSARY.
	O'BREADY WELLFIELD	(2) TOWN GARAGE	STORAGE/DISPOSAL OF CHEMICALS. LOW PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH TOWN, DEP & DPH AS NECESSARY.
	POWDER HOLLOW WELLFIELD	(3) WELDING SHOP	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH DEP & DPH AS NECESSARY.
		(4) MACHINE SHOP	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD.	CONSULT WITH DEP & DPH AS NECESSARY.
		(5) MANUFACTURING	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH DEP & DPH AS NECESSARY.
		(6) GASOLINE STATION	STORAGE/DISPOSAL OF CHEMICALS, UFST (POTENTIAL RELEASE). MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH DEP & DPH AS NECESSARY.
WINDSOR LOCKS	WINDSOR LOCKS WELL FIELD	(7) CAR DEALERSHIP	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH DEP & DPH AS NECESSARY.

TABLE 3.1.1 continued

TOWN IN WHICH WATERSHED/ AQUIFER AREA IS LOCATED	SOURCE OF SUPPLY	LAND USE ACTIVITY	POTENTIAL HAZARD	MITIGATIVE MEASURES
EAST WINDSOR	HUNT WELLFIELD	(8) VEHICLE MAINTENANCE FACILITY	STORAGE/DISPOSAL OF CHEMICALS, UFST (POTENTIAL RELEASE). LOW PRIORITY DUE TO PROXIMITY TO WELLFIELD	CONSULT WITH DEP & DPH AS NECESSARY.
SOMERS	PRESTON WELLS	(9) ENGINE REPAIR	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM PRIORITY DUE TO CLOSE PROXIMITY TO WELL FIELD.	CONSULT WITH DEP & DPH AS NECESSARY.
		(10) VEHICLE REPAIR FACILITY	STORAGE/DISPOSAL OF CHEMICALS. MEDIUM/HIGH PRIORITY DUE TO CLOSE PROXIMITY TO WELL FIELD.	CONSULT WITH DEP & DPH AS NECESSARY.
UNION/STAFFORD	STAFFORD RESERVOIRS #2,3,& 4	(11) BRADWAY DAIRY FARM (MANURE & MILK ROOM WASTE LAGOON, RUNOFF FROM TURNOUT AND FEED LOT AREAS).	HIGH PRIORITY DUE TO LOCATION OF LAGOON & ANIMALS NEAR TRIBUTARY STREAM OF RESERVOIR SYSTEM.	MONTHLY FIELD INSPECTION. MONITOR MANURE STORAGE AND DISPOSAL PRACTICES AND EROSION FROM TURNOUT AREAS. CWC RETAINED CONSULTANT TO DEVELOP BMP'S. SEVERAL BMP'S IMPLEMENTED BY FARMER WHICH RESULTED IN IMPROVED WATER QUALITY. CONSULT WITH DPH AS NECESSARY.
TOLLAND	SHENIPSIT LAKE RESERVOIR	(12) HORSE FARM- MANURE STORAGE/DISPOSAL, EROSION	MEDIUM PRIORITY DUE TO LOCATION OF FARM TO RESERVOIR.	QUARTERLY FIELD INSPECTION. MONITOR MANURE STORAGE AND DISPOSAL PRACTICES AND SIGNS OF EROSION FROM PASTURE AREAS. CONSULT WITH DEP, DPH AND TOWN AS NECESSARY.

NOTES:
(#) REFERS TO SITE ON SUPPLY AND LAND USE MAP.

3.2 SOURCE PROTECTION

The Connecticut Water Company (CWC) conducts an aggressive, multifaceted source protection program covering 13 towns in the Northern Region in which its water supplies and associated watershed/aquifer areas are located. The Company has one full-time employee in the source protection program and five employees who devote part of their time to watershed/aquifer inspections. The source protection program includes the following elements:

* Land use monitoring
* On-site field inspections
* Planning - Local, Regional, State and Federal
* Emergency Spill Response

Land Use Monitoring

CWC is able to protect its sources of supply in part by owning land within watershed/aquifer recharge areas and prohibiting public access to this land. Appendix I, Supply and Land Use Map identifies land owned by CWC, sources of supply and source water protection areas. Detailed information about company-owned land is provided in Section 3.3.

Land use monitoring consists of reviewing town planning, zoning, conservation and inland wetland commissions' agenda notices for development proposals which may impact CWC's sources of supply. All significant proposals within source water protection areas are evaluated in detail. Site plans, septic system plans, soil data, engineering specifications and other available information are obtained and reviewed. Written comments are prepared and sent to the appropriate town commission(s), officials and the developer. CWC's sanitary inspectors monitor the progress of construction work for the duration of the project to ensure compliance with the plans. This process is intended to avoid potential problems by providing constructive input during the various stages of a proposal.

The source water protections areas for CWC's sources of supply have been mapped and provided to the local land use commissions. All wells within the Northern Region that were required to be mapped to Level B standards have been done and approved by DEP. The recently approved DEP Land Use Regulations establishes a target deadline of June 1, 2008 for completion of Level A mapping. CWC provides annual notification to local land use commission to advise applicants of the statutory requirements, pursuant to Sections 22a-42f and 8-3i of the Connecticut General Statute, for notification to water utilities for any applications or activities within the watershed or aquifer areas and also request to receive copies of their agendas. Due to security concerns, CWC continues to review source and infrastructure information provided to local agencies. Copies of the Level B/A aquifer area maps and watershed areas are no longer provided to the local land use commissions.

If source protection concerns arise with a particular development or land use, assistance is sought from local and state officials to correct the existing or potential source of pollution. CWC initially contacts town officials and the developer. Assistance is sought from the Department of Environmental Protection and Department of Public Health when necessary. If a state pollution abatement order is issued or other state regulatory action is taken, CWC monitors compliance with that directive, and, if necessary, seeks additional legal action.

Separate files are maintained for each development proposal, on-going construction projects, and other important source protection concerns. CWC maintains an in-house "Source Protection Bulletin" which summarizes the important source protection concerns company-wide. The bulletin is updated monthly and distributed to Managers, Company Officials, and sanitary inspectors. An in-house report called "Monitoring of Development Sites" is also maintained. This report informs the sanitary inspectors which development sites need to be routinely monitored for source protection concerns.

The DPH's Source Water Assessment Program (SWAP) has rated CWC's groundwater sources of supply, relative to susceptibility to potential sources of contamination, as high for the Fuller Hurd Well, Kerry Well, Preston Well, Windsor Locks Wellfield and O'Bready Well; moderate for the Ellis Well, Vernon Wells 1,2&4, Hunt Wellfield, Powder Hollow Wellfield, Spring Lots Wellfield, West Suffield Well, Pine Knob Well, Mapleton Wells, and Ellsworth Well #3; low for the Torry Road #3 Well, Woodland Park Well, Vernon Well #5, Llynwood Wells, Nathan Hale Wells, Lacek Wells, Lakeview/Lakewood Wells, Scussel Well and Vernon Wells #3 &6.

The DPH SWAP has rated the Shenipsit Lake Reservoir and Stafford Reservoir Systems, relative to susceptibility to potential sources of contamination, as moderate.

<u>On-Site Field Inspections</u>

On-site field inspections are undertaken on a regular basis (weekly or monthly). Sanitary inspectors monitor specific source protection concerns listed in the Monitoring of Development Sites report. Additional concerns (e.g. spills, erosion problems) are reported to appropriate authorities.

When necessary, water quality sampling is conducted to evaluate the potential effect of a particular land use or pollution problem on sources of supply. For example, sampling may be conducted up and down stream of a specific area of concern. Test wells may be installed upgradient of a production well to monitor the impact of nearby land use activities. Water quality sampling enables CWC to respond to potential pollution problems in a timely manner.

The sanitary inspectors conduct the annual sanitary survey of the Company's public water supply watersheds, as required by Section 19-13-B102(b) of the State Public Health Code. Most problems encountered are resolved by working with town sanitarians and other local agencies.

Planning

As part of CWC's source protection program, a variety of information and technical assistance is provided to town officials, commissions and aquifer/watershed residents. In 2002, CWC revised the booklet "Clean Water and Your Health" which was originally developed by the Source Water Protection Committee of the Connecticut Section of the American Water Works Association. The booklet discusses land use concerns and practices for public water supply watershed areas (e.g., management of septic systems, safe use of pesticides, reporting of chemical spills, small pond management and animal waste control). The booklet is distributed to watershed residents during the annual sanitary survey and to other interested groups.

CWC continues to play a major role in the development and review of municipal land use plans and regulations to protect sources of supply. CWC reviews proposed plans and regulations, such as town plans of development, erosion and sediment control, inland wetlands and zoning regulations. Wherever possible, source protection concerns are incorporated into the local planning and regulatory framework.

CWC recognizes the critical role of local land use controls in providing for source protection. This is conveyed to local agencies wherever possible: through review/ comment on pending regulations or development proposals, in conjunction with local or state enforcement actions and through our public education efforts. Concerns for source protection are repeatedly emphasized to the municipalities and assistance is offered to towns in developing appropriate land use controls. CWC presently does not take a lead role in initiating development of source water protection regulations. CWC commends the DEP for their work in developing Land Use Regulations that were approved in 2005. CWC will provide assistance to towns for review of town aquifer protection regulations for consistency with the model state regulations. With the required schedule for adoption of local regulations imposed by the State, CWC can identify priorities and scheduling for providing technical assistance to municipalities. CWC will also assist the DEP in developing a strategic groundwater monitoring plan.

CWC will continue to provide technical assistance when commenting on development proposals and Town Plans of Development. CWC will continue to stress to towns the need and reasons for developing watershed protection regulations to protect these vital surface water supply resources and recommend they implement controls contained in the DEP watershed protection handbook. CWC will also continue to encourage towns to require development proposals to incorporate controls contained in DEP's 2004 Connecticut Stormwater Control Manual for both surface and groundwater water supply sources.

CWC will continue to take an active role in providing information on the need to protect drinking water supplies through bill inserts, news releases, and other company publications.

CWC's library consists of a variety of natural resources data and land use information for each source of supply and the municipalities within which the supplies and drainage areas are located. This includes information such as watershed and aquifer maps, soils maps, surficial and bedrock geology maps, updated town zoning and subdivision regulations, inland wetlands regulations and town plans of development.

Regional Planning

Regional Planning Organizations (RPO) play an important role in water supply planning through their representation on the Water Utility Coordinating Committee's (WUCC's) as area wide water supply plans are developed. The RPO representatives on the WUCC's provide a regional perspective on water supply issues including source protection concerns, local and regional land use/development patterns, and long range water supply alternatives. The RPO representatives can help promote some of the long range regional goals and identify some conflicts evident between water supply and local planning efforts.

The RPOs may also address water supply concerns through the mandatory referrals of zoning amendments by P&Z Commissions to RPOs under Section 8-3b of the CGS. Through this referral process, RPOs may identify potential conflicts between land use proposals and water supply concerns before the local commissions approve them. If the RPOs refer to local aquifer and watershed maps, they may consider source protection concerns in their review. RPOs should be encouraged to use the Level B/A aquifer protection maps and watershed maps in their review process.

CWC sees a need for expanded regional coordination in source protection efforts. Whether the efforts are developed using the current RPO system or promoted through greater communication and cooperation between adjacent municipalities, there is clearly a need for a multi-town approach to source protection. Since aquifer/watershed boundaries are not confined within political boundaries, it is evident that a multi-town approach will be more effective.

State and Federal Planning

CWC coordinates source protection efforts with state and federal agencies and programs. CWC reviews and provides comments on state DEP, OPM and DPH planning and regulatory initiatives, such as the State Conservation and Development Policies Plan 2004-2009; State Water Quality Standards and Criteria; River Basin Plans; River Management and a variety of proposed environmental regulations. CWC considers these various state planning programs as source protection strategies are implemented and supply alternatives evaluated.

State policies and plans are also considered in the CWC review of source protection concerns of local land development proposals, local planning documents (i.e. Town Plans of Development) and proposed municipal improvements. The State Conservation and Development Policies Plan 2004-2009 and its Locational Guide Map may be referenced to substantiate conflicts or concerns in our review. Other state planning and regulatory programs are referenced as appropriate.

The CWC source protection program is consistent with the State Conservation and Development Policies Plan and serves as a practical means to achieve many of the stated goals and strategies in the plan such as:

Drinking Water Supplies

Protect public health by meeting or exceeding state and federal drinking water standards for water supplies, by preventing degradation of water supplies through the proactive protection of drinking water sources and by providing adequate levels of treatment. Use a multi-barrier approach so that all public water supplies meet all drinking water standards.

- Acquire critical water supply watershed and aquifer protection lands as feasible by water utilities, municipalities and the state.

- Encourage new land uses within existing and potential public water supply watersheds and aquifers that are compatible with and operate in accordance with appropriate preservation and protection management strategies. Guide intensive development away from existing and potential water supply watershed and aquifers and consider the cumulative effects of incremental growth in sate, regional and local planning programs and regulations.

- Evaluate regional and municipal plans of conservation and development and municipal zoning regulations to promote protective measures with the most stringent measures focused on critical areas. Permit land use types and intensities that do not require sewer service.

- Continue the implementation of the Aquifer Protection Areas Program so as to achieve Level A mapping for all existing and potential well fields and to bring into conformance all land uses with state and locally adopted land use regulations.

Identify water supply resources sufficient to meet existing demand, to mitigate water shortages during droughts and to meet projected growth and economic development over at least the next 50 years.

- Use the Individual Water Utility Water Supply Plans, Water Supply Management Area Plans, DEP high yield aquifer assessments and recommendations of the Water Planning Council to identify surface and groundwaters that are needed for water supplies.
- Allocate water resources through DEP's Diversion Permit Process by giving high priority to drinking water supply needs.
- Prevent plans and projects that irreversibly commit potential water supply resources to other uses. Conduct environmental reviews in accordance with the Connecticut Environmental Policy Act to evaluate direct, indirect and cumulative impacts.

<u>Emergency Spill Response</u>

A company-wide Emergency Spill Response Plan has been developed and is updated annually. A copy of the plan is included in Appendix H. The plan identifies specific notification procedures for reporting and responding to hazardous materials and chemical spills in watershed and aquifer areas. The Company provides for emergency spill control equipment at key facility locations within the Central System. The Company also has an ongoing emergency spill control training program which includes Awareness and Operations Level training for Company Officials, Managers, Supervisors, Watershed Inspectors, treatment plant personnel and stand-by personnel. Spills discovered within watershed and aquifer protection areas are routinely reported to the DEP Spill Control Unit. A copy of the Company's Emergency Spill Response Plan has been submitted to DEP.

Table 3.3.1 CWC Owned Land Within the Watershed

SURFACE WATER SUPPLIES

RESERVOIR	APPROXIMATE CRITICAL LAND OWNED BY CWC (ACRES BY TOWN)	TOTAL WATERSHED AREA (ACRES)	PERCENT OF WATERSHED OWNED (%)	APPROXIMATE ACRES OF PUBLIC/PRIVATE OWNED LAND
STAFFORD RESERVOIR #2	Stafford-134	1,472	9	
STAFFORD RESERVOIR #3	Stafford/Union-55	2,240	2 }	600
STAFFORD RESERVOIR #4	Union- 52 (reservoir)	704	7	
LAKE SHENIPSIT RESERVOIR	Tolland/Ellington/Vernon- 1063	10,441	10	703

Table 3.3.2 CWC Owned Land Within the Aquifer Protection Area

GROUNDWATER SUPPLIES

The acreage listed in Tables 3.3.1, 3.3.2 and 3.3.3 comprises total CWC land holdings within this region.

Table 3.3.3 CWC Class III Owned Land

Town	Estimated Acres	Location	Use
Enfield	5.5	S. side of Brainard Road	ST
	0.6	S. of Rt. 190, E Side Rt. 5	ST
	0.1	N. of Rt. 91 on W. side of Rt. 5	PS
East Windsor	2.5	N. of Rt. 140 and E. of Rt. 5	RO
	0.8	S. of Rt. 140 and E. of Rt. 5	ST
Windsor Locks	1.5	N. Side of Elm St.	ST
	0.8	S. of Suffield Town Line on E. side of Mildred St.	ST
Suffield	0.4	N. of Rt. 190 in W. side of Rt. 75	ST
	0.5	W. side of Suffield St.	PS
	0.1	S. of Rt. 190	PS
Vernon	8	E. of Snipsic St.	WTP, PS, ST
	0.75	Raymond St.	UL
	2	South St.	ST
	1	N. of Rt. 74 & S. of Shenipsit Reservoir	UL
	1	W. Shenipsit Reservoir	UL
South Windsor	1.1	W. Rt. 75 and E. of Niederwerfer Rd.	ST

Town	Estimated Acres	Location	Use
Tolland	0.3	S. of Rt. 30 & E. Old Post Rd.	PS
Stafford	30	SW of Stafford Res. #2	UL
	9	S. of Collette Rd. & SE of Stafford Well #3	UL
	12.5	N. of Rt. 190 & E. of Rt. 19	WTP
	0.14	N. of Rt. 190 & E. of Rt. 19	PS
	1.4	E. of Quinn St.	ST
	0.2	E. of Quinn St.	UL
Somers	0.13	S. of Rt. 190 & W. of Gulf Rd.	UL
Ellington	0.4	Sadds Mill Rd.	PS

WTP= Water Treatment Plant
UL= Unimproved Land
ST= Storage Tank
PS= Pump Station
RO= Region Office

3.4 LAND ACQUISITION/DISPOSITION STRATEGY

Land Acquisition

Tables 3.3.1 and 3.3.2 identifies the extent of utility owned Class I and Class II land within the watershed or aquifer areas for the sources in the Northern Region. For most of the sources, there are extensive utility land holdings and minimal conflict with permitted local land uses.

While it may be preferred to acquire additional lands to have 100% of the watershed or aquifer protection areas around our sources, circumstances of land availability, existing land used, and economic constraints prohibit total acquisition. The source evaluation and land use inventory conducted in developing the water supply plan provides a basis for establishing company priorities for land acquisitions. CWC will continue to identify and consider acquisition of critical lands located within the watershed and aquifer protection areas. CWC also works to obtain sanitary easements and/or deed restrictions from property owners adjacent to streams or other sensitive areas. Many of these easements are provided as a result of the source protection staff review of local land use proposals. The easements or deed restrictions are requested by the company and then stipulated by the local land use commission as a condition of project approval. These negotiated agreements provide an additional means of source protection without always requiring outright purchase by the utility.

CWC feels that continued efforts in source protection by the utility, as well as state and local government may provide many necessary land use controls which will provide additional means of source protection without requiring utility ownership of lands. The initiatives taken by the State through the Aquifer Protection Legislation will lead to more widespread and uniform protection in aquifer areas. The DEP handbook "Protecting Connecticut's Water Supply Watersheds: A Guide for Local Officials" provides guidance to municipalities to develop effective watershed protection programs. CWC supports initiatives at the state and local level that provide authority, minimum standards, technical assistance, and training for development and implementation of local land use controls for protecting water supplies. It may be necessary for the state to eventually develop mandatory watershed protection programs, similar to the aquifer protection program. With more effective land use controls some potential water quality conflicts may be eliminated and the need for extensive utility acquisition minimized.

CWC also continues to investigate and identify lands necessary for development of CWC facilities (e.g. storage tanks, pump stations, etc.) to provide service within the identified planning horizons. For the Stafford System

In the Town of Stafford a pump station and storage tank are planned in an area between Tolland Avenue and Rt. 32 within the 20 year planning horizon. A pump station and storage tanks are also planned within this horizon along Rt. 190 in the West Stafford area of town. For the Somers System in the Town of Somers a second storage tank in planned on land owned by CWC on Gulf Road for the 20 year planning horizon. For the Western System in the Town of East Windsor a second storage tank is planned on Rt. 5 just south of Rt. 140 for the 20 year planning horizon. In the Town of South Windsor a second storage tank is planned on Wapping Road near the Ellington town line within the 5 year planning horizon. In the Town of Vernon a storage tank and pumping station is planned on Tunnel Road south of Rt. I-84 within the 20 year planning horizon. In the Town of Tolland a second storage tank is planned at the Tolland Tank site within the 20 year planning horizon. In the Town of Coventry a storage tank is planned north of Rt. 31 within the 50 year planning horizon. Sites necessary for the construction of utility facilities are also provided by developers as part of a construction project.

Land/Source Disposition

As shown in Table 3.3.2, CWC plans to abandon the following sources of supply in the near future:

Heritage Woods Wells #1-4
Nathan Hale Wells #5 &11
Torry Road Caison Wells # 1&2
Farnham Well
Spring Lots Wells #4&6
Llynwood Well #1
Ellington Well
Windsor Locks Bedrock

In addition, the following sources are to be assessed for possible abandonment.

Ellis Well
Fuller Hurd Well
Windsor Locks

CWC has determined the following parcels of land or sources of supply are no longer needed by the company and would be available for disposition in the future:

East Windsor

A. Ellsworth Well # 2, 0.38 acres. Source has been abandoned and will be reclassified to Class III land.

Coventry

B. Nathan Hale Well #5, 0.18 acres. Source has been inactive and there are no plans to use it in the future. Will apply to DPH for approval to abandon and reclassify to Class III land.

C. Nathan Hale Well #11, 0.1 acres. Source has been inactive and there are no plans to use it in the future. Will apply to DPH for approval to abandon and reclassify to Class III land.

Vernon

D. North of Rt. 74 and South of Shenipsit Lake Reservoir, 1 acre.

E. Raymond Street, 0.75 acre.

Stafford

F. Southwest of Stafford Reservoir #2, 35 acres.

G. South of Collette Road and southeast of Stafford Well #3, 9 acres.

Somers

H. Gulf Road, 0.13 acres.

I. Ellis Well, Wells Road, 1.8 acres. Well being assessed for abandonment. Will apply to DPH for approval to abandon and reclassify to Class III land if warrented.

Windsor Locks

J. Windsor Locks Wellfied, 225 acres. Wellfield being assessed for replacement or abandonment. Will apply to DPH for approval to abandon and reclassify to Class III land if warranted.

Enfield

K. Thompsonville Pump Station, 13.5 acres. Will apply to DPH for verification as Class III upon completion of Level A aquifer protection map.

South Windsor

L. Farnham Well, 0.53 acres. Will apply to DPH for approval to abandon and reclassify to Class III land.

The costs incurred in disposing of any of these properties must be considered in determining the merits of releasing properties. The expenses associated with processing the necessary state agency permits and approvals, finding interested buyers, and preparing the sale or lease agreements for the property may, in some cases, exceed the potential revenues from the disposition.

CHAPTER 4

HISTORICAL DEMAND/CONSUMPTION DATA
FUTURE SERVICE AREAS
POPULATION PROJECTIONS
CONSUMPTION PROJECTIONS
MARGIN OF SAFETY
WATER CONSERVATION PROGRAM

CHAPTER 4

HISTORICAL DEMAND/CONSUMPTION DATA
FUTURE SERVICE AREAS
POPULATION PROJECTIONS
CONSUMPTION PROJECTIONS
MARGIN OF SAFETY
WATER CONSERVATION PROGRAM

4.1 HISTORICAL DEMAND DATA

Five years of reservoir status for the Stafford Reservoir System and Shenipsit Lake are shown in Appendix E, Table E.1. Reservoir status data for Stafford are presented as feet below spillway crest with 0.00 indicating a full reservoir condition. For Shenipsit Lake, a full reservoir condition equates to 26.5 feet. The corresponding gross reservoir capacity is obtained through use of storage capacity curves. These curves, which plot feet below (or above) spillway crest verses the gross storage capacity of the reservoir, are presented in Appendix E as Figures E. 1 through E. 4.

Appendix E, Tables E.2- E.4 presents five years of system production data for wells and reservoirs for the Western, Stafford and Somers Systems, respectfully. Individual wells within each wellfield are metered separately as required by the Public Health Code. *Table E.5 presents five years of production by water supply source.*

Average and maximum water demands for the Northern Region are presented in Tables 4.1.1 a-h. These demands are expressed in million gallons per day on a monthly basis for the years 2001-2005. The average and maximum water demand during the summer months is higher than during the remaining months due to seasonal water use, such as watering lawns and gardens, swimming pool use, and similar out-of-door activities. ~~Only average~~ *Currently, peak* day demand is *not readily* available for the Nathan Hale, Crescent Lake, Lakewood/Lakeview, Reservoir Heights or Lynnwood systems. *Implementation of the Company's Operational Data Management System (ODMS), which is ongoing, will allow the Company to access peak demand data for all systems beginning with the 2007 calendar year.*

Figures 4.1.1 a-f graphically illustrates annual demand and demand ratios for the systems within the Northern Region. Changes in water demand over time are clearly shown.

TABLE 4.1.1a WATER PRODUCTION DATA - WESTERN SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	261.305	8.429	9.425
	Feb	235.879	8.424	9.975
	Mar	260.754	8.411	9.41
	April	262.606	8.753	9.814
	May	288.197	9.296	10.756
	June	364.575	12.152	15.39
	July	340.676	10.989	12.863
	Aug	356.106	11.487	13.564
	Sept	326.929	10.897	13.301
	Oct	297.083	9.583	11.22
	Nov	272.965	9.098	10.162
	Dec	266.740	8.604	10.749

YEARLY AVERAGE DAY (MGD) = 9.681
RATIO MAX DAY/AVG DAY = 1.589
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.255

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	256.123	8.262	9.507
	Feb	241.640	8.332	9.332
	Mar	257.891	8.319	9.33
	Apr	260.279	8.675	10.069
	May	303.708	9.797	11.038
	June	336.689	11.222	13.757
	July	338.787	10.928	12.994
	Aug	315.394	10.174	12.077
	Sept	296.129	9.870	11.245
	Oct	275.476	8.8866	9.941
	Nov	251.915	8.397	9.69
	Dec	256.919	8.287	9.157

YEARLY AVERAGE DAY (MGD) = 9.264
RATIO MAX DAY/AVG DAY = 1.484
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.211

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	254.982	8.225	8.931
	Feb	228.285	8.153	9.565
	Mar	253.409	8.174	8.856
	April	252.801	8.426	9.813
	May	290.772	9.379	1.848
	June	288.249	9.608	11.168
	July	332.802	10.735	12.506
	Aug	317.866	10.253	12.006
	Sept	282.607	9.420	10.879
	Oct	265.128	8.552	9.552
	Nov	249.011	8.300	9.124
	Dec	251.268	8.105	8.858

YEARLY AVERAGE DAY (MGD) = 8.951
RATIO MAX DAY/AVG DAY = 1.435
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.199

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	257.470	8.305	9.452
	Feb	228.438	8.158	8.912
	Mar	256.011	8.258	9.298
	April	256.970	8.565	9.39
	May	283.378	9.141	10.567
	June	290.708	9.690	11.774
	July	364.481	11.757	13.578
	Aug	362.392	11.690	14.06
	Sept	297.226	9.907	12.053
	Oct	272.545	8.791	10.506
	Nov	249.518	8.317	9.22
	Dec	258.176	8.328	9.15

YEARLY AVERAGE DAY (MGD) = 9.253
RATIO MAX DAY/AVG DAY = 1.520
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.271

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	255.224	8.233	8.835
	Feb	226.450	8.087	8.820
	Mar	252.848	8.156	8.850
	April	257.611	8.587	10.641
	May	347.419	11.207	13.150
	June	319.569	10.652	13.06
	July	364.384	11.754	14.237
	Aug	345.375	11.141	14.118
	Sept	300.586	10.019	12.461
	Oct	279.348	9.011	9.678
	Nov	251.568	8.385	9.248
	Dec	255.746	8.249	9.004

YEARLY AVERAGE DAY (MGD) = 9.469
RATIO MAX DAY/AVG DAY = 1.504
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.241

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1b WATER PRODUCTION DATA - STAFFORD SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD	Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	15.222	0.491	0.635	2004	Jan	15.875	0.512	0.683
	Feb	13.619	0.486	0.626		Feb	15.629	0.538	0.664
	Mar	15.067	0.486	0.649		Mar	16.709	0.539	0.669
	April	13.265	0.442	0.572		Apr	14.909	0.496	0.689
	May	13.971	0.450	0.605		May	15.622	0.503	0.653
	June	14.956	0.498	0.652		June	17.306	0.576	0.724
	July	14.225	0.458	0.563		July	17.687	0.570	0.751
	Aug	14.719	0.474	0.629		Aug	17.855	0.575	0.715
	Sept	14.956	0.498	0.629		Sept	15.654	0.521	0.666
	Oct	16.064	0.518	0.643		Oct	15.811	0.510	0.637
	Nov	15.542	0.518	0.674		Nov	15.473	0.515	0.717
	Dec	15.203	0.490	0.702		Dec	14.887	0.480	0.658

YEARLY AVERAGE DAY (MGD) = 0.484
RATIO MAX DAY/AVG DAY = 1.450
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.070

YEARLY AVERAGE DAY (MGD) = 0.528
RATIO MAX DAY/AVG DAY = 1.422
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.090

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD	Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	17.517	0.565	0.781	2002	Jan	15.133	0.488	0.619
	Feb	14.712	0.525	0.644		Feb	12.818	0.457	0.688
	Mar	15.338	0.494	0.613		Mar	13.967	0.450	0.584
	April	15.401	0.513	0.666		April	13.779	0.459	0.582
	May	15.370	0.495	0.691		May	14.968	0.482	0.613
	June	16.257	0.541	0.656		June	14.413	0.480	0.646
	July	16.647	0.537	0.650		July	15.224	0.491	0.638
	Aug	16.278	0.525	0.681		Aug	14.263	0.460	0.610
	Sept	17.805	0.593	0.781		Sept	14.811	0.493	0.613
	Oct	17.853	0.575	0.685		Oct	16.667	0.537	0.656
	Nov	15.354	0.511	0.717		Nov	14.987	0.499	0.636
	Dec	15.570	0.502	0.695		Dec	15.880	0.512	0.661

YEARLY AVERAGE DAY (MGD) = 0.532
RATIO MAX DAY/AVG DAY = 1.469
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.116

YEARLY AVERAGE DAY (MGD) = 0.485
RATIO MAX DAY/AVG DAY = 1.419
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.109

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	14.223	0.458	0.558
	Feb	12.822	0.457	0.598
	Mar	14.896	0.480	0.616
	April	14.233	0.474	0.633
	May	15.389	0.496	0.705
	June	14.888	0.496	0.639
	July	15.414	0.497	0.657
	Aug	18.023	0.581	0.735
	Sept	17.964	0.598	0.768
	Oct	16.162	0.521	0.694
	Nov	13.470	0.449	0.649
	Dec	12.869	0.415	0.672

YEARLY AVERAGE DAY (MGD) = 0.494
RATIO MAX DAY/AVG DAY = 1.554
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.212

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1c WATER PRODUCTION DATA - SOMERS SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	3.581	0.115	0.138
	Feb	3.181	0.113	0.145
	Mar	3.062	0.098	0.129
	April	3.303	0.110	0.167
	May	4.055	0.130	0.167
	June	6.056	0.201	0.314
	July	5.290	0.170	0.266
	Aug	5.704	0.184	0.281
	Sept	4.628	0.154	0.236
	Oct	3.585	0.115	0.16
	Nov	3.203	0.106	0.13
	Dec	3.115	0.100	0.153

YEARLY AVERAGE DAY (MGD) = 0.134
RATIO MAX DAY/AVG DAY = 2.350
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.511

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	3.075	0.099	0.113
	Feb	3.017	0.107	0.137
	Mar	3.419	0.110	0.130
	April	3.526	0.117	0.159
	May	4.066	0.131	0.208
	June	4.067	0.135	0.192
	July	5.387	0.173	0.260
	Aug	5.646	0.182	0.262
	Sept	4.370	0.145	0.214
	Oct	3.299	0.106	0.134
	Nov	3.191	0.106	0.135
	Dec	3.311	0.106	0.135

YEARLY AVERAGE DAY (MGD) = 0.127
RATIO MAX DAY/AVG DAY = 2.062
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.433

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	3.596	0.116	0.162
	Feb	3.046	0.108	0.147
	Mar	3.586	0.115	0.170
	April	4.031	0.134	0.199
	May	6.548	0.211	0.332
	June	5.584	0.186	0.270
	July	7.150	0.230	0.380
	Aug	6.298	0.203	0.363
	Sept	4.797	0.159	0.219
	Oct	4.434	0.143	0.189
	Nov	3.747	0.124	0.169
	Dec	3.147	0.101	0.140

YEARLY AVERAGE DAY (MGD) = 0.153
RATIO MAX DAY/AVG DAY = 2.478
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.504

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	3.333	0.107	0.132
	Feb	3.301	0.113	0.142
	Mar	3.503	0.113	0.149
	Apr	3.564	0.118	0.215
	May	4.226	0.136	0.191
	June	5.108	0.170	0.266
	July	4.603	0.148	0.244
	Aug	4.523	0.145	0.207
	Sept	4.298	0.143	0.215
	Oct	3.613	0.116	0.138
	Nov	3.453	0.115	0.137
	Dec	3.575	0.115	0.145

