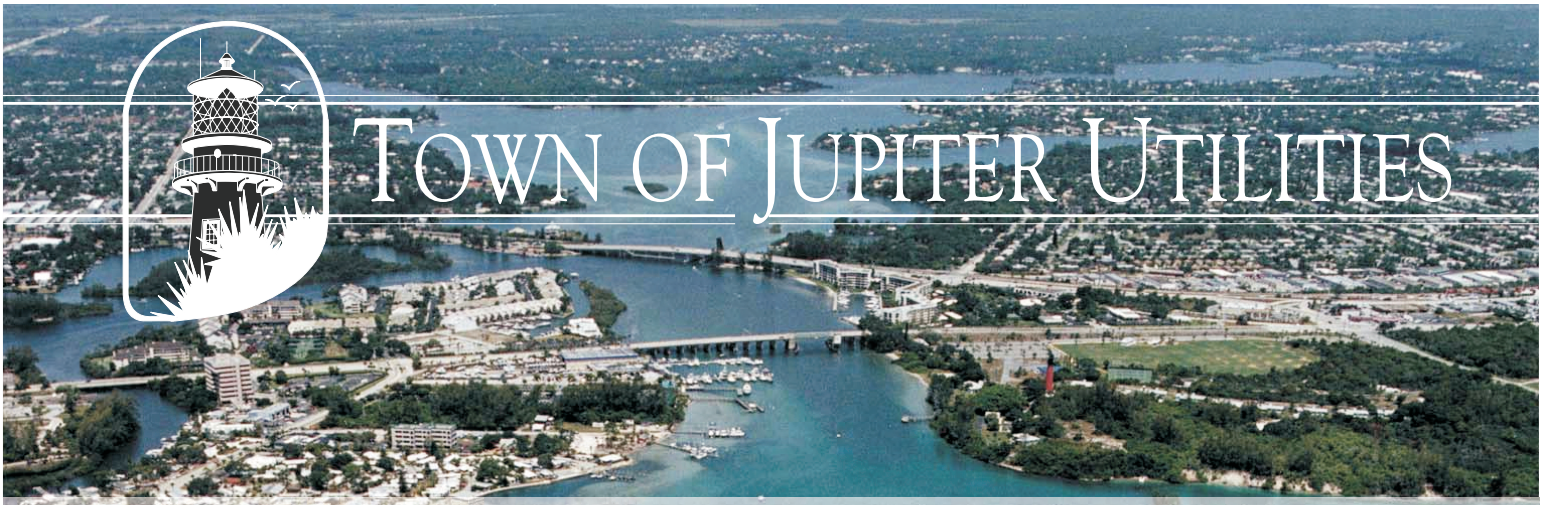

TOWN OF JUPITER UTILITIES

WATER MASTER PLAN UPDATE

September 2007

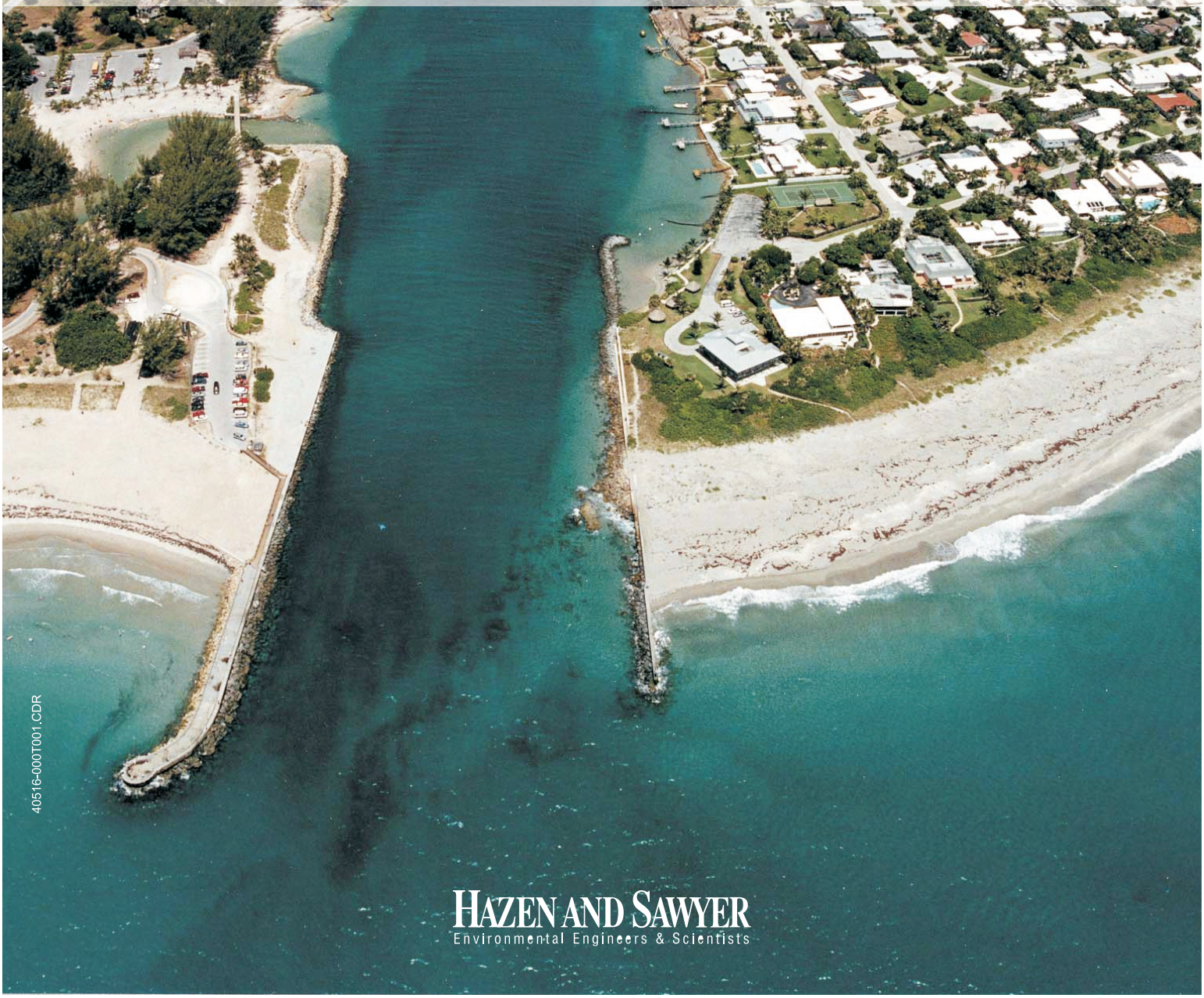

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Table of Contents

Executive Summary

Chapter I Existing Conditions

A. Jupiter Water System History
B. Service Area, Customer Base and Production Demands
C. Water Supply

1. Overview
2. Surficial Source
3. Floridan Source
4. Permitted Withdrawal
5. Northern Palm Beach County Regional Water Management Plan

D. Existing Water Treatment Facilities
E. Water Storage, Transmission and Distribution Facilities
F. Level of Service
G. Capital Cost Recovery System

Chapter II Future Projections

A. Service Area, Customer Base and Production Demands
B. Water Supply
C. Water Treatment Facilities

1. Raw Water Pretreatment
2. Membrane Treatment
3. Product Water Treatment
4. Odor Control
5. Concentrate Disposal

D. Future Water Storage, Transmission and Distribution Facilities

Chapter III GIS System Update

Chapter IV Hydraulic Model Development and Use

A. Existing System Description

1. Distribution System Pipelines
2. Water Storage Facilities
3. High Service/Re-pump Facilities

B. Distribution System Hydraulic Model

C. System Water Demands

1. Base Flow Demand
2. Fire Flow Demand
3. Year 2010 Water Demands
4. Maximum Daily and Peak Hourly Flows

D. Hydraulic Model Calibration

E. Water Distribution System Evaluation

1. Existing Distribution Network – 2004 Demand
2. 2010 Distribution Network Demand

F. Capital Needs Assessment

1. Bluffs Transmission System
2. Bluffs Booster Pump Station
3. South Martin County Repump Station

G. Improvement Implementation

Chapter V Identification/Prioritization of Capital Improvements

Chapter VI Anticipated Regulatory Impacts on Utility

Chapter VII Utility Financial Issues Update

A. Utility Asset Valuation
B. Connection Charge Sufficiency Analysis
C. Renewal and Replacement Requirements Evaluation

Appendices

Appendix A Ten Year Water Supply Plan

Appendix B Water Use Permits

Appendix C Asset Valuation Technical Memorandum

Appendix D PRMG Letter Report (Financial Issues)

Appendix E Capacity Reservation Report

Appendix F Town of Jupiter Water System Regulatory Compliance Review

Appendix G Nanofiltration Plant Exhibits

List of Tables

Table ES.1 Jupiter Water Source Characteristics
Table ES.2 Existing Permitted Water use (MGD)
Table ES.3 Existing Rated Plant Capacities
Table ES.4 Transmission/Distribution Pipeline Data
Table ES.5 System Water Storage Capacity
Table ES.6 Estimated Future Growth and Water Demands
Table ES.7 Estimated Future Plant Capacity
Table ES.8 Future Water Storage, Transmission and Distribution Facilities
Table ES.9 Distribution System Assessment Criteria
Table ES.10 Water Distribution Capital Improvements
Table ES.11 Jupiter Capital Improvement Plan
Table ES.12 Water Transmission and Distribution System Asset Valuation Results Summary
Table ES.13 Expansion-Related Costs and Available Funds
Table ES.14 Summary of R&R Deposit Requirements

Table I.1 Existing Water Demand
Table I.2 Existing Permitted Water Use (MGD)
Table I.3 Existing Rated Plant Capacities
Table I.4 Transmission/Distribution Pipeline Data
Table I.5 System Water Storage Capacity
Table I.6 System Capacity Charges

Table II.1 Estimated Future Population Growth
Table II.2 Estimated Future Finished Water Demand (MGD)
Table II.3 Estimated Future Raw Water Requirements ADF (MGD)
Table II.4 Estimated Future Plant Capacity

Table IV.1 System Water Storage Capacity
Table IV.2 Initial Hazen-Williams Friction Coefficients (C-Factors)
Table IV.3 Total Potable Water Sales 2004 (Gallons)
Table IV.4 Fire Protection Evaluation Criteria
Table IV.5 Fire Demand Simulations
Table IV.6 Model Calibration Results
Table IV.7 Distribution System Assessment Criteria
Table IV.8 Fire Flow Analysis Results for Existing Piping Network – 2004
Table IV.9 Water Distribution System Capital Improvements

Table V.1 5 Year CIP (2008–2012)
Table V.II 10-Year CIP (2013–2017)

Table VII.1 Water Transmission and Distribution System Asset Valuation Results Summary
Table VII.2 Quantities Estimated Using GIS Attribute Information
Table VII.3 Reference Tables
Table VII.4 Expansion-Related Costs and Available Funds
Table VII.5 Summary of R&R Deposit Requirements

Table A.1 Existing Rated Plant Capacities
Table A.2 Transmission / Distribution Pipeline Data
Table A.3 System Water Storage Capacity
Table A.4 Existing Permitted Water Use (MGD)
Table A.5 Surficial Wellfield Capacity Data
Table A.6 Floridan Well Capacity
Table A.7 Raw Water Supply on Emergency Power, Summary of Surficial and Floridan Sources
Table A.8 Future Demand Projections
Table A.9 LEC Proposed Water Supply Projects (FY07-25)
Table A.10 Additional 10-year Planning Period Projects

List of Figures

Figure ES.1 Existing Water Service Area
Figure ES.2 Storage, Transmission and Distribution System – South
Figure ES.3 Storage, Transmission and Distribution System – North

Figure I.1 Existing Water Service Area
Figure I.2 Existing and Future Surficial Wells
Figure I.3 Existing Floridan Wells
Figure I.4 Surficial Wellfield Recharge System
Figure I.5 Storage, Transmission and Distribution System – South
Figure I.6 Storage, Transmission and Distribution System – North
Figure I.7 Water Transmission Service Zones
Figure I.8 Water System Process Flow Diagram (Existing Configuration)

Figure II.1 Nanofiltration Plant – Pre Treatment
Figure II.2 Treatment Process Required for Various Particle Sizes
Figure II.3 Nanofiltration Plant – Membrane Treatment
Figure II.4 Nanofiltration Plant – Post Treatment
Figure II.5 Nanofiltration Plant – Odor Control
Figure II.6 Existing and Proposed Transmission System
Figure II.7 Water System Process Flow Diagram (Proposed Future Configuration)

Figure III.1 Global Positioning System – Geographic Information System Facilities (Typical)

Figure IV.1 Water Distribution System – North
Figure IV.2 Water Distribution System – South
Figure IV.3 Potable Water Service Locations
Figure IV.4 Areas of New Demand
Figure IV.5 Pressure Monitoring Locations
Figure IV.6 Existing Network Performance 2004 PHF – North
Figure IV.7 Existing Network Performance 2004 PHF – South
Figure IV.8 Network Performance 2010 PHF – North
Figure IV.9 Network Performance 2010 PHF – South
Figure IV.10 Location of 16-inch Parallel ICW Crossing
Figure IV.11 Network Performance without 16-inch Parallel Crossing – 2010
Figure IV.12 Network Performance with 16-inch Parallel Crossing – 2010
Figure IV.13 Bluffs In-Line Booster Pump Station Alternative Assignments
Figure IV.14 Network Performance with Bluffs In-Line Booster Pump Station East ICW Alignment – 2010

Figure IV.15 Network Performance with Bluffs In-Line Booster Pump Station West ICW Alignment – 2010
Figure IV.16 Network Performance with Bluffs In-Line Booster Pump Station No Parallel ICW Crossing
Figure IV.17 Network Performance with South Martin County Repump Station - 2010
Figure IV.18 Network Performance without South Martin County Repump Station – 2010
Figure IV.19 Network Performance without South Martin County Repump Station and Failed Central Blvd 24-inch Main - 2010
Figure IV.20 Network Performance with South Martin County Repump Station and Failed Central Blvd 24-inch Main - 2010

Figure A.1 Existing Water Service Area
Figure A.2 Existing Surficial Wells
Figure A.3 Existing Floridan Wells
Figure A.4 Storage, Transmission and Distribution System – South
Figure A.5 Storage, Transmission and Distribution System – North
Figure A.6 Surficial Wellfield Recharge System

Executive Summary

40516-112B001.CDR

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Executive Summary

Existing Conditions

The Jupiter Water System has been in existence since approximately 1963, and it has been owned and operated by the Town since 1978. The Town's Utility Service Area covers an area with a population of approximately 75,000. As of March 31, 2007, the system served almost 40,000 equivalent residential connections (ERCs) and had approximately 7,000 ERCs in reserve. The Town limits and 2010 Service Area are shown in Figure ES.1.

Water Supply

The Town utilizes two distinct sources (Surficial Aquifer and Floridan Aquifer) for its water supply. Table ES.1 summarizes the important characteristics of the two sources.

Table ES.1
Jupiter Water Source Characteristics

	Floridan Aquifer	Surficial Aquifer
Number of Wells	11	52
Well Capacity	1000 to 2040 gpm/each	140 to 900 gpm/each
Range of Well Depths	1017 to 1465 ft	140 to 220 ft
Treatment Process(es)	Reverse Osmosis	Lime Softening/Ion Exchange

Water supply is permitted by the South Florida Water Management District (SFWMD). The Town's primary water supply is governed by Water Use Permit (WUP) No. 50-00010-W, which was issued in 2004 and expires in October 2024. Allocation established by this water use permit is outlined in Table ES.2.

Table ES.2
Existing Permitted Water Use (MGD)

	Total	Surficial Aquifer	Floridan Aquifer
Through Oct. 2009			
Max month (daily) [1]	35.70	20.60	18.50
Annual avg. (daily)	25.13	13.00	12.13
Oct. 2009 to 2024			
Max month (daily) [1]	31.20	12.70	18.50
Annual avg. (daily)	22.78	10.65	12.13

[1] *Based on 30 days/month*

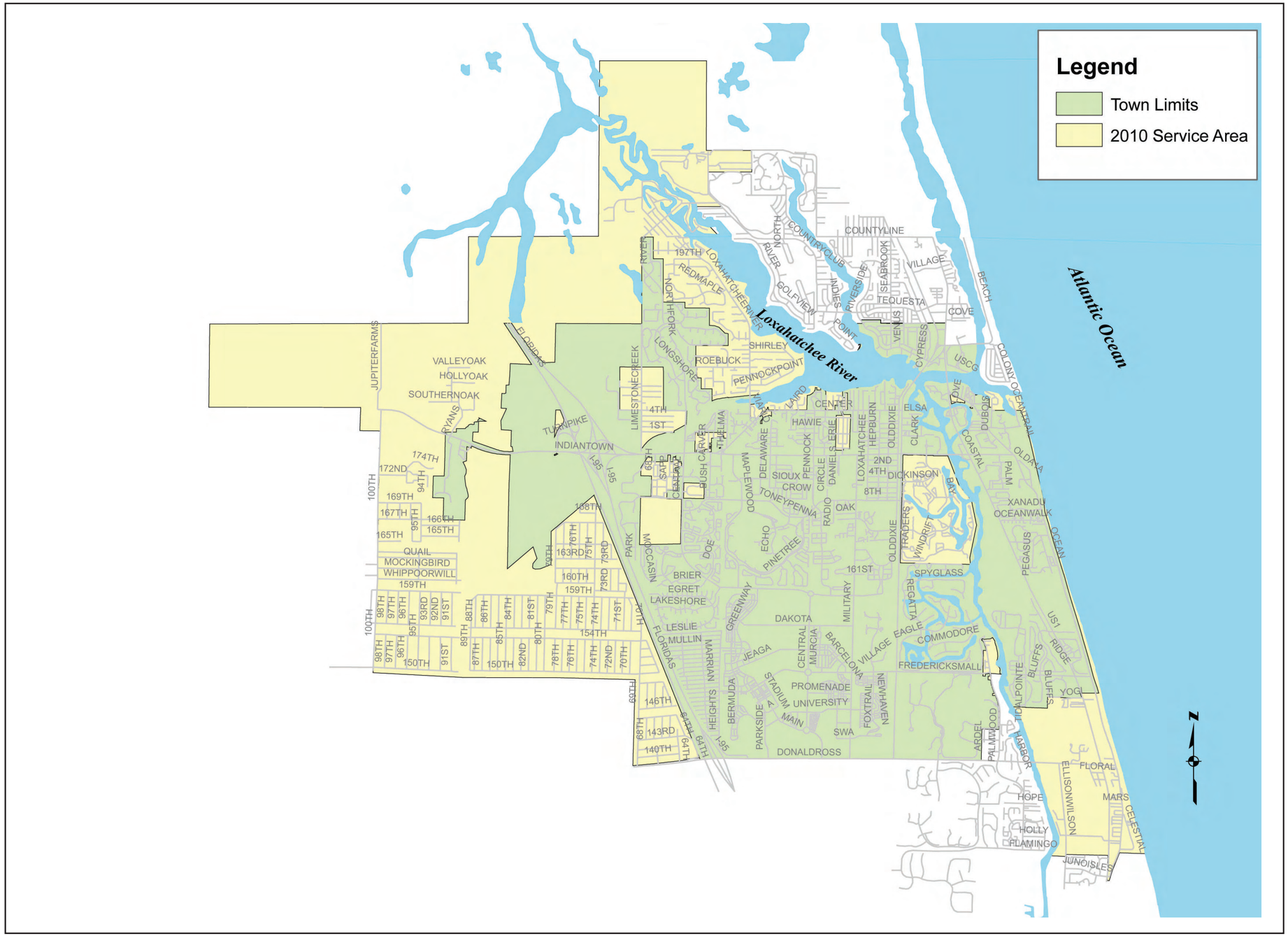

Figure ES.1
Existing Water Service Area

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Town of Jupiter Water Master Plan Update

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A critical element in this permit is the October 2009 reduction in the withdrawal allocation from the surficial aquifer. It will be necessary for the Town to reopen the permit prior to this date to ensure that the full current withdrawal allocation is preserved.

The Town also has a WUP (No. 50-01584-W) for withdrawal from the C-18 Canal under specific conditions. While this source has not been productive to date, because withdrawal conditions are rarely met, it represents a placeholder for an anticipated future supply. Through the Regional System, it is expected that the SFWMD and United States Army Corps of Engineers (USACOE) will be able to provide approximately 25 cfs to the Town (for surficial recharge purposes) in the future.

Water Treatment

The Town currently has three water treatment facilities located together on one site which cumulatively produce the necessary potable water for utility customers. Table ES.3 summarizes the various processes and their respective permitted capacities.

Table ES.3
Existing Rated Plant Capacities

Facility	FDEP Permitted Capacity (MGD)
Lime Softening (LS)	13.5
Reverse Osmosis (RO)	13.7
Ion Exchange (1X)	1.8
Total	**29.0**

Water Storage, Transmission and Distribution Facilities

The Town has existing water storage, transmission and distribution facilities consisting of over 365 miles of pipeline and 26.5 MG of tank storage, as summarized in Tables ES.4 and ES.5 respectively.

Table ES.4
Transmission/Distribution Pipeline Data

Pipe Diameter (Inches)	Length (Feet)	Length (Miles)
Unidentified	15,259	2.89
2	104,489	19.79
3	7,294	1.38
4	98,637	18.68
6	543,857	103.00
8	646,619	122.47
10	108,313	20.51
12	226,896	42.97
14	396	0.08
16	57,349	10.86
18	17,452	3.31
20	4,155	0.79
24	44,247	8.38
30	703	0.13
Total	**1,875,666**	**355.24**

Table ES.5
System Water Storage Capacity

Water Treatment Plant	1.5 MG 3.0 MG
Central Boulevard	5.0 MG 8.0 MG 8.0 MG
Juno Beach Repump Station	1.0 MG
Total	**26.5 MG**

Included amongst these facilities are three functional pipeline crossings of the Intra-coastal Waterway and one new crossing, which is not yet in service. Additionally, the Town has five crossings of the Loxahatchee River/C-18 Canal.

Figures ES.2 and ES.3 illustrate the storage and high service pumping capabilities of the Town's Water System.