YEARLY AVERAGE DAY (MGD) = 0.128
RATIO MAX DAY/AVG DAY = 2.078
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.328

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	3.617	0.116	0.120
	Feb	2.726	0.097	0.124
	Mar	3.105	0.100	0.149
	April	3.086	0.102	0.132
	May	3.837	0.123	0.164
	June	4.218	0.140	0.302
	July	5.958	0.192	0.279
	Aug	6.007	0.193	0.274
	Sept	4.144	0.138	0.206
	Oct	3.462	0.111	0.149
	Nov	3.173	0.105	0.167
	Dec	3.158	0.101	0.142

YEARLY AVERAGE DAY (MGD) = 0.126
RATIO MAX DAY/AVG DAY = 2.394
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.536

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1d WATER PRODUCTION DATA - LAKEVIEW/LAKEWOOD SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	0.712	0.022	NA
	Feb	0.621	0.022	NA
	Mar	0.732	0.023	NA
	April	0.711	0.023	NA
	May	0.774	0.024	NA
	June	0.898	0.029	NA
	July	0.875	0.028	NA
	Aug	0.974	0.031	NA
	Sept	0.831	0.027	NA
	Oct	0.769	0.024	NA
	Nov	0.737	0.024	NA
	Dec	0.746	0.024	NA

YEARLY AVERAGE DAY (MGD) = 0.025
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.240

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	0.802	0.025	NA
	Feb	0.717	0.024	NA
	Mar	0.763	0.024	NA
	Apr	0.762	0.025	NA
	May	0.826	0.026	NA
	June	0.870	0.029	NA
	July	0.844	0.027	NA
	Aug	0.781	0.025	NA
	Sept	0.720	0.024	NA
	Oct	0.717	0.023	NA
	Nov	0.693	0.023	NA
	Dec	0.710	0.022	NA

YEARLY AVERAGE DAY (MGD) = 0.025
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.160

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	0.838	0.027	NA
	Feb	0.788	0.028	NA
	Mar	0.898	0.028	NA
	April	0.844	0.028	NA
	May	0.776	0.025	NA
	June	0.799	0.026	NA
	July	0.879	0.028	NA
	Aug	0.928	0.029	NA
	Sept	0.735	0.024	NA
	Oct	0.742	0.023	NA
	Nov	0.732	0.024	NA
	Dec	0.753	0.024	NA

YEARLY AVERAGE DAY (MGD) = 0.026
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.115

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	0.689	0.022	NA
	Feb	0.637	0.022	NA
	Mar	0.701	0.022	NA
	April	0.695	0.023	NA
	May	0.722	0.023	NA
	June	0.743	0.024	NA
	July	0.807	0.026	NA
	Aug	0.840	0.027	NA
	Sept	0.733	0.024	NA
	Oct	0.729	0.023	NA
	Nov	0.709	0.023	NA
	Dec	0.775	0.025	NA

YEARLY AVERAGE DAY (MGD) = 0.024
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.125

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	0.740	0.023	NA
	Feb	0.672	0.024	NA
	Mar	0.754	0.024	NA
	April	0.759	0.025	NA
	May	0.911	0.029	NA
	June	0.794	0.026	NA
	July	0.909	0.029	NA
	Aug	0.899	0.029	NA
	Sept	0.823	0.027	NA
	Oct	0.938	0.030	NA
	Nov	0.730	0.024	NA
	Dec	0.717	0.023	NA

YEARLY AVERAGE DAY (MGD) = 0.026
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.153

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1e WATER PRODUCTION DATA - RESERVOIR HEIGHTS SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	0.136	0.004	NA
	Feb	0.099	0.003	NA
	Mar	0.129	0.004	NA
	April	0.176	0.005	NA
	May	0.134	0.004	NA
	June	0.218	0.007	NA
	July	0.151	0.004	NA
	Aug	0.107	0.003	NA
	Sept	0.192	0.006	NA
	Oct	0.156	0.005	NA
	Nov	0.140	0.004	NA
	Dec	0.163	0.005	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.590

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	0.190	0.006	NA
	Feb	0.147	0.005	NA
	Mar	0.140	0.004	NA
	Apr	0.103	0.003	NA
	May	0.187	0.006	NA
	June	0.117	0.003	NA
	July	0.160	0.005	NA
	Aug	0.182	0.005	NA
	Sept	0.141	0.004	NA
	Oct	0.152	0.004	NA
	Nov	0.091	0.003	NA
	Dec	0.126	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.500

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	0.190	0.006	NA
	Feb	0.147	0.005	NA
	Mar	0.140	0.004	NA
	April	0.103	0.003	NA
	May	0.187	0.006	NA
	June	0.117	0.003	NA
	July	0.160	0.005	NA
	Aug	0.182	0.005	NA
	Sept	0.141	0.004	NA
	Oct	0.152	0.004	NA
	Nov	0.091	0.003	NA
	Dec	0.126	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.500

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	0.105	0.003	NA
	Feb	0.130	0.004	NA
	Mar	0.127	0.004	NA
	April	0.137	0.004	NA
	May	0.157	0.005	NA
	June	0.112	0.003	NA
	July	0.161	0.005	NA
	Aug	0.159	0.005	NA
	Sept	0.114	0.003	NA
	Oct	0.152	0.004	NA
	Nov	0.143	0.004	NA
	Dec	0.152	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.250

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	0.097	0.003	NA
	Feb	0.097	0.003	NA
	Mar	0.120	0.003	NA
	April	0.105	0.003	NA
	May	0.194	0.006	NA
	June	0.127	0.004	NA
	July	0.142	0.004	NA
	Aug	0.165	0.005	NA
	Sept	0.105	0.003	NA
	Oct	0.090	0.002	NA
	Nov	0.102	0.003	NA
	Dec	0.102	0.003	NA

YEARLY AVERAGE DAY (MGD) = 0.003
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 2.000

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1f WATER PRODUCTION DATA - CRESCENT LAKE SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	0.823	0.026	NA
	Feb	0.861	0.031	NA
	Mar	0.875	0.028	NA
	April	1.117	0.037	NA
	May	1.316	0.042	NA
	June	0.772	0.025	NA
	July	1.515	0.048	NA
	Aug	1.474	0.047	NA
	Sept	1.158	0.038	NA
	Oct	1.086	0.035	NA
	Nov	0.886	0.029	NA
	Dec	0.856	0.027	NA

YEARLY AVERAGE DAY (MGD) = 0.034
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.411

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	1.306	0.042	NA
	Feb	0.782	0.026	NA
	Mar	0.802	0.025	NA
	Apr	1.072	0.035	NA
	May	1.001	0.032	NA
	June	1.289	0.042	NA
	July	1.442	0.046	NA
	Aug	1.041	0.033	NA
	Sept	1.070	0.036	NA
	Oct	0.849	0.027	NA
	Nov	0.930	0.031	NA
	Dec	0.946	0.030	NA

YEARLY AVERAGE DAY (MGD) = 0.034
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.352

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	1.172	0.037	NA
	Feb	0.836	0.029	NA
	Mar	0.920	0.029	NA
	April	0.822	0.027	NA
	May	1.538	0.049	NA
	June	0.962	0.032	NA
	July	1.310	0.042	NA
	Aug	1.324	0.042	NA
	Sept	0.941	0.031	NA
	Oct	1.036	0.033	NA
	Nov	0.914	0.030	NA
	Dec	1.141	0.036	NA

YEARLY AVERAGE DAY (MGD) = 0.035
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.40

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	0.842	0.027	NA
	Feb	1.463	0.052	NA
	Mar	0.979	0.031	NA
	April	0.796	0.026	NA
	May	1.112	0.035	NA
	June	0.927	0.030	NA
	July	1.758	0.056	NA
	Aug	1.478	0.047	NA
	Sept	1.019	0.033	NA
	Oct	0.872	0.028	NA
	Nov	1.100	0.036	NA
	Dec	1.027	0.033	NA

YEARLY AVERAGE DAY (MGD) = 0.036
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.555

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	0.839	0.027	NA
	Feb	0.838	0.029	NA
	Mar	0.942	0.030	NA
	April	1.239	0.041	NA
	May	1.394	0.044	NA
	June	1.107	0.036	NA
	July	1.388	0.044	NA
	Aug	1.424	0.045	NA
	Sept	0.998	0.033	NA
	Oct	0.854	0.027	NA
	Nov	0.815	0.027	NA
	Dec	0.816	0.026	NA

YEARLY AVERAGE DAY (MGD) = 0.034
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.323

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1g WATER PRODUCTION DATA - NATHAN HALE SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	0.135	0.004	NA
	Feb	0.120	0.004	NA
	Mar	0.136	0.004	NA
	April	0.119	0.003	NA
	May	0.147	0.004	NA
	June	0.165	0.005	NA
	July	0.168	0.005	NA
	Aug	0.174	0.005	NA
	Sept	0.161	0.005	NA
	Oct	0.130	0.004	NA
	Nov	0.134	0.004	NA
	Dec	0.122	0.003	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.250

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	0.142	0.004	NA
	Feb	0.127	0.004	NA
	Mar	0.146	0.004	NA
	April	0.141	0.004	NA
	May	0.176	0.005	NA
	June	0.176	0.005	NA
	July	0.165	0.005	NA
	Aug	0.164	0.005	NA
	Sept	0.147	0.004	NA
	Oct	0.152	0.004	NA
	Nov	0.148	0.004	NA
	Dec	0.146	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.005
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.00

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	0.155	0.005	NA
	Feb	0.121	0.004	NA
	Mar	0.152	0.004	NA
	April	0.158	0.005	NA
	May	0.208	0.006	NA
	June	0.181	0.006	NA
	July	0.190	0.006	NA
	Aug	0.191	0.006	NA
	Sept	0.165	0.005	NA
	Oct	0.160	0.005	NA
	Nov	0.153	0.005	NA
	Dec	0.167	0.005	NA

YEARLY AVERAGE DAY (MGD) = 0.005
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.20

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	0.153	0.004	NA
	Feb	0.135	0.004	NA
	Mar	0.139	0.004	NA
	Apr	0.135	0.004	NA
	May	0.196	0.006	NA
	June	0.169	0.005	NA
	July	0.152	0.004	NA
	Aug	0.144	0.004	NA
	Sept	0.137	0.004	NA
	Oct	0.141	0.004	NA
	Nov	0.126	0.004	NA
	Dec	0.133	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.50

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	0.156	0.005	NA
	Feb	0.138	0.004	NA
	Mar	0.149	0.004	NA
	April	0.144	0.004	NA
	May	0.155	0.005	NA
	June	0.145	0.004	NA
	July	0.159	0.005	NA
	Aug	0.157	0.005	NA
	Sept	0.151	0.005	NA
	Oct	0.146	0.004	NA
	Nov	0.134	0.004	NA
	Dec	0.147	0.004	NA

YEARLY AVERAGE DAY (MGD) = 0.004
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.250

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

TABLE 4.1.1h WATER PRODUCTION DATA - LYNNWOOD SYSTEM

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2005	Jan	0.254	0.008	NA
	Feb	0.209	0.007	NA
	Mar	0.234	0.007	NA
	April	0.226	0.007	NA
	May	0.262	0.008	NA
	June	0.333	0.011	NA
	July	0.306	0.009	NA
	Aug	0.310	0.010	NA
	Sept	0.253	0.008	NA
	Oct	0.221	0.007	NA
	Nov	0.208	0.006	NA
	Dec	0.225	0.007	NA

YEARLY AVERAGE DAY (MGD) = 0.008
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.375

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2004	Jan	0.266	0.008	NA
	Feb	0.215	0.007	NA
	Mar	0.243	0.007	NA
	Apr	0.225	0.007	NA
	May	0.268	0.008	NA
	June	0.301	0.010	NA
	July	0.291	0.009	NA
	Aug	0.219	0.007	NA
	Sept	0.257	0.008	NA
	Oct	0.251	0.008	NA
	Nov	0.241	0.008	NA
	Dec	0.274	0.008	NA

YEARLY AVERAGE DAY (MGD) = 0.008
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.250

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2003	Jan	0.246	0.007	NA
	Feb	0.214	0.007	NA
	Mar	0.247	0.007	NA
	April	0.239	0.007	NA
	May	0.275	0.008	NA
	June	0.269	0.008	NA
	July	0.304	0.009	NA
	Aug	0.283	0.009	NA
	Sept	0.249	0.008	NA
	Oct	0.246	0.008	NA
	Nov	0.226	0.007	NA
	Dec	0.254	0.008	NA

YEARLY AVERAGE DAY (MGD) = 0.008
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.125

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2002	Jan	0.290	0.009	NA
	Feb	0.258	0.009	NA
	Mar	0.280	0.009	NA
	April	0.255	0.008	NA
	May	0.262	0.008	NA
	June	0.269	0.008	NA
	July	0.332	0.010	NA
	Aug	0.312	0.010	NA
	Sept	0.259	0.008	NA
	Oct	0.260	0.008	NA
	Nov	0.245	0.008	NA
	Dec	0.252	0.008	NA

YEARLY AVERAGE DAY (MGD) = 0.008
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.250

Year	Month	Total Prod MG	Avg Prod MGD	Max Prod MGD
2001	Jan	0.247	0.007	NA
	Feb	0.217	0.007	NA
	Mar	0.249	0.008	NA
	April	0.269	0.008	NA
	May	0.338	0.010	NA
	June	0.296	0.009	NA
	July	0.319	0.010	NA
	Aug	0.320	0.010	NA
	Sept	0.305	0.010	NA
	Oct	0.306	0.009	NA
	Nov	0.275	0.009	NA
	Dec	0.297	0.009	NA

YEARLY AVERAGE DAY (MGD) = 0.009
RATIO MAX DAY/AVG DAY = NA
RATIO OF HIGHEST MONTHLY AVG
DAY TO YEARLY AVG DAY = 1.111

2004 WAS A LEAP YEAR, AFFECTING THE CALCULATION OF AVERAGE DAY DEMAND IN FEBRUARY.

IN CALCULATING AVERAGE AND MAXIMUM DAY DEMANDS, AND RATIOS, MORE SIGNIFICANT FIGURES WERE USED THEN ARE SHOWN. THIS MAY GIVE THE APPEARANCE OF ROUNDING ERRORS WHEN CHECKING RATIOS.

Figure 4.1.1a

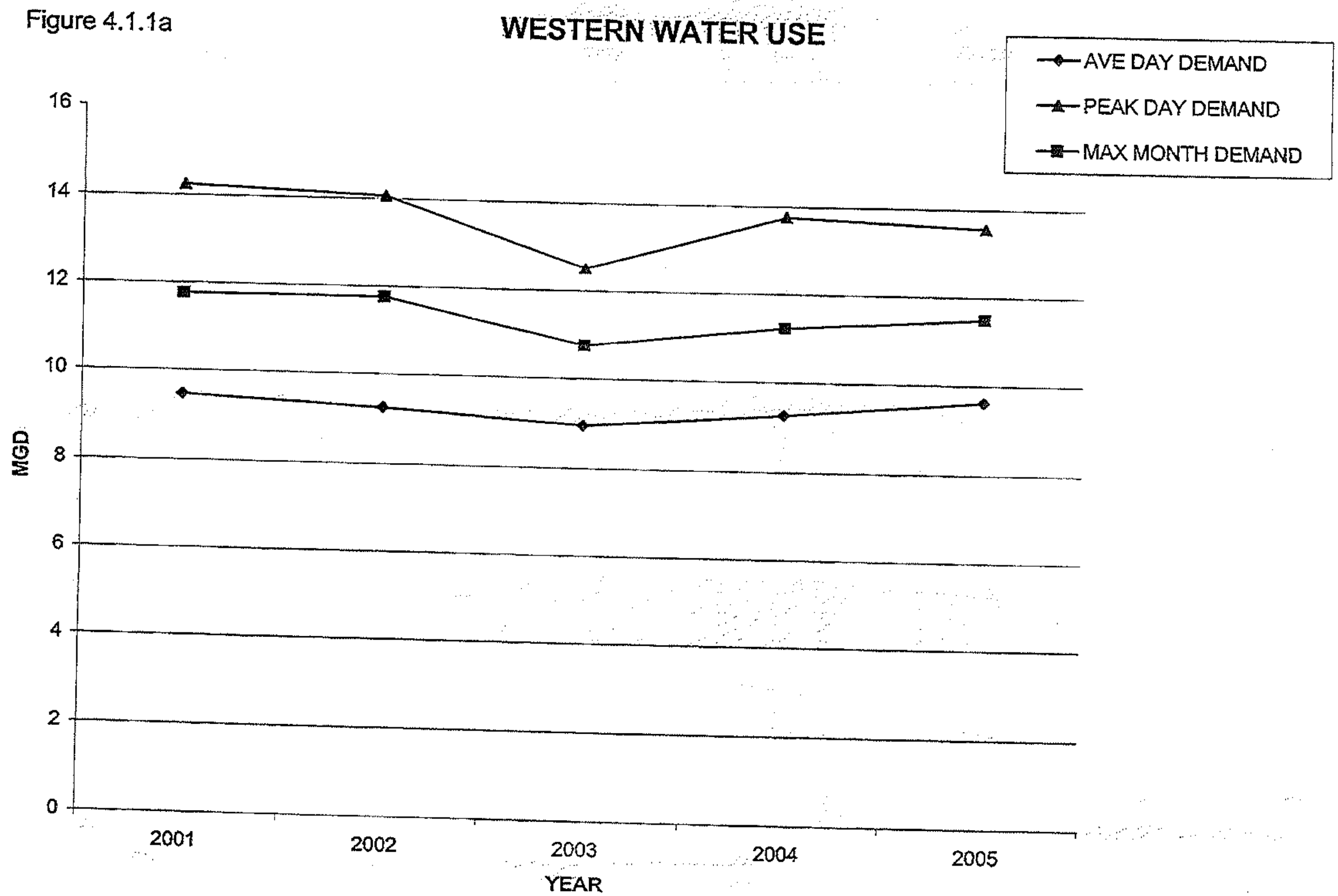

WESTERN WATER USE
AVE DAY DEMAND
PEAK DAY DEMAND
MAX MONTH DEMAND
16
14
12
10
8
6
4
2
0
MGD
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1b

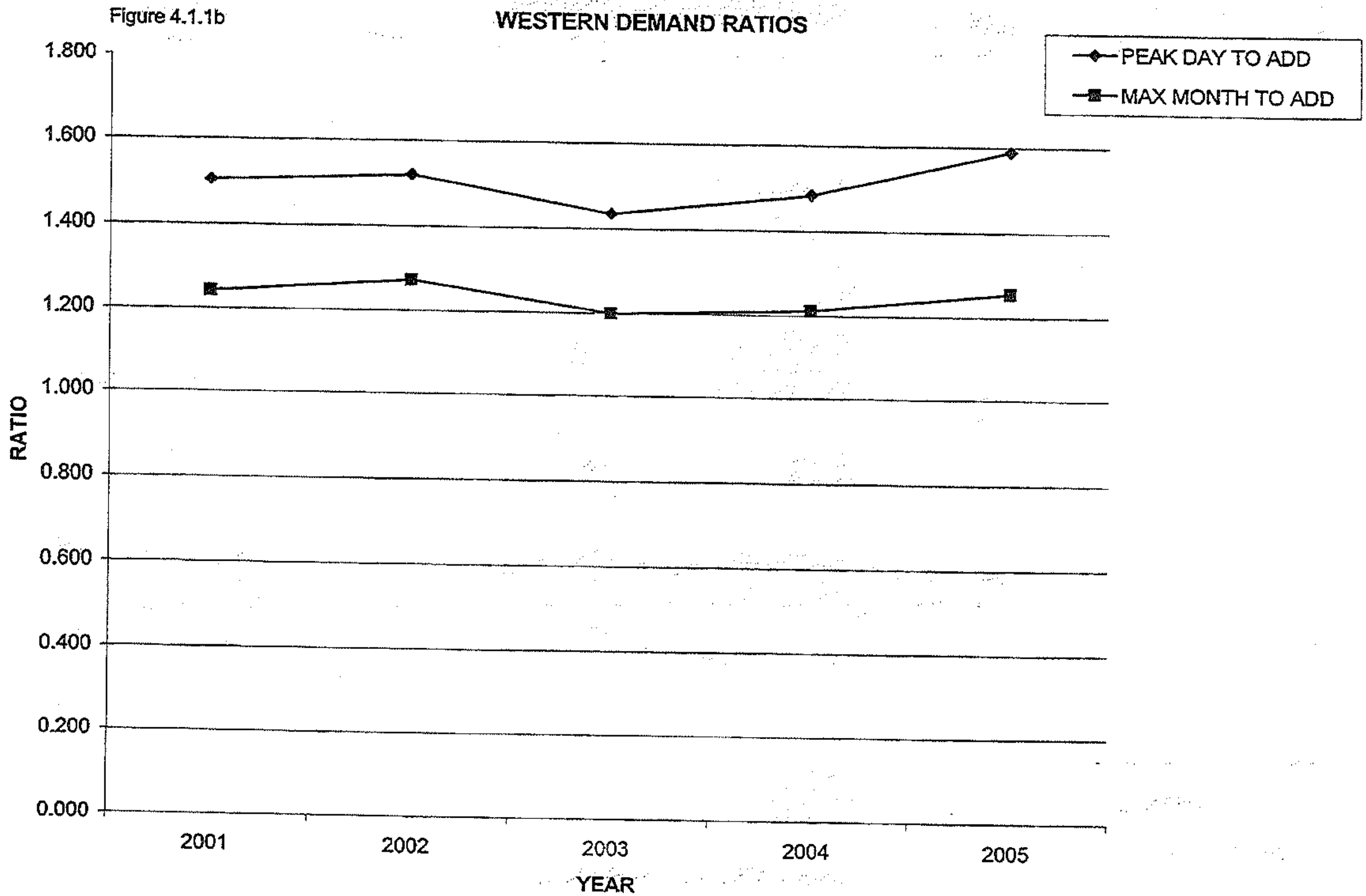

WESTERN DEMAND RATIOS
PEAK DAY TO ADD
MAX MONTH TO ADD
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
RATIO
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1 c

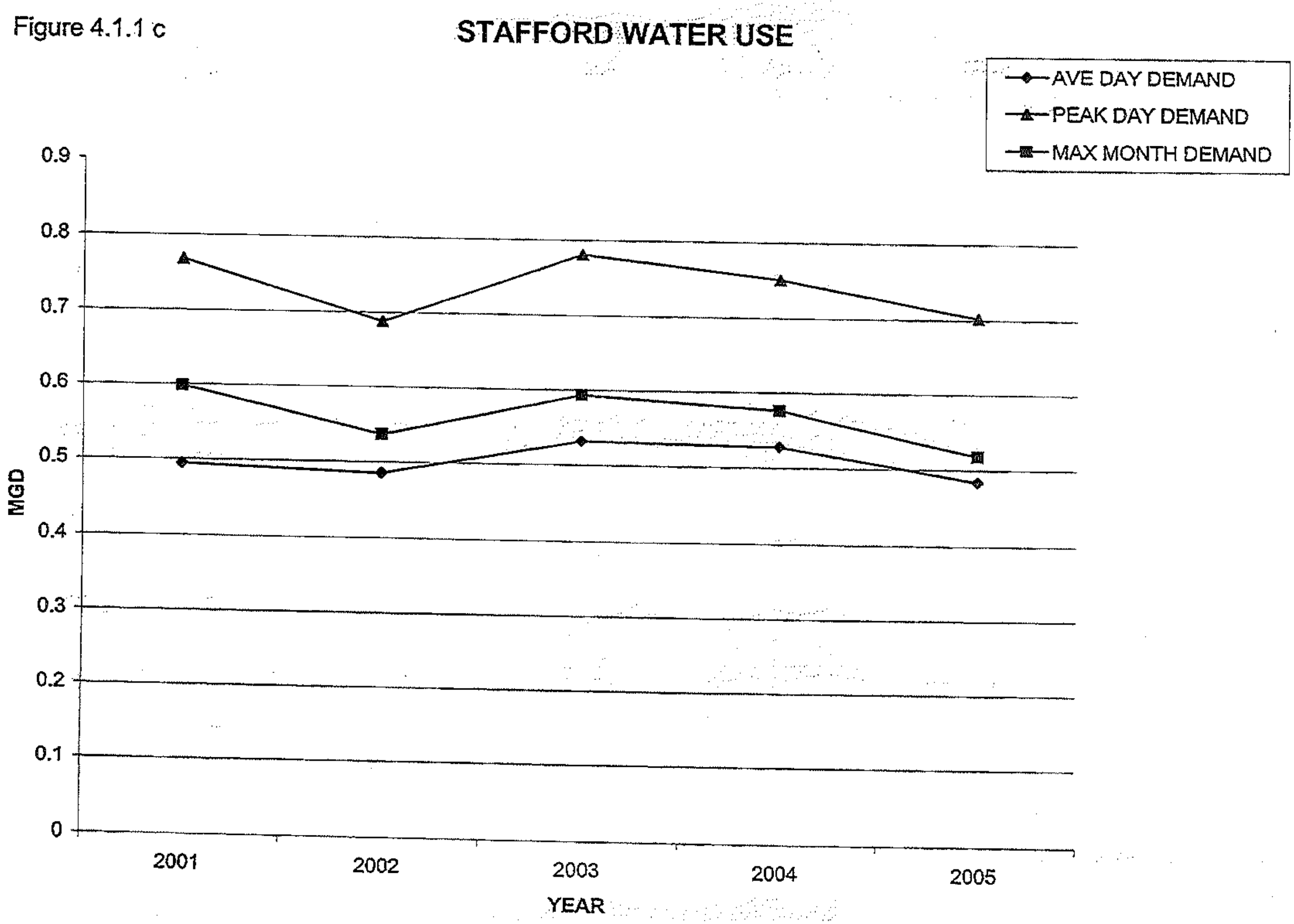

STAFFORD WATER USE
AVE DAY DEMAND
PEAK DAY DEMAND
MAX MONTH DEMAND
MGD
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1 d

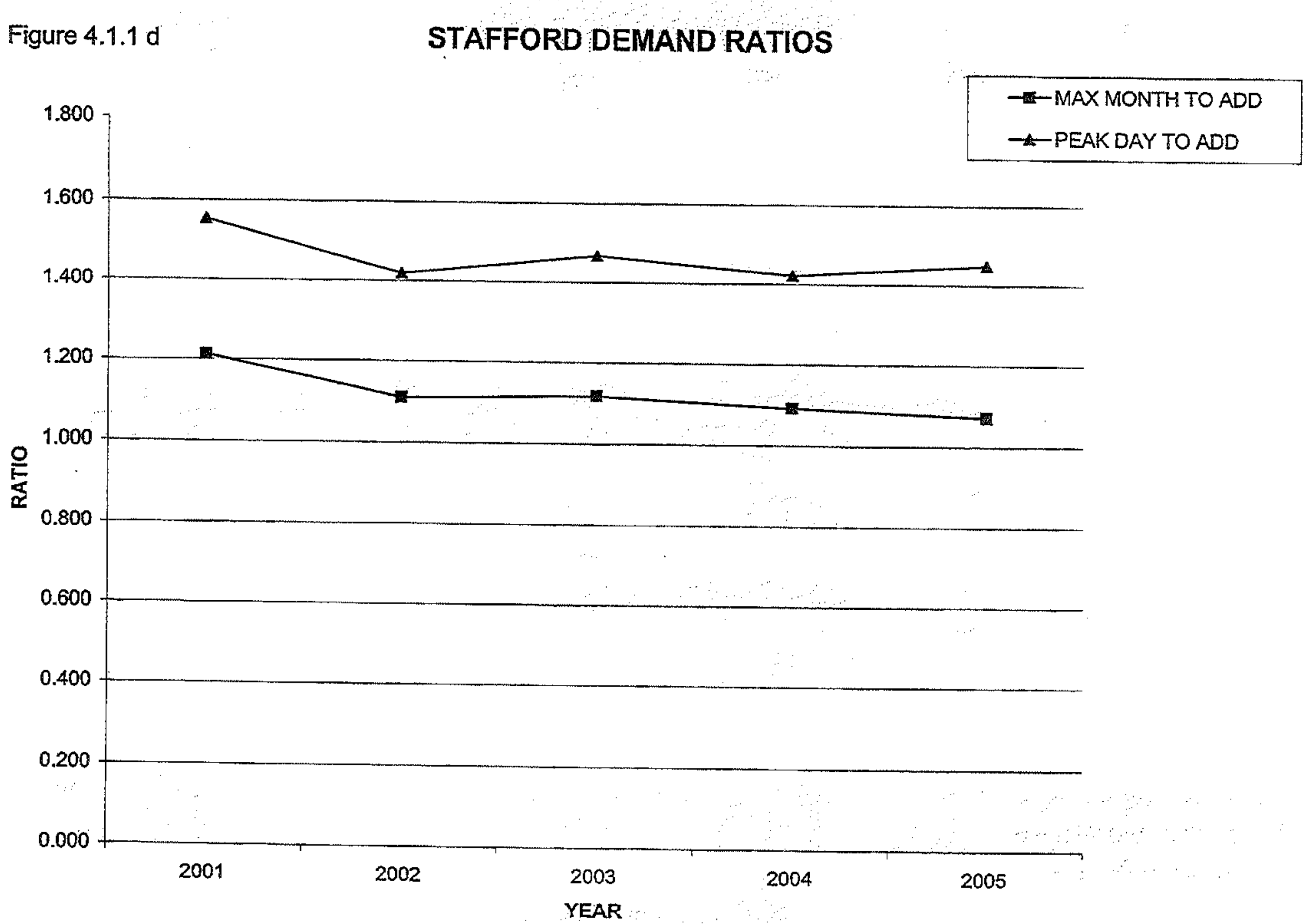

STAFFORD DEMAND RATIOS
MAX MONTH TO ADD
PEAK DAY TO ADD
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
RATIO
2001
2002
2003
2004
2005
YEAR

Figure 4.4.1e

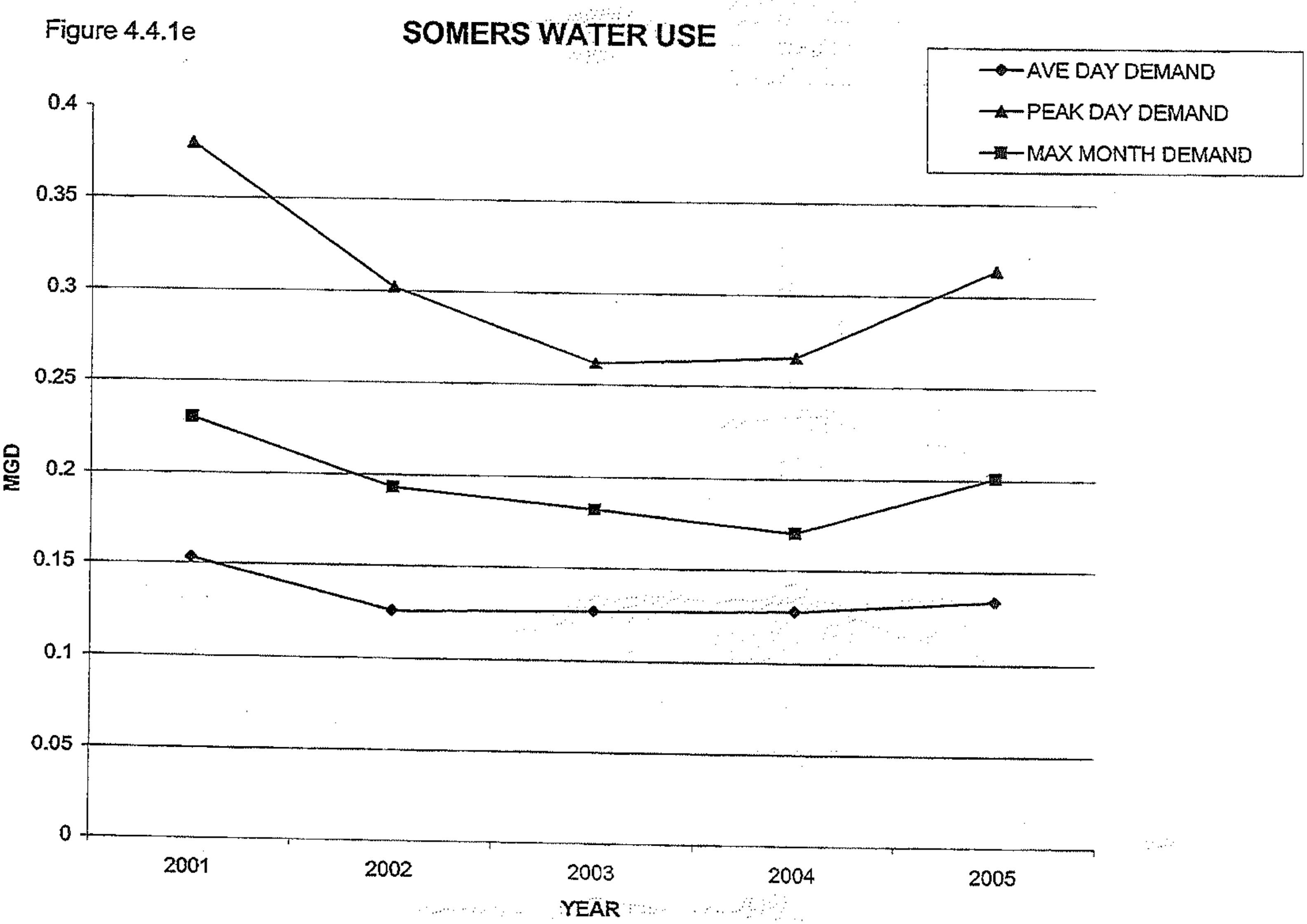

SOMERS WATER USE
AVE DAY DEMAND
PEAK DAY DEMAND
MAX MONTH DEMAND
MGD
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1f