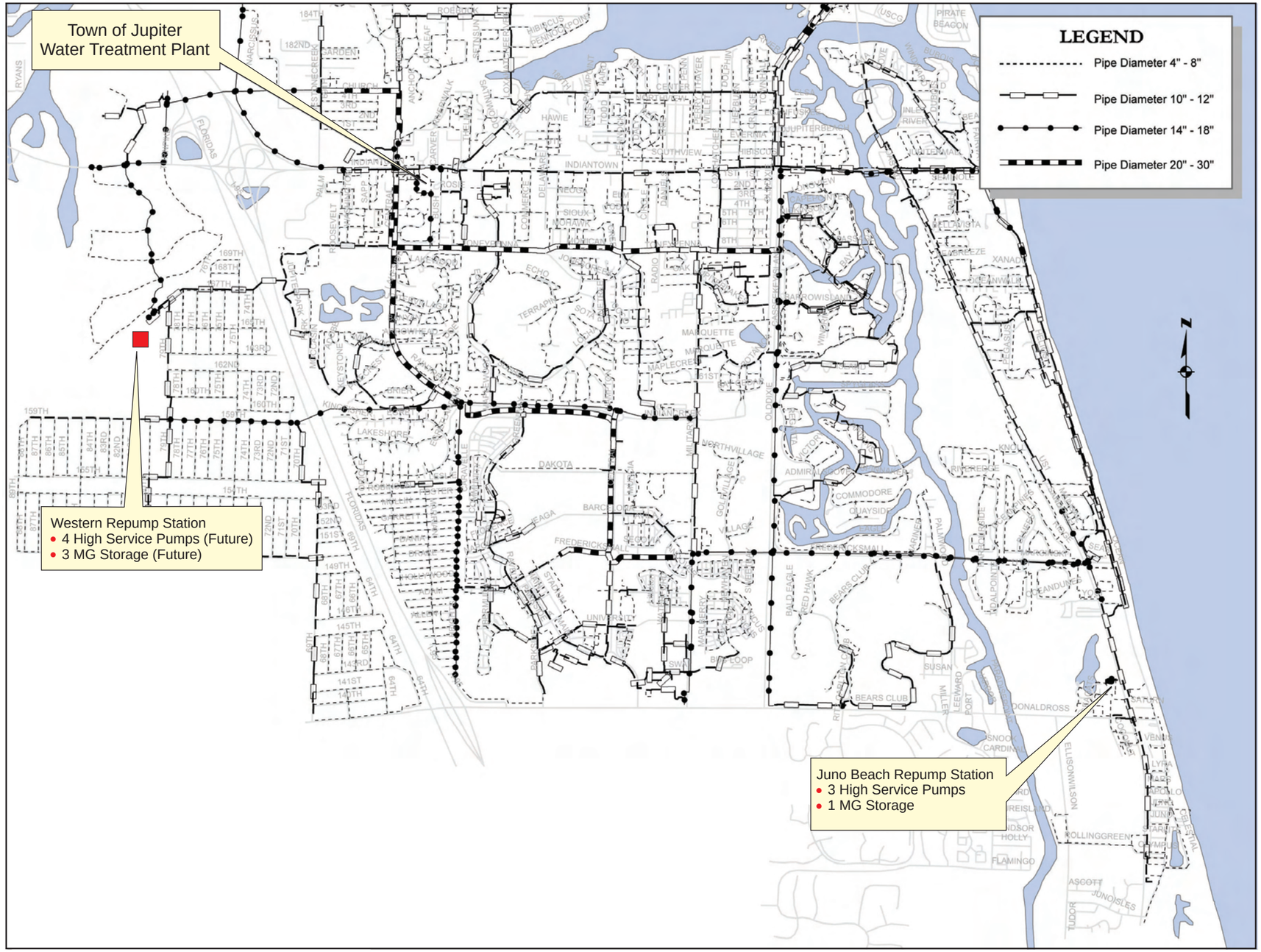

Figure ES.2
Storage, Transmission
and Distribution System - South

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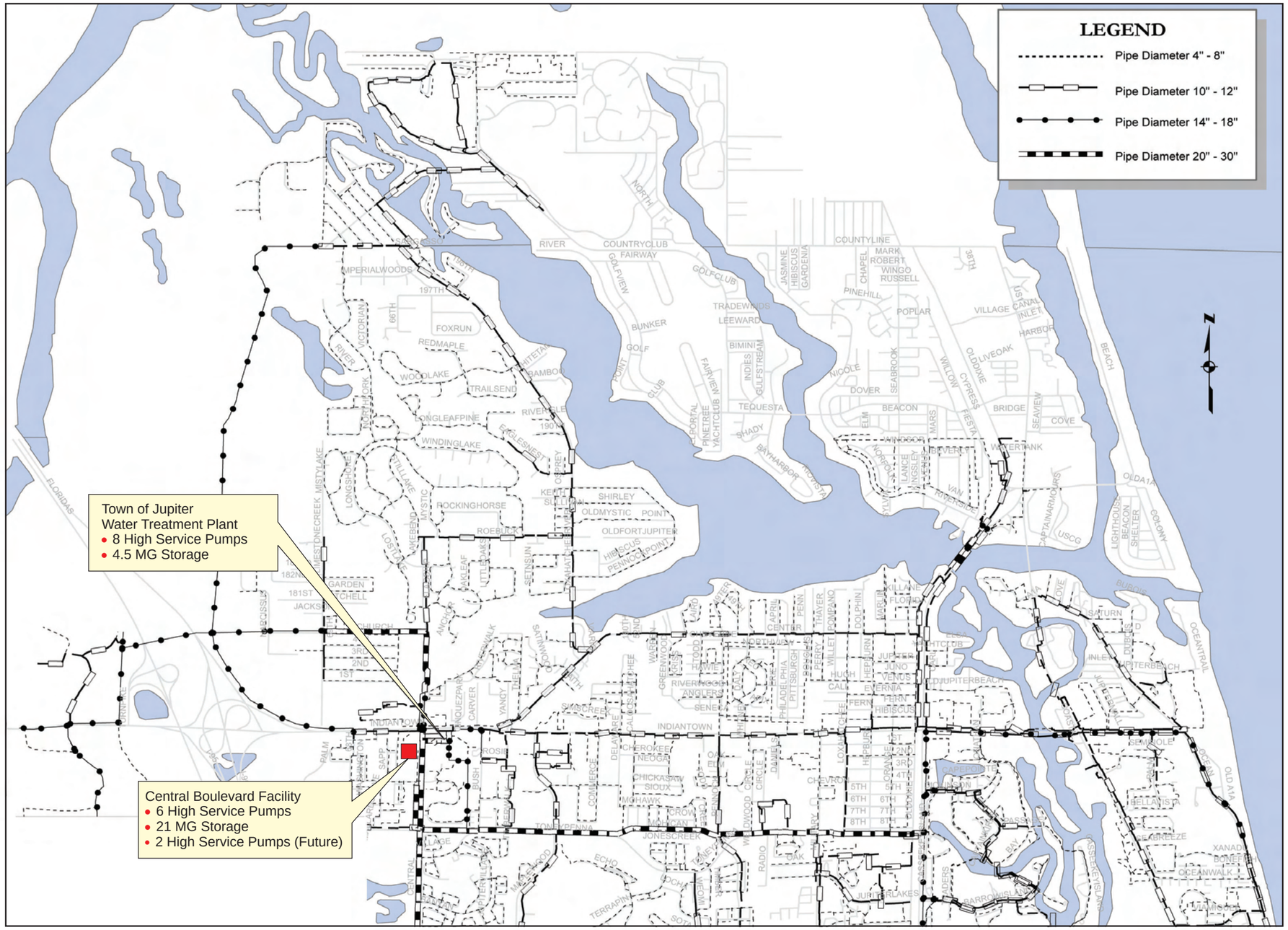

Figure ES.3
Storage, Transmission
and Distribution System – North

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Future Projections

Population and Water Supply

The Town has experienced tremendous growth over the past 20 years, and future growth within the Utilities Service Area is expected to slow as the community approaches build out. Table ES.6 summarizes estimations of future growth and the corresponding raw and finished water demands for the water service area. These data are from values provided by the Town to the SFWMD for the Lower East Coast (LEC) Water Supply Plan. These values have been retained herein, because they are slightly more conservative than an extrapolation based on either population or anticipated ERC's. Adjustments from Average Daily Flow (ADF) to Maximum Daily Flow (MDF) and Peak Hourly Flow (PHF) are made by utilizing peaking factors of 1.38 and 2.24 respectively.

Table ES.6
Estimated Future Growth and Water Demands

	2010	2015	2020	2025
Population	75,792	83,408	88,458	93,057
Raw Water Demand (ADF - MGD)	22.21	24.23	25.56	26.79
Finish Water Demand (MGD) - ADF	17.05	18.77	19.90	20.94
Finish Water Demand (MGD) - MDF	23.53	25.90	27.47	28.89
Finish Water Demand (MGD) - PHF	38.20	42.04	44.58	46.90

Water Treatment

In addition to the treatment facilities previously discussed (Lime Softening, Reverse Osmosis, Ion Exchange), the Town is moving forward with design and construction of a 14.5 MGD Nanofiltration (NF) Plant (expandable to 17.0 MGD). This proposed facility will use the same surficial raw water source as the lime softening and ion exchange plants, and is intended to supplant a portion of the existing lime softening capacity. Table ES.7 outlines the estimated future plant capacity.

Table ES.7
Estimated Future Plant Capacity

Process	Maximum Production Rate
Lime Softening (LS)	9.0 MGD (Standby Capacity)
Reverse Osmosis (RO)	13.7 MGD
Ion Exchange (IX)	1.8 MGD
Nanofiltration (NF)	14.5 MGD (17.0 MGD Future)

Note: Maximum production of Lime Softening and Nanofiltration cannot occur simultaneously. Overall maximum production rate will be 30 MGD with NF at 14.5 MGD and 32.5 MGD if NF is expanded to 17 MGD.

The proposed NF Plant will be located on the western third of the existing facility at 17403 Central Boulevard. Key components of the new plant include:

1. Raw Water Pretreatment

   - Booster Pump Station (approximately 20,000 gpm capacity)
   - Pressure (sand) Filters (three filters, 4,630 gpm capacity/each)
   - Acid/Scale Inhibitor Addition
   - Cartridge Filters (five filters, 3,150 gpm capacity/each)

2. Membrane Treatment

   - Membrane Feed Pumps (five pumps, 3,150 gpm capacity/each)
   - Five Membrane Skids (two stage, center port 2.9 MGD capacity/each)
   - 85% recovery

3. Product Water Treatment

   - Degasification (three degasifiers, 8.5 mgd max capacity/each, 5.67 mgd rate/each when all three in use)
   - Disinfection

4. Odor Control (two units, 40,000 scfm capacity/each)

5. Concentrate Disposal/Reuse (blending with reclaimed wastewater)

Water Storage, Transmission and Distribution Facilities

Table ES.8 summarizes future storage, transmission and distribution improvements (recommended for implementation over the next five years) identified as important in helping the Town keep pace with growth and maintain a high level of service to existing customers.

Table ES.8
Future Water Storage, Transmission and Distribution Facilities

Project	Estimated Cost
Central Boulevard 8 MG Storage Tank	$3,600,000
Western Service Area Water Storage and Repumping Facility [1]	$4,615,400
South Martin County Repump Station	$2,200,000
Bluffs Area Transmission System	$304,000
West Jupiter Transmission	$3,000,000
Distribution System Renewal and Replacement (Subtotal)	$11,560,342
Jupiter River Estates	*$2,825,742*
North Jupiter	*$1,234,000*
Inlet Village	*$877,000*
Penn Park	*$509,000*
Juno Beach	*$1,205,000*
Loxahatchee River Road Area	*$912,450*
Fisherman's Landing	*$582,000*
Seneca Street	*$75,000*
Yacht Club Drive	*$522,250*
U.S. 1 Level Bridges	*$500,000*
Little Club	*$1,972,900*
Riverbend	*$345,000*
Total	**$25,279,742**

[1] *A portion of this project has already been constructed, but the system will not be complete and operational until 2008.*

[2] *Additional information regarding project descriptions, funding sources and year(s) of funding is provided in Section V.*

[3] *The above do not include transmission and distribution system extensions/additions which are constructed by developers and ultimately deeded to the Town. Significant extensions/additions are currently being constructed in the Western Service Area (particularly Palm Beach County Estates and Parcel 19).*

Geographic Information System Update

The Utility's Geographic Information System (GIS) has made significant advances in recent years. The Utility has developed a database with important system attributes (such

as pipelines, valves, meters, hydrants, etc.) and engaged a local survey firm to ground truth a majority of these features using Global Position System (GPS) technology. This more robust data set has been beneficial to the Utility in many regards, including daily operations, utility coordination, the development of a system Hydraulic Model, and the completion of an Asset Valuation.

Hydraulic Model Development and Use

Model Development

Until this time, the Utility has operated without the benefit of an overall system Hydraulic Model. A system wide hydraulic model was developed utilizing information from the Town's GIS and Water Atlas. All distribution pipelines six inches and greater were included in the model, as were smaller pipelines deemed critical to the model. Network nodes were established at pipe intersections and points of water demand. The final model network included approximately 5,400 pipes and 2,900 pressure junction nodes.

Water demand was estimated using actual billing records for 2004 (the most recent complete year data set at the time of the model development). Water consumption was spatially allocated to the demand nodes in the water distribution network. Simulations were conducted based on four different demand scenarios.

1. Base Demand
2. Fire Flow Demand
3. Year 2010 Demand
4. Maximum Daily and Peak Hour Demand

Model Calibration

The model was calibrated using system data collected via pressure recorders deployed at multiple locations within the service area. The average difference between predicted and measured pressures was 3.1% which is well within the American Water Works Association Manual M32's definition of acceptable calibration (prediction within 10% of observed).

System Evaluation

The calibrated model was utilized to evaluate the following scenarios:

1. Existing System Peak Hourly Flow
2. Existing System Fire Flows (Maximum Daily Flow)
3. Year 2010 Peak Hourly Flow
4. Year 2010 Fire Flows (Maximum Daily Flows)

Distribution system assessment criteria were established as shown in Table ES.9.

Table ES.9
Distribution System Assessment Criteria

System Pressure	Assessment Criteria
Normal Pressure at WTP	70 psi
Minimum Pressure - Non-Fire	45 psi at service
Minimum Pressure - Fire Flows	20 psi at hydrant

Model results were depicted in the form of pressure contours throughout the service area, so that areas of concern relative to the assessment criteria could be easily identified.

Based on these results, peak hourly flow scenarios were modeled for a number of possible system improvements. As a result, the capital improvements listed in Table ES.10 are recommended.

Table ES.10
Water Distribution Capital Improvements

Improvement Name	Capital Cost
Bluff's Area Transmission System (16-inch Parallel ICW Crossing)	$304,000
Bluff's Booster Pump Station	$1,900,000
South Martin County Repump Station	$2,200,000

Regarding the Bluff's Booster Pump Station, based on the relatively minor existing pressure deficiency predicted and the relatively high cost of the inline booster pump station, the Town may wish to consider monitoring water pressures along the coastal ridge for the next five years or so to see how the system pressures change. The selection of that time frame is based on the trend of slowed development such that buildout conditions are not likely to be achieved by 2010. In the meantime, localized pressure issues, if they exist, could be dealt with using remediation efforts such as the elimination of double residential services. At the next five year update of the Water Masterplan (or sooner if necessitated by pressure data collected) demand growth can be revisited and the system remodeled to determine what, if any, action (such as proceeding with the booster pump station) is appropriate.

Identification/Prioritization of Capital Improvements

A suite of future projects were identified for implementation via 5 and 10 Year Capital Improvement Programs (CIP). The projects, their estimated cost, and the proposed year(s) of implementation are shown in Table ES.11.

Table ES.11
Utilities Capital Improvement Plan

Project Name	Funding Source FY	Estimated Capital Cost
Operating System Reprogramming	Renewal and Replacement 2007	$400,000
Water Utilities Security Improvements	Connection Charges 2007	$600,000
Water Treatment Plant Structure Hardening	Renewal and Replacement, Plant Capacity Charges 2007	$1,200,000
Western Service Area Water Storage and Repumping Facility	Off-Site Transmission Fees 2007-2008	$4,615,400
Rehabilitation of RO Wells 5, 6, 7, 8, 9 and 10	Renewal and Replacement 2007-2008	$605,000
ABACOA Surficial Aquifer Wells	Plant Capacity Charges 2007–2008	$7,217,196
Jupiter River Estates Distribution Improvements	Renewal and Replacement 2007-2008	$2,825,742
Little Club Area Distribution Improvements	Renewal and Replacement 2007-2008	$1,972,900
Seneca Street Watermain Replacement	Renewal and Replacement 2007-2008	$75,000
Surface Water Recharge Improvements	Connection Charges 2007-2008	$2,937,900
Bluff's Area Transmission System	Off-Site Transmission Fees 2007-2008	$304,000
Construct 14.5 MGD Nanofiltration Plant	Bond Proceeds, Plant Capacity Charges, and Renewal and Replacement Funds 2007–2009	$44,449,621
Surficial Aquifer Well Rehabilitation	Renewal and Replacement 2007–2009	$900,000
Modifications to Phase II (1997) RO	Renewal and Replacement 2007–2009	$764,256

Table ES.11
Utilities Capital Improvement Plan

Project Name	Funding Source FY	Estimated Capital Cost
Water Treatment Plant Warehouse	Renewal and Replacement, Plant Capacity Charges 2007–2010	$2,035,000
North Limestone Creek Wellfield	Plant Capacity Charges 2007-2010	$5,919,700
North Jupiter Distribution System Improvements - Phase II	Renewal and Replacement 2007–2011	$1,234,000
Radio Read Water Metering System	Renewal and Replacement 2007–2011	$4,339,500
Large Meter Replacement	Renewal and Replacement 2007–2012	$1,000,000
Deepen RO Well No. 4	Renewal and Replacement 2007-2012	$690,000
Filter Replacement (Lime Softening)	Renewal and Replacement 2008	$200,000
Riverbend Distribution Improvements	Renewal and Replacement 2008	$345,000
Inlet Village Water Main Replacement	Renewal and Replacement 2008–2010 Developer Participation 2009–2010	$877,000
Yacht Club Drive Area Distribution Improvements	Renewal and Replacement 2009-2010	$522,250
Loxahatchee River Road Area Water Distribution System Rehabilitation	Renewal and Replacement 2010-2012	$912,450
Construction of 8 MG Water Storage Tank	Off-Site fees 2011	$3,600,000
Fisherman's Landing Water Main Replacement	Renewal and Replacement 2011	$582,000
Water Main Replacement – U.S. 1 Level Bridges	Renewal and Replacement 2011-2012	$500,000
Penn Park Distribution Improvements	Renewal and Replacement 2012	$509,000
South Martin County Repump Station	Off-Site Transmission Fees 2012	$2,200,000

Table ES.11
Utilities Capital Improvement Plan

Project Name	Funding Source FY	Estimated Capital Cost
Additional Water Interconnect with Seacoast Utilities	Off-Site Transmission Fees 2012	$250,000
West Jupiter Transmission	Off-Site Transmission Fees 2012	$5,725,000
Juno Beach Distribution System Improvements	Renewal and Replacement 2012	$1,205,000
Onsite Hypochlorite Generation	Plant Capacity Charges 2013	$2,500,000
Bluffs Booster Pump Station	Plant Capacity Charges 2013	$1,900,000
Utilities Field Operations Warehouse Expansion	Off-Site Fees 2013	$793,500
Surface Water Recharge Improvements (Phase 2)	Plant Capacity Charges 2013	$2,000,000 [1]
Surficial Aquifer Well Rehabilitation	Renewal and Replacement 2013–2016	$900,000
RO Treatment Plant Motor Control Center Upgrade	Renewal and Replacement 2014	$806,300

[1] *Anticipated to be a cooperative project with SFWMD, and potentially FDOT.*

[2] *Funding allocations prior to FY 2008 are all noted as 2007.*

[3] *All costs are in 2007 dollars and should be escalated annually based on reasonable market variation.*

Anticipated Regulatory Impacts on Utility

Boyle Engineering Corporation (Boyle) provided assistance to the Town relative to reviewing issues pertinent to the Town's drinking water distribution system, particularly relative to water quality regulations. The work performed included:

1. Review of Distribution System Water Quality Data including the following parameters:

   - Disinfection By Products
   - Primary and Secondary Standards
   - Total Coliform
   - Lead and Copper

2. Review of recent and anticipated (through 2010) regulatory actions including relevance to and potential impacts on the Jupiter Water System. The following are among the items/issues considered:

   - Primary and Secondary Standards
   - Lead and Copper Rule
   - Total Coliform Rule
   - Phase VI-b SOC and VOC's
   - Radionuclides
   - Consumer Confidence Report
   - Unregulated Contaminants Monitoring Rule
   - Proposed Stage 2 Disinfection/Disinfection By Products Rule
   - Proposed Sulfate Rule
   - Proposed Groundwater Disinfection Rule

Financial Issues Update

Several financial issues related to the Utility were addressed as part of the Master Plan Update, including:

- Utility Asset Valuation
- Connection Charge Sufficiency Analysis
- Renewal and Replacement Requirements Evaluation

Water Transmission and Distribution System Asset Valuation

An asset valuation relative to the Town's water transmission and distribution system was performed using the following information:

- Existing water system GIS data
- Asset service life schedules from the Florida Public Service Commission
- The Engineering News Record (ENR) construction cost index (CCI).

The results of the valuation are summarized in Table ES.12.

Table ES.12
Water Transmission and Distribution System Asset Valuation Results Summary

Quantity	Pipes ($/1,000)	Hydrants, Valves, Meters, Reducers ($/1,000)	Meters not in Database ($/1,000)	Combined Total ($/1,000)
Replacement Cost	$124,622	$15,033	$12,000	$151,655
Annual Depreciation for Replacement Cost	$2,990	$491	$600	$4,081
Accumulated Depreciation for Replacement Cost	$52,862	$7,650	$6,000	$66,512
Present Valuation Using Replacement Cost	$71,760	$7,383	$6,000	$85,143
Original Cost	$71,573	$9,055	$8,604	$89,233
Annual Depreciation for Original Cost	$1,716	$298	$430	$2,443
Accumulated Depreciation for Original Cost	$25,573	$3,944	$4,302	$33,819
Present Valuation Using Original Cost	$46,000	$5,112	$4,302	$55,414

Note: Represents estimated construction cost only. Cost based on May 2006 data/valuation.

Connection Charge Sufficiency Analysis

Public Resources Management Group, Inc. (PRMG) performed an analysis relative to the sufficiency of current connection charges (capacity charges and off-site transmission fees). Table ES.13 summarizes expansion related costs and available funds. Based upon these findings, PRMG recommended that the Town "evaluate the possibility of adjusting connection charges to recover the remaining expansion related costs where possible and practical." However, an adjustment to connection charges is not explicitly recommended herein.

Renewal and Replacement Requirements Evaluation

PRMG also evaluated the Town's renewal and replacement (R&R) funding requirements. PRMG proposed a policy which considers the timing of R&R expenditures in order to leverage rates and most equitably divide costs between current and future rate payers. An analysis of R&R deposit requirements was conducted and the results are summarized in Table ES.14.

PRMG's recommendation sets forth a target annual R&R deposit level of $7.2 million to be phased in over a period of seven years. It should be noted that an adjustment to the Town's current water rates is not recommended herein to achieve this target goal under the time frame set forth.

Table ES.13
Expansion-Related Costs and Available Funds

Expansion-Related Project Costs:	Amount
Capacity Expenditures	$40,116,850
Expansion Component of Outstanding Parity Bonds	$41,757,680
Total Expansion-Related Project Costs	$81,874,540
Sources of Funds:	
Estimated Capacity Charges on Account	$14,598,186
Anticipated Capacity Charges	$35,929,442
Avail. Bond Proceeds Allocable to Expansion Projects	$11,098,010
Total Sources Before Additional Net Revenues	$61,625,638
Net Available for Other Capital Project Funding	($20,248,902)
Additional Revenue Generated by New Customers	$20,562,016
Adjusted Net Available for Other Capital Project Funding	$313,114

Table ES.14
Summary of R&R Deposit Requirements

Adjusted System Fixed Assets		
Original Cost	$198,443,493	
Replacement Cost	$347,903,365	
Difference	$124,513,393	
Replacement Cost Breakdown		
Short Service Life (<15 years)	$54,233,252	(15.6%)[1]
Long Service Life (>15 years)	$293,670,113	(84.4%)[1]
Net Asset R&R Expenditures	$68,970,216	
Proposed Annual R&R Deposits		
Short Service Life Assets (100% Funded)	$4,523,000	
Long Service Life Assets (50% Funded)	$2,677,000	
Total Recommended Deposit	$7,200,000	

[1] *Percentage of Total Replacement Costs*

Based on these findings, PRMG recommended that the Town incrementally raise its annual R&R deposit from the current level to the proposed level of $7.2 million, with the increase to be phased in over a period not to exceed seven years.

Chapter I

Existing Conditions

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Chapter I
Existing Conditions

A. Jupiter Water System History

The Jupiter Water System has existed since approximately 1963, and has expanded from a small investor owned utility to the present municipal utility of today (serving a population of approximately 75,000). The following is a brief chronological summary of the utility's history:

Approximate Date	Jupiter Water System Milestone
1963	Water system founded as investor owned facility
1968	Facilities relocated to current Central Boulevard location
1973	1.0 MGD lime softening and filtration system constructed
1975	1.5 MG ground storage tank added
1976	4.0 MGD lime softening added
1978	Town purchases water system
1982	8.0 MGD lime softening added
1985	Original 1.0 MGD lime softening unit removed
1985	Lime softening capacity re-rated to 13.5 MGD
1990	Reverse Osmosis (6.0 MGD) facility constructed
1996	R.O. Facility expanded to 12 MGD
1999	Ion Exchange (1.8 MGD) facility constructed
2006	R.O. Facility expanded to 13.7 MGD

B. Service Area, Customer Base and Production Demands

Figure I.1 shows the existing Town limits as well as the boundaries of Water Utilities Service Area. The service area covers the entire Town limits as well as areas within Juno Beach, unincorporated Martin County and unincorporated Palm Beach County. This service area covers a population of approximately 75,000.

As of March 31, 2007 the utility served almost 40,000 equivalent residential connections (ERCs) and there were approximately 7,000 more ERCs reserved, but not yet in service.

In addition to the customer base in the service area, the Town had a wholesale water agreement with the Village of Tequesta for 1.35 million gallons per day. The Town's a-

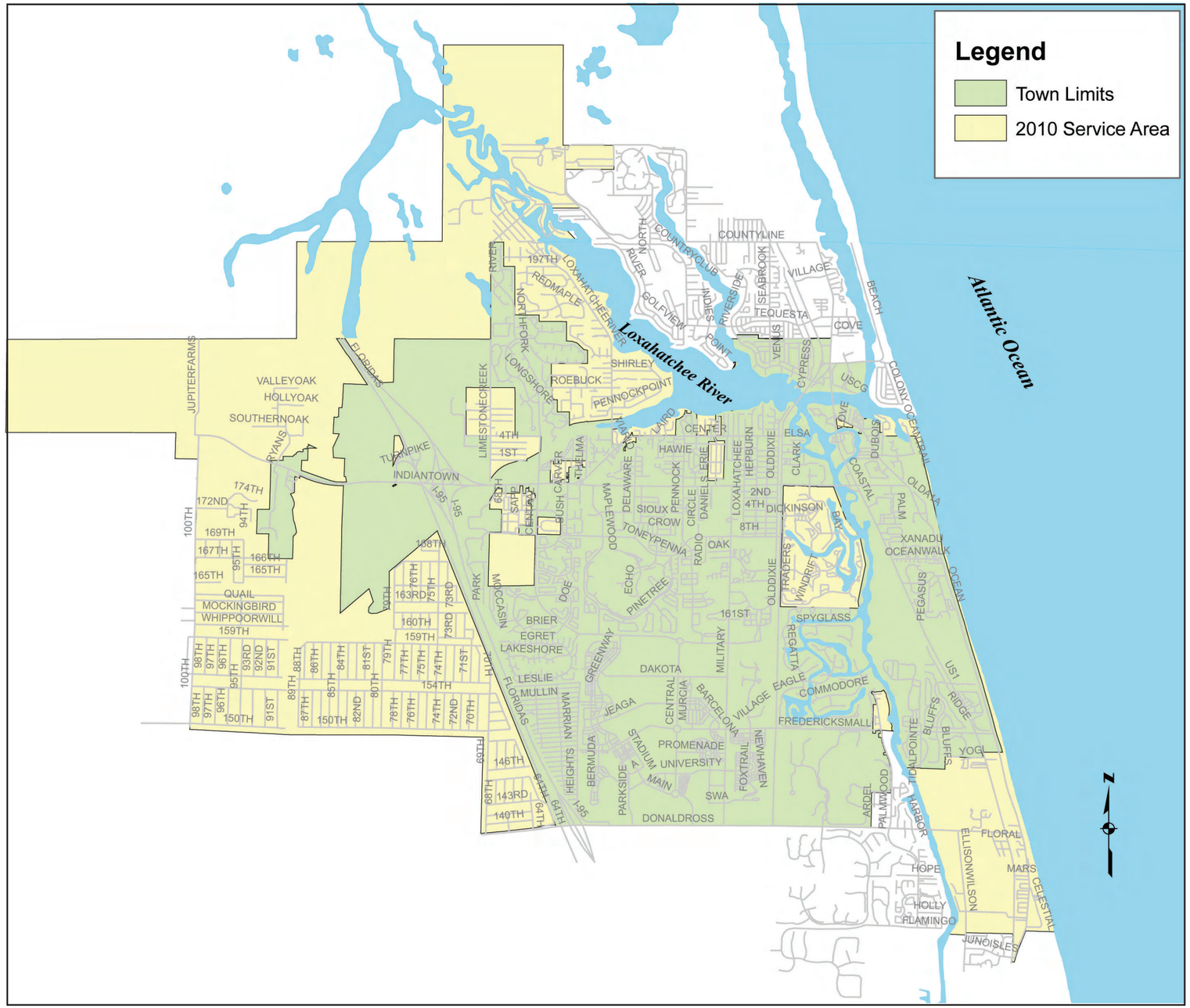

Figure I.1
Existing Water Service Area

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greement with the Village of Tequesta expired on July 17, 2007. Table I.1 shows an abbreviated accounting of Jupiter's existing water demand.