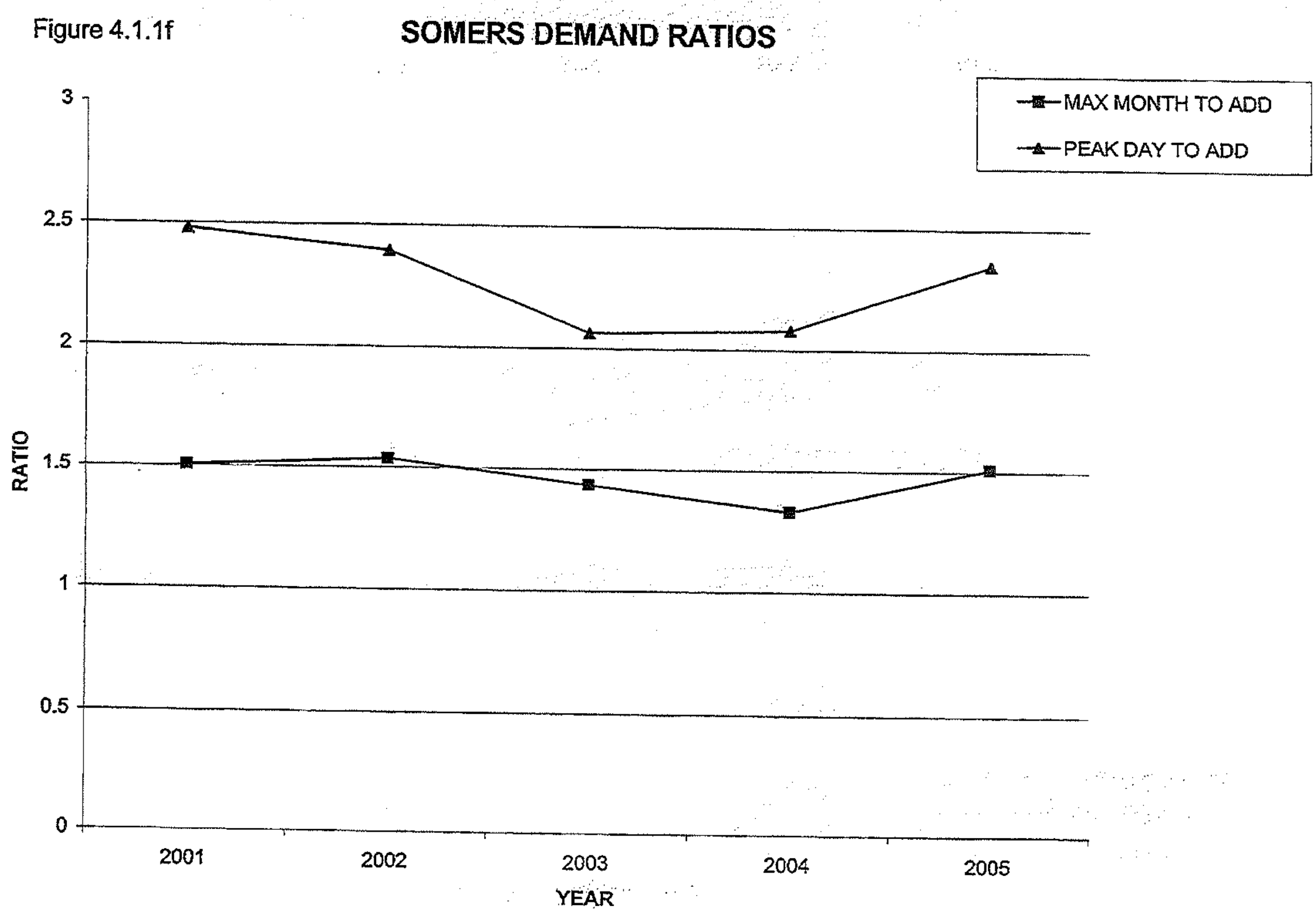

SOMERS DEMAND RATIOS
MAX MONTH TO ADD
PEAK DAY TO ADD
RATIO
3
2.5
2
1.5
1
0.5
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1g

CRESECENT LAKE WATER USE

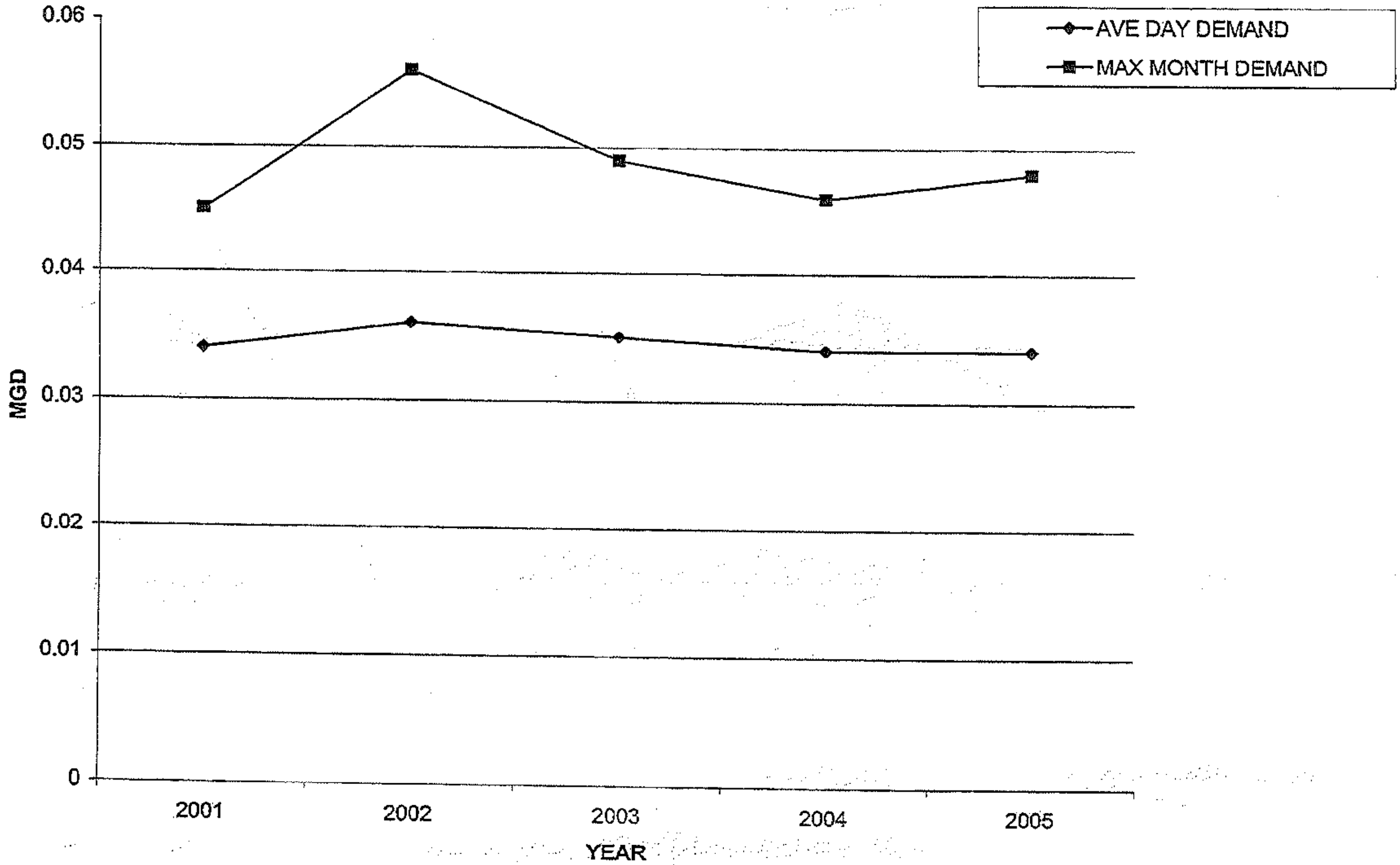


Figure 4.1.1h

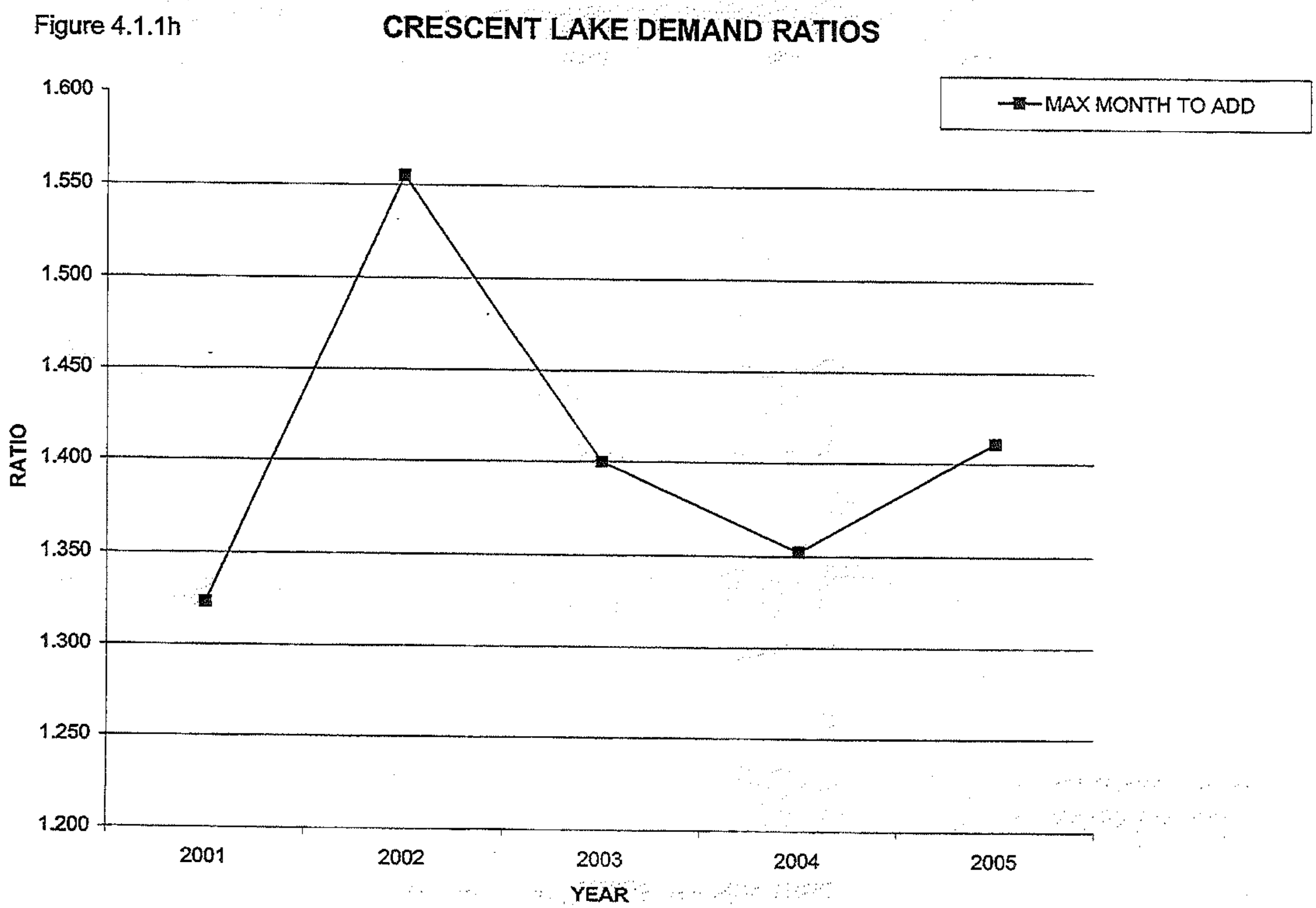

CRESCENT LAKE DEMAND RATIOS
MAX MONTH TO ADD
RATIO
1.600
1.550
1.500
1.450
1.400
1.350
1.300
1.250
1.200
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1i

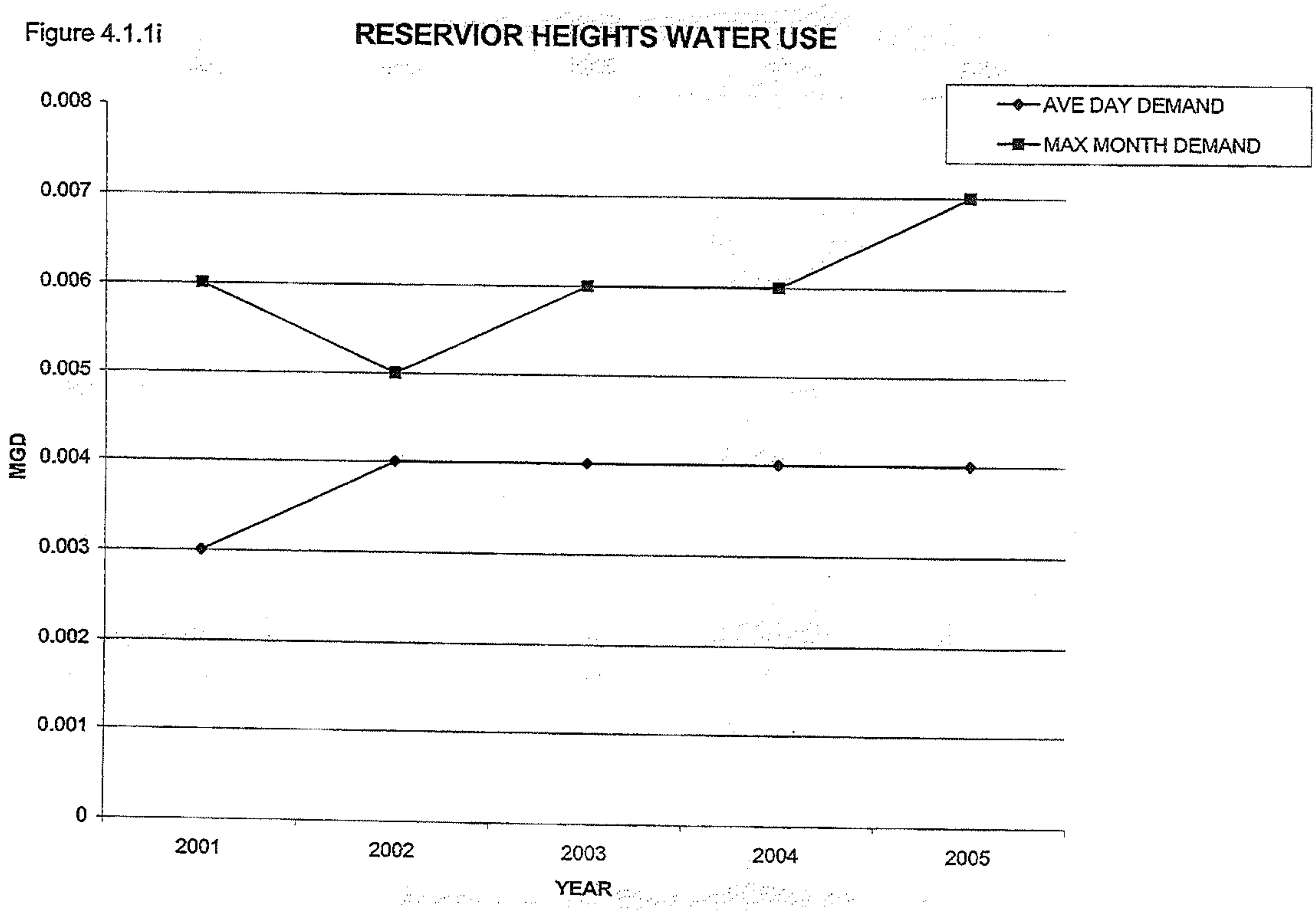

RESERVIOR HEIGHTS WATER USE
AVE DAY DEMAND
MAX MONTH DEMAND
MGD
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1j

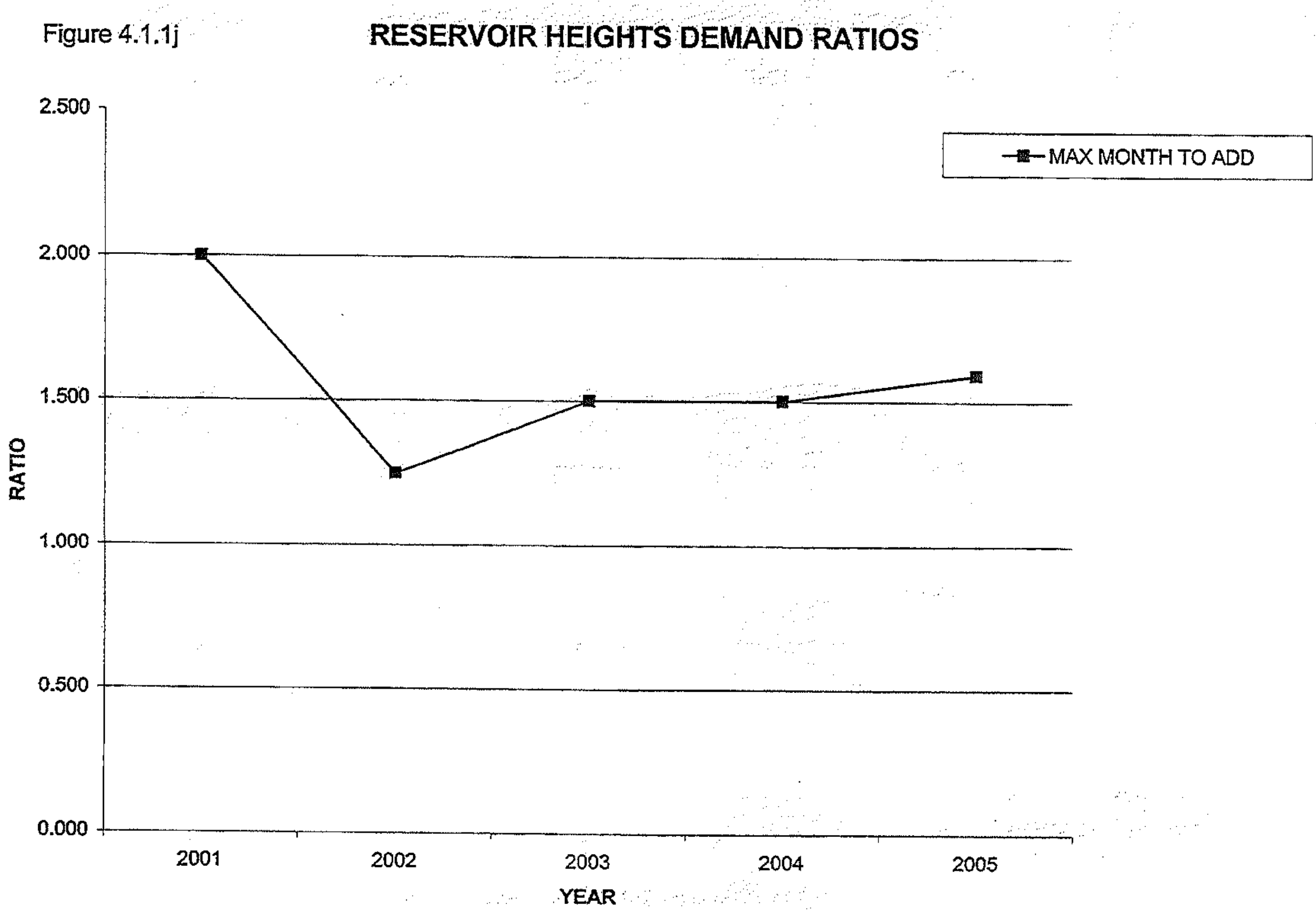

RESERVOIR HEIGHTS DEMAND RATIOS
MAX MONTH TO ADD
2.500
2.000
1.500
1.000
0.500
0.000
RATIO
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1k

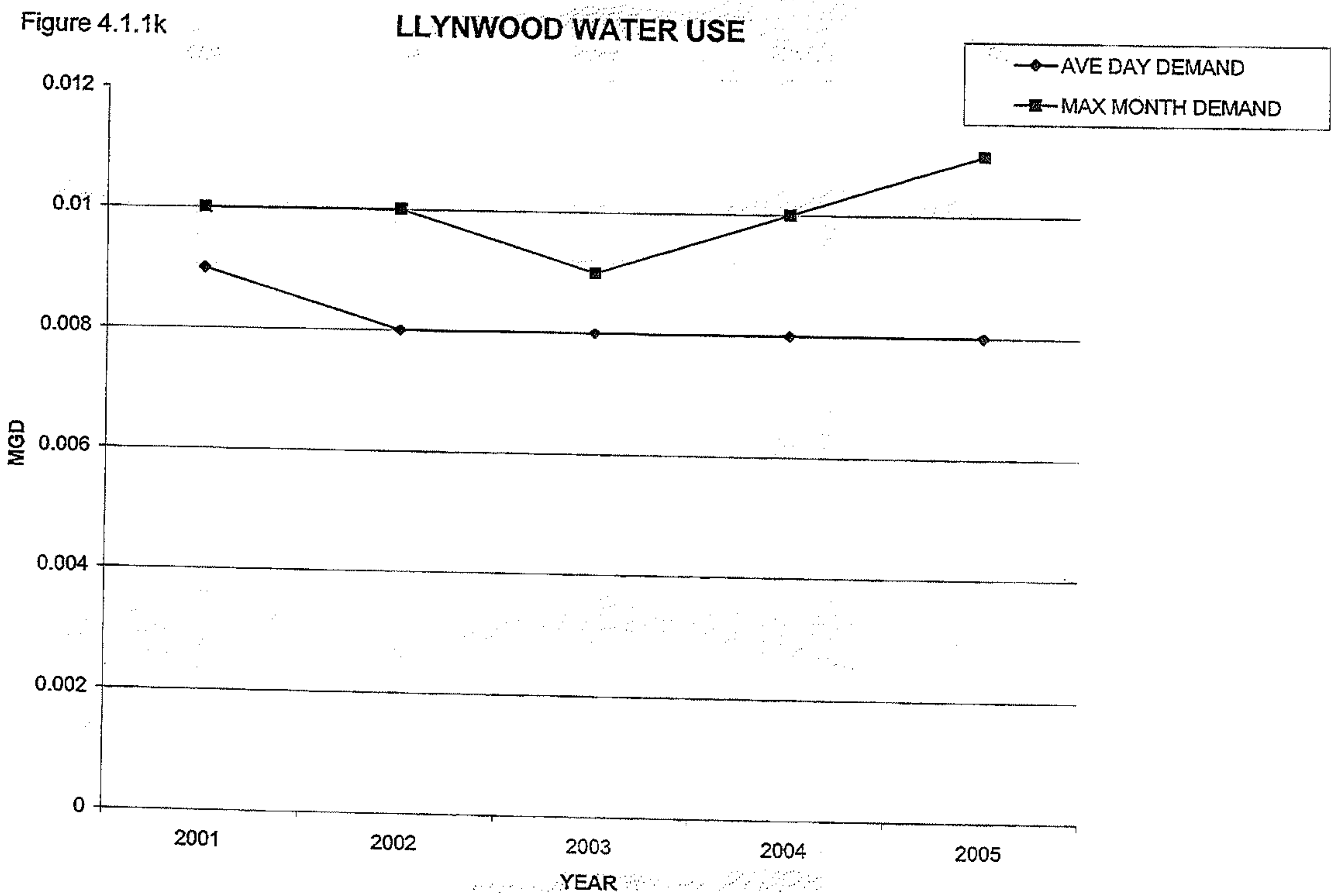

LLYNWOOD WATER USE
AVE DAY DEMAND
MAX MONTH DEMAND
MGD
0.012
0.01
0.008
0.006
0.004
0.002
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1I

LLYNWOOD DEMAND RATIOS

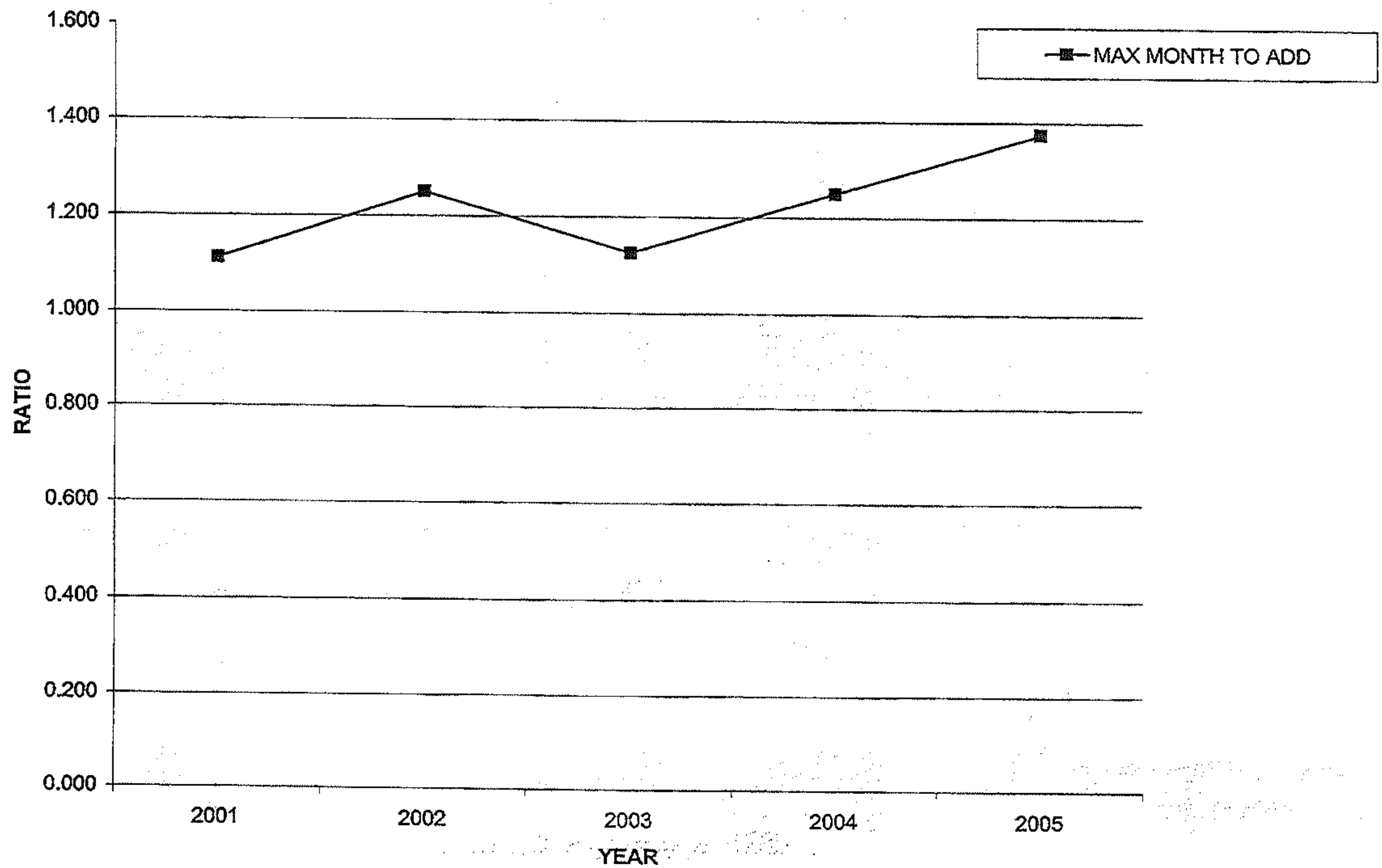


Figure 4.1.1m

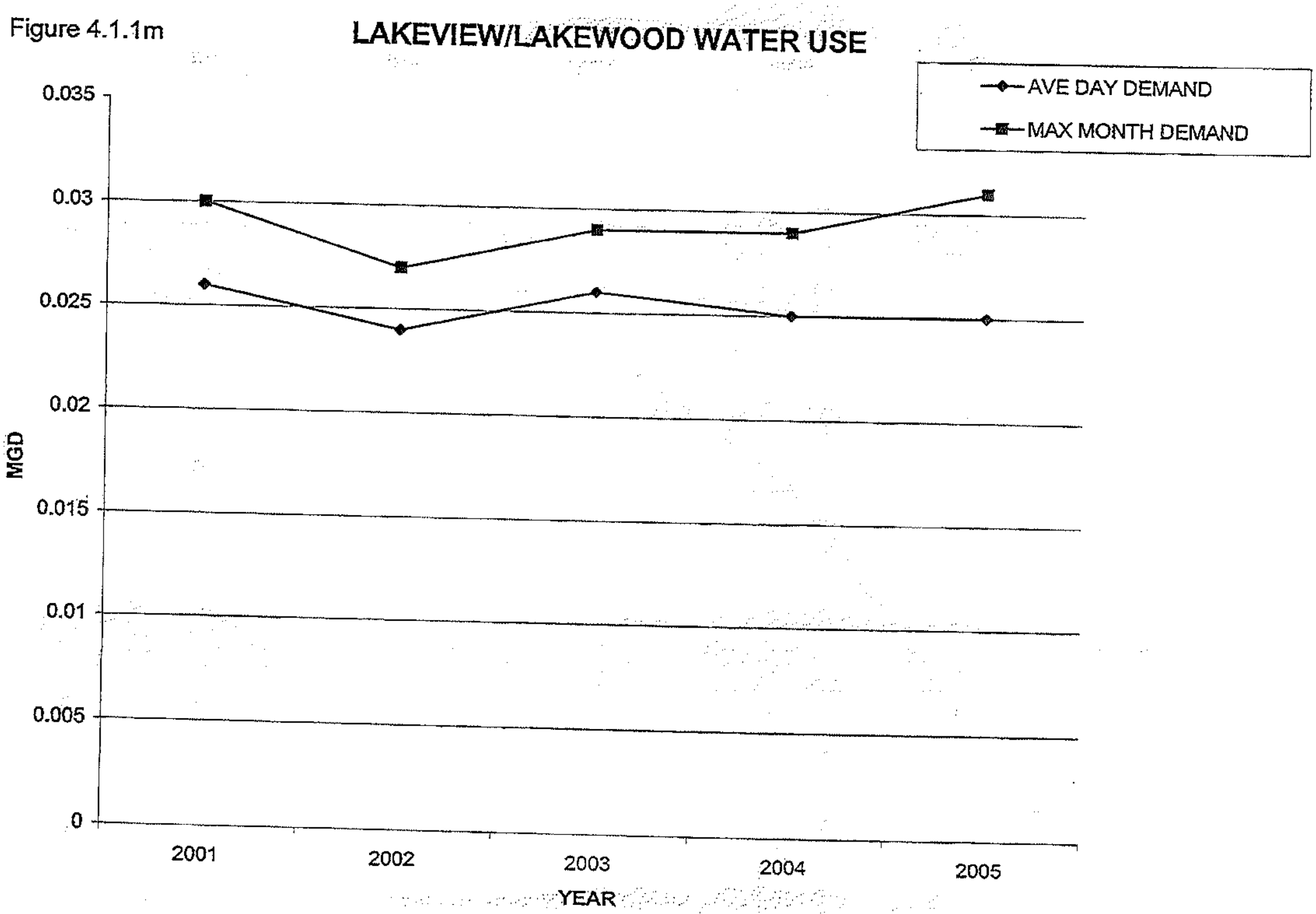
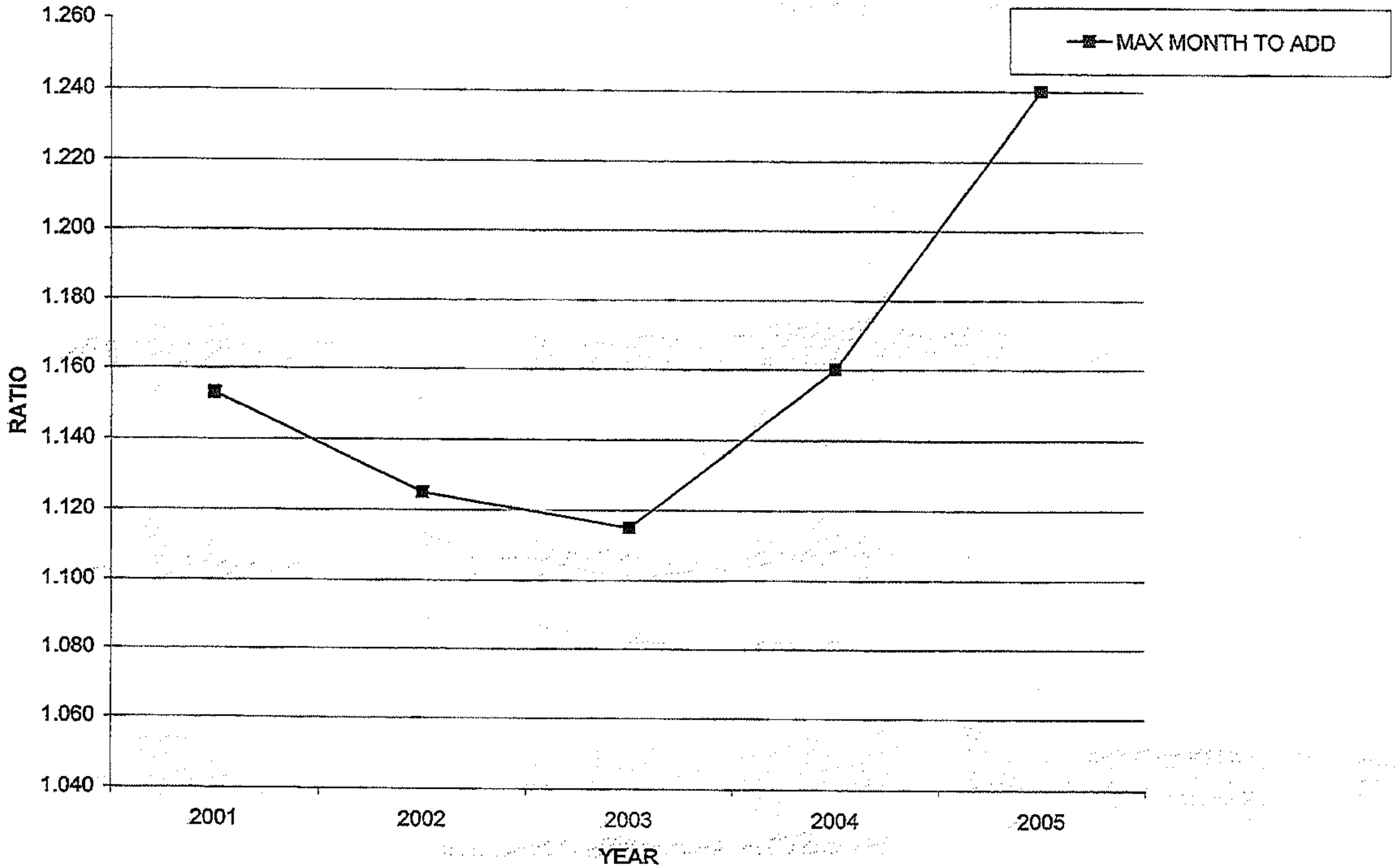