Table I.1
Existing Water Demand [1]

	Number of ERCs	Water Accounted for (MGD)
Existing ERCs	39,969.6	13.99
Reserved ERCs	8,441.8	2.95
Wholesale Water [2]	3,857.1	1.35
Total	**52,262.5**	**18.29**

[1] *Based on June 2007 Capacity Reservation report.*

[2] *Expired July, 17 2007*

C. Water Supply

1. Overview

The Town utilizes two distinct water supply sources to meet the needs of its water treatment facilities. Raw water from the surficial aquifer (fresh) is used to supply the Lime Softening and Ion Exchange plants, while raw water from the Floridan aquifer (brackish) is used to supply the Reverse Osmosis (R.O.) Plant.

Both water sources are permitted by the South Florida Water Management District (a copy of the Water Use Permit is included in Appendix B). While each source has a permitted maximum withdrawal rate (annual and max month), the total allowable withdrawal rate is less than the sum of the two. The Town's general approach to operating the utility is to depend more heavily on the brackish water source (and the R.O. Plant) during dry periods. This operating approach aids in reducing the impacts on the surficial aquifer, which is typically strained during dry times. During wet periods, the Town relies more heavily on the surficial aquifer (Lime Softening) due to its lower operating costs as compared to R.O.

2. Surficial Source

Raw water from the surficial aquifer comes from three existing wellfields, which are comprised of 52 wells (nine of which are currently being equipped for production). These wells range in depth from 140 to 220 feet and produce anywhere from 140 to 900 gpm/each. Additional wells are planned in Wellfield No. 3 and a future Wellfield No. 4 is planned to coincide with ongoing development along the Island Way Corridor. Figure I.2 shows the location of existing and future surficial wells.

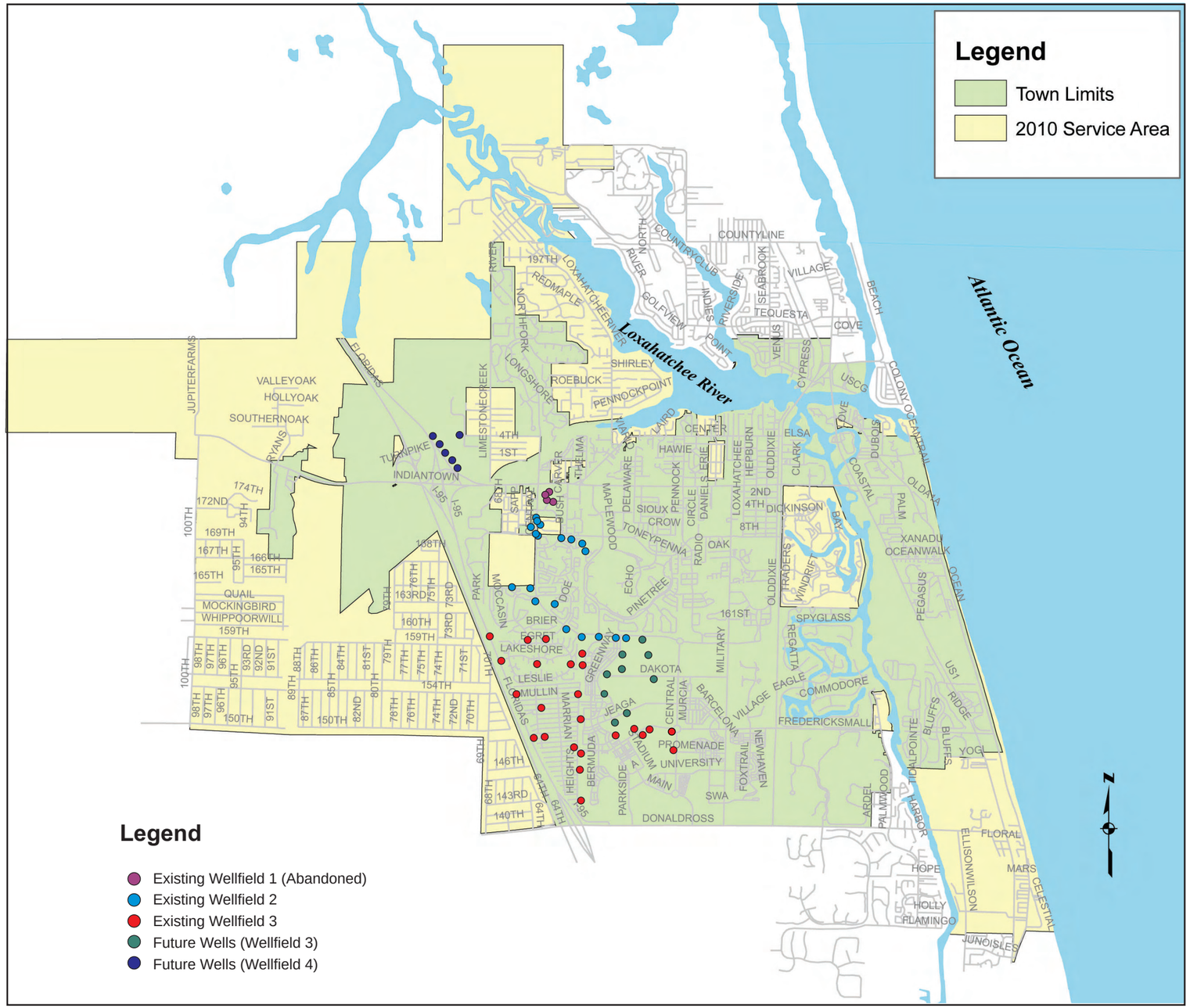

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Figure I.2
Existing and Future Surficial Wells

Existing Surficial Well

3. Floridan Source

Raw water from the Floridan Aquifer comes from 11 existing R.O. wells (there are two additional wells – one which has been abandoned and one that is currently not producing). These wells range in depth from 1,017 to 1,465 feet and produce flows anywhere from 1,000 to 2,040 gpm/each. Figure I.3 shows the location of existing R.O. (Floridan) Wells.

Floridan Aquifer Well

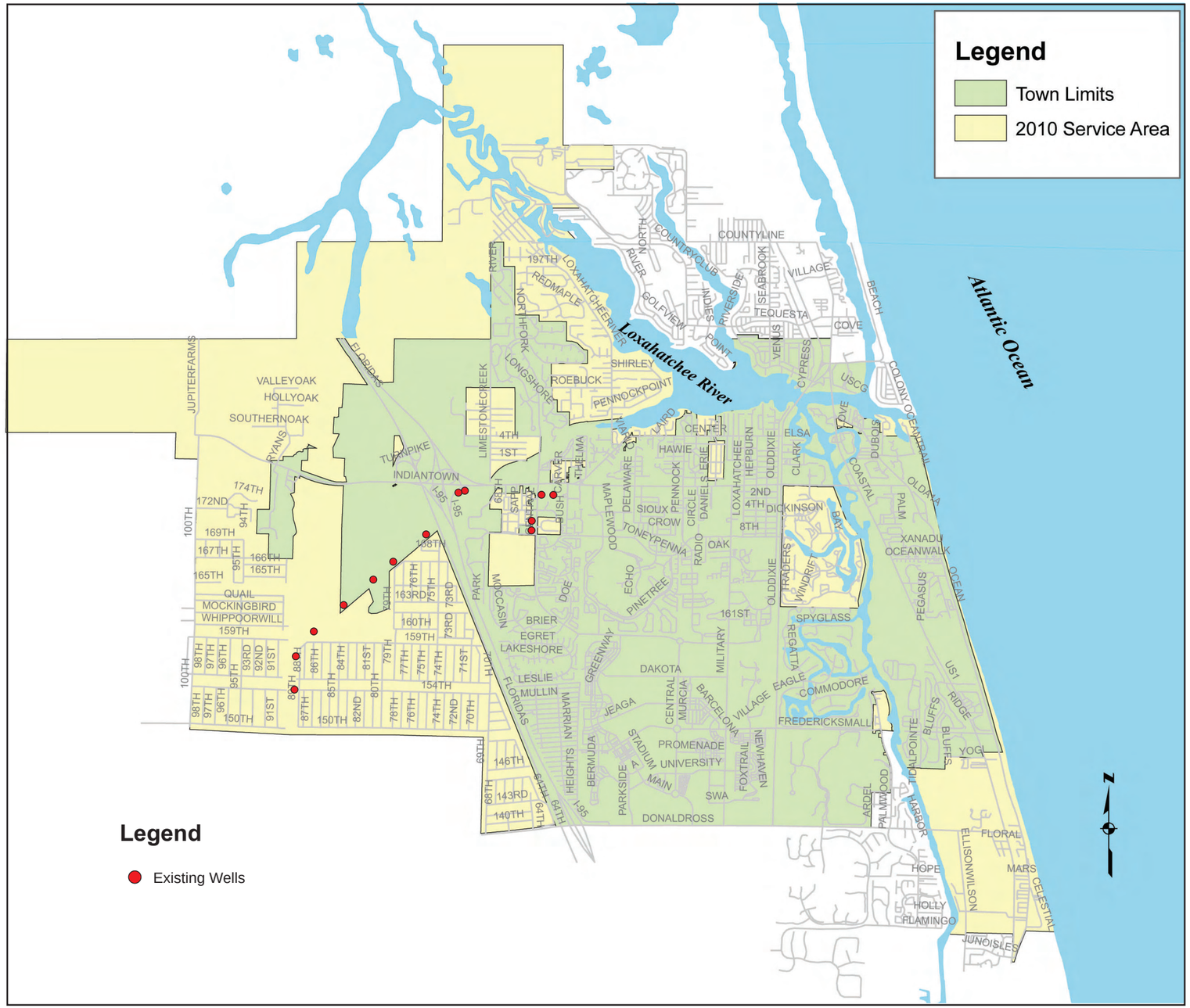

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Figure I.3
Existing Floridan Wells

4. Permitted Withdrawal

The existing permitted withdrawal approved by SFWMD Water Use Permit (WUP) No. 50-00010-W (issued November 10, 2004) is summarized in Table I.2. It is important to note that the permit, which expires in 2024, includes a reduction in allocation from the surficial aquifer source starting in October 2009. This was based on SFWMD Water Use Regulation's policy of not allowing utilities to simultaneously hold capacity from two sources for the same demand. The Town will have to reopen the permit (for modification) in adequate advance of October 2009 to ensure that the reduction in capacity does not occur. It is believed that as the Town approaches build out of its service area, demands will warrant the higher (current) surficial aquifer allocation.

WUP 50-00010-W will require modification prior to the October 2009 milestone to ensure that a reduction in allocation from the surficial aquifer does not occur. This was acknowledged during the negotiations for the permit renewal in 2004. In order to maintain the current surficial allocation, the Town will have to document historical use and future demand. It is also expected that water from the Regional Water Management System (described in the next section) will supplement the surficial aquifer recharge system and help justify the continued withdrawal of the full allocation from the surficial aquifer.

Table I.2
Existing Permitted Water Use (MGD)

	Total	Surficial Aquifer	Floridan Aquifer
Through Oct. 2009			
Max month (daily) [1]	35.70	20.60	18.50
Annual avg. (daily)	25.13	13.00	12.13
Oct. 2009 to 2024			
Max month (daily) [1]	31.20	12.70	18.50
Annual avg. (daily)	22.78	10.65	12.13

[1] *Based on 30 days/month*

The Town's current raw water withdrawal facilities' capacities for the surficial aquifer and Floridan aquifer are approximately 21 mgd and 23 mgd respectively.