LAKEVIEW/LAKEWOOD WATER USE
AVE DAY DEMAND
MAX MONTH DEMAND
MGD
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1n

LAKEVIEW/LAKEWOOD DEMAND RATIOS



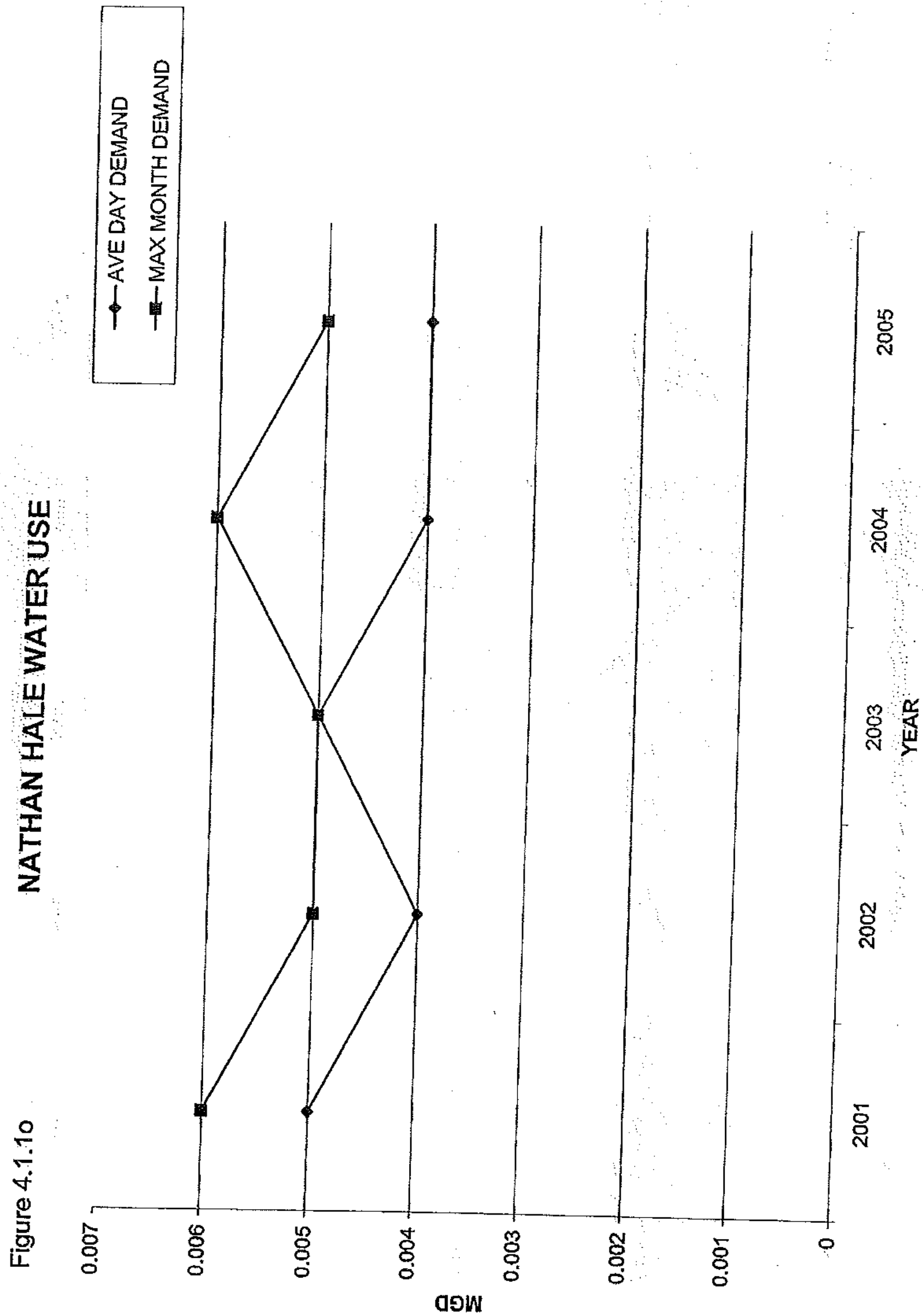
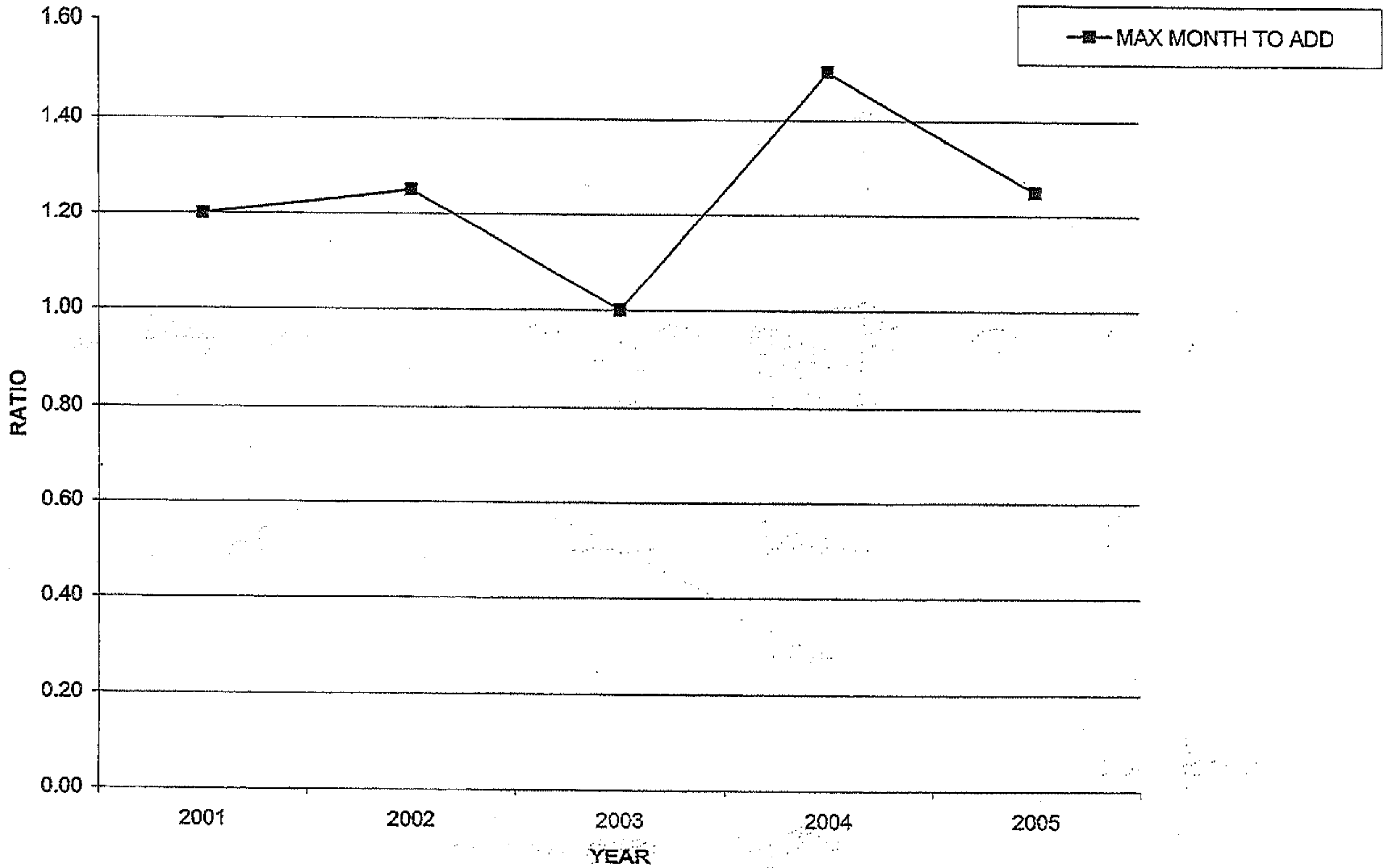


Figure 4.1.1o
NATHAN HALE WATER USE
AVE DAY DEMAND
MAX MONTH DEMAND
MGD
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
2001
2002
2003
2004
2005
YEAR

Figure 4.1.1p

NATHAN HALE DEMAND RATIOS



4.2 HISTORICAL WATER CONSUMPTION DATA

Water consumption data by user category for the Northern Region for the years 2001-2005 are presented in Tables 4.2.2. These data support the basic trends shown in Tables 4.1.1a-h and Figures 4.1.1a-p. The user categories include industrial, residential, commercial, and public authority. Over the previous five years, the number of residential customers has increased in the Western system; slightly increased in the Stafford, Somers, Crescent Lake, Lakewood/Lakeview, Nathan Hale and Lynnwood systems; and remained the same in the Reservoir Heights system. During the same period, residential water demand slightly decreased in the Western, Reservoir Heights, Crescent Lake, Lakewood/Lakeview and Lynnwood systems; and remained relatively constant in the Stafford, Somers and Nathan Hale systems. In the Western System the number of commercial customers has increased while industrial customers have decreased over the previous five years. Commercial and industrial demands have slightly increased in this system. In the Stafford system the number of residential customers has slightly increased while demand has stayed relatively constant. Commercial customers have somewhat stayed the same while industrial customers have slightly decreased. Commercial and industrial water demands have both increased in this system. In the Somers system the number of residential customers has slightly increased while demand has remained relatively constant. Commercial customers have slightly decreased however water demand has slightly increased.

The amount of non-revenue water can be determined by comparing total metered consumption against the total amount of water produced. The non-revenue water represents the difference between metered water entering the system and that sold to customers. The percentage of non-revenue water versus the total water produced has differed in the Northern Region over time. A discussion of how CWC analyzes and reduces lost water within each of the systems is presented in Section 4.7.

TABLE 4.2.2 YEARLY CONSUMPTION BY USER CATEGORY (MGD)

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
SOMERS	2001	0	0.009	0.098	0.006	0.113	0.153	0.040	26.1
	2002	0	0.010	0.096	0.005	0.112	0.126	0.014	11.1
	2003	0	0.008	0.096	0.005	0.109	0.127	0.018	14.1
	2004	0	0.008	0.099	0.004	0.111	0.128	0.017	13.2
	2005	0	0.009	0.102	0.006	0.117	0.134	0.017	12.6

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	0	7	76	4

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
STAFF.	2001	0.204	0.043	0.189	0.008	0.446	0.494	0.047	9.7
	2002	0.203	0.038	0.187	0.008	0.437	0.484	0.046	9.6
	2003	0.252	0.040	0.183	0.102	0.487	0.531	0.044	8.3
	2004	0.250	0.032	0.179	0.008	0.471	0.528	0.567	10.7
	2005	0.201	0.031	0.180	0.009	0.421	0.484	0.062	12.9

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	42	6	37	2

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
WEST.	2001	0.397	1.506	6.050	0.482	8.438	9.468	1.030	10.9
	2002	0.373	1.533	5.903	0.510	8.320	9.252	0.931	10
	2003	0.353	1.543	5.717	0.631	8.248	8.951	0.703	7.9
	2004	0.339	1.553	5.852	0.649	8.394	9.264	0.870	9.5
	2005	0.394	1.591	6.079	0.658	8.723	9.681	0.958	9.9

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	4	16	63	7

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
LLNWOD	2001	0	0	0.008	0	0.008	0.009	0.001	11.8
	2002	0	0	0.009	0	0.009	0.008	-0.00008	-0.9
	2003	0	0	0.008	0	0.008	0.008	0.002	2.7
	2004	0	0	0.008	0	0.008	0.008	-0.0001	-1.3
	2005	0	0	0.009	0	0.009	0.008	-0.0007	-8.9

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	0	0	100	0

TABLE 4.2.2 YEARLY CONSUMPTION BY USER CATEGORY (MGD)

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
LW/LV	2001	0	0	0.022	0	0.022	0.026	0.004	16
	2002	0	0	0.021	0	0.021	0.024	0.002	11.5
	2003	0	0	0.020	0	0.020	0.026	0.005	21.4
	2004	0	0	0.021	0	0.021	0.025	0.003	13
	2005	0	0	0.022	0	0.022	0.025	0.003	14

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	0	0	86	0

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
CRSLAKE	2001	0	0.00002	0.033	0.0016	0.035	0.034	-0.0008	-2.3
	2002	0	0.00002	0.032	0.0013	0.033	0.036	0.003	8.8
	2003	0	0.00002	0.029	0.0007	0.030	0.035	0.004	14.1
	2004	0	0.00002	0.029	0.0001	0.029	0.034	0.004	12.7
	2005	0	0.00004	0.031	0.0009	0.031	0.034	0.003	10.7

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY				
2005	0	0	89	.1	.2

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
RESHGTS	2001	0	0	0.003	0	0.003	0.003	0.00001	0.4
	2002	0	0	0.003	0	0.003	0.004	0.0005	7.1
	2003	0	0	0.003	0	0.003	0.004	0.0007	16.5
	2004	0	0	0.003	0	0.003	0.004	0.0002	5.4
	2005	0	0	0.004	0	0.004	0.005	0.0008	16.4

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	0	0	84	0

SYSTEM	YEAR	IND	COMM	RES	PA	TOTAL	PROD	NON-REV	%NR
NATHAN	2001	0	0	0.005	0	0.005	0.005	-0.0003	-6.9
	2002	0	0	0.005	0	0.005	0.004	-0.0006	-13.2
	2003	0	0	0.005	0	0.005	0.005	-0.0004	-9.5
	2004	0	0	0.005	0	0.005	0.004	-0.0004	-8.5
	2005	0	0	0.005	0	0.005	0.004	-0.0005	-11.5

YEAR	PERCENT OF TOTAL PRODUCTION PER USER CATEGORY			
2005	0	0	100	0

ABBREVIATIONS:

IND	INDUSTRIAL	PA	PUBLIC AUTHORITY
COMM	COMMERCIAL	PROD	TOTAL PRODUCED
RES	RESIDENTIAL	NON-REV	NON-REVENUE
TOTAL	TOTAL METERED WATER USE	%NR	NON-REVENUE AS PERCENT OF TOTAL PRODUCED

4.3 FUTURE SERVICE AREAS

The Supply and Land Use Maps depict the general areas that will likely require public water from these water systems over the next 50 years. The Company reviewed existing town zoning and planning policies for future growth patterns, reviewed each town's Plan of Conservation and Development and reviewed the State's Conservation and Development Policies Plan for 2005-2010 to estimate the areas and population that would likely need public water service. These areas will be served public water by main extension from the existing water system or by development of a non-interconnected satellite system, as may be required. Areas outside of the planning periods may also require public water service. These areas would also be served by main extension or by a non-interconnected system as the need arises.

Existing and future service areas, nonresidential development areas, CWC lands, aquifer and watershed areas and conservation land areas are shown on the Supply and Land Use Maps.

Section 25-33c through 25-33j of the CT General Statutes initiated a procedure to coordinate the planning of public water supply systems. The legislation was developed to provide the efficient and effective development of the state's public water supply systems through a coordinated planning approach. Under this process the state is divided into seven public water supply management areas. Water Utility Coordinating Committees (WUCC) have convened and developed area-wide supplements for four of the seven management areas. The administration of the planning process is the responsibility of the DPH in consultation with the DEEP, PURA and OPM.

The legislation that established the coordinated water system planning process specifies that exclusive service area boundaries be established according to specific criteria in each of the seven water supply management areas. A water utility can serve customers in its exclusive service area (ESA) by developing supply sources, main extensions, or by satellite management. Not all areas within a town will be built to densities that would require public water supply. In areas that will require public water service, the water utility that has declared the ESA is given the responsibility to provide service if requested. The Northern Region is primarily part of the Upper Connecticut River Water Supply Management Area WUCC. However, some portions of the Region, including Tolland, Bolton, Coventry, Mansfield, Willington, Ashford, and Stafford, are part of the Northeast Water Supply Management Area, which has not had it WUCC convened as of this date. Consequently, exclusive service areas for all Northern Region systems are not finalized. The established ESA boundaries within the area are delineated on the Supply and Land Use Maps.

As a practical matter, only a portion of the population in these areas will actually require water service from the public system. Planning periods of 5, 20 and 50 years corresponding to 2015, 2030, and 2060 are shown as required by Section 25-32d-1 of the Regulations of Connecticut State Agencies.

The 5 year planning period includes areas where development projects are in various stages of active planning and other areas where system improvements within the next five years are anticipated by the Company. Following the last plan update, the Western System was extended to connect with the Somers regional pipeline. Acquisition of the former Ellington Acres water system and subsequent main extension in Somers and tie-in to the Western System in Ellington have now fully integrated the Ellington and Somers' service areas into the Western System. Within the current 5 year planning period, it is anticipated the Western System will continue to expand in Somers to serve the Johnson Memorial Hospital.

Following acquisition of former Birmingham Utilities' Eastern Division assets, the Company's service area footprint was significantly enhanced in the northeast/central area of the state, with multiple water systems added in such Northern service towns as Coventry and the adjoining Willington and Mansfield. As the leading provider of public water service in the region, and in order to permanently address chronic supply issues in the area, the Company has proposed a regional pipeline that would provide water service to the northwest area of the Town of Mansfield and address peak demand needs at the University of Connecticut. An environmental impact evaluation of this proposal and several other supply alternatives is underway. It is anticipated the regional pipeline will be identified as the preferred alternative and constructed within the 5 year planning period. The increased demands associated with the pipeline are discussed in Section 4.6.

The 20 year planning period includes projects that are highly speculative at this time but are considered to have a reasonable chance of actually occurring over the long term. Also included within the 20 year planning period are most of the major commercially and industrially zoned areas in accordance with the towns most recent plans of developments and zoning maps. Such areas generally require public water service to allow development to proceed. It is anticipated the Reservoir Heights, Crescent Lake and Stafford Systems will be connected to the Western System sometime within this planning period. It is also anticipated that the Lakewood/Lakeview System and Nathan Hale System will be connected with the recently acquired South Coventry System sometime within this planning period.

The 50 year planning period covers some presently rural areas in the towns of Stafford, Tolland, Ellington, Willington and Somers. It is anticipated that the Lynnwood System will be connected with the Western System within this planning period. Also included are areas which are likely to be developed as the population base increases and other previously developed residential and commercial areas that are currently served by individual wells require public water. These previously developed and potential future development areas are expected to request the benefits of a properly monitored and protected public water supply system, provided by either a main extension or non-interconnected system during the 50 year planning period as such services become available.

Some areas outside of the 5, 20, and 50 year planning periods may require the benefits of a public water supply. The demand for public water will grow as the standards for drinking water quality, including that derived from private wells, become more stringent. These areas will most likely be served by non-interconnected satellite water systems. The CWC is willing to own and operate any such residential systems provided they are properly designed and constructed in full compliance with our standards and Section 16-262m of the Connecticut General Statutes for small water systems.

Future Service Area Zoning

Land use patterns and current zoning regulations are briefly described below for each of the communities. These land use patterns and regulations were analyzed with regard to existing CWC supply sources, each town's Plan of Development (POD), and the State Conservation and Development Policies Plan. Town zoning districts for future service areas were reviewed for water demand projections for residential, commercial and industrial uses. Existing service areas, future service areas, nonresidential development areas, potential source contamination sites, CWC land and conservation land areas are shown on the Supply and Land Use Maps.

Bolton

The Town of Bolton is primarily rural with a small business district located along Route 44.

CWC currently provides water service to a small area of the town and expects demand to require a limited expansion of the water service to a small area of residential development zoned for half-acre within the 50 year planning horizon.

Coventry

The Town of Coventry is primarily rural, with small areas of development scattered throughout the town.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20 and 50 year planning periods.

The 5 year planning period includes residential area zoned for one acre and a small commercially zoned area. The 20 year planning period includes residential areas zoned for one acre and a small commercially zoned area. The 50 year planning period includes residential areas zoned for one acre and a small commercially zoned area.

East Windsor

The Town of East Windsor is a moderately developed town, with most of the development occurring in the western and central part of the community.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20, and 50 year planning periods. The 5 year planning period includes residential areas zoned for three-quarter acres to two acre zoning. The 20 year planning period includes residential areas zoned for three-quarter to one acre in the north and west areas and three-quarter acres along the eastern side of town. Also included in this planning period are industrially zoned areas located in the northwest corner of the town. The 50 year planning period includes a half residentially zoned area along the northeastern area of town. A large industrially zoned area along with residentially zoned land of one-half to one acres and a small commercially zoned area is located in the south central area of town.

Ellington

Ellington is a low density residential and open land community with higher density residential and commercial development scattered throughout the town. The more developed areas are Crystal Lake and the southern area of town.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20, and 50 year planning periods. The 5 year planning period will serve small areas that are zoned for one acre. The 20 year planning period includes residential areas zoned for one acre and a small industrial zone along Route 81. The Crystal Lake area includes a commercially zoned area with the remaining land around the lake and the area along Route 140 to the Stafford town line zoned for one acre residential land. The 50 year planning period includes residential areas zoned for one acre and a large area of industrial zoned land located in the northwest area of town.

Enfield

The Town of Enfield is highly developed in the west, northwest, and central portions of the town. The southeastern portion of the town is less intensively developed, with more areas of open and agricultural land.

CWC currently provides water service to a large portion of the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20 and 50 year planning periods. The 5 year planning period includes commercial and industrial zoned areas with residentially zoned areas for one acre located in the northern area of town. The 20 year planning period includes mostly commercial and industrial zoned land with a small area zoned one acre residential located in the southwest area of town and a small area zoned for 2 acre residential located in the northeast area of town near the Somers town line. The 50 year planning period includes two acre residentially zoned land located in the southeastern area of town.

Mansfield

The Town of Mansfield is rural in nature. CWC serves several small residential subdivisions located in the northwest, central and southeast areas of town. Within the 5 year planning period CWC has proposed a regional pipeline from the Western System that would provide water service to the northwest area of the Town of Mansfield. The area to be served is located along Route 195 and is zoned for one to two acre residential development and a small area of commercial development.

Somers

The Town of Somers consists mostly of residential development and open agricultural land with small industrial and business areas located along Route 90 at the intersection of Routes 83 and Maple Street.

CWC currently provides water service to a small portion of the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20 and 50 year planning periods. The 5 year planning period includes residential areas with one acre zoning. The 20 year planning period includes residential areas zoned for one acre and industrial zone land in the south central area of town. The 50 year planning period includes residential areas zoned for one acre and industrially zoned land.

South Windsor

The Town of South Windsor is a highly developed town with areas of residential and commercial development scattered throughout.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20, and 50 year planning periods.

The 5 year planning period includes industrial zoning located in the northwest area of town. The 20 year planning period includes industrial and commercial zoning located in the northwest and southeast area of town with the remaining land zoned for one acre residential. The 50 year planning period includes residential areas zoned for one acre located near the East Windsor and Ellington town lines.

Stafford

The Town of Stafford is primarily rural with a large area of state forest located within the town. The south-central part of the town is densely populated with areas of commercial development.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20, and 50 year planning periods. The 5 year planning period includes a small industrial area along Rt. 19 with the remainder of the area zoned for one acre along Rt. 19 to Rt. 611. The 20 year planning period includes residential areas zoned for two acres around Staffordville Reservoir, one acre along Rt. 19, Rt. 611 and Rt. 190, and two acres along Rt. 190 from West Stafford to the Somers town line. Several small areas of commercial and industrial land are located within this planning period. The 50 year planning period includes a residentially zoned area of one acre south of Rt. 611 and east of Rt. 190 with a commercially zoned area east of Rt. 190. A residentially zoned area of one acre south of Rt. 190 to the Willington town line, 2 acre zoning south of Rt. 190 along Rt. 30 to the Ellington town line with a small area of industrially zoned land located on the west side of Rt. 30 and 2 acre zoning west of Staffordville Reservoir.

Suffield

The Town of Suffield is primarily rural, having a great deal of agricultural land in the western portion of the town. These rural areas are zoned for large lot residential development, requiring minimum lot sizes of between one acre and two acres. The more developed areas of town are located in the central portion of town along Suffield Street. Residential densities in these developed portions of town are greater, as minimum lot sizes are one half acre. Bradley International Airport is located in the southern portion of town along the border with Windsor Locks.

CWC currently provides water service to a portion of the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5 and 20 planning periods. The 5 year planning period includes small residential areas zoned for one acre in the northern area, two acres in the southwest area and one-half to one acre in the east along Rt. 159 and an area of industrially zoned land in the southwest area of town. The 20 year planning period includes one acre residential land located in the northern area, half-acre in the eastern area along Rt. 159 and a large industrially zoned area located in the southern area of town along the Windsor Locks town line.

Tolland

The Town of Tolland is primarily rural with low density housing being the dominant land use. There are several areas of commercial and industrial zoning and higher density residential development in the western and eastern area of town along Routes 30 and 74.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 20 and 50 year planning periods. Within the 5 year planning period CWC has proposed a regional pipeline along Rt. 195 that would provide water service to the northwest area of the Town of Mansfield. The 20 year planning period includes a small residential area zoned for two acres located at the southern end of Shenipsit Lake Reservoir watershed. The 50 year planning period includes a residentially zoned area of one and a half acres just north of I-84 in the central area of town and 2 acre zoning along Route 30 to the Ellington town line. Two small areas of commercially zoned land is also located within this planning period.

Union

The Town of Union is rural in nature and is not currently anticipated to be served by CWC within the 50 year planning period.

Vernon

The Town of Vernon is highly developed with the majority of residential and commercial development occurring in the central and northern portions of town. The southeastern part of town is primarily rural with low density residential development.

CWC currently provides water service to the town and expects demand to require expansion of the water service to additional portions of residential and nonresidential development areas within the 5, 20, and 50 year planning periods. The 5 year planning period includes a residential area located in the south central area of town zoned for one-half acre. The 20 year planning period includes residential areas zoned for one-half acre and small areas of commercial and industrial zones located on the west side of town north of I-84. South of I-84 to the Bolton town line is zoned for one-half acre residentially land. North of I-84 along the Tolland town line is zoned for commercial and industrial land with a small area of one-quarter acre residentially zoned land. The 50 year planning period includes residential area zoned for one-half acre located south of I-84 to the Manchester town line. South of I-84 to the Bolton town line is zoned one acre residential with a small area of one-half acre residential zoned land.

Willington

The Town of Willington is rural in nature. CWC provides service to a single, small consecutive water system, whose supply is obtained from the Town of Tolland. Any growth in this system would likely occur along Route 32. Within the 50 year planning period, the northern area of town is expected to be served from the Stafford System. This area is zoned for two acre residential development.

Windsor Locks

Windsor Locks is a highly developed community. A major portion of Bradley International Airport is located within the town. CWC currently provides water service to almost the entire town. CWC only expects demand to require expansion of the water service within the existing service area.

4.4 POPULATION AND SERVICE CONNECTION PROJECTIONS

The projected town population and projected number of housing units for the towns within the Northern Region for each of the planning horizons is shown in Table 4.4.1. The Western System provides service to residential customers in the towns of Suffield, Windsor Locks, East Windsor, South Windsor, Enfield, Tolland, Vernon, and Ellington (a small area of the Town of Mansfield will be served within the 5 year planning horizon). The Somers System serves only the Town of Somers. The Stafford System serves only the Town of Stafford (a small area of the Town of Willington will be served within the 50 year planning south central area of town zoned for one-half acre. The 20 year planning horizon includes residential areas zoned for one-half acre and small areas of commercial and industrial zones located on the west side of town north of I-84. South of I-84 to the Bolton town line is zoned for one-half acre residentially land. North of I-84 along the Tolland town line is zoned for commercial and industrial land with a small area of one-quarter acre residentially zoned land. The 50 year planning horizon includes residential area zoned for one-half acre located south of I-84 to the Manchester town line. South of I-84 to the Bolton town line is zoned one acre residential with a small area of one-half acre residential zoned land.

Willington

The Town of Willington is rural in nature and is not currently served by CWC. It is expected to be served by CWC sometime within the 50 year planning horizon from the Stafford System. The area to be served is located north of I-84 to the Stafford town line and is zoned for two acre residential development.

Windsor Locks

Windsor Locks is a highly developed community. A major portion of Bradley International Airport is located within the town. CWC currently provides water service to almost the entire town. CWC only expects demand to require expansion of the water service within the existing service area.

Some areas outside of the 5, 20, and 50 year planning horizons may also require the benefits of a public water supply. This demand for public water will grow as the standards for drinking water quality, including that derived from private wells, become more stringent. These areas will most likely be served by non-interconnected satellite water systems. CWC is willing to own and operate any such residential community water systems located within its exclusive service areas provided they are properly designed and constructed in full compliance with our standards and Section 16-262m of the Connecticut General Statutes for small water systems.

4.4 POPULATION AND SERVICE CONNECTION PROJECTIONS

The projected town population and projected number of housing units for the towns within the Northern Region for each of the planning horizons is shown in Table 4.4.1. The Western System provides service to residential customers in the towns of Suffield, Windsor Locks, East Windsor, South Windsor, Enfield, Tolland, Vernon, and Ellington (a small area of the Town of Mansfield will be served within the 5 year planning horizon). The Somers System serves only the Town of Somers. The Stafford System serves only the Town of Stafford (a small area of the Town of Willington will be served within the 50 year planning

TABLE 4.4.1 POPULATION PROJECTION AND HOUSING UNITS BY TOWN

TOWN: WINDSOR LOCKS

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	4,968	12,073
2010	4,981	12,103
2020	4,989	12,123
2050	5,081	12,346

TOWN: SUFFIELD

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	5,340	13,617
2010	5,365	13,682
2020	5,499	14,022
2050	5,832	14,872

TOWN: TOLLAND

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	4,751	13,446
2010	4,857	13,746
2020	5,098	14,426
2050	5,905	16,710

TOWN: VERNON

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	12,745	28,803
2010	13,072	29,543
2020	13,802	31,193
2050	14,922	33,724

TABLE 4.4.1 POPULATION PROJECTION AND HOUSING UNITS BY TOWN

TOWN: ELLINGTON

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	5,372	13,322
2010	5,537	13,732
2020	5,848	14,502
2050	6,779	16,813

TOWN: ENFIELD

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	18,094	45,777
2010	18,317	46,342
2020	18,692	47,292
2050	19,653	49,723

TOWN: EAST WINDSOR

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	4,264	9,978
2010	4,332	10,138
2020	4,486	10,498
2050	4,812	11,261

TOWN: SOUTH WINDSOR

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	9,196	25,012
2010	9,416	25,612
2020	10,030	27,282
2050	12,034	32,733

TABLE 4.4.1 POPULATION PROJECTION AND HOUSING UNITS BY TOWN

TOWN: STAFFORD

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	4,536	11,612
2010	4,655	11,917
2020	4,936	12,637
2050	5,743	14,701

TOWN: SOMERS

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	3,805	10,577
2010	3,862	10,737
2020	3,963	11,017
2050	4,321	12,013

TOWN: WILLINGTON

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	2,829	6,394
2010	3,022	6,829
2020	3,376	7,629
2050	4,840	10,939

TOWN: BOLTON

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	1,997	5,252
2010	2,086	5,487
2020	2,250	5,917
2050	2,902	7,631

TABLE 4.4.1 POPULATION PROJECTION AND HOUSING UNITS BY TOWN

TOWN: COVENTRY

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	4,455	11,984
2010	4,633	12,464
2020	5,016	13,494
2050	6,474	17,416

TOWN: MANSFIELD

YEAR	PROJECTED # HOUSING UNITS	PROJECTED TOWN POP.
2005	9,203	21,905
2010	9,710	23,110
2020	10,155	24,170
2050	11,686	27,813

planning periods. For example, the number of service connections projected for the Western System at the end of the five year planning period was calculated by adding one percent growth to the 2005 number of service connections, for five consecutive years. Table 4.4.2 shows the projected number of residential service connections.

The projected service ratio was calculated by dividing the number of projected service connections by the number of projected housing units. The projected population served was then calculated by multiplying the projected service ratio by the projected town population. This is shown in Table 4.2.2. As shown in Table 4.4.3, the Western System will combine with the Somers System sometime within the 5 year planning period, the Stafford, Reservoir Heights and Crescent Lake Systems will combine with the Western System sometime within the 20 year planning period, the Lakewood/Lakeview System will combine with the Nathan Hale System sometime within the 20 year planning period and the Llynwood System will combine with the Western System sometime within the 50 year planning period.

TABLE 4.4.2 PROJECTED RESIDENTIAL SERVICE CONNECTIONS AND POPULATION SERVED

WESTERN SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	29,837	64,730	0.46	162,028	74,686
2010(2)	31,359	75,587	0.41	188,008	77,999
2020	34,640	78,599	0.44	195,508	86,163
2050	46,689	86,704	0.54	215,995	116,311

Includes the Towns of Ellington, Tolland, East Windsor, South Windsor, Vernon, Enfield, Windsor Locks, Suffield

STAFFORD SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	931	4,536	0.21	11,612	2,383
2010	955	4,655	0.21	11,917	2,444
2020	1,003	4,936	0.20	12,637	2,569
2050(3)	1,165	10,583	0.11	25,640	2,823

SOMERS SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	378	3,805	0.10	10,577	1,051
2010	388	3,862	0.10	10,737	1,077
2020	407	3,963	0.10	11,017	1,132
2050	473	4,321	0.11	12,013	1,315

(1) ACTUAL DATA
(2) INCLUDES TOWN OF MANSFIELD
(3) INCLUDES TOWN OF WILLINGTON

TABLE 4.4.2 PROJECTED RESIDENTIAL SERVICE CONNECTIONS AND POPULATION SERVED

CRESCENT LAKE SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	159	18,094	0.01	45,777	402
2010	161	18,317	0.01	46,342	407
2020	165	18,692	0.01	47,292	418
2050	178	19,653	0.01	49,723	450

LLYNWOOD SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	73	1,997	0.04	5,252	192
2010	74	2,086	0.04	5,487	194
2020	76	2,250	0.03	5,917	199
2050	82	2,902	0.03	7,631	215

NATHAN HALE SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	40	4,455	0.01	11,984	108
2010	41	4,633	0.01	12,464	109
2020	42	5,016	0.01	13,494	112
2050	45	6,474	0.01	17,416	120

(1) ACTUAL DATA

TABLE 4.4.2 PROJECTED RESIDENTIAL SERVICE CONNECTIONS AND POPULATION SERVED

RESERVOIR HEIGHTS SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	23	12,745	0.00	28,803	52
2010	23	13,072	0.00	29,543	53
2020	24	13,802	0.00	31,193	54
2050	26	14,922	0.00	33,724	58

LAKEVIEW/LAKEWOOD SYSTEM

YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
2005(1)	182	4,455	0.04	11,984	490
2010	184	4,633	0.04	12,464	496
2020	189	5,016	0.04	13,494	508
2050	204	6,474	0.03	17,416	548

TABLE 4.4.3 PROJECTED RESIDENTIAL SERVICE CONNECTIONS AND POPULATION SERVED NORTHERN REGION

SYSTEM	YEAR	PROJECTED # SERVICE CONNECTIONS	PROJECTED # HOUSING UNITS	PROJECTED SERVICE RATIO	PROJECTED TOWN POP.	PROJECTED YEAR ROUND POP. SERVED
WESTERN	2005	29,837	64,730	0.46	162,028	74,686
STAFFORD	2005	931	4,536	0.21	11,612	2,383
SOMERS	2005	378	3,805	0.10	10,577	1,051
CRESCENT LAKE	2005	159	18,094	0.01	45,777	402
RESERVOIR HGTS	2005	23	12,745	0.00	28,803	52
LKWD/LKVW	2005	182	4,455	0.04	11,984	490
LYNNWOOD	2005	73	1,997	0.04	5,252	192
NATHAN HALE	2005	40	4,455	0.01	11,984	108
WESTERN(1)	2010	31,747	79,449	0.40	198,745	79,076
STAFFORD	2010	955	4,655	0.21	11,917	2,444
LYNNWOOD	2010	74	2,086	0.04	5,487	194
LKD/LKW	2010	184	4,633	0.04	12,464	496
CRESCENT LAKE	2010	161	18,317	0.01	46,342	407
RESERVOIR HGTS	2010	23	13,072	0.00	31,193	53
NATHAN HALE	2010	41	4,633	0.01	12,464	109
WESTERN(2)	2020	36,239	119,992	0.30	297,647	90,336
LYNNWOOD	2020	76	2,250	0.03	5,917	199
NATHAN/LKD/LKV(3)	2020	231	5,016	0.05	13,494	620
WESTERN(4)	2050	48,613	139,085	0.35	344,726	121,172
NATHAN/LKD/LKV	2050	249	6,474	0.04	17,416	668

(1) SOMERS SYSTEM COMBINES WITH WESTERN SYSTEM WITHIN THE 5 YEAR PLANNING PERIOD

(2) RESERVOIR HEIGHTS, CRESCENT LAKE AND STAFFORD SYSTEMS COMBINE WITH WESTERN SYSTEM WITHIN THE 20 YEAR PLANNING PERIOD

(3) LAKEWOOD/LAKEVIEW SYSTEM COMBINES WITH NATHAN HALE SYSTEM WITHINTHE 20 YEAR PLANNING PERIOD

(4) LYNNWOOD SYSTEM COMBINES WITH WESTERN SYSTEM WITHIN THE 50 YEAR PLANNING PERIOD

4.5 WATER CONSUMPTION PROJECTIONS

The areas designated as future service areas on the Supply and Land Use Maps in Appendix I were developed based on an evaluation of historic data and review of local and regional planning documents. As detailed below, specific local trends and projections were considered to determine areas where public water supply may be needed in the future.

Some of the areas identified for future service are in locations designated as rural, conservation or preservation areas on the map of the State's Conservation and Development Policies Plan for 2004-2009. While these designations in the plan would not encourage expansion of utilities, CWC must respond to local development patterns, health considerations and request for service.

Some of these areas may require water service because of known limitations for development of private wells, either because of quality or quantity considerations. Many of these areas are designated by local zoning for current or future land uses as commercial/industrial sites. CWC attempts to work with municipalities to resolve obvious conflicts with local zoning and our source protection concerns, however, it is not our role to direct towns to implement the recommendations of the State's Conservation and Development Policies Plan. This may be an area where the state or regional organizations may need to take a more aggressive role. When appropriate, we do identify those state goals and policies that promote the protection of our sources of supply.

Residential Consumption

Residential water consumption projections for the Northern Region for each of the planning horizons are presented in Table 4.5.1. Residential water consumption projections are based upon the projected population served in each system, as calculated from Table 4.4.2. The impact of the residential retrofit conservation program on demand projections has been considered in determining residential demand projections. This is further discussed in Appendix G, Water Conservation Plan, Section I.2.

For projection purposes, per capita residential consumption was averaged for the proceeding five years using the average residential consumption and number of service connections for years 2001-2005. The use of such averaging more accurately reflects long-term consumption patterns than a single year's data, which can be skewed during an overly wet or dry year. As show in Table 4.51, the daily residential consumption rates for the Western, Stafford, Somers, Llynnwood, Nathan Hale, Reservoir Heights, Crescent Lake and Lakewood/Lakeview Systems are 79 gallons per capita per day (gpcpd), 77 gpcpd, 74 gpcpd, 45 gpcpd, 51 gpcpd, 76 gpcpd, 77 gpcpd and 44 gpcpd,

TABLE 4.5.1 RESIDENTIAL WATER DEMAND (GPD)

SYSTEM	2005 POP. SERVED	2005 RESID. DEMAND	2010 POP. SERVED	2010 RESID. DEMAND	2020 POP. SERVED	2020 RESID. DEMAND	2050 POP. SERVED	2050 RESID. DEMAND
WESTERN (1)	74,686	5,923,991	77,999	6,161,921	86,163	6,806,877	116,311	9,188,569
SOMERS (2) *	1,051	77,683	1,077	79,698	1,132	83,768	1,315	97,310
			79,076	6,241,619				
STAFFORD (3) **	2,383	184,366	2,444	188,188	2,569	197,813	2,823	217,371
RES. HGTS(4) **	52	3,995	53	4,028	54	4,101	58	4,408
CREST. LAKE(5)**	402	31,264	407	31,339	418	32,186	450	34,650
					90,336	7,124,745		
LYNNWOOD(6) ***	192	8,649	194	8,730	199	8,955	215	9,675
							121,172	9,551,983
NATHAN (7) ****	108	5,508	109	5,559	112	5,712	120	6,120
LK/LV (8) ****	490	21,697	496	21,824	508	22,352	548	24,112
					620	37,019	668	30,232
RYE HILL*****		20,928		21,500		21,500		21,500
TOTAL FOR NORTHERN REGION							121,840	9,603,715

* SOMERS SYSTEM COMBINE WITH WESTERN SYSTEM WITHIN THE 5 YEAR PLANNING HORIZON.
** STAFFORD, CRESCENT LAKE AND RESERVOIR HEIGHTS SYSTEMS COMBINE WITH THE WESTERN SYSTEM WITHIN THE 20 YEAR PLANNING HORIZON.
*** LYNNWOOD SYSTEM COMBINES WITH THE WESTERN SYSTEM WITHIN THE 50 YEAR PLANNING HORIZON.
**** LAKEWOOD/LAKEVIEW AND NATHAN HALE SYSTEMS COMBINE WITHIN THE 20 YEAR PLANNING HORIZON.
***** WATER SOLD TO HAZARDVILLE WATER COMPANY TO SERVE A SMALL RESIDENITAL SUBDIVISION IN THE RYE HILL AREA IN TOWN OF SOMERS.

(1) ALL WATER DEMAND FOR THE WESTERN SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 79 GPCPD.
(2) ALL WATER DEMAND FOR THE SOMERS SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 74 GPCPD.
(3) ALL WATER DEMAND FOR THE STAFFORD SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 77 GPCPD.
(4) ALL WATER DEMAND FOR THE RESERVOIR HEIGHTS SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 76 GPCPD.
(5) ALL WATER DEMAND FOR THE CRESCENT LAKE SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 77 GPCPD.
(6) ALL WATER DEMAND FOR THE LYNNWOOD SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 45 GPCPD.
(7) ALL WATER DEMAND FOR THE NATHAN HALE SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 51 GPCPD.
(8) ALL WATER DEMAND FOR THE LAKEWOOD/LAKEVIEW SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 44 GPCPD.

RESIDENTIAL DEMAND BASED ON FIVE YEAR AVERAGE (2001-2005) respectfully. CWC sells water to the Hazardville Water Company to serve a small residential area in the Town of Somers called Rye Hill. Residential demand for the Rye Hill area was estimated to remain relatively constant over time.

Future residential development is expected to maintain current patterns of apartment/condominium, and small lot single family development near the urban areas, and large lot single family development in the more rural areas of each community.

Nonresidential Water Demand

Historical water consumption data for commercial and industrial categories are shown in Table 4.5.2 and Figures 4.5.2 a-h.

The methodology used to determine water consumption projections is based upon a per acreage consumption rate. Existing zoning within each town was reviewed and the acreage of commercial and industrial zones was calculated for each of the planning horizons. The estimated service acres were developed based upon a review of the physical limitations, such as wetlands and steep slopes, within each planning horizon. Also considered was a review of each town's master plan and the State's Conservation and Development Policies Plan. These data are presented in Tables 4.5.3a and 4.5.3b.

Nonresidential water consumption projections for each system are presented in Tables 4.5.4a and 4.5.4b. The average gallons per day per acre consumption rate was determined by using 2005 actual consumption data for commercial and industrial classes and dividing this by the commercial and industrial acreage presently served for this system. The commercial consumption rate for the Western, Stafford, Somers, Lakeview/Lakewood and Crescent Lake Systems are 540 gallons per day per acre (gpdpa), 540 gpdpa, 459 gpdpa, 251 gpdpa and 49 gpdpa and 49 gpdpa, respectfully. In the Lakewood/Lakeview System there are no commercial customers until the 5 year planning horizon. The types of commercial uses allowed by the Town of Coventry' s zoning regulations are similar to those allowed by the Town of Enfield zoning regulations. Therefore the same commercial demand of 49 gpdpa was used for the Lakeview/Lakewood System.

The industrial consumption rate for the Western System is 121 gpdpa. The industrial demand in the Stafford System is primarily from one large customer. Industrial demand usage for this system takes into account the demand for this one customer's rate of 197,043 gpd (98,521 gpda/2 acres). The remaining industrial usage was then calculated at a rate of 125 gpdpa. Additional industrial demand for the Somers System occurs within the 20 year planning horizon. The types of industrial activities allowed by the town's zoning regulations are similar to those permitted in industrial zones in the Western System, therefore the demand rate of 121 gpdpa was used for industrial demand projections. Demand projections for these systems assume the commercial and industrial acreage identified is fully developed within each planning horizon.

The majority of the industrial/commercial zoned land will be captured within the 20 and 50 year planning horizons in the Western and Stafford Systems and within the 20 year planning horizon in the Somers System. Demand projections for these systems assumes the commercial and industrial acreage identified is fully developed within each planning horizon.

CWC recognizes the role local land use policies have in developing commercial and industrial zones within a town. It is difficult to predict where future commercial and industrial zones may either be created or existing areas rezoned to other types of uses (i.e. residential, open space, etc.). For planning purposes current town zoning districts were used to develop demand projections for each of the planning horizons.

Public Authority

Public authority consumption projection demands were calculated based on town population projections and 2005 actual water consumption data. As town populations increase, public authority consumption demands will most likely increase on a proportional basis. These data are shown in Tables 4.5.5a-i.

Accountable Non-Revenue Water

Accountable non-revenue water is comprised of two types of usage. The water used for fighting fires, flushing of distribution systems, filling of town sweeper trucks, and other similar uses, makes up the first type of accountable non-revenue water consumption. This perfectly legitimate usage is usually a small quantity of water, typically between two or three percent of the total water produced. It is generally not metered, but can be estimated and accounted for.

The second type of accountable non-revenue water consumption is from quickly identified and repaired main and service line leaks and related facilities. This water is obviously unmetered, but can often be estimated and accounted for.

Lost, or unaccounted-for water, is comprised mostly of distribution system leakeage and is more fully described in the Water Conservation Plan, Appendix G.

TABLE 4.5.2 NON-RESIDENTIAL CONSUMPTION BY USER CATEGORY MILLION GALLONS PER DAY

SOMERS SYSTEM

YEAR	IND.	COMM.	TOTAL	RATIO IND.	RATIO COMM.
2001	0.0000	0.0092	0.0092	0.0000	1.0000
2002	0.0000	0.0108	0.0108	0.0000	1.0000
2003	0.0000	0.0082	0.0082	0.0000	1.0000
2004	0.0000	0.0088	0.0088	0.0000	1.0000
2005	0.0000	0.0090	0.0090	0.0000	1.0000

STAFFORD SYSTEM

YEAR	IND.	COMM.	TOTAL	RATIO IND.	RATIO COMM.
2001	0.2043	0.0433	0.2476	0.8251	0.1749
2002	0.2037	0.0384	0.2421	0.8414	0.1586
2003	0.2529	0.0406	0.2935	0.8617	0.1383
2004	0.2508	0.0326	0.2834	0.8850	0.1150
2005	0.2011	0.0312	0.2323	0.8657	0.1343

WESTERN SYSTEM

YEAR	IND.	COMM.	TOTAL	RATIO IND.	RATIO COMM.
2001	0.3976	1.5060	1.9036	0.2089	0.7911
2002	0.3735	1.5330	1.9065	0.1959	0.8041
2003	0.3553	1.5430	1.8983	0.1872	0.8128
2004	0.3394	1.5530	1.8924	0.1793	0.8207
2005	0.3943	1.5191	1.9134	0.2061	0.7939

CRESECENT LAKE

YEAR	IND.	COMM.	TOTAL	RATIO IND.	RATIO COMM.
2001	0.0000	0.00002	0.00002	0.0000	1.0000
2002	0.0000	0.00002	0.00002	0.0000	1.0000
2003	0.0000	0.00002	0.00002	0.0000	1.0000
2004	0.0000	0.00002	0.00002	0.0000	1.0000
2005	0.0000	0.00004	0.00004	0.0000	1.0000

Figure 4.5.2a

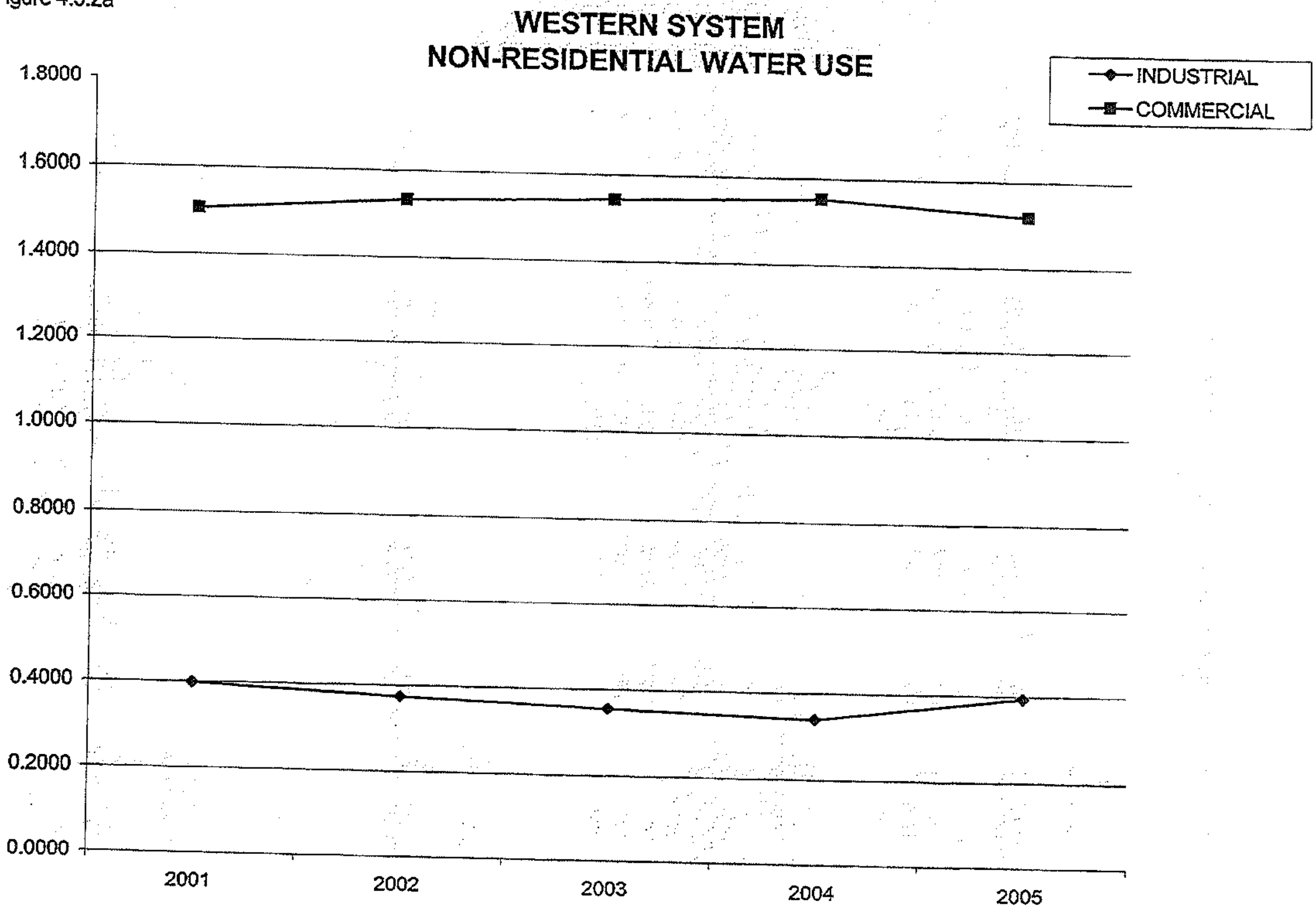
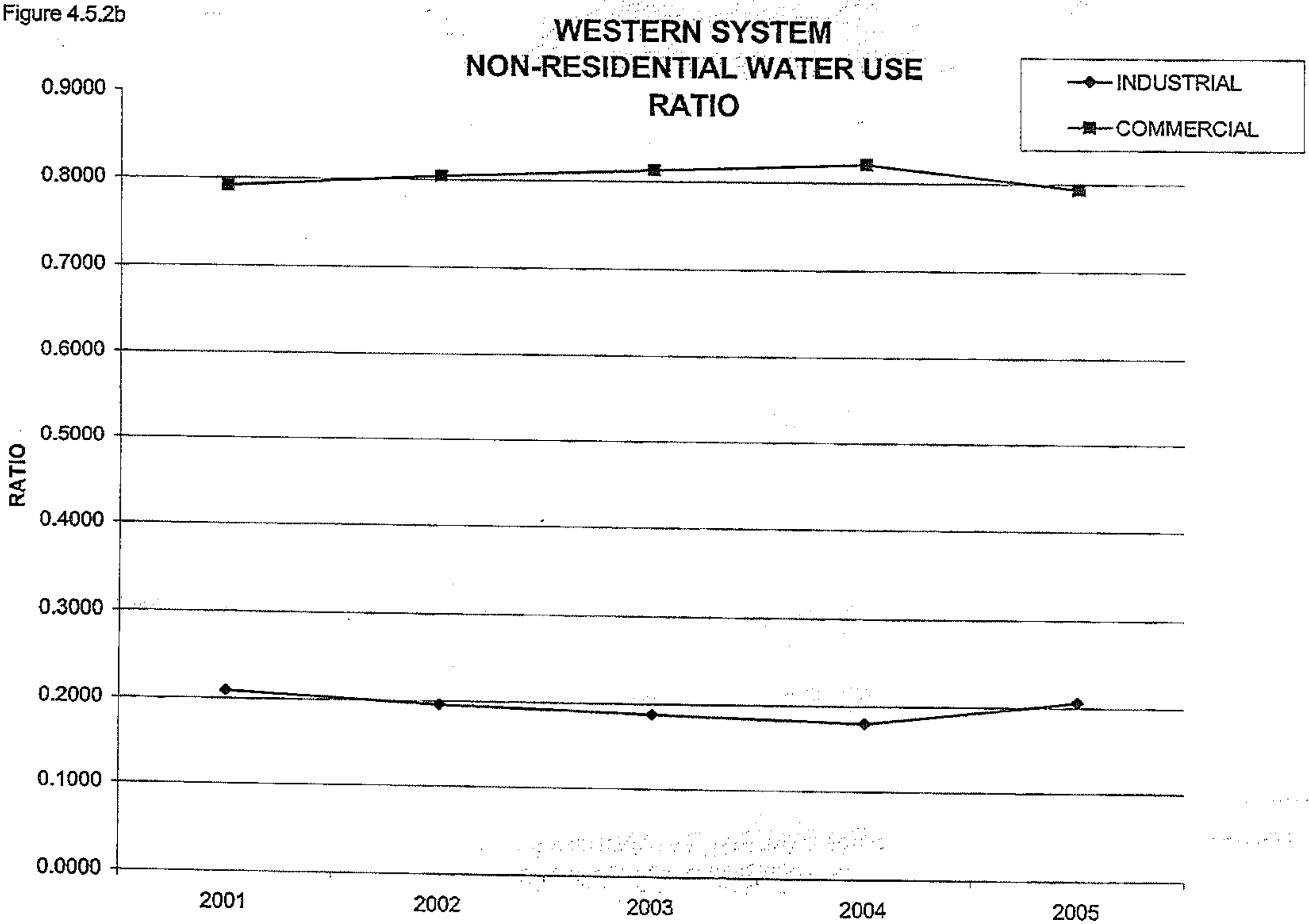
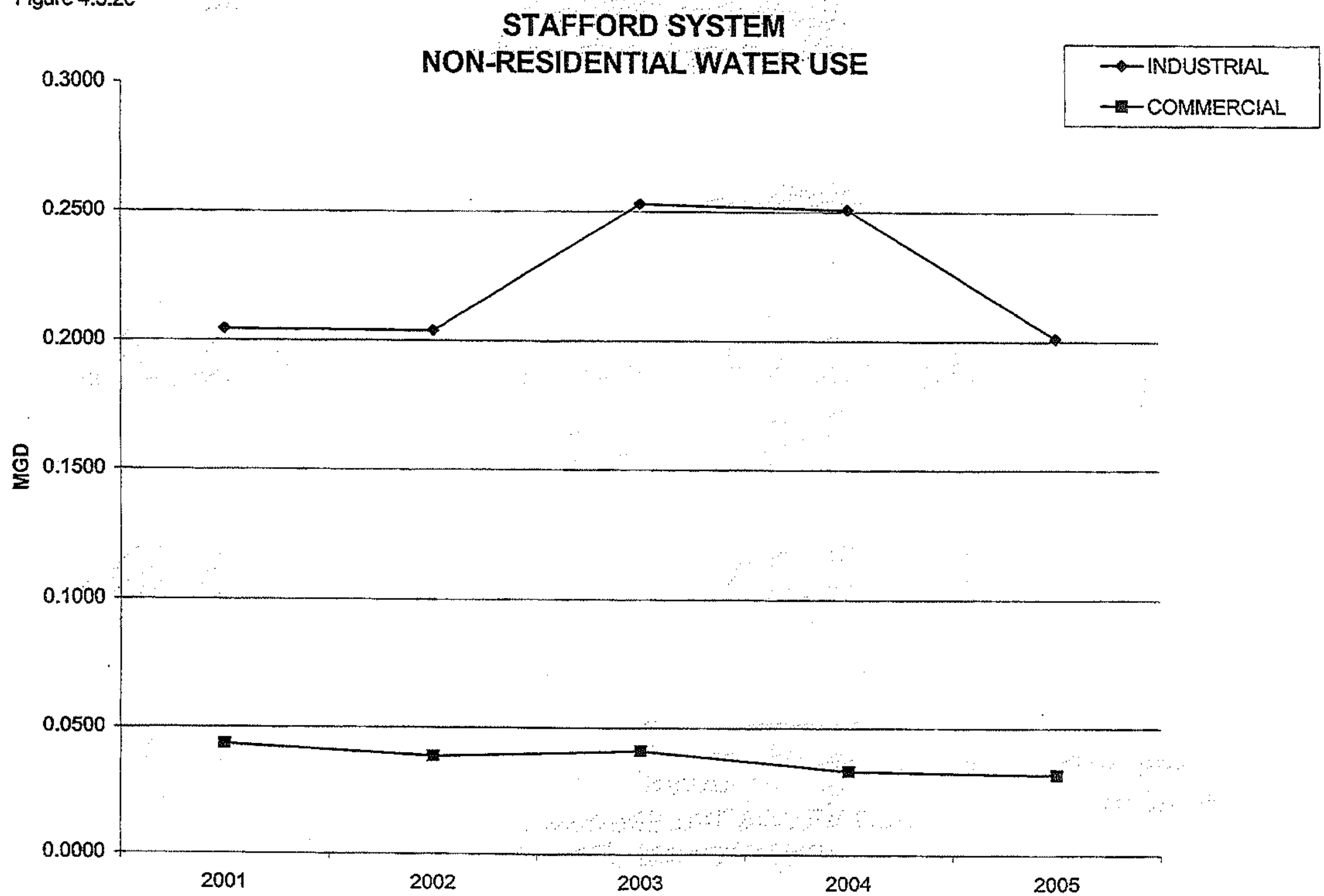

WESTERN SYSTEM
NON-RESIDENTIAL WATER USE
INDUSTRIAL
COMMERCIAL
MGD
1.8000
1.6000
1.4000
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
2001
2002
2003
2004
2005

Figure 4.5.2b



WESTERN SYSTEM
NON-RESIDENTIAL WATER USE
RATIO
INDUSTRIAL
COMMERCIAL
RATIO
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
2001
2002
2003
2004
2005

Figure 4.5.2c



STAFFORD SYSTEM
NON-RESIDENTIAL WATER USE
INDUSTRIAL
COMMERCIAL
MGD
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
2001
2002
2003
2004
2005