In addition, the Town has a second Water Use Permit (No. 50-01584-W). This permit, which was most recently reissued September 9, 2004 (expiring September 9, 2009), is for Diversion and Impoundment Use of an allocation of 3,650 million gallons per year from the SFWMD C-18 Canal. The maximum monthly allocation is 304 million gallons. The water which is siphoned from the C-18 Canal into the South Indian River Water Control District (SIRWCD) Outfall Canal can be distributed into the Town's surficial well-

field recharge system (see Figure I.4). The limiting conditions of the permit include specific combinations of physical conditions which must be satisfied before a withdrawal from the C-18 may be made, and due to these conditions, water is rarely available from this source. When water is available from the C-18, the capacity is certainly nowhere near the permitted allocation.

5. Northern Palm Beach County Regional Water Management Plan

The SFWMD and USACOE are currently in the early phases of a regional plan to provide water in Northern Palm Beach County to meet environmental and public water supply needs. Currently the project is in the Alternatives Formulation phase. This phase will establish various alternatives formulated from combinations of "Management Measures." Discussions with SFWMD staff and consultants have indicated that a total of approximately 50 cfs is likely to be allocated to Jupiter and Seacoast Utilities for wellfield recharge purposes. At this time that allocation is presumably in all proposed alternatives, and accordingly, the Town has also discussed with SFWMD staff and consultants the appropriateness of proceeding with Cooperative Agreement(s) with the SFWMD for the implementation of other infrastructure (for surface water conveyance) which may be necessary to utilize water from the regional system once it becomes available. At this time the point of delivery of the water is expected to be the SFWMD C-18 Canal.

D. Existing Water Treatment Facilities

The Town's existing water treatment facilities, located at 17403 Central Boulevard, consist of three separate processes; lime softening, reverse osmosis and ion exchange. Each of the processes is permitted by the Florida Department of Environmental Protection (FDEP) and have rated capacities as shown in Table I.3.

Table I.3
Existing Rated Plant Capacities

Facility	FDEP Permitted Capacity (MGD)
Lime Softening	13.5
Reverse Osmosis	13.7
Ion Exchange	1.8
Total	**29.0**

Figure I.4
Surficial Wellfield Recharge Systems

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The lime softening plant consists of a 4.5 MGD unit (constructed in 1976) and a 9.0 MGD unit (constructed in 1978). The reverse osmosis treatment plant consists of Bank I (Trains A-D), rated at 6.0 MGD (constructed in 1990), Bank II (Trains E-H), rated at 6.0 MGD (constructed in 1996) and of Train I rated at 1.7 MGD (constructed in 2006). The ion exchange plant consists of one unit (constructed in 1999) rated at 1.8 MGD.

Lime Softening and Reverse Osmosis Plants

The reverse osmosis plant is capable of producing 13.7 MGD of finished water. The system has a permitted (by SFWMD) daily withdrawal allocation from the Floridian Aquifer of 17.9 MGD (max month basis), which allows the R.O. plant the ability to produce 13.7 MGD of product water at the 75% recovery rate of the process.

In 1999, a 1.8 MGD ion exchange treatment plant was constructed. The ion exchange plant utilizes surficial aquifer water to produce water of increased alkalinity and low color which when blended with the lime softened and R.O. permeate waters improves the chemical and aesthetic characteristics of the total blended finish water.

The lime softening plant includes two units with a total capacity of 13.5 MGD. The plant utilizes raw water from the surficial aquifer, which is the same source to be used for the future nanofiltration plant. The lime softening process produces a sludge by-product that is cumbersome (and troublesome) to deal with. It is anticipated that some or all of the lime softening capacity will be retired as the proposed nanofiltration plant comes on line.

Ion Exchange Plant

In summary, the water treatment facility currently consist of three (3) separate processes (lime softening, ion exchange, and reverse osmosis) that treat raw water from two sources to meet current production demands. The freshwater treatment system is capable of treating 13.5 MGD through the use of the lime softening filtration units and 1.8 MGD through the ion exchange plant. The brackish water treatment system is capable of producing 13.7 MGD. All facilities are operated from the R.O. plant control room and the treated water from each of the three plants is blended in the R.O. clear well before being pumped to storage or distributed to Jupiter's water customers. The Water Treatment Plant is currently capable of producing a total of 29.0 MGD of finished water for distribution.

E. Water Storage, Transmission and Distribution Facilities

Existing System Description

The existing water storage, distribution and transmission system consists of approximately 365 miles of pipelines. Table I.4 identifies the approximate length of pipeline (that was utilized in the model) by diameter. Additional facilities include a remote one-million gallon ground storage tank and pump station northwest of Donald Ross Road and US 1 in Juno Beach; finished water storage capacity of 4.5 million gallons on site at the Water Treatment Plant; and 21 million gallons of storage capacity at the storage/high service pump facility on Central Boulevard. High service pumping facilities at the plant and on the west side of Central Boulevard supply the distribution system and operate to maintain system pressure.

Table I.4
Transmission/Distribution Pipeline Data

Pipe Diameter (Inches)	Length (Feet)	Length (Miles)
Unidentified	15,259	2.89
2	104,489	19.79
3	7,294	1.38
4	98,637	18.68
6	543,857	103.00
8	646,619	122.47
10	108,313	20.51
12	226,896	42.97
14	396	0.08
16	57,349	10.86
18	17,452	3.31
20	4,155	0.79
24	44,247	8.38
30	703	0.13
Total	**1,875,666**	**355.24**

** Some pipe segments in the Town's database included no data relative to pipe diameter.*

Based upon discussions with utility staff, together with the review of available system pressure records, the system appears to maintain adequate pressure throughout most of the service area under current conditions. However, areas with the most noted pressure deficiencies are in the North Jupiter Service Area and in the Bluffs area (south to Juno Beach).

Pipelines

The distribution system includes pipe segments made of primarily four types of materials – ductile iron, C-900 PVC, HDPE and asbestos cement. In general, asbestos cement pipe was installed from approximately 1957 to 1997, C-900 PVC from approximately 1971 to present, ductile iron pipe from approximately 1958 to present, and HDPE, primarily used for service connections, from approximately 1971 to present. Pipe sizes range from 2 to 30 inches in diameter. The distribution system originates at the Town's water treatment plant and extends in all directions.

There are three functional crossings of the Intracoastal Waterway, as follows:

Location	Pipe Size/Type
• Indiantown Road	10 inch diameter HDPE
• Indiantown Road	16 inch diameter HDPE
• Frederick Small/ Marcinski Roads	18 inch diameter ductile iron pipe

The Town recently completed negotiations with the Loxahatchee River District for the purchase of a previously unused 16-inch diameter pipe also crossing the Intracoastal Waterway at Frederick Small/Marcinski Roads. This crossing is not yet functional. There are also five crossings of various branches of the Loxahatchee River and the C-18 Canal, as follows:

Location	Pipe Size
• Alternate A1A	20 inch diameter (2 parallel lines)
• Island Way	12 inch diameter
• Island Way (C-18)	18 inch diameter ductile iron pipe
• Loxahatchee River Road	12 inch diameter
• Central Boulevard	24 inch diameter

Water Storage Facilities

The Town's water storage system consists of six ground storage tanks located at the Water Treatment Plant, at the Central Boulevard High Service Pump Station and at the Juno Beach Re-pump Station. Water is delivered from the Water Treatment Plant across the road to the ground storage tanks at the Central Boulevard High Service Pump Station via a dedicated 30-inch diameter main. Table I.5 summarizes the finished water storage volume available at each facility.

Table I.5
System Water Storage Capacity

Water Treatment Plant	1.5 MG
	3.0 MG
Central Boulevard	5.0 MG
	8.0 MG
	8.0 MG
Juno Beach Repump Station	1.0 MG
Total	**27.5 MG**

High Service/Re-pump Facilities

Finished water is supplied to the transmission and distribution system through high service pumping systems located at the Water Treatment Plant and the Central Boulevard High Service Pump Station. In general, pumps are operated automatically, that is, started, stopped and speeds adjusted by the Water Treatment Plant's control system. The Water Treatment Plant has an array of eight high service pumps with drives that include both 150 hp and 200 hp motors. The Central Boulevard storage/high service facility includes two High Service Pump Stations. The first station has four pumps each rated at 200 hp. The second high-service pump station (recently constructed) at the Central Boulevard facility has two 200 hp pumps and can accommodate two future 200 hp pumps. The Juno Beach Re-pump facility has three high-service pumps, each rated at 75 hp. All pumps in the system can be operated manually from the Water Treatment Plant control room, or automatically, relying on automated control logic associated with programmable logic controllers located at each facility. Each pumping facility's control system is set to maintain a service pressure of 70 psi.

Figures I.5 and I.6 identify various components of the Town's current storage, transmission and distribution systems.

The Town's water distribution network has grown steadily over the years to provide service to the Town's growing population and expanding business community. Until recently, expansion of the Town's distribution system has been accomplished without the benefit of a comprehensive water distribution system hydraulic model.

A hydraulic model, when calibrated correctly to reflect the hydraulic performance of the existing piping network, pumping systems and storage facilities, allows the Town to analyze the current system to identify areas of low pressure and poor performance. The hydraulic model developed for the Town's existing potable water transmission and distribution system assists the Town's utilities/engineering staff and their consultants with troubleshooting operational deficiencies and planning of future network expansions. The hydraulic model developed by Hazen and Sawyer in 2006 is further discussed in Section IV.

Recent System Additions/Upgrades

Since completion of the FY 2001-2002 Master Plan Update, the following are significant assets which have been added to the Utilities Storage, Transmission and Distribution System:

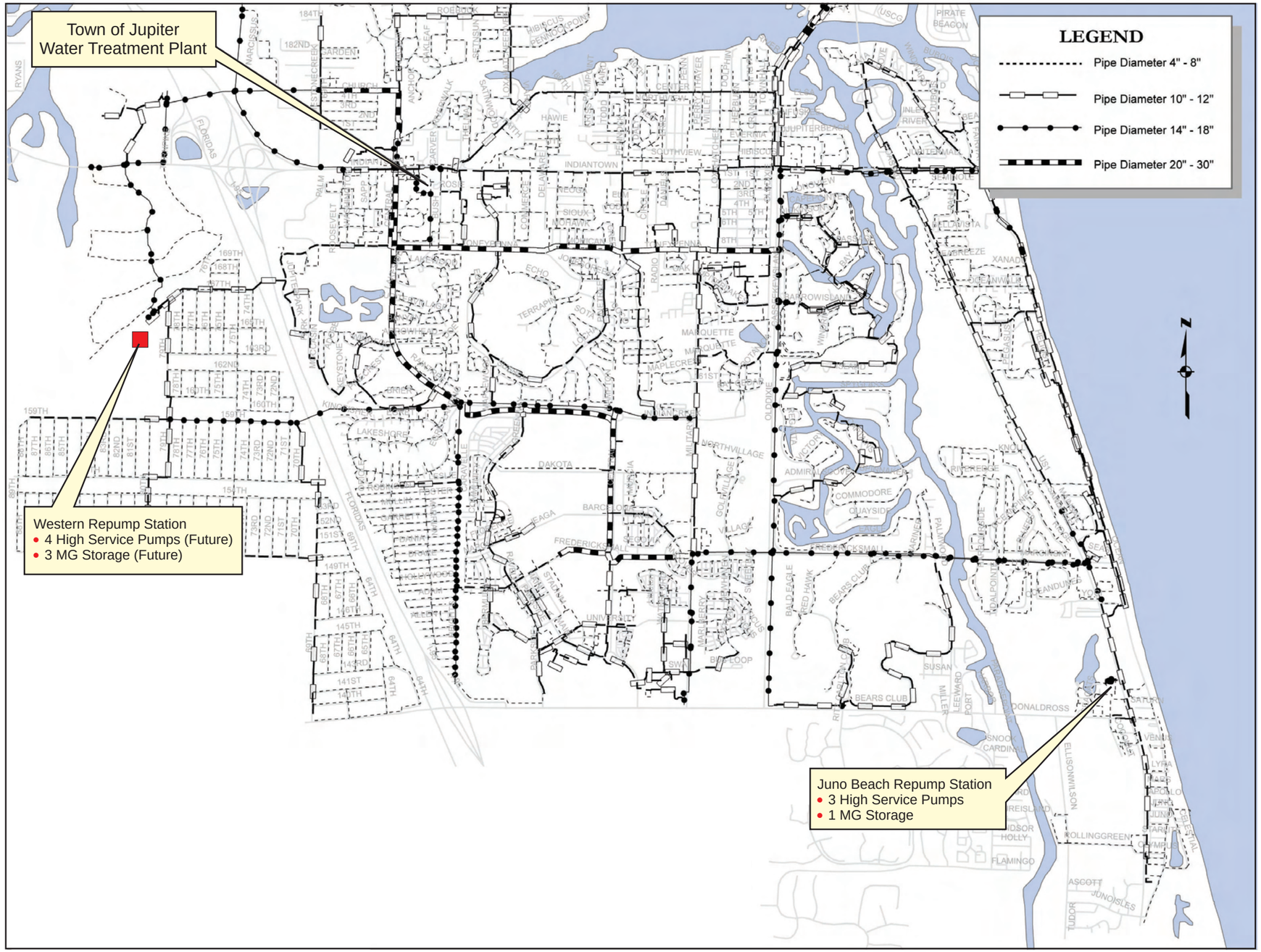

Figure I.5
Storage, Transmission
and Distribution System – South

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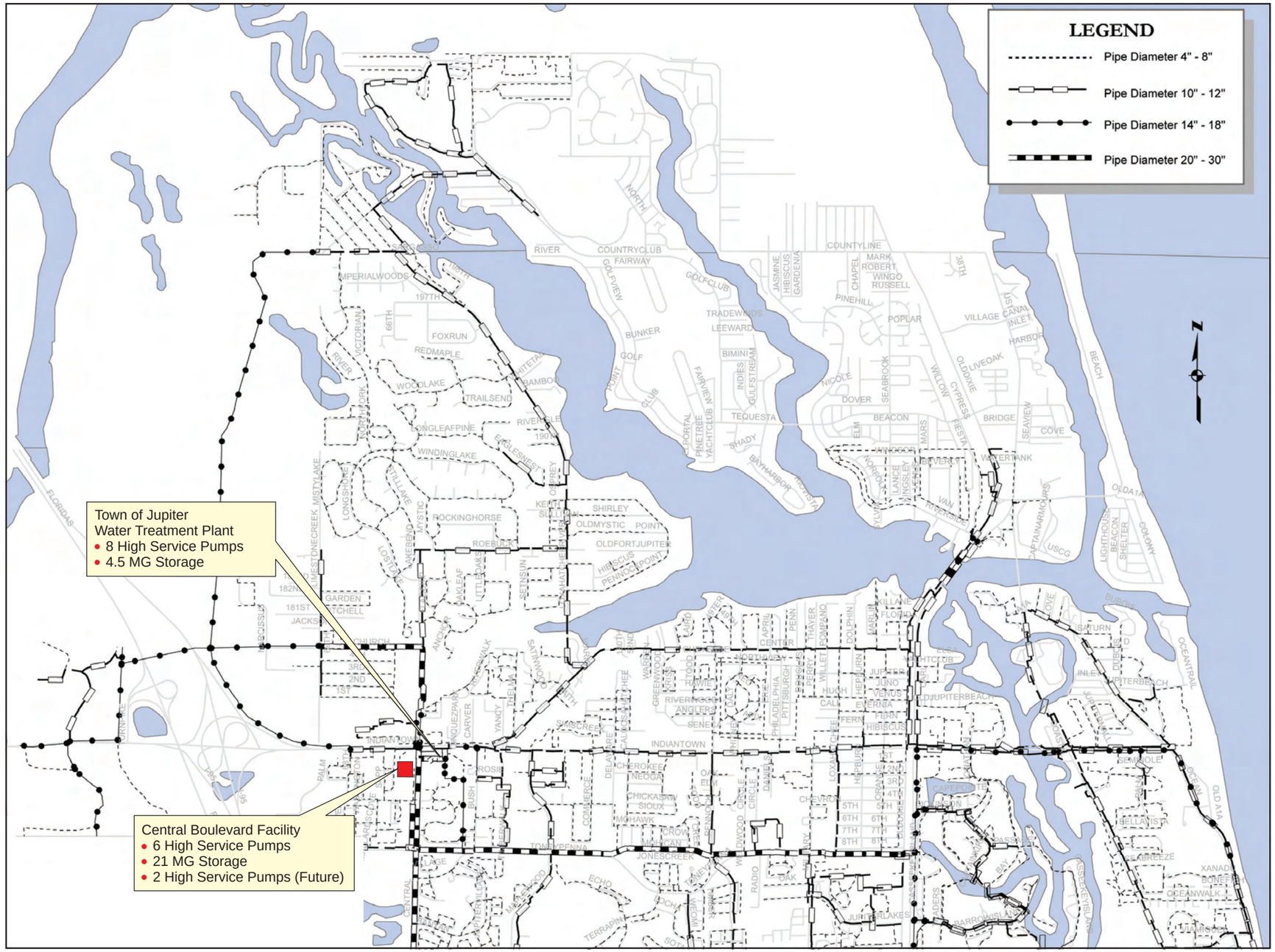

Figure I.6
Storage, Transmission
and Distribution System – North

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- Significant Transmission and Distribution Piping, notably in ABACOA, along the Island Way Corridor, and in various new developments within Town.
- Acquisition of the North Service Area Distribution System from the Village of Tequesta and significant upgrades to that area.
- A second Loxahatchee River crossing at the Alternate A1A bridge.
- Completion of a new 5 MG Ground Storage Tank on the Central Boulevard site.
- Installation of additional high service pumps at the Water Treatment Plant site.
- Construction of a new High Service Pump Station at the Central Boulevard site.

F. Level of Service

The Jupiter Water Utility is subject to federal, state and local regulation. At the federal level, regulatory jurisdiction is vested in the United States Environmental Protection Agency (EPA). The Florida Department of Environmental Protection (FDEP) is the state agency with authority over water treatment, and at the local level, the Palm Beach County Health Department administers the regulations of the FDEP.

1. **Federal:** The Town's utility is regulated by the EPA under the Safe Drinking Water Act (SDWA). Via the SDWA, EPA has promulgated nationwide drinking water regulations which specify the maximum levels of harmful contaminants allowed in drinking water and which govern the construction, operation and maintenance of water supply systems.

2. **State and Local:** Under the terms of the SDWA, states have primary enforcement responsibility for public water systems if the EPA determines that the state's drinking water regulations are at least as stringent as the federal drinking water regulations. Florida has adopted all of the regulations promulgated by the EPA pursuant to the SDWA as part of its drinking water program. Thus, regulation of the system is primarily under the jurisdiction of the State of Florida. The State of Florida has delegated the administration of its water program to certain qualifying County Health Departments throughout the state. That delegation has taken place in Palm Beach County.

The quality of water provided by the system exceeds all state and federal requirements. Jupiter's Water Utility was awarded the EPA's Safe Drinking Water Act Excellence Award in both 1999 and 2001 signifying it as the best drinking water facility in the South-

eastern United States. In total, the Utility has been honored more than 35 times with various awards related to operations, treatment, and drinking water quality.

In addition to having been honored for excellence as noted above, Jupiter's Utility has been a leader and innovator in developing/utilizing alternative water supplies and implementing other measures and programs to preserve fresh water for the critical environmental resources of the region.

G. Capital Cost Recovery System

Connection Charges are capital charges levied against new system customers in order to allocate the cost of new plant facilities required by the average demand the new user proposes to exert upon the system. The current connection charge consists of two components, which recover from developers their fair share of the cost of water treatment facilities (plant capacity charges) and the water transmission facilities (off-site transmission fees).

Jupiter's water transmission system has three regions or service zones (as shown in Figure I.7). Generally speaking, Zone 1 encompasses all properties east of Alternate A1A, Zone 2 includes properties west of Alternate A1A but east of I-95, and Zone 3 includes all parcels west of I-95. These separate areas are necessary to more appropriately divide the costs of water transmission based on location.

When the Town acquired the System in 1978, connection charges were established and collected at the rate of $750.00 for each new single family unit and $528.00 for each multifamily unit. The level of such charges was based upon the cost of conventional water treatment plant facilities. In subsequent years, the Town increased connection charges due to the increased cost of reverse osmosis type treatment facilities and incremental increases in the cost of water transmission, as well as to account for normal inflationary factors. Town Ordinance No. 10-97 contains provisions for the further adjustment of connection charges to account for future inflation or for necessary improvement in treatment technology.

Table I.6 shows the current total connection charges for the various service zones. As part of the Master Plan Update, Public Resources Management Group (PRMG) performed an analysis relative to the sufficiency of current connection charges. Further discussion relative to that analysis is included in Section VII, and the full letter report from PRMG is included in Appendix D. Note that in the PRMG report, "connection charges," as referenced above, are called "capacity charges."

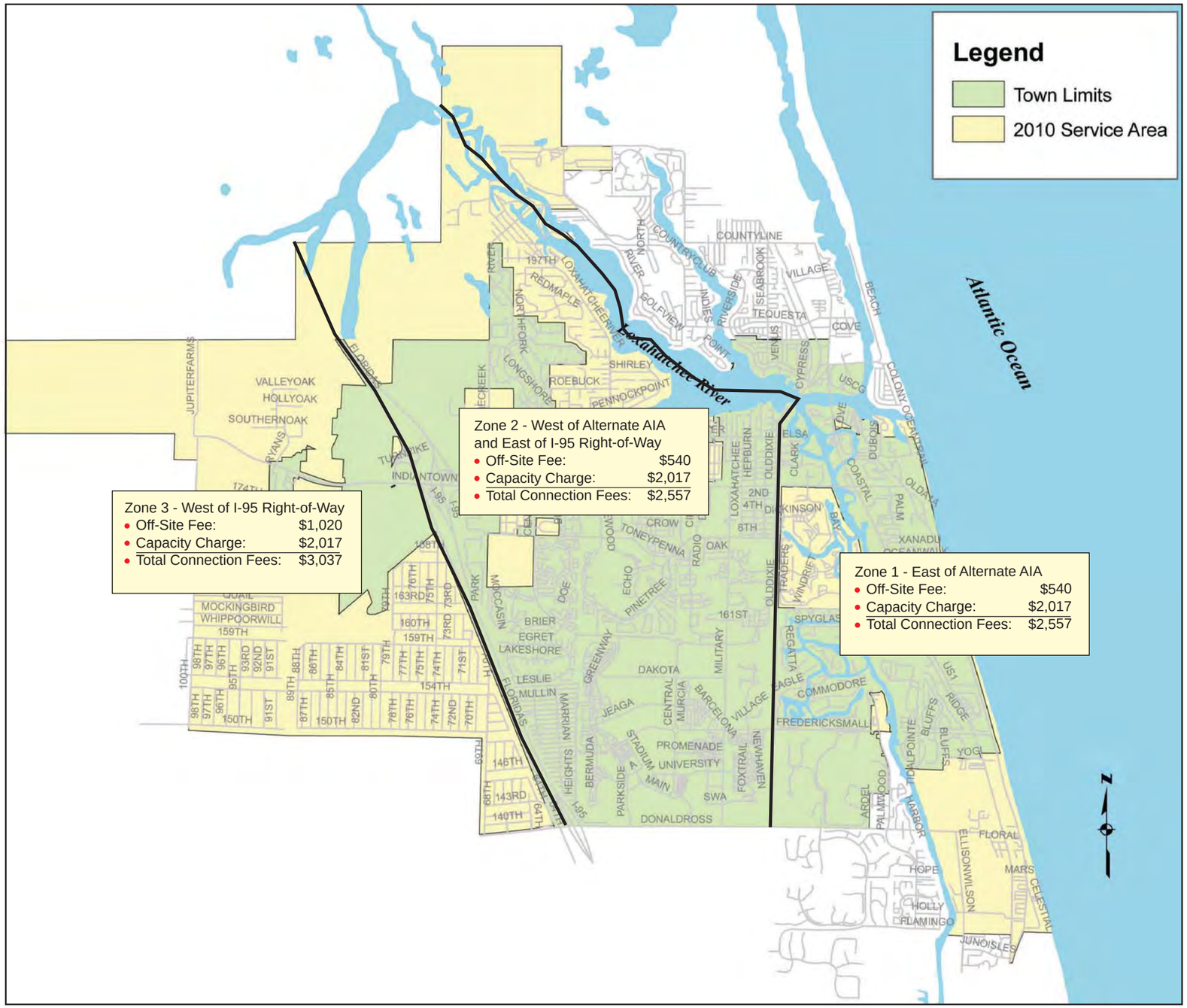

Figure I.7
Water Transmission Service Zones

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Table I.6
System Capacity Charges [1]

	Service Zone One	Service Zone Two	Service Zone Three
Capacity Charge	$2,017	$2,017	$2,017
Off-site Transmission Fee	$540	$540	$1,020
Total Capacity Charges	$2,557	$2,557	$3,037

[1] *Amounts shown provided by Town and do not include administrative fees or other fees such as meter installation charges. Charges and fees based on 1.0 ERC*

Note: See Figure 1.7 for Service Zone locations.

The various existing system components are indicated graphically in Figure I.8.