Figure 4.5.2d

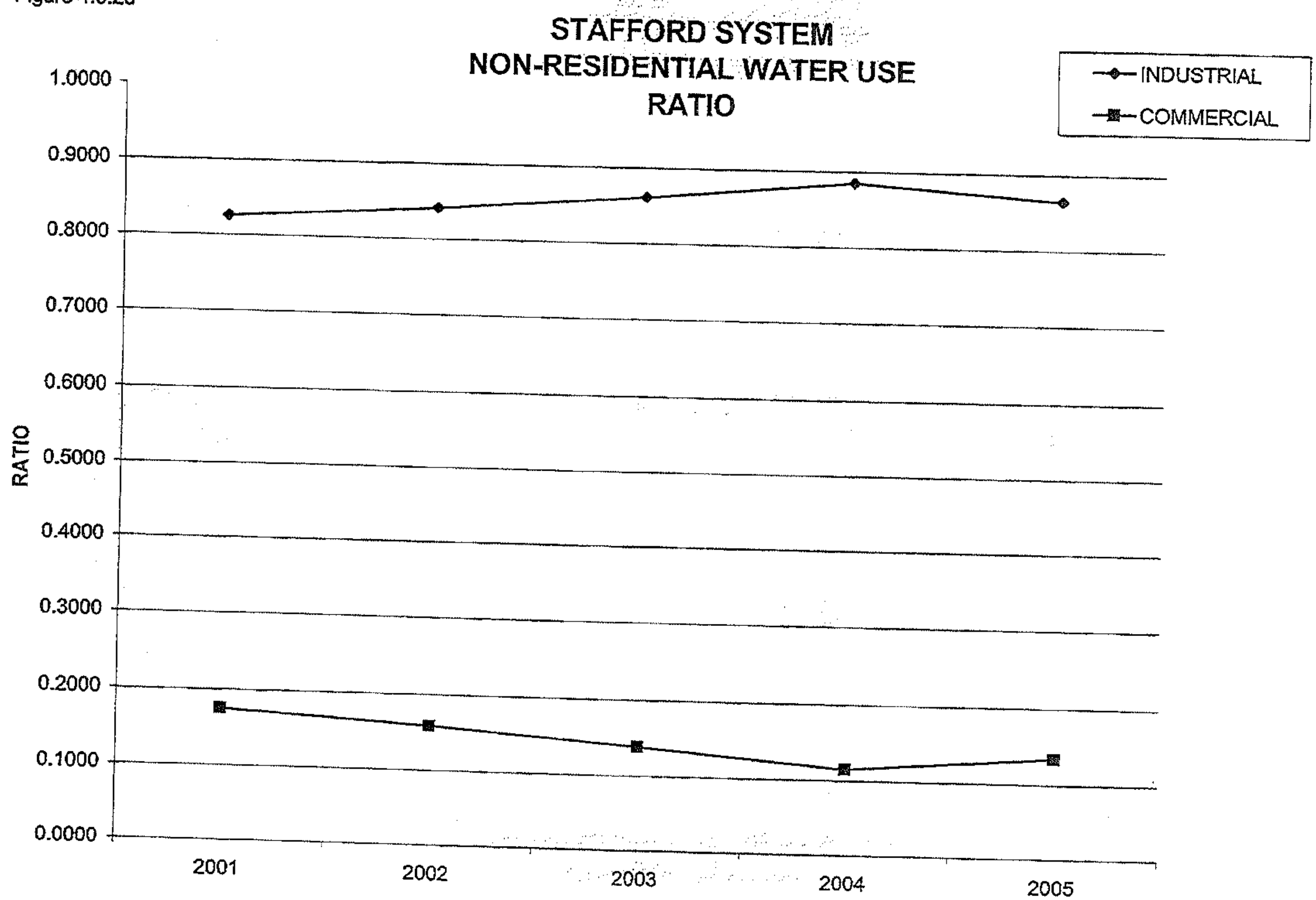

STAFFORD SYSTEM
NON-RESIDENTIAL WATER USE
RATIO
INDUSTRIAL
COMMERCIAL
RATIO
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
2001
2002
2003
2004
2005

Figure 4.5.2e

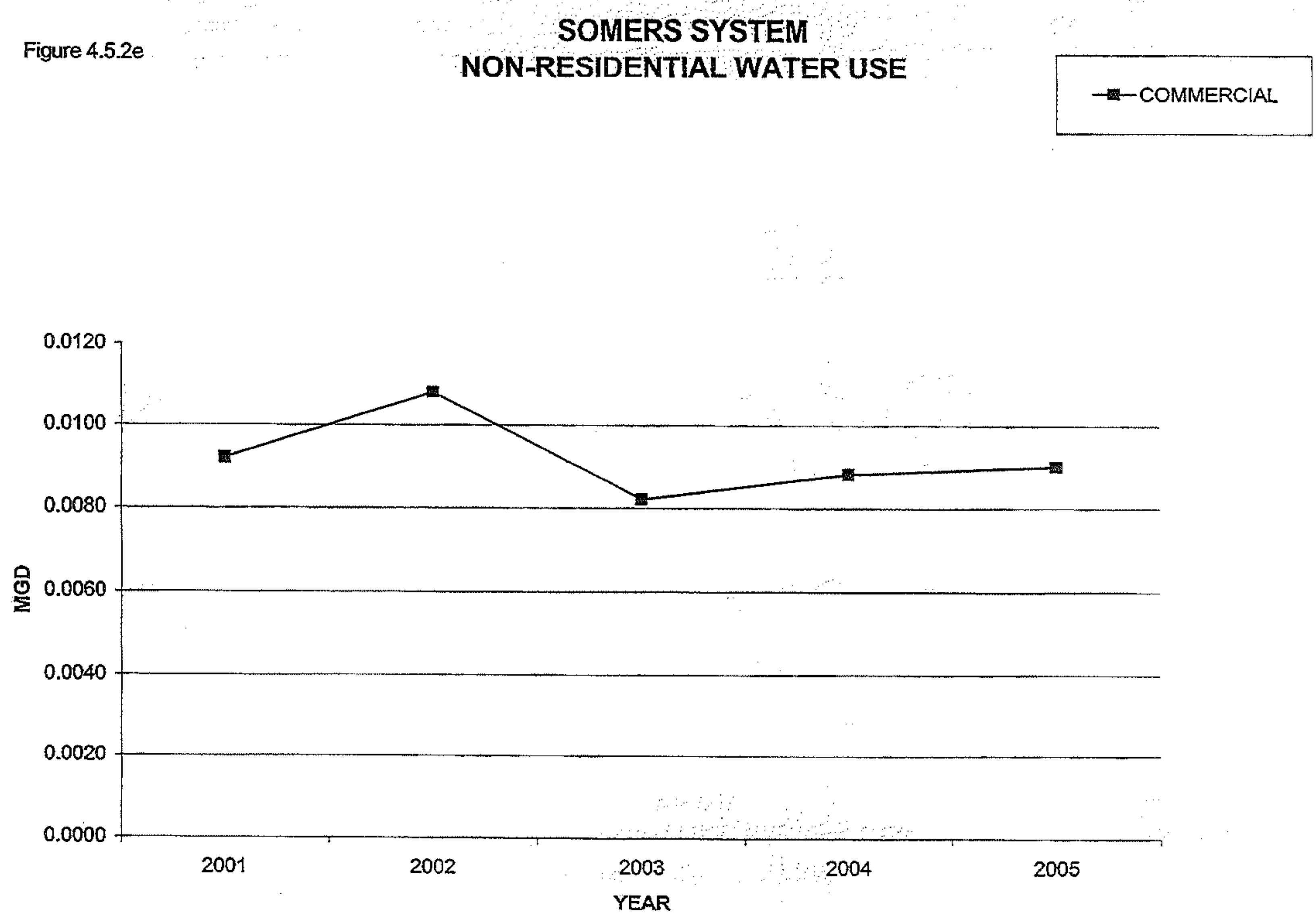

SOMERS SYSTEM
NON-RESIDENTIAL WATER USE
COMMERCIAL
MGD
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
2001
2002
2003
2004
2005
YEAR

Figure 4.5.2f

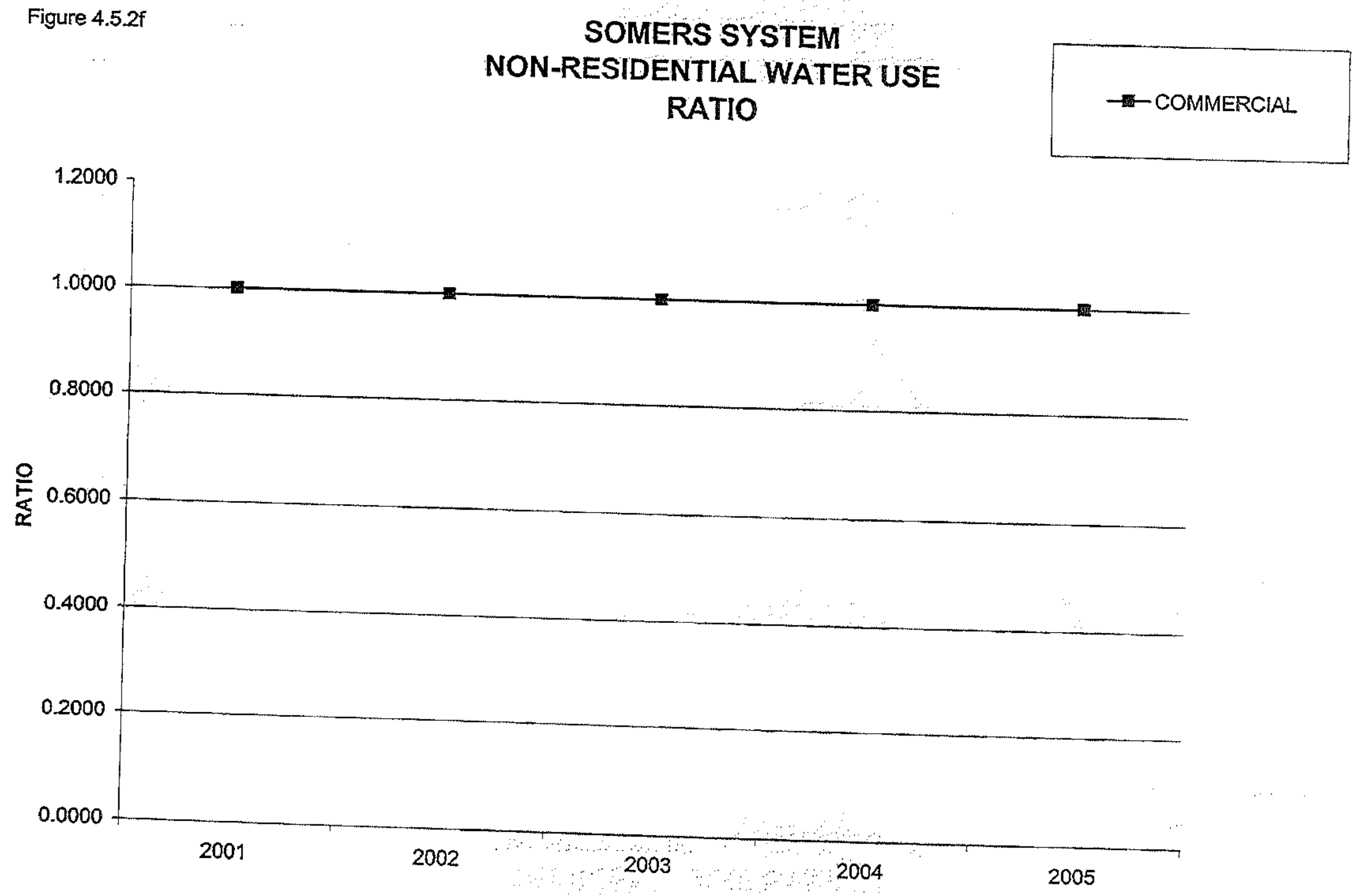
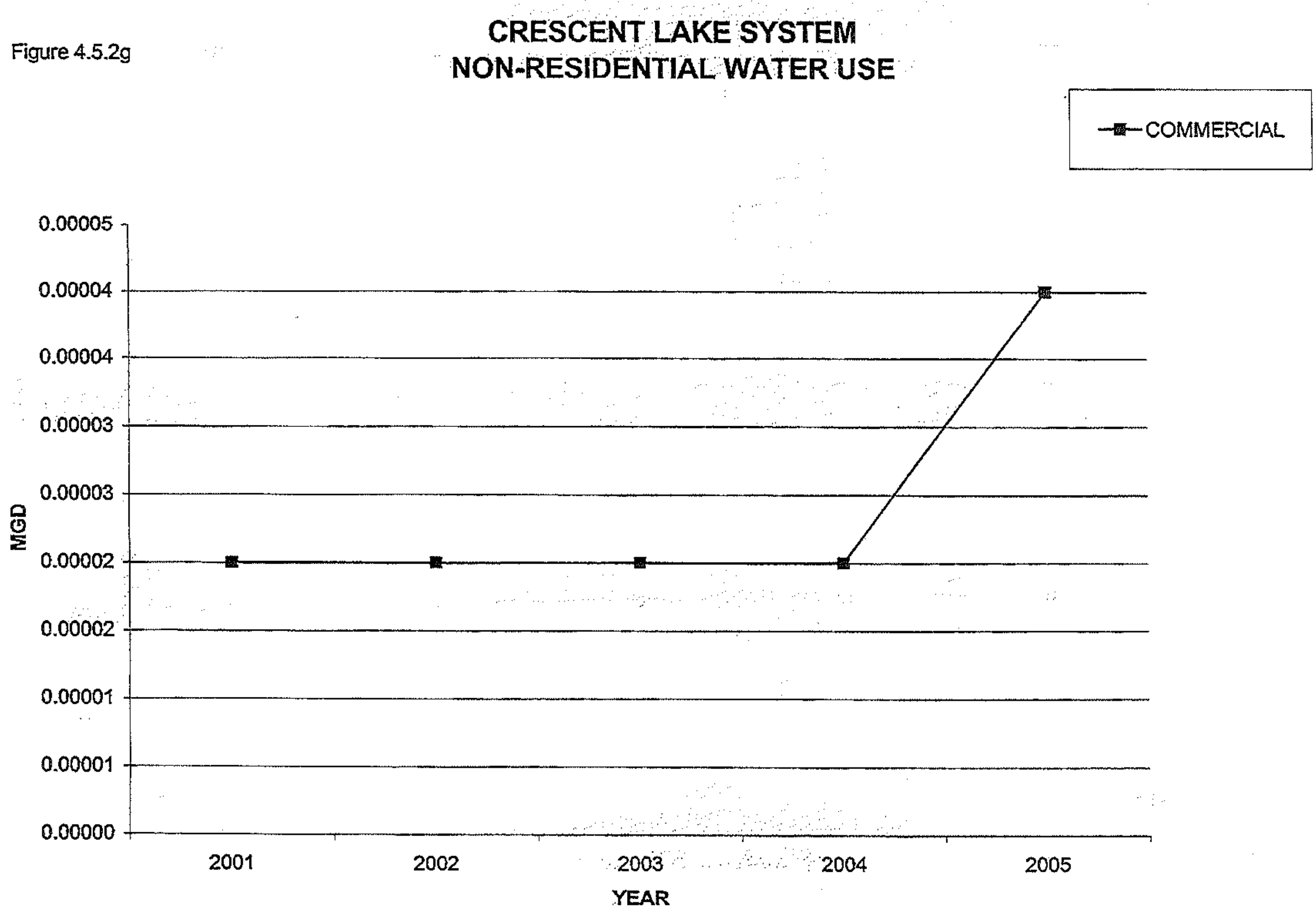

SOMERS SYSTEM
NON-RESIDENTIAL WATER USE
RATIO
COMMERCIAL
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
RATIO
2001
2002
2003
2004
2005

Figure 4.5.2g



CRESCENT LAKE SYSTEM
NON-RESIDENTIAL WATER USE
COMMERCIAL
0.00005
0.00004
0.00004
0.00003
0.00003
0.00002
0.00002
0.00001
0.00001
0.00000
MGD
2001
2002
2003
2004
2005
YEAR

Figure 4.5.2h

CRESCENT LAKE SYSTEM
NON-RESIDENTIAL WATER USE RATIO

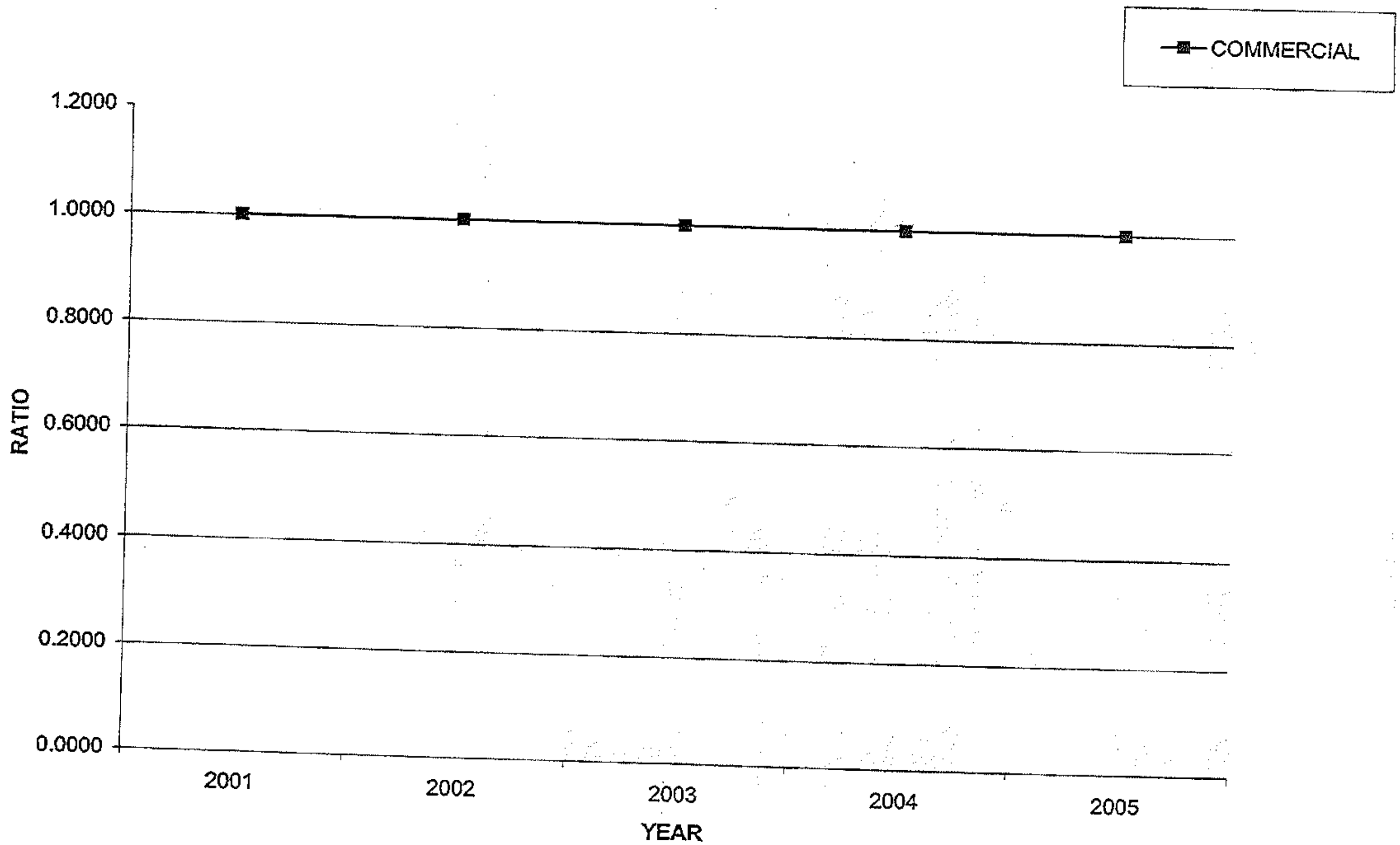


TABLE 4.5.3a PROJECTED COMMERCIAL WATER DEMANDS (GPD) NORTHERN REGION

WESTERN SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(1)
2005*	2,944	2,944	1,591,391
2010	3,338	3,253	1,756,620
2020	3,672	3,487	1,882,980
2050	3,745	3,537	1,909,980

STAFFORD SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(2)
2005*	69	69	31,682
2010	72	72	33,048
2020	99	99	45,441
2050	99	99	45,441

LAKEVIEW/LAKEWOOD SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(3)
2005*	0	0	0
2010	10	3	147
2020	13	6	294
2050	23	16	784

* ACTUAL DATA

(1) ALL WATER DEMAND FOR THE WESTERN SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 540 GPDPA.

(2) ALL WATER DEMAND FOR THE STAFFORD SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 459 GPDPA.

(3) ALL WATER DEMAND FOR THE LAKEVIEW/LAKEWOOD SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 49 GPDPA.

TABLE 4.5.3a Continued PROJECTED COMMERCIAL WATER DEMANDS (GPD) NORTHERN REGION

SOMERS SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(3)
2005*	36	36	9,049
2010	36	36	9,049
2020	36	36	9,049
2050	36	36	9,049

CRESCENT LAKE SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(4)
2005*	1	1	49
2010	1	1	49
2020	1	1	49
2050	1	1	49

* ACTUAL DATA

(3) ALL WATER DEMAND FOR THE SOMERS SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 251 GPDPA.

(4) ALL WATER DEMAND FOR THE CRESCENT LAKE SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 49 GPDPA.

TABLE 4.5.3b PROJECTED INDUSTRIAL WATER DEMANDS (GPD) NORTHERN REGION

WESTERN SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(1)
2005*	3,252	3,252	394,304
2010	4,013	3,793	458,953
2020	6,727	5,460	660,660
2050	7,460	6,019	728,299

STAFFORD SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(2)
2005*	35	35	201,183
2010	45	45	202,418
2020	72	72	205,793
2050	171	140	214,293

SOMERS SYSTEM

YEAR	ACRES IN HORIZON	ESTIMATED SERVICE ACRES	PROJECTED DEMAND(3)
2005*	0	0	0
2010	0	0	0
2020	112	86	10,406
2050	147	115	13,915

* ACTUAL DATA

(1) ALL WATER DEMAND FOR THE WESTERN SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 121 GPDPA.

(2) ONE MAJOR CUSTOMER'S ACTUAL DEMAND IN THE STAFFORD SYSTEM IS 98,521 GPDPA (2 ACRE).
REMAINING ACREAGE IS CALCULATED AT A RATE OF 125 GPDPA.

(3) ALL WATER DEMAND FOR THE SOMERS SYSTEM IS IN GALLONS PER DAY PER ACRE AT A RATE OF 121 GPDPA.

TABLE 4.5.4a COMMERCIAL WATER DEMAND (GPD)

SYSTEM	2005 SERVICE ACRES	2005 DEMAND	2010 SERVICE ACRES	2010 DEMAND	2020 SERVICE ACRES	2020 DEMAND	2050 SERVICE ACRES	2050 DEMAND
WESTERN (1)	2,944	1,591,391	3,253	1,756,620	3,487	1,882,980	3,537	1,909,980
SOMERS (2)*	36	9,049	36	9,049	36	9,049	36	9,049
			3,289	1,765,669				
STAFFORD (3)**	69	31,682	72	33,048	99	45,441	99	45,441
CREST LAKE (4)**	1	49	1	49	1	49	1	49
					3,623	1,937,519	3,673	1,964,519
LV/LW (5)	0	0	3	147	6	294	16	784
TOTAL FOR NORTHERN REGION							3,689	1,965,303

*SOMERS SYSTEM COMBINES WITH WESTERN SYSTEM WITHIN THE 5 YEAR PLANNING HORIZON.
**STAFFORD AND CRESECENT LAKE SYSTEMS COMBINE WITH THE WESTERN SYSTEM WITHIN THE 20 YEAR PLANNING HORIZON.

(1) ALL WATER DEMAND FOR THE WESTERN SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 540 GPDPA.
(2) ALL WATER DEMAND FOR THE SOMERS SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 251 GPDPA.
(3) ALL WATER DEMAND FOR THE STAFFORD SYSTEM ARE IN GALLONS PER DAY AT A RATE 459 OF GPDPA.
(4) ALL WATER DEMAND FOR THE CRESCENT LAKE SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 49 GPDPA.
(5) ALL WATER DEMAND FOR THE LAKEWOOD/LAKEVIEW SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 49 GPDPA.

TABLE 4.5.4b INDUSTRIAL WATER DEMAND (GPD)

SYSTEM	2005 SERVICE ACRES	2005 DEMAND	2010 SERVICE ACRES	2010 DEMAND	2020 SERVICE ACRES	2020 DEMAND	2050 SERVICE ACRES	2050 DEMAND
WESTERN (1)	3,252	394,304	3,793	458,953	5,460	660,660	6,019	728,299
SOMERS (2)*	0	0	0	0	86	10,406	115	13,915
			3,793	458,953				
STAFFORD (3)**	35	201,183	45	202,418	72	205,793	140	214,293
					5,618	876,859	6,274	956,507
TOTAL FOR NORTHERN REGION							6,274	956,507

*SOMERS SYSTEM COMBINES WITH WESTERN SYSTEM WITHIN THE 5 YEAR PLANNING HORIZON.
**STAFFORD SYSTEM COMBINES WITH WESTERN SYSTEM WITHIN THE 20 YEAR PLANNING HORIZON.

(1) ALL WATER DEMAND FOR THE WESTERN SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 121 GPDPA.
(2) ALL WATER DEMAND FOR THE SOMERS SYSTEM ARE IN GALLONS PER DAY AT A RATE OF 121 GPDPA.
(3) ONE MAJOR CUSTOMER'S ACTUAL DEMAND IN THE STAFFORD SYSTEM IS 98,521 GPDPA (2 ACRES). REMAINING ACREAGE IS CALCULATED AT A RATE OF 125 GPDPA

Non-Revenue Water

It is necessary to project the amount of non-revenue water for each of the planning periods. CWC has an aggressive leak detection and management program with a goal to maintain non-revenue water to a practical minimum (15% or less). According to CWC records for the Northern Region, the amount of non-revenue water for the
Western, Stafford, Somers, Lynnwood, Lakewood/Lakeview, Nathan Hale, Crescent Lake and Reservoir Heights systems has represented an average of 9.6, 10.2, 10.7, 15.4, 0.68, 15.1, -9.9, 8.8 and 9.1 respectfully over the last five years. Through additional leak detection, these figures are expected to decline over time as shown in Tables 4.5.5a-i.

Miscellaneous Sales

Miscellaneous consumption is comprised of uses such as filling of pool water tank trucks, water used for construction activities (residential, commercial), etc. All miscellaneous sale uses are metered. Since these demands are considered insignificant, they are not included in the consumption projections.

TABLE 4.5.5a PROJECTED WATER DEMAND (GPD) WESTERN SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	5,923,991	6,161,921	6,806,877	9,188,569
COMMERCIAL	1,591,391	1,756,620	1,882,980	1,909,980
INDUSTRIAL	394,304	458,953	660,660	728,299
PUBLIC AUTHORITY	658,505	763,981	794,540	873,994
NON-REVENUE	958,087	900,000	850,000	875,000
TOTAL	9,526,278	10,041,475	10,995,057	13,575,842
NON-REVENUE (%)	9.9	9.0	7.7	6.4
AVERAGE DAY DEMAND	9,526,278	10,041,475	10,995,057	13,575,842
MAXIMUM MONTHLY AVERAGE DAY DEMAND	12,003,110	12,451,429	13,633,870	16,834,044
MAXIMUM DAY DEMAND	15,146,782	15,062,212	16,492,585	20,363,763

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5b PROJECTED WATER DEMAND (GPD) STAFFORD SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	184,366	188,188	197,813	217,371
COMMERCIAL	31,682	33,048	45,441	45,441
INDUSTRIAL	201,183	202,418	205,793	214,293
PUBLIC AUTHORITY	9,046	9,281	9,837	11,410
NON-REVENUE	62,457	60,000	56,000	50,000
TOTAL	488,734	492,935	514,884	538,515
NON-REVENUE (%)	12.9	12.2	10.9	9.3
AVERAGE DAY DEMAND	488,734	492,935	514,884	538,515
MAXIMUM MONTHLY AVERAGE DAY DEMAND	522,945	552,087	576,670	603,136
MAXIMUM DAY DEMAND	708,664	719,685	751,730	786,231

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5c PROJECTED WATER DEMAND (GPD)
SOMERS SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	77,683	79,698	83,768	97,310
RYE HILL**	20,928	21,500	21,500	21,500
COMMERCIAL	9,049	9,049	9,049	9,049
INDUSTRIAL	0	0	10,406	13,915
PUBLIC AUTHORITY	6,197	6,289	6,414	6,991
NON-REVENUE	15,841	13,500	12,000	10,000
TOTAL	129,698	130,036	143,137	158,765
NON-REVENUE (%)	12.6	10.4	8.4	6.3
AVERAGE DAY DEMAND	129,698	130,036	143,137	158,765
MAXIMUM MONTHLY AVERAGE DAY DEMAND	194,547	189,852	208,980	231,796
MAXIMUM DAY DEMAND	303,493	295,181	324,920	360,396

*Residential demand based on five year average (2001-2005)

** Sold to Hazardville Water Company

TABLE 4.5.5d PROJECTED WATER DEMAND (GPD)
LYNNWOOD SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	8,649	8,730	8,955	9,675
COMMERCIAL	0	0	0	0
INDUSTRIAL	0	0	0	0
PUBLIC AUTHORITY	0	0	0	0
NON-REVENUE	-139	500	500	500
TOTAL	8,510	9,230	9,455	10,175
NON-REVENUE (%)	-8.9	5.4	5.3	4.9
AVERAGE DAY DEMAND	8,510	9,230	9,455	10,175
MAXIMUM MONTHLY AVERAGE DAY DEMAND	11,743	11,260	11,535	12,413
MAXIMUM DAY DEMAND	NA	NA	NA	NA

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5e PROJECTED WATER DEMAND (GPD) RESERVOIR HEIGHTS SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	3,995	4,028	4,101	4,408
COMMERCIAL	0	0	0	0
INDUSTRIAL	0	0	0	0
PUBLIC AUTHORITY	0	0	0	0
NON-REVENUE	810	700	550	400
TOTAL	4,805	4,728	4,651	4,808
NON-REVENUE (%)	16	14.8	11.8	8.3
AVERAGE DAY DEMAND	4,805	4,728	4,651	4,808
MAXIMUM MONTHLY	NA	NA	NA	NA
AVERAGE DAY DEMAND MAXIMUM DAY DEMAND	NA	NA	NA	NA

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5f PROJECTED WATER DEMAND (GPD) NATHAN HALE SYSTEM

USER CATEGORY	2000	2005	2020	2050
RESIDENTIAL*	5,508	5,559	5,712	6,120
COMMERCIAL	0	0	0	0
INDUSTRIAL	0	0	0	0
PUBLIC AUTHORITY	0	0	0	0
NON-REVENUE	-536	500	500	500
TOTAL	4,972	6,059	6,212	6,620
NON-REVENUE (%)	-11.5	8.3	8.0	7.6
AVERAGE DAY DEMAND	4,972	6,059	6,212	6,620
MAXIMUM MONTHLY AVERAGE DAY DEMAND	6,215	7,513	7,702	8,208
MAXIMUM DAY DEMAND	NA	NA	NA	NA

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5g PROJECTED WATER DEMAND (GPD)
LAKEVIEW/LAKEWOOD SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	21,697	21,824	22,352	24,112
COMMERCIAL	0	147	294	784
INDUSTRIAL	0	0	0	0
PUBLIC AUTHORITY	0	0	0	0
NON-REVENUE	3,597	3,000	2,000	1,500
TOTAL	25,294	24,971	24,646	26,396
NON-REVENUE (%)	14	12.0	8.1	5.7
AVERAGE DAY DEMAND	25,294	24,971	24,646	26,396
MAXIMUM MONTHLY AVERAGE DAY DEMAND	31,364	28,966	28,589	30,619
MAXIMUM DAY DEMAND	NA	NA	NA	NA

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5h PROJECTED WATER DEMAND (GPD)
CRESCENT LAKE SYSTEM

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL*	31,264	31,339	32,186	34,650
COMMERCIAL	49	49	49	49
INDUSTRIAL	0	0	0	0
PUBLIC AUTHORITY	93	94	96	101
NON-REVENUE	3,756	3,000	3,500	3,000
TOTAL	35,162	34,482	35,831	37,800
NON-REVENUE (%)	10.7	8.7	9.8	7.9
AVERAGE DAY DEMAND	35,162	34,482	35,831	37,800
MAXIMUM MONTHLY	NA	NA	NA	NA
AVERAGE DAY DEMAND				
MAXIMUM DAY DEMAND	NA	NA	NA	NA

*Residential demand based on five year average (2001-2005)

TABLE 4.5.5i PROJECTED WATER DEMAND (GPD)
NORTHERN REGION*

USER CATEGORY	2005	2010	2020	2050
RESIDENTIAL	6,299,009	6,455,287	7,213,719	9,625,215
COMMERCIAL	1,632,171	1,798,913	1,937,813	1,965,303
INDUSTRIAL	595,487	661,369	876,857	956,505
PUBLIC AUTHORITY	673,841	779,645	810,887	892,496
NON-REVENUE	1,043,873	981,200	925,050	940,900
TOTAL	10,244,381	10,676,414	11,764,326	14,380,419
NON-REVENUE (%)	10.2	9.2	7.9	6.5
AVERAGE DAY DEMAND	10,244,381	10,676,414	11,764,326	14,380,419
MAXIMUM MONTHLY AVERAGE DAY DEMAND	*	*	*	*
MAXIMUM DAY DEMAND	*	*	*	*

*See separate system sheets

4.6 AVAILABLE WATER, DEMAND and MARGIN OF SAFETY

Margin of Safety is the unitless ratio of available water over demand, where available water is defined as the maximum amount of water a system can dependably supply from its active, approved sources, taking into account hydraulic, treatment or other limitations. Water obtained through interconnections is generally not included as available water, unless reliable delivery is assured by contract.

Available Water

For the Northern Region systems, available water is limited to those quantities identified in Chapter 2, Section 2.2 and 2.3, and summarized in Table 4.6.1. For the Crescent Lake, Reservoir Heights and Riversedge consecutive water systems, interconnections with East Longmeadow, Manchester and Tolland, respectively, comprise 100 percent of each system's available water calculation.

Quantities of available water are assessed based on 24-hour and 18-hour pumping days. For systems utilizing one or more ground water sources, available supply is also calculated with the largest yielding well source off-line. Surface water available supply is calculated using maximum short-term treatment capacity, source safe yield, and an assessment of monthly demand as a percentage of the annual safe yield draft. These supply quantities are compared to system demand in order to assess each system's ability to satisfy various demands over the 50-year planning horizon and plan for additional supply development needs.

Demand

Historical and projected Average Day Demand (ADD), Maximum Month Average Day Demand (MMADD), and Maximum Day Demand (MDD) are shown for the Western System. Demands realized over the most recent five years are averaged and used as the basis for future projections, with the mean ratio of MMADD and MDD to ADD remaining constant for demand projection purposes. ADD growth is estimated based on historical growth, known projects in the service area having significant demand consequences, or other factors. System demand includes water consumption for residential, commercial, industrial and public use, and non-revenue water losses.

TABLE 4.6.1 AVAILABLE SUPPLY (MGD)

REGION: SYSTEM:	NORTHERN WESTERN			
Source	Maximum Day Short Term (24Hr) Capacity	Max Month Average Day Capacity	Average Day (18 Hr) Capacity	Largest Well Offline 24 Hr Pumping Day
Total Current Available Supply	**16.69**	**14.02**	**14.02**	**15.36**
Total Future Available Supply	**23.19**	**18.39**	**17.47**	**19.86**

[1] = Emergency Use; supply not included as available.
[2] = Existing MDC Interconnection currently used for peaking purposes only.

TABLE 4.6.1 AVAILABLE SUPPLY (MGD)

REGION:	NORTHERN
SYSTEM:	STAFFORD

Total Available Supply	**1.000**	**na**	**na**

REGION:	NORTHERN
SYSTEM:	SOMERS

Total Available Supply	**0.307**	**0.230**	**0.177**

TABLE 4.6.1 AVAILABLE SUPPLY (TGD)

REGION: SYSTEM:	NORTHERN LAKEWOOD/LAKEVIEW		
Source	24 hr Pumping Day	18 hr Pumping Day	Largest Well Off-Line 24 hr Pumping Day
Available Supply	**43.4**	**32.6**	**31.9**
REGION: SYSTEM:	NORTHERN NATHAN HALE		
Systems	57.8	43.4	43.4

* Backup Well

TABLE 4.6.1 AVAILABLE SUPPLY (TGD)

REGION:	NORTHERN		
SYSTEM:	LLYNWOOD		
Supply	41.7	31.3	27.3

REGION:	NORTHERN		
SYSTEM:	CRESCENT LAKE		
Source	24 hr Pumping Day	18 hr Pumping Day	Largest Well Off-Line 24 hr Pumping Day
East Longmeadow Interconnection	*	*	NA
Total Available Supply	*	*	

REGION:	NORTHERN		
SYSTEM:	RESERVOIR HEIGHTS		
Source	24 hr Pumping Day	18 hr Pumping Day	Largest Well Off-Line 24 hr Pumping Day
Manchester Interconnection	*	*	NA
Total Available Supply	*	*	

* Available supply is not limited and equal to daily demand

Following a consistent historical decline in per-capita consumption over the past decade, a projected one-quarter percent in organic growth is considered reasonable for the Western System, and is shown in Table 4.6.2a and graphically in Figure 5.3.1a. Demands associated with the proposed regional pipeline, which include quantities of water necessary to supplement the University of Connecticut system and meet identified community needs, are added to this base growth in Table 4.6.2b and in Figure 5.3.1b. Over the planning period, this anticipated additional daily demand equals a combined 0.06 MGD by 2015 for UConn and Tolland, and an added 0.35 MGD and 0.12 MGD by 2020 and 2030, respectively, for off-campus and Mansfield Four Corners customers. In addition, 0.5 MGD is added to projected Maximum Month Average Day Demand values in 2015 to reflect the University's need to supplement its supply during periods when lowered stream flows affect wellfield operation.

Margin of Safety

Margins of Safety are calculated and contained in Tables 4.6.2a-d. Values are obtained by dividing available water by demand and shown as decimal equivalents, whereby demands in excess of available water result in numbers < 1.00 and demands less than available water generate numbers > 1.00. As an example, a system with a ratio of available supply to demand of 1.10 would be said to have a ten-percent margin of safety. DPH guidelines require that an adequate margin of safety be maintained at all times. System specific, a margin of safety is approved by DPH on a case-by-case basis. A 15 percent margin of safety is typically used for most planning purposes, however, in the Western System, the Rockville WTP's clearwell storage and peaking capacity allow for a lower MOS to be used when scheduling future supply projects.

The following is a discussion of current and projected Western System margin of Safety over the full 50 year planning period, as shown in Tables 4.6.2a-d.

System margin of safety absent the proposed regional pipeline is shown in Table 4.6.2a. Available supply does not include supply associated with the existing MDC interconnection; while actively used at rates up to 1.0 MGD on an as-needed basis, quantities of water under the existing agreement are considered interruptible if needed by MDC customers. For this reason, available supply is regarded as limited during peak demand periods, and additional supply would be needed between the 5 and 20 year planning periods to maintain an adequate margin of safety.

TABLE 4.6.2a DEMAND/MARGIN OF SAFETY

REGION: **NORTHERN**
SYSTEM: **WESTERN**

HISTORICAL DEMAND (MGD) / **AVAILABLE SUPPLY (MGD)**

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
						14.02	15.36	14.02	16.69
2007	9.71	11.89	14.79	1.22	1.52	1.44	1.58	1.18	1.13
2008	8.97	10.66	12.95	1.19	1.44	1.56	1.71	1.32	1.29
2009	8.72	10.39	12.77	1.19	1.46	1.61	1.76	1.35	1.31
2010	10.01	13.20	16.65	1.32	1.66	1.40	1.53	1.06	1.00
2011	9.20	11.68	15.17	1.27	1.65	1.52	1.67	1.20	1.10
5 Year Mean	9.32	11.56	14.47	1.24	1.55	1.50	1.65	1.21	1.15
Maximum	10.01	13.20	16.65			1.40	1.53	1.06	1.00

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
2015	9.42	11.66	14.58	1.24	1.55	1.49	1.63	1.20	1.14
2020	9.53	11.81	14.76	1.24	1.55	1.47	1.61	1.19	1.13
2030	9.65	11.96	14.95	1.24	1.55	1.45	1.59	1.17	1.12
2060	10.40	12.89	16.11	1.24	1.55	1.35	1.48	1.09	1.04

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:

AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
2011 AVERAGE DAY DEMAND THROUGH 9/12/2011
SOMERS AND ELLINGTON ACRES SYSTEMS FULLY INTEGRATED 1st Q 2009;
TO COMPENSATE, 0.3 ADD, 0.375 MMADD AND 0.45 MDD ADDED TO 2007 & 2008.
ADD PROJECTIONS ASSUME 5 YEAR AVERAGE 2007-2011 INCREASING AT 0.25% PER YEAR.

TABLE 4.6.2b DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: WESTERN

						AVAILABLE SUPPLY (MGD)			
HISTORICAL DEMAND (MGD)						14.02	15.36	14.02	16.69
Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
2007	9.71	11.89	14.79	1.22	1.52	1.44	1.58	1.18	1.13
2008	8.97	10.66	12.95	1.19	1.44	1.56	1.71	1.32	1.29
2009	8.72	10.39	12.77	1.19	1.46	1.61	1.76	1.35	1.31
2010	10.01	13.20	16.65	1.32	1.66	1.40	1.53	1.06	1.00
2011	9.20	11.68	15.17	1.27	1.65	1.52	1.67	1.20	1.10
5 Year Mean	9.32	11.56	14.47	1.24	1.55	1.50	1.65	1.21	1.15
Maximum	10.01	13.20	16.65			1.40	1.53	1.06	1.00

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
2015	9.48	12.24	14.67	1.29	1.55	1.48	1.62	1.15	1.14
2020	9.94	12.84	15.40	1.29	1.55	1.41	1.54	1.09	1.08
2030	10.32	13.32	15.98	1.29	1.55	1.36	1.49	1.05	1.04
2060	11.12	14.36	17.22	1.29	1.55	1.26	1.38	0.98	0.97

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
2011 AVERAGE DAY DEMAND THROUGH 8/8/2011
SOMERS AND ELLINGTON ACRES SYSTEMS FULLY INTEGRATED 1st Q 2009;
TO COMPENSATE, 0.3 ADD, 0.375 MMADD AND 0.45 MDD ADDED TO 2007 & 2008.
ADD PROJECTIONS ASSUME 5 YEAR AVERAGE 2007-2011 INCREASING AT 0.25% PER YEAR.
2015: ADDED UCONN DEMAND OF 0.04 ADD & 0.5 MMADD; TOLLAND DEMAND OF 0.02 ADD.
2020: ADDED OFF CAMPUS DEMAND OF 0.3 ADD; MANSFIELD 4 CORNERS DEMAND OF 0.05.
2030: ADDED MANSFIELD 4 CORNERS FULL BUILD OUT DEMAND OF 0.17.

NORTHERNWEST462b 2011

As noted above, Table 4.6.2b includes additional demands associated with the proposed regional pipeline project. The added demand, which would be realized over one or more decades of build-out, affects MMADD and MDD margins of safety sooner, necessitating the addition of supply earlier than otherwise projected. In this case, supply would be needed for both MMADD and MDD purposes shortly after 2015. Average day MOS continues to be more than adequate for the full planning horizon.

Tables 4.6.2c and 4.6.2d show the effect of additional increments of supply on projected margins of safety. In Table 4.6.2c, additional groundwater supply adds some 0.5 MGD and 0.38 MGD to 24 hour and 18 hour available supply totals, respectively, establishing an adequate margin of safety through the 5 year planning period. With increased demand projected to occur on or about 2020, however, an additional increment in supply is needed for MMADD and MDD purposes. As previously, average day MOS continues to be more than adequate for the full planning horizon.

Table 4.6.2d adds 1.0 MGD in purchased supply to short-term (24 hour) and maximum month average day capacities. While not needed, a small quantity – 0.08 MGD – is also available for average day purposes. With the additional 1.0 MGD supply, margins of safety remain adequate throughout the 20 year planning period. Thereafter, however, supply would again be needed for maximum month and maximum day demand purposes. At that time, a commitment to additional supply from Lake Shenipsit would ensure all demands were adequately provided for through the remainder of the 50 year planning horizon.

TABLE 4.6.2c DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: WESTERN

HISTORICAL DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	AVAILABLE SUPPLY (MGD) 14.39 MOS ADD,18hr	15.86 MOS ADD,LWO	14.39 MOS MMADD,18hr	17.19 MOS MDD,24hr
2007	9.71	11.89	14.79	1.22	1.52	1.48	1.63	1.21	1.16
2008	8.97	10.66	12.95	1.19	1.44	1.60	1.77	1.35	1.33
2009	8.72	10.39	12.77	1.19	1.46	1.65	1.82	1.38	1.35
2010	10.01	13.20	16.65	1.32	1.66	1.44	1.58	1.09	1.03
2011	9.20	11.68	15.17	1.27	1.65	1.56	1.72	1.23	1.13
5 Year Mean	9.32	11.56	14.47	1.24	1.55	1.54	1.70	1.24	1.19
Maximum	10.01	13.20	16.65			1.44	1.58	1.09	1.03

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
2015	9.48	12.24	14.67	1.29	1.55	1.52	1.67	1.18	1.17
2020	9.94	12.84	15.40	1.29	1.55	1.45	1.59	1.12	1.12
2030	10.32	13.32	15.98	1.29	1.55	1.39	1.54	1.08	1.08
2060	11.12	14.36	17.22	1.29	1.55	1.29	1.43	1.00	1.00

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:

AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1; REFLECTS ADDITION OF GROUNDWATER & MDC ALTERNATIVE
2011 AVERAGE DAY DEMAND THROUGH 8/8/2011
SOMERS AND ELLINGTON ACRES SYSTEMS FULLY INTEGRATED 1st Q 2009;
TO COMPENSATE, 0.3 ADD, 0.375 MMADD AND 0.45 MDD ADDED TO 2007 & 2008.
ADD PROJECTIONS ASSUME 5 YEAR AVERAGE 2007-2011 INCREASING AT 0.25% PER YEAR.
2015: ADDED UCONN DEMAND OF 0.04 ADD & 0.5 MMADD; TOLLAND DEMAND OF 0.02 ADD.
2020: ADDED OFF CAMPUS DEMAND OF 0.3 ADD; MANSFIELD 4 CORNERS DEMAND OF 0.05.
2030: ADDED MANSFIELD 4 CORNERS FULL BUILD OUT DEMAND OF 0.17.

NORTHERNWEST462b 2011

TABLE 4.6.2d DEMAND/MARGIN OF SAFETY

REGION: **NORTHERN**
SYSTEM: **WESTERN**

HISTORICAL DEMAND (MGD) — AVAILABLE SUPPLY (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
						14.47	16.86	15.39	18.19
2007	9.71	11.89	14.79	1.22	1.52	1.49	1.74	1.29	1.23
2008	8.97	10.66	12.95	1.19	1.44	1.61	1.88	1.44	1.40
2009	8.72	10.39	12.77	1.19	1.46	1.66	1.93	1.48	1.42
2010	10.01	13.20	16.65	1.32	1.66	1.45	1.68	1.17	1.09
2011	9.20	11.68	15.17	1.27	1.65	1.57	1.83	1.32	1.20
5 Year Mean	9.32	11.56	14.47	1.24	1.55	1.55	1.81	1.33	1.26
Maximum	10.01	13.20	16.65			1.45	1.68	1.17	1.09

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMADD,18hr	MOS MDD,24hr
2015	9.48	12.24	14.67	1.29	1.55	1.53	1.78	1.26	1.24
2020	9.94	12.84	15.40	1.29	1.55	1.46	1.70	1.20	1.18
2030	10.32	13.32	15.98	1.29	1.55	1.40	1.63	1.16	1.14
2060	11.12	14.36	17.22	1.29	1.55	1.30	1.52	1.07	1.06

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1; REFLECTS ADDITION OF GROUNDWATER & MDC ALTERNATIVE
2011 AVERAGE DAY DEMAND THROUGH 8/8/2011
SOMERS AND ELLINGTON ACRES SYSTEMS FULLY INTEGRATED 1st Q 2009;
TO COMPENSATE, 0.3 ADD, 0.375 MMADD AND 0.45 MDD ADDED TO 2007 & 2008.
ADD PROJECTIONS ASSUME 5 YEAR AVERAGE 2007-2011 INCREASING AT 0.25% PER YEAR.
2015: ADDED UCONN DEMAND OF 0.04 ADD & 0.5 MMADD; TOLLAND DEMAND OF 0.02 ADD.
2020: ADDED OFF CAMPUS DEMAND OF 0.3 ADD; MANSFIELD 4 CORNERS DEMAND OF 0.05.
2030: ADDED MANSFIELD 4 CORNERS FULL BUILD OUT DEMAND OF 0.17.

NORTHERNWEST462b 2011

TABLE 4.6.2b DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: STAFFORD

HISTORICAL DEMAND (MGD)						AVAILABLE SUPPLY (MGD)			
						0.70	NA	0.70	1.00
Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2001	0.49	0.60	0.77	1.21	1.55	1.42	NA	1.17	1.30
2002	0.49	0.54	0.69	1.11	1.42	1.44	NA	1.30	1.45
2003	0.53	0.59	0.78	1.11	1.47	1.32	NA	1.18	1.28
2004	0.53	0.58	0.75	1.09	1.42	1.33	NA	1.22	1.33
2005	0.48	0.52	0.70	1.07	1.45	1.45	NA	1.35	1.42
5 Year Mea	0.50	0.56	0.74	1.12	1.46	1.39	NA	1.24	1.36
Maximum	0.53	0.60	0.78			1.32	NA	1.17	1.28

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2010	0.49	0.55	0.72	1.12	1.46	1.42	NA	1.27	1.39
2020	0.51	0.58	0.75	1.12	1.46	1.36	NA	1.22	1.33
2050	0.54	0.60	0.79	1.12	1.46	1.30	NA	1.16	1.27

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
PROJECTED DEMANDS FROM TABLE 4.5.5

TABLE 4.6.2c DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: SOMERS

HISTORICAL DEMAND (MGD) / AVAILABLE SUPPLY (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	0.23	0.18	0.23	0.31
						MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2001	0.15	0.23	0.38	1.50	2.48	1.50	1.16	1.00	0.81
2002	0.13	0.19	0.30	1.53	2.40	1.83	1.40	1.19	1.02
2003	0.13	0.18	0.26	1.43	2.06	1.81	1.39	1.26	1.17
2004	0.13	0.17	0.27	1.33	2.08	1.80	1.38	1.35	1.15
2005	0.13	0.20	0.31	1.50	2.34	1.72	1.32	1.14	0.98
5 Year Mea	0.13	0.20	0.30	1.46	2.27	1.72	1.32	1.18	1.01
Maximum	0.15	0.23	0.38			1.50	1.16	1.00	0.81

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2010	0.13	0.19	0.30	1.46	2.27	1.76	1.36	1.21	1.04
2020	0.14	0.21	0.33	1.46	2.27	1.61	1.24	1.10	0.94
2050	0.16	0.23	0.36	1.46	2.27	1.45	1.11	0.99	0.85

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
PROJECTED DEMANDS FROM TABLE 4.5.5

SOMERS/WESTERM REGIONAL PIPELINE IS PROJECTED TO BE COMPLETED WITHIN THE 5 YEAR PLANNING HORIZON

TABLE 4.6.2d DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: LAKEWOOD/LAKEVIEW

HISTORICAL DEMAND (MGD) / AVAILABLE SUPPLY (MGD)

						0.033	0.032	0.033	0.043
Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2001	0.026	0.030	NA	1.15	-	1.25	1.23	1.09	-
2002	0.024	0.027	NA	1.13	-	1.36	1.33	1.21	-
2003	0.026	0.029	NA	1.12	-	1.25	1.23	1.12	-
2004	0.025	0.029	NA	1.16	-	1.30	1.28	1.12	-
2005	0.025	0.031	NA	1.24	-	1.30	1.28	1.05	-
5 Year Mea	0.025	0.029	-	1.16	-	1.29	1.27	1.12	-
Maximum	0.026	0.031	-			1.25	1.23	1.05	-

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2010	0.025	0.029	-	1.16	-	1.31	1.28	1.13	-
2020	0.025	0.029	-	1.16	-	1.32	1.29	1.14	-
2050	0.026	0.031	-	1.16	-	1.24	1.21	1.07	-

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
PROJECTED DEMANDS FROM TABLE 4.5.5

TABLE 4.6.2e DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: NATHAN HALE

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS	MOS	MOS	MOS
	HISTORICAL DEMAND (MGD)					AVAILABLE SUPPLY (MGD)			
						0.011	0.012	0.011	0.014
						ADD,18hr	ADD,LWO	MMAD,18hr	MDD,24hr
2001	0.005	0.006	NA	1.20	-	2.16	2.30	1.80	-
2002	0.004	0.005	NA	1.25	-	2.70	2.88	2.16	-
2003	0.005	0.005	NA	1.00	-	2.16	2.30	2.16	-
2004	0.004	0.006	NA	1.50	-	2.70	2.88	1.80	-
2005	0.004	0.005	NA	1.25	-	2.70	2.88	2.16	-
5 Year Mea	0.004	0.005	-	1.24	-	2.45	2.61	2.00	-
Maximum	0.005	0.006	-			2.16	2.30	1.80	-

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2010	0.006	0.008	-	1.24	-	1.78	1.90	1.44	-
2020	0.006	0.008	-	1.24	-	1.74	1.85	1.40	-
2050	0.007	0.008	-	1.24	-	1.63	1.74	1.32	-

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
PROJECTED DEMANDS FROM TABLE 4.5.5

TABLE 4.6.2f DEMAND/MARGIN OF SAFETY

REGION: NORTHERN
SYSTEM: LLYNWOOD

HISTORICAL DEMAND (MGD)						AVAILABLE SUPPLY (MGD)			
						0.031	0.027	0.031	0.042
Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2001	0.009	0.010	NA	1.11	-	3.48	3.03	3.13	-
2002	0.008	0.010	NA	1.25	-	3.91	3.41	3.13	-
2003	0.008	0.009	NA	1.13	-	3.91	3.41	3.48	-
2004	0.008	0.010	NA	1.25	-	3.91	3.41	3.13	-
2005	0.008	0.011	NA	1.38	-	3.91	3.41	2.85	-
5 Year Mea	0.008	0.010	-	1.22	-	3.82	3.33	3.13	-
Maximum	0.009	0.011	-			3.48	3.03	2.85	-

PROJECTED DEMAND (MGD)

Year	ADD	MMADD	MDD	MMADD/ADD	MDD/ADD	MOS ADD,18hr	MOS ADD,LWO	MOS MMAD,18hr	MOS MDD,24hr
2010	0.009	0.011	-	1.22	-	3.39	2.96	2.77	-
2020	0.009	0.012	-	1.22	-	3.31	2.89	2.71	-
2050	0.010	0.012	-	1.22	-	3.08	2.68	2.52	-

ADD = AVERAGE DAY DEMAND
MMADD = MAX. MONTH AVERAGE DAY DEMAND
MDD = MAX. DAY DEMAND
MOS = MARGIN OF SAFETY

NOTES:
AVAILABLE SUPPLY VALUES FROM TABLE 4.6.1
PROJECTED DEMANDS FROM TABLE 4.5.5

4.7 WATER CONSERVATION PROGRAMS

A Water Conservation Plan developed in accordance with the Water Supply Plan Regulations is included in Appendix G.

CHAPTER 5

SYSTEM PERFORMANCE AND WEAKNESS
SYSTEM IMPROVEMENTS
ADDITIONAL SUPPLY

CHAPTER 5

SYSTEM PERFORMANCE AND WEAKNESS
SYSTEM IMPROVEMENTS
ADDITIONAL SUPPLY

In this chapter, future system needs are identified and specific system improvements and supply alternatives are discussed. System needs have been determined from the evaluation of population and water consumption projections, available supply, future service areas, land use compatibility, development pressures and existing system needs, which are presented in Chapters 2-4 of this plan. System needs were prioritized with the highest priority given to health and water quality related problems. System improvements which address high priority needs are included in the Five Year and Long Term Capital Expenditures Plan and are presented below. System improvements which are included in the 5, 20 and 50 year planning periods are discussed in general terms. Future sources of supply are discussed in Section 5.3

5.1 SYSTEM PERFORMANCE AND WEAKNESSES

The existing systems' performances were evaluated using customer complaint files, water quality data, source protection information and DPH inspection reports. In addition, the Company has a hydraulic model available for the Northern Region. This model is used as a planning tool to see what effects certain demands (e.g., fire flow, large user) or other operating scenarios may have on the distribution system. In this section, system deficiencies are listed and prioritized, with health and water quality problems having the highest priority. Company policies which affect system performance are also discussed.

<u>Water Quality Evaluation/Treatment Deficiencies</u>

consistently receives water from the Rockville Water Treatment Plant. This location represents at least 80% penetration into the distribution system. During the period of 2001-2005, the average total THM level was 20.3 ug/L which is well below the MCL of 80 ug/L.

An annual distribution system flushing program is conducted to maintain the distribution system free of excessive accumulation of sediment, organic growth, and products of corrosion and erosion. A detailed explanation of water quality is provided in Chapter 2, Section 2.1.

CWC is aware of Connecticut's prohibition on the use of asbestos-cement (AC) pipe for replacement and new installations. No new AC pipe has been installed since the date the law went into effect. In the Northern Western system a water sample collected in Enfield that was in contact with approximately 20,000 feet of 12 AC pipe was tested for asbestos and the results were below the detection level of 0.12 million fibers per liter. A water sample collected at the Somers Town Hall for asbestos testing was below the detection level of 0.12 million fibers per liter. A water sample collected at 63 West Main Street in Stafford for asbestos testing was below the detection level of 0.12 million fibers per liter. The water for the sample had been in contact with 1500 feet of 8" AC pipe.

Asbestos monitoring was conducted in 2002 in the Northern Region - Western System. Sampling was done at two locations; in Enfield at the Enfield Booster Station and in Vernon at the Talcottville Post Office which were representative of areas with asbestos cement piping in the distribution system. Testing was performed by the CT State Department of Health Services Laboratory. Results at both locations were below the method detection limit of 0.12 MFL. The next scheduled round of asbestos monitoring will take place in 2011.

CWC completed the first two rounds of monitoring for the Lead and Copper Rule in the Western System. Lead results (90th Percentile) for the first two rounds were 0.008 mg/L and <0.005 mg/L; copper results were 0.40 mg/L and 0.23 mg/L. One third of the samples collected during each monitoring period were collected from customers with lead service lines and the remaining were from customers with lead soldered copper plumbing installed between 1982 and 1987. Only 6 samples were collected in the second round from customers whose homes were in the tier 3 criteria group. Following the monitoring, CWC with the assistance of an Engineering Consultant, conducted a Desk Top Corrosion Control Evaluation for large systems in 1994 according with the USEPA's "Lead and Copper Rule Guidance Manual". Based on this study, the Northern Region - Western System was deemed to have optimized corrosion control methodologies. This study has been approved by the DPH and the system qualified for reduced monitoring under the Lead and Copper Rule. The System remains in compliance with the Lead and Copper Rule with the most recent Lead results (90th Percentile) for the 2003 monitoring at 0.003 mg/L; and copper results were 0.18 mg/L.

Customer Complaints

Customer complaint files from 2001-2005 were reviewed to evaluate system performance. In the Western System (includes Crescent Lake and Reservoir Heights systems) the number of complaints from 2001-2005 averaged 1.4% of the total number of customers served. The most common complaints were for high bills averaging 1.3% per year. The next most common complaints were low pressure at 0.23% and water quality at 0.30% on average for 2001-2005. These levels of complaints and types are similar and typical of other CWC systems.

In the Stafford System, the total number of complaints averaged 0.1% of customers served from 2001-2005. High bill complaints averaged 0.1% of customers served per year. Less than 5 complaints per year were received for categories of low pressure, water quality and leaking meters and service lines.

In the Somers System the total number of complaints averaged 2% of the customers served from 2001-2005. The most common complaints were received for high bills at 3.9% per year. Less than 5 complaints per year were received for leaking service lines and meters and water quality concerns.

In Coventry, the Lakewood/Lakeview System and Nathan Hale system, the total number of complaints averaged 2.3% of the customers served from 2001-2005. The most common complaints were received for low pressure concerns at 1.9% per year. Less than 5 complaints per year were received for leaking service lines and meters.

In the Llynwood System, the total number of complaints averaged 1.4% of the customers served from 2001-2005. The most common complaints were received for high bills at 0.6% per year. Less than 5 complaints per year were received for leaking service lines and meters and water quality concerns.

Supply Availability

In the Western System, improvements at the Spring Lots and Powder Hollow well fields added some 1.5 mgd to available supply calculations, making supply adequate for at least the 5 year planning period. As discussed in Chapter 4, however, additional supply will be needed shortly thereafter to maintain an adequate margin of safety during peak demand periods. Potential additional supply for the Western system includes the following short and long-term alternatives:

- Revisit interconnection agreements with MDC
- Additional supply from established well fields
- Expansion of the Rockville Water Treatment Plant
- Kupchunos Well in South Windsor
- Diversion of the Scantic River to Lake Shenipsit
- Purchase water from Agawam, MA
- Use of the Connecticut River

The Stafford system has an adequate supply of water from its surface water supplies to meet demands throughout the 50 year planning period. If and when additional supply is needed, the Stafford Wells would be activated to increase the system safe yield. In the event additional supply is required beyond activation of the wells, the dam at Stafford Reservoir No. 2 would be raised to increase system safe yield.

The Somers system requires additional supply to meet maximum daily demands. This need has accelerated the planned interconnection of the Somers and Western distribution systems via the existing regional pipeline. Additionally, efforts to address secondary water quality concerns at the Preston wells remain ongoing in an effort to reestablish source available supply.

In the Nathan Hale, Llynwood, Crescent Lake, and Reservoir Heights systems, available supply is sufficient to meet all projected water demands throughout the entire 50 year planning period. Over time, the Lakewood/Lakeview system has experienced a gradual diminishment in available supply from its bedrock wells, specifically those in the Lakeview zone of the system. Consequently, and as discussed in Chapter 4, supply available from the various well sources is not currently sufficient to meet the system's peak water demands. To redress this need, the Company is pursuing various supply options, including the treatment of existing Lakewood wells and new source development.

Implementation of potential sources is discussed in Section 5.3.

5.2 SYSTEM IMPROVEMENTS

System improvements that address specific system needs are discussed in this section. Approximate costs are presented in Table 5.2.1 for system improvements which are included in CWC's *Five Year and Long Term Capital Expenditures Plan*. Supply improvements planned for the next five, twenty and fifty years are also shown in this table. Non-capitalized short-term system improvements are identified in Table 5.2.2.

Distribution system improvements are now addressed through the Company's Water Infrastructure Replacement Program. These system improvements, when coupled with our continuing commitment to leak location and repair, are expected to reduce non-revenue water over time. Replacement of old mains, hydrants and measurement lines is also done on an as needed basis, i.e., if other construction is being done in the roadway, or under the Company's comprehensive WICA program.

Table 5.2.1 Five Year and Long Term Capital Expenditure Plan[1]

		Estimated Cost- 1,000 Dollars						
Water System	Project Description	2011	2012	2013	2014	2015	20yr	50yr

Western System Needs

The primary short-term need (less than 5 years) for the Western System is to complete installation of the Rockville WTP lagoons, at a cost of some $1.5 million. Other short-term needs include completion of Level A aquifer mapping for the system's stratified drift wells, undertaking various wellfield improvements and pumping upgrades at the Enfield booster station, and completing the abandonment of bedrock supplies previously serving the former Somers system. Level A Mapping in the Northern Region is ongoing, with modeling and mapping of the Hunt Wellfield currently in progress.

Along with miscellaneous distribution system improvements, an extension from the Western System, in Tolland, to the University of Connecticut system in Mansfield is expected to occur within the 5 year planning period. As discussed in Chapter 4, the extension would provide supply to the Town of Mansfield, help the University meet peak demands, and provide critical supply redundancy. The University, in conjunction with the Town of Mansfield, is in the process of undertaking an Environmental Impact Evaluation of the pipeline and other supply alternatives. It is anticipated this evaluation will be completed in early 2012 and the main extension selected as the most practicable supply alternative, at which time engineering and permitting of the project would begin. Actual construction would be expected to occur during the 2013 – 2014 construction seasons. Although the timing and funding of the project may be influenced by funding from outside sources, the pipeline could be operational by 2015.

System improvements that are to be addressed over the 20 year planning period include the construction of storage tanks in East Granby, East Windsor, Enfield and Somers. System improvements in the 50 year planning period include construction of a storage tank in the Town of Suffield and expansion of the Rockville WTP.

Stafford System Needs

Within the 5 year planning period, an upgrade of the Stafford Springs Water Treatment Plant is needed to meet more stringent upcoming water quality regulations. The plant upgrade will include the use of chlorine dioxide and UV. Other short-term needs include an evaluation of the Stafford wells.

System improvements that are to be addressed over the 20 year planning period include construction of a second storage tank and possible main extension to the expanded Western/ Somers system. System improvements in the 50 year planning period include raising the dam at Stafford Reservoir No. 2 to increase system available supply.

Somers System Needs

The primary short-term need for the Somers System is completion of the installation of some 6,000 feet of main and booster pumping station that will deliver water from Enfield to Somers. This $1.4 million project will address short and long-term supply needs in the Somers system. It is also expected that water main in Springfield Road will be replaced within the five year planning horizon. System improvements to be addressed over the 20 year planning period include the construction of a second Gulf Road storage tank.

Satellite System Needs

Securing additional on-site water supplies for the Lakeview portion of the Lakeview/Lakewood System is needed to address a chronic lack of available supply from the system's bedrock well sources.

Table 5.2.2 Short Term Improvement Schedule (Non-Capitalized) [1]

	2011	2012	2013	2014	2015	2020

5.3 ADDITIONAL SUPPLIES

In order to determine when additional water supplies will be required for each system, projections of annual average, maximum monthly average and maximum day water demands, along with available supply have been plotted against time. This information is presented in Figures 5.3.1a-d for the Western system.

Projections of average day water demand were developed in Chapter 4. Projections of maximum month average day demand and maximum day demand were made based on the five year average ratio of maximum month average day demand and maximum day demand to yearly average day demand. While maximum day demands are short duration peaks lasting one or more days, maximum monthly average daily demands indicate an elevated demand that must be met for sustained periods, often up to 120 days during the summer months. These periods of high monthly demand usually occur in the summer, however, in systems where a high percentage of the total water demand is for industrial use, they may occur at any time of the year.

System improvements and development of additional supply are implemented in a timely manner to ensure that an adequate margin of safety is maintained through the entire fifty-year planning horizon. In general, the development of any new supply is scheduled such that it becomes available when 85 percent of the available average day supply has been utilized by the average day demand (ADD) or maximum monthly average daily demand (MMADD), or when the maximum daily demand reaches about 85 percent of the available maximum capacity. As noted in Chapter 4, the Rockville WTP's clearwell storage and peaking capacity allow for a tighter margin of safety to be used when scheduling future supply projects in the Western System. Supply or treatment alternatives are scheduled to allow sufficient time for necessary studies, explorations, designs and permitting.

Western System

Near term alternatives for future additional water supply for the Northern Region include groundwater sources, water purchases from neighboring utilities such as the MDC or Agawam, MA, and an upgrade and expansion of the Rockville Water Treatment Plant.

GroundWater Sources

Over the past several decades, CWC has undertaken a number of improvements at various well fields in an effort to maximize available water from its groundwater sources, most notably at the Powder Hollow and Spring Lots well fields. These past efforts have been successful, and added some 1.5 MGD supply to the system.

In spite of the success of such efforts, a groundwater yield assessment indicates additional water resources are available at the Hunt and Powder Hollow well fields. Accessing this additional supply, which is a combined, estimated 0.5 MGD, will require the replacement of one or more existing sources in order to regain currently unused, but registered, capacity.

In South Windsor, the Kupchunos Well Field and Farnham Wells are also potential sources of supply. The Kupchunos Well Field may be capable of producing up to 1.0 mgd of water, but lack of proper sanitary protection may prevent development of the well field's full potential. There is an existing naturally developed test well at this 7.6 acre site; however, there is no production from this well, and the quality of the water is unknown. The well field is located immediately adjacent to a waterfowl sanctuary; any use of it may have to consider continued viability of the sanctuary. Because of these constraints, development of the well field is expected to be fairly limited.

The Farnham Well was used as an active supply for a short time, but is presently inactive due to high levels of sodium, chloride, nitrate, solids, iron and manganese in the water. While the well is located in a sewered area, company owned land is limited to about one third of an acre, affording little sanitary protection. Because of the limited space available for treatment facilities and the range of parameters which require removal, treatment processes such as membrane filtration, reverse osmosis and and/or ion exchange may be appropriate. These processes require a substantial capital investment, and carry high operation and maintenance costs. Because of these factors, and the relatively small yield of the well, the Farnham Well is not currently considered an appropriate source of supply.

Purchased Water Sources

CWC's interconnection with The Metropolitan District Commission (MDC) on Old County Road, at the Windsor/ Windsor Locks town line, has historically provided water from the District to CWC during peak demand periods. Differing hydraulic grade lines required the installation of a permanent pump station housing a 750 gpm pump to move up to 1.0 MGD to CWC's Windsor Locks' 257' gradient. Because quantities of water under the existing purchased water agreement are considered interruptible if needed by MDC customers, CWC is currently exploring an amendment to the agreement that would ensure the Company could purchase up to 1.0 MGD daily, if need be, for peak day and maximum month purposes. Such an agreement would add 1.0 MGD in available supply on a maximum day and maximum month average day basis, and a nominal 0.08 MGD over the course of a year.

CWC's distribution system in the town of Suffield terminates at the Connecticut/ Massachusetts state border, as does the system maintained and operated by the city of Agawam, MA. In the past, CWC and Agawam have explored the possibility of an interconnection between the two systems. Such an interconnection would be used for emergency transfers between systems, and/or the possible purchase of water by CWC to augment Western system supply.

Surface Water Sources

The next large (> 1.0 MGD) increment of available supply would likely come from Lake Shenipsit, and require an expansion of the Rockville Water Treatment Plant. The current treatment facility has undergone several upgrades, yet remains undersized relative to source safe yield. In a January 2008 evaluation of the plant, EarthTech, Inc. identified a number of recommendations for future plant improvements, including construction of a new treatment facility having a 9.8 MGD design capacity using superpulsators and deep-bed granular activated carbon (GAC) filters as a primary treatment process. Such an expansion would add 3.8 MGD in available supply and remains an essential supply alternative for meeting long-term system demand. Future detailed design will need to take into account planned changes in streamflow regulations, however, the impact of such regulations on safe yield is expected to be manageable at this time, and additional supply for average day and peaking purposes is an estimated 3.0 MGD and 5.0 MGD, respectively, for water supply planning purposes. Because of the anticipated expense, a plant upgrade will need to be carefully timed to minimize customer rate impact.

Other Sources

Other long-term alternatives include lowering the intake level at Lake Shenipsit and skimming water from the Scantic River to Lake Shenipsit as a means of increasing source safe yield. Because of the political, environmental and engineering complexities of the issues involved with diversion of the Scantic River, this alternative would require careful review and possible legislative authorization. Lowering the intake elevation within the lake would involve a modification to the inlet structure and construction of a deep water intake, requiring diversion and other permits. As both alternatives would only serve to increase source safe yield, system available supply would still be dictated by installed treatment plant capacity.

Recommended Plan of Improvements - Western System

The recommended plan of improvements to meet future demands in the Western System includes the following:

- Continue efforts to maximize existing ground water supplies
- Purchase water from the MDC in Windsor Locks
- Expand Rockville Water Treatment Plant

As identified in Chapter 4, additional supply is needed for both MMADD and MDD purposes shortly after 2015, and then periodically throughout the 50 year planning period as additional demands associated with the regional pipeline are gradually realized. Enhancements at existing well fields are expected to add some 0.5 MGD and 0.38 MGD to 24 hour and 18 hour available supply totals, respectively, while formalizing the MDC agreement would add 1.0 MGD to the system's peaking capacity. The addition of such supplies would mean margins of safety remain adequate throughout the 20 year planning horizon. Following that, and at such time that system margins of safety are no longer adequate, an expansion of the Rockville Water Treatment Plant would ensure all demands were adequately provided for through the remainder of the 50 year planning horizon.

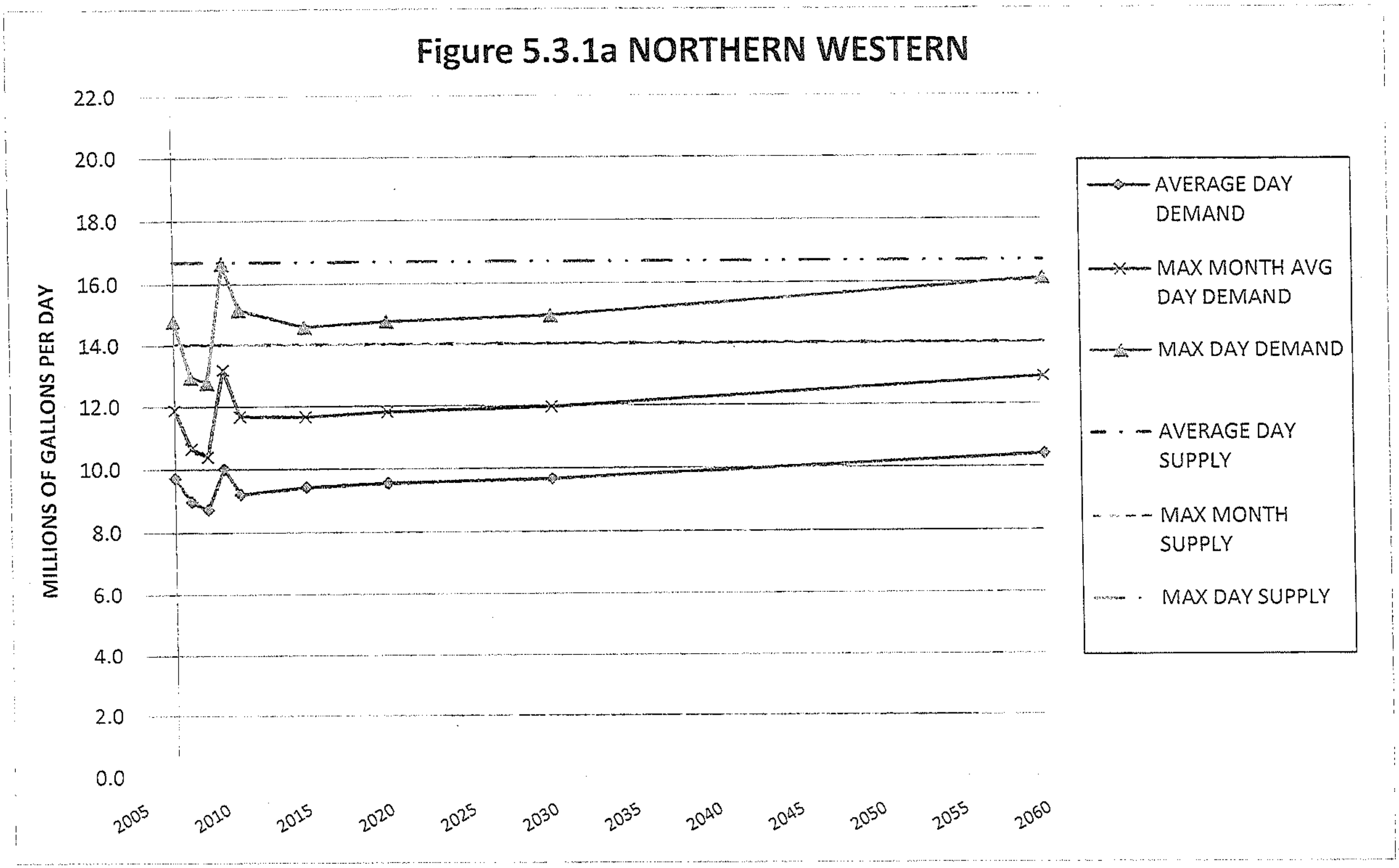


Figure 5.3.1a NORTHERN WESTERN
MILLIONS OF GALLONS PER DAY
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
AVERAGE DAY DEMAND
MAX MONTH AVG DAY DEMAND
MAX DAY DEMAND
AVERAGE DAY SUPPLY
MAX MONTH SUPPLY
MAX DAY SUPPLY

Figure 5.3.1b NORTHERN WESTERN

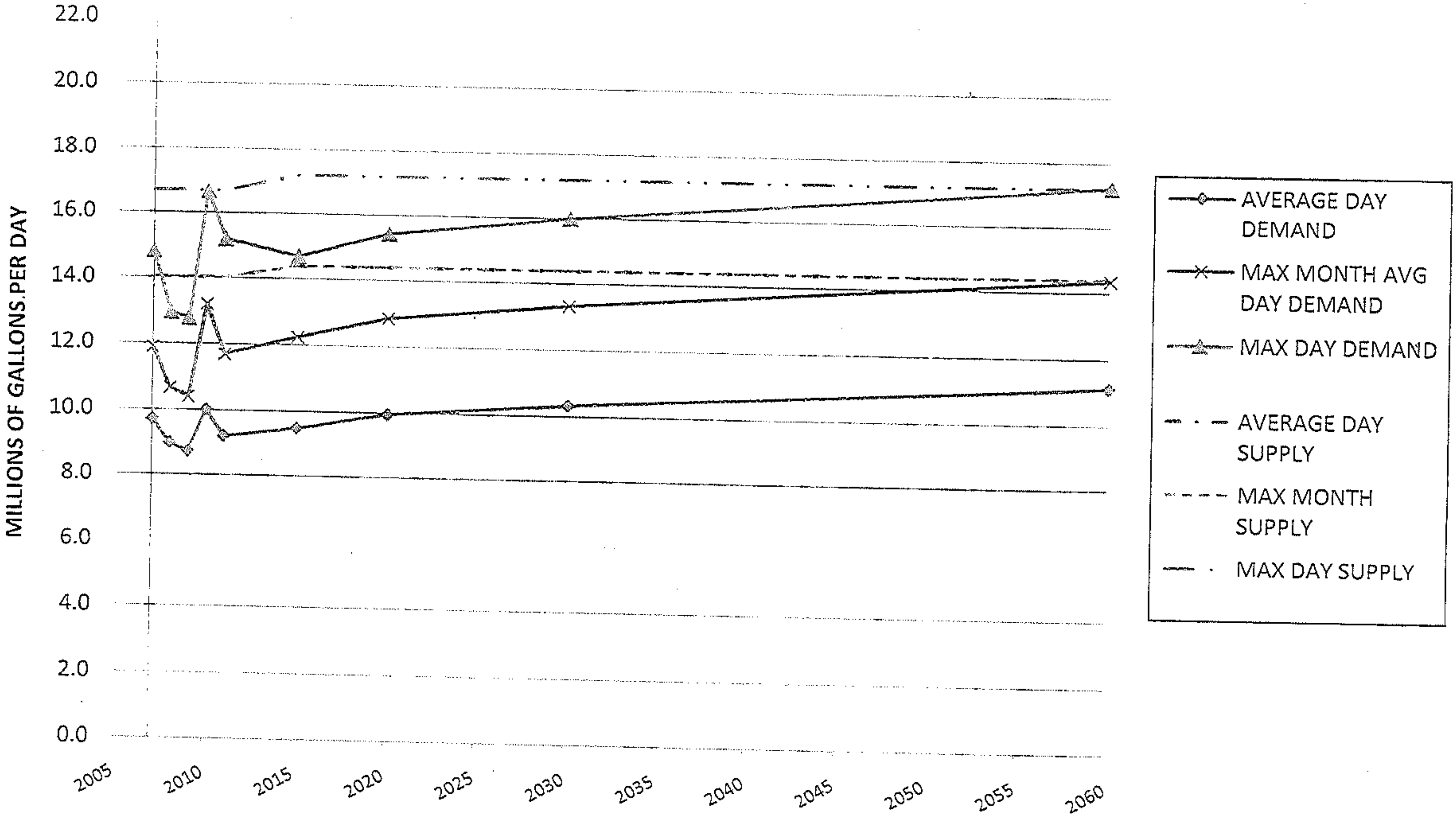


Figure 5.3.1c NORTHERN WESTERN

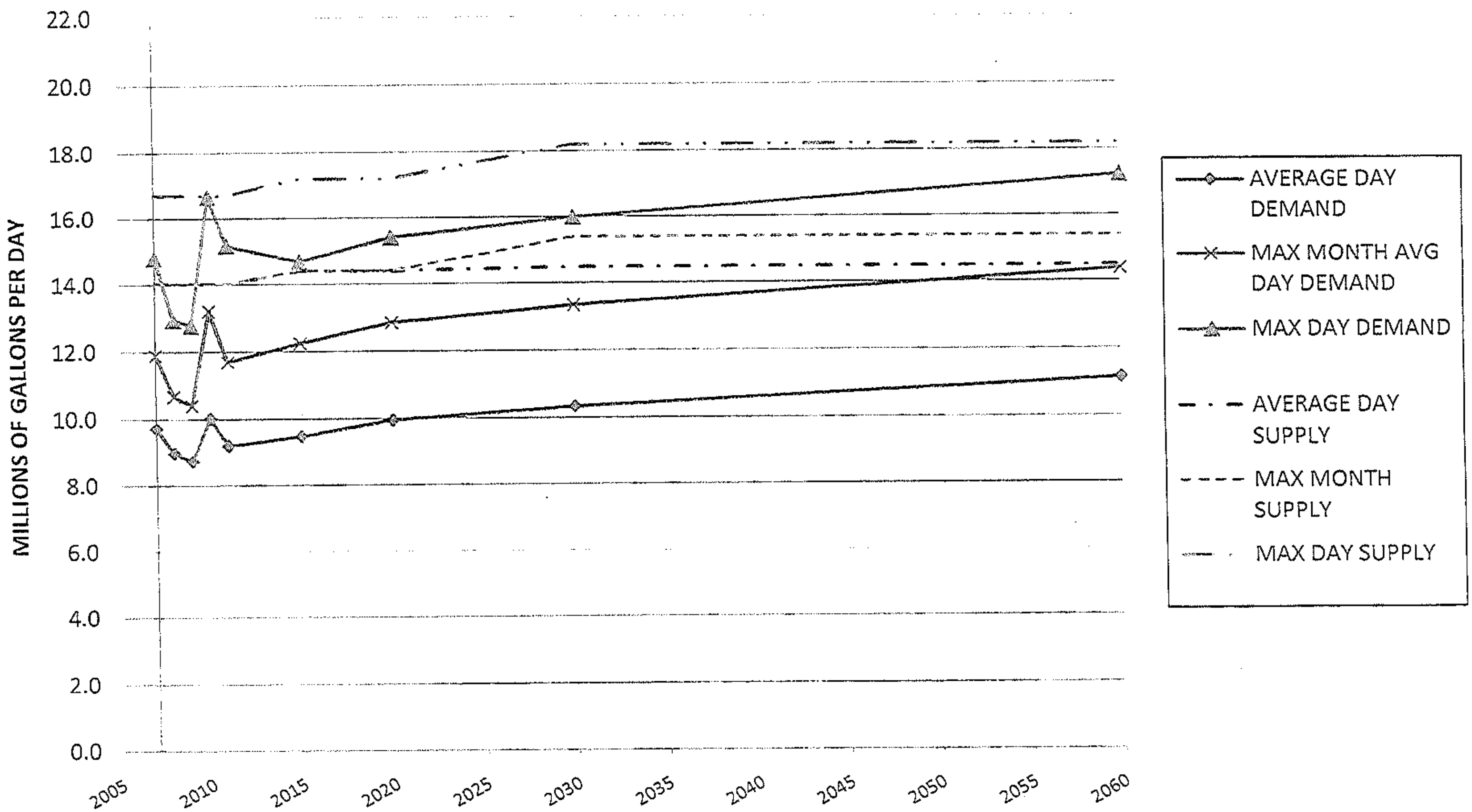
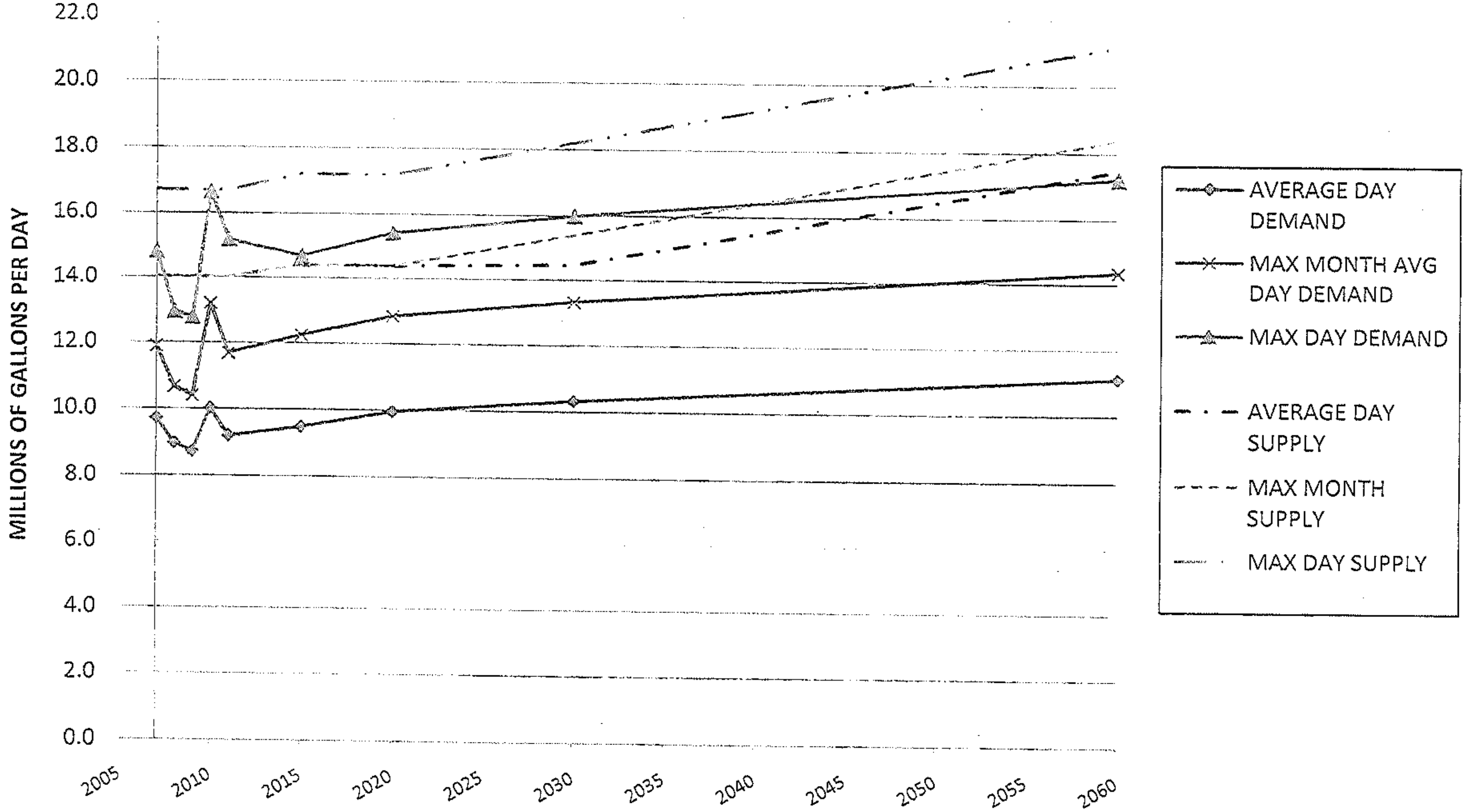


Figure 5.3.1d NORTHERN WESTERN



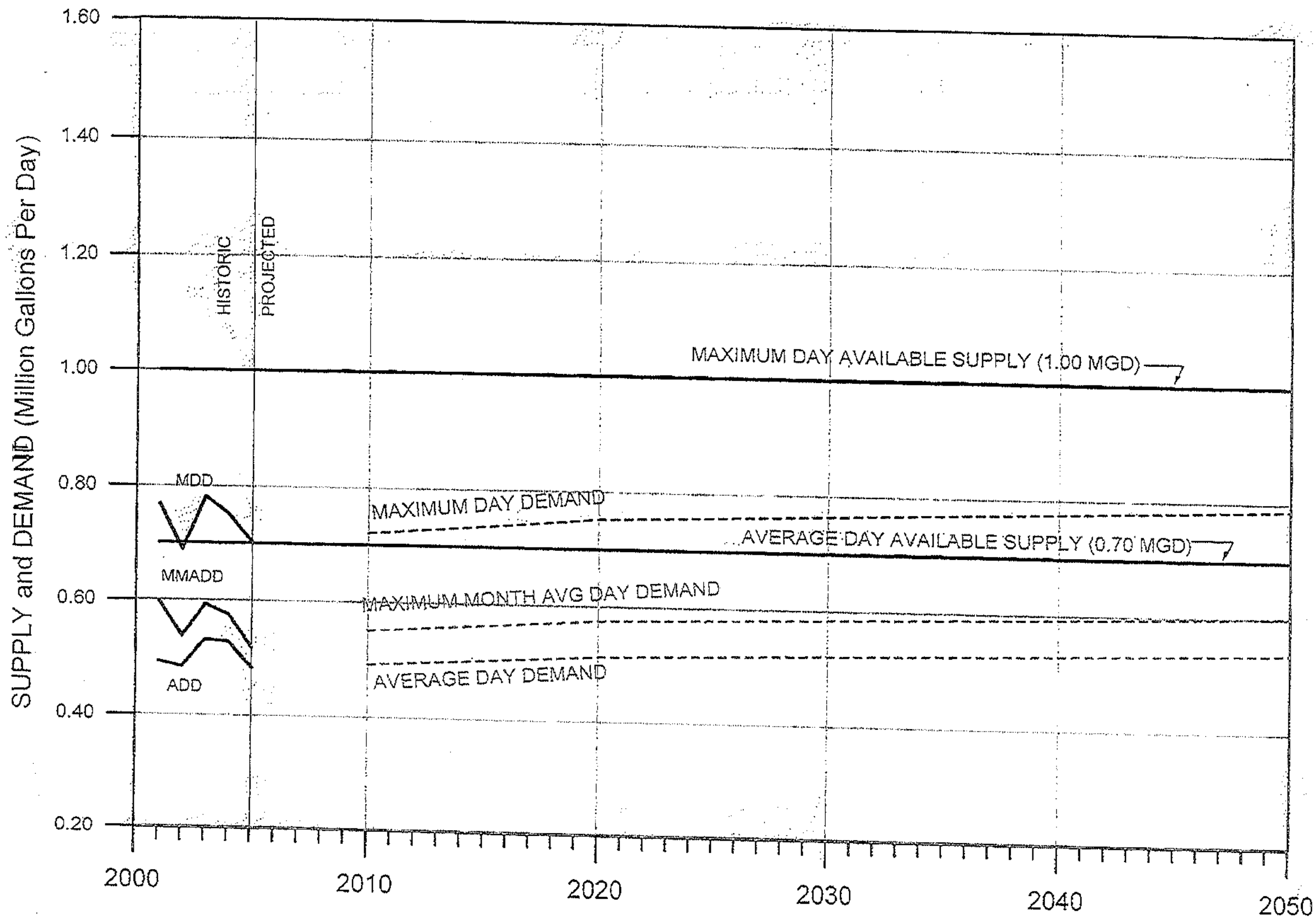


Fig. 5.2.2 Water Demand Projections - Northern Region Stafford System

NOSTFWDP.GRF

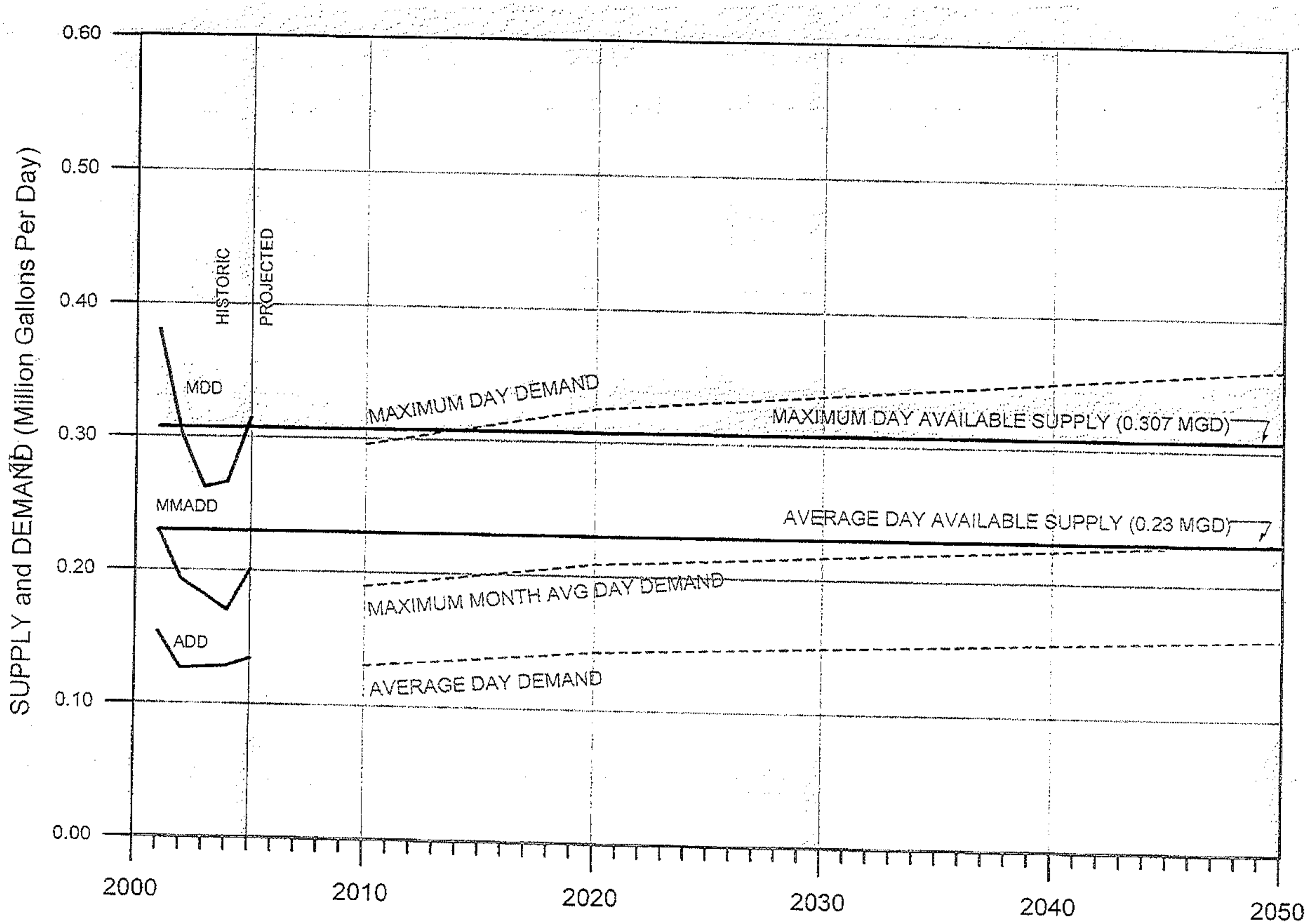


Fig. 5.2.3 Water Demand Projections - Northern Region Somers System

NOSOMWDP.GRF

Stafford System

Alternatives for future water supply for the Stafford system were evaluated in a report prepared by Metcalf & Eddy in 1966. The report recommended a program of development utilizing water from Stafford Reservoir No. 2, along with a series of treatment and transmission system developments. Improvements implemented since the 1966 report include construction of a new dam at Reservoir No. 2, construction of the Stafford Water Treatment Plant, and the construction of a new supply main, which was completed in 1997. The elevation of the spillway crest at Reservoir No.2 is currently 760 feet, mean sea level (MSL).

The report further recommended that future supply for the Stafford system be obtained by increasing the height of the dam. It is estimated that by raising the spillway crest to elevation 770 feet MSL, the total dependable yield of the Stafford Reservoir system would be increased to approximately 2 mgd. This project remains the best source of future supply for the Stafford system.

The only other potential source of supply for the Stafford system are the existing wells located along the supply main from Reservoir No. 2 to the WTP. Water from the wells is reported to have high iron content and the combined safe yield of the wells is estimated to be 0.20 MGD.

Recommended Plan of Improvements - Stafford System

Stafford system supply is currently projected to meet demands through the 2025 planning horizon. Additional supply, when needed, would likely entail reactivation of the Stafford wells, and is expected to provide an additional 0.20 mgd of safe yield. If additional treatment capacity is required, modifications to the plant may include an additional clarifier, an additional filter and tube settlers. This planned expansion was provided for in the original design of the plant. In the event additional supply is needed, it is recommended that plans to increase the supply safe yield to approximately 2 mgd through the raising of Reservoir No. 2 spillway crest, as previously discussed, be initiated. Connection of the Stafford system with the Western system is projected to occur within the 20 year planning period. Any such connection could affect the timing and need for system supply improvements.

Somers System

Supply alternatives for the Somers System include replacement and/or repair of Preston Well 1 to re-establish lost capacity, activation of the Gulf Road bedrock well, and the integration of the Somers and Western water supply systems.

Elevated iron and manganese levels at Preston Well 1 have recently limited production from the well in order to avoid aesthetic finished water quality problems in the distribution system. To address these concerns, CWC added phosphate treatment to the well station and currently operates the well by blending with Well 2. Efforts to replace the well by redrilling were not approved by DPH due to site constraints, although work on the well may be possible to re-establish supply. The Gulf Road well was utilized as a temporary source in 2002 to help meet peak summer demand when supply issues at Preston well field were first experienced. The well remains a possible future source capable of delivering approximately 36,000 gpd to the system. A diversion permit and DPH approval are required for use of the well on a permanent basis.

Recommended Plan of Improvements - Somers System

The Somers system currently requires additional supply to meet maximum daily demands, which peak in excess of 2.5 times average day demands. This need has accelerated the planned integration of the Somers distribution system with and into the Western system through an extension of the Western system to the existing regional pipeline terminus at the Somers/ Enfield boundary. While originally constructed to supply water from Somers to mitigate contaminated domestic wells in the Rye Hill area, the pipeline has the capacity to move water to Somers with the construction of a pumping station. It is expected the necessary water main installation will be completed in 2006, with the pumping facility occurring the following year. Upon integration of the two systems, CWC will evaluate the practicality of retaining the existing Somers systems sources. At that time, it is expected the low-yielding Fuller Hurd and Ellis wells will be removed from active service and scheduled for abandonment.

Satellite Systems

The Lakewood/Lakeview system has an immediate need to reestablish supply for peak water demand purposes. In addition to efforts made to redevelop existing well supplies serving the Lakeview zone of the system, the company is currently implementing treatment technologies at the Lakewood wells that should allow a full sharing of resources between zones. Once fully implemented, it is expected the system's collective on-site wells will be able to safely meet normal system demand. In the event additional supplies are needed, a potential future bedrock well site has been identified at the Lakewood well field.