PRESENT SYSTEM CAPACITIES:

TREATMENT CAPACITY

SURFICIAL AQUIFER TREATMENT
- COMBINED LIME SOFTENING = 13.5 MGD
- ION EXCHANGE = 1.8 MGD

FLORIDAN AQUIFER TREATMENT
- BRACKISH WATER R.O. DESALINATION = 13.7 MGD

TOTAL TREATMENT PRODUCTION = 29.0MGD

STORAGE CAPACITY

TOTAL COMBINED GROUND STORAGE = 26.5M GALLONS

PUMPING CAPACITY

TOTAL HIGH SERVICE PUMPAGE = 26,900 GPM

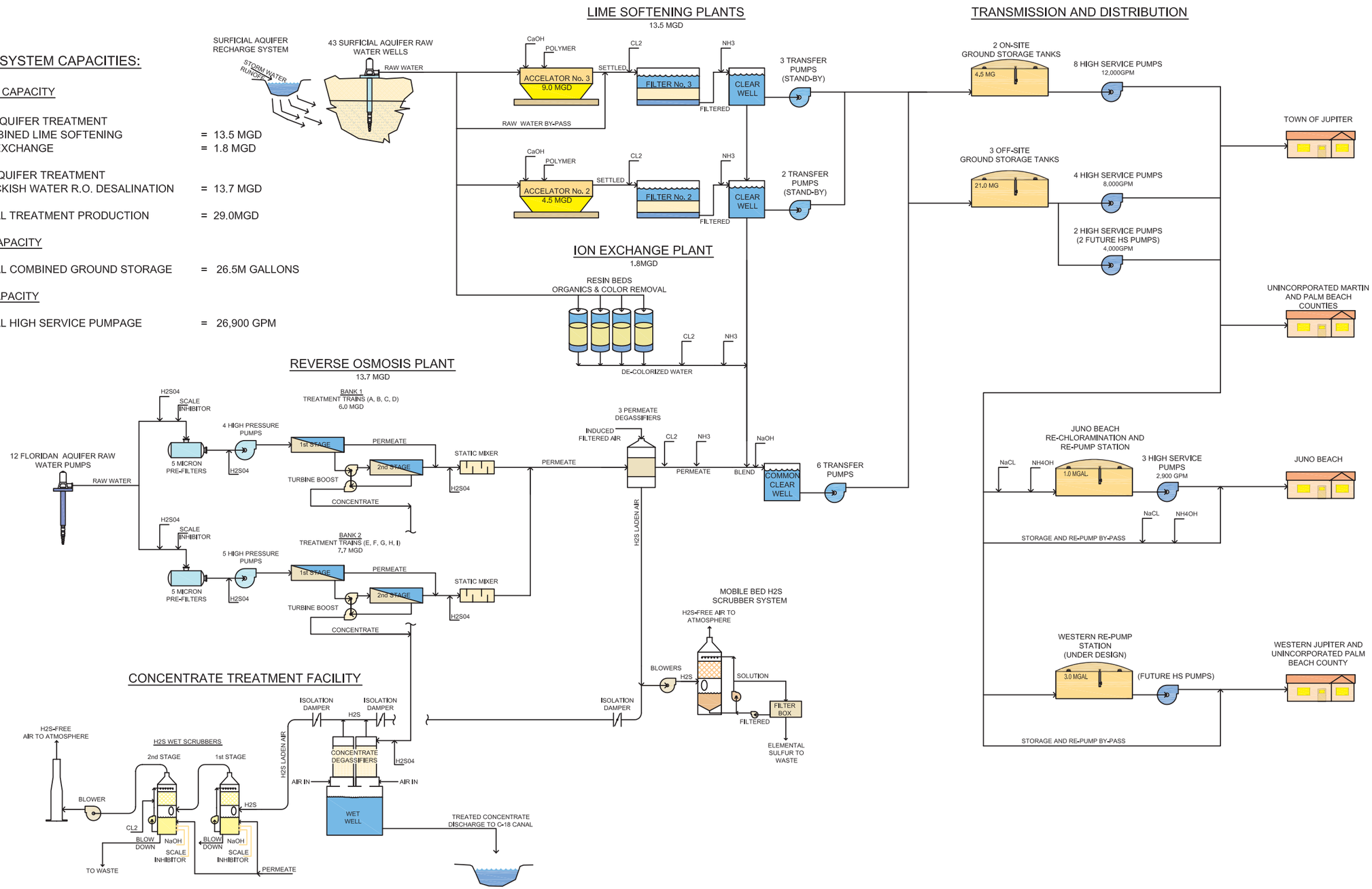

Figure I.8
Water System Process Flow Diagram – Existing Configuration

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Chapter II

Future Projections

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HAZEN AND SAWYER
Environmental Engineers & Scientists

Chapter II
Future Projections

A. Service Area, Customer Base and Production Demands

Population projections for the service area indicate slowing growth as the Town and service area approach build out. Table II.1 indicates future population growth. Additionally, Table II.2 includes information provided to SFWMD by the Town regarding expected water demand through 2025. These data were provided for the District's regional water supply planning.

Table II.1
Estimated Future Population Growth

Year			
2010	**2015**	**2020**	**2025**
75,792	83,408	88,458	93,057

Table II.2
Estimated Future Finished Water Demand (MGD) - Average Daily Flow

Year			
2010	**2015**	**2020**	**2025**
17.05	18.77	19.90	20.94

B. Water Supply

As noted in Section I.C.4, the Town currently has a 20 year WUP from the SFWMD. The permitted allocation from the surficial aquifer (20.6 mgd – max month) is scheduled to drop to 12.7 mgd (max month) in October 2009 (see Table I.2). This drop in allocation is a result of the Town's pro-activity in meeting past expansion demands out of the Floridan aquifer, thus they have had limited withdrawals from the surficial aquifer. Conversations have been ongoing between the Town and SFWMD to clarify that future expansion (to build out) must come out of the surficial aquifer, thus the need to maintain (or increase) the surficial allocations. Raw water requirements to meet future demand are noted in Table II.3.

Table II.3
Estimated Future Raw Water Requirements
ADF (MGD)

Year			
2010	**2015**	**2020**	**2025**
22.21	24.23	25.56	26.79

Note: Incremental withdrawals from the surficial and Floridan aquifers are independently governed by the limits established in WUP No. 50-00010-W (see Table I.2).

Planned facilities to meet future demand as providing reliability and redundancy include the following:

- Nine additional surficial wells in Wellfield #3 (currently in progress)
- Six additional surficial wells in Wellfield #4 (North Limestone Creek)
- New raw water main to WTP from Wellfield #4
- Deepening of R.O. Well #4
- Ongoing surficial and Floridan Wellfield Rehabilitation programs

C. Water Treatment Facilities

With the recent completion of the 1.7 MGD expansion of the R.O. plant, the primary future element related to water treatment is the Nanofiltration (NF) Water Treatment Plant. The capacity of the NF plant is initially scheduled to be 14.5 MGD with ultimate expansion to 17.0 MGD. The intention is that NF capacity will supplant at least a portion of the existing lime softening capacity, as shown in Table II.4.

Table II.4
Estimated Future Plant Capacity

Process	Maximum Production Rate
Lime Softening (LS)	9.0 MGD (Standby Capacity)
Reverse Osmosis (RO)	13.7 MGD
Ion Exchange (IX)	1.8 MGD
Nanofiltration (NF)	14.5 MGD (17.0 MGD Future)

Note: Maximum production of Lime Softening and Nanofiltration cannot occur simultaneously. Overall maximum production rate will be 30 MGD with NF at 14.5 MGD and 32.5 MGD if NF is expanded to 17 MGD.

The nanofiltration treatment process, in general, consists of raw water pretreatment, membrane treatment and product-water treatment. Other ancillary processes include odor control and concentrate reuse. It is anticipated that the elements will operate at approximately 85% efficiency, meaning there is a 15% water loss (to concentrate) during the treatment process. Therefore, approximately 17 MGD of raw water will be required to produce 14.5 MGD of potable water. The following is a brief description of the proposed processes:

1. Raw Water Pretreatment

The pretreatment process satisfies several important objectives in the overall membrane treatment process. Most importantly, raw water pretreatment protects the membrane elements from particulates and from scaling (precipitation and deposition of soluble salts) and fouling (entrapment of particulates such as iron floc or silt).

The first step in raw water pretreatment is pressure filtration to remove sand and other particulates that may be present in the raw water. To accomplish this, four 4,908 gallon per minute (gpm) raw water booster pumps boost raw water system pressure to levels required for effective filtering through three horizontal pressure filters (see Figure II.1). As needed, a polymer may be added during this process to improve treatment. The main constituents that will be removed in this process are sand, silt and precipitated iron sulfide. Other potential inorganic foulants found in the Town's raw water (which would be removed by this step) are elemental sulfur, ferric hydroxide and alumino-silicate clay.

Subsequent to the sand filters, acid and scale inhibitor are added to assist in treating the raw water. Pretreatment acidification is used primarily to prevent precipitation of carbonate scales, inhibit the oxidation of iron and lower the permeate pH to facilitate hydrogen sulfide removal. Scale inhibitors are used to suppress precipitation of salts which can damage membrane elements.

The raw water is then passed through five cartridge filters which remove smaller amounts of suspended particles that may remain in the water, such as silt, floc, precipitates and some microorganisms. The filters are horizontally oriented and are 42-inches in diameter.

2. Membrane Treatment

Traditional filtration technologies can be categorized on the basis of the size of particles removed from a water source. Filtration of large particles is accomplished by passing the source water through a filter media in a perpendicular direction. Examples of such filtration methods include cartridge filters, sand filters, and multimedia filters. These filtration methods are usually limited to undissolved particles greater than 1 micron.

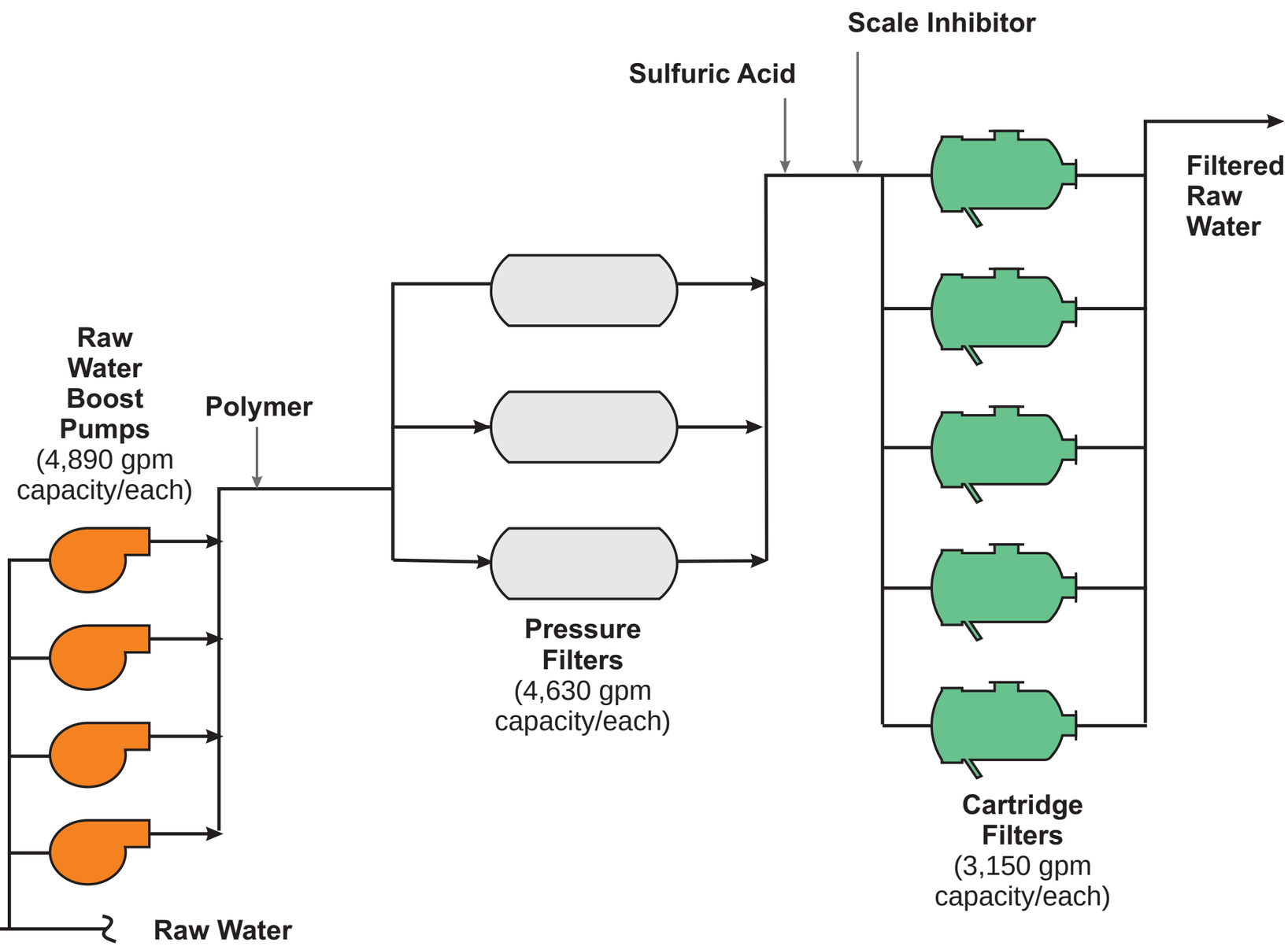

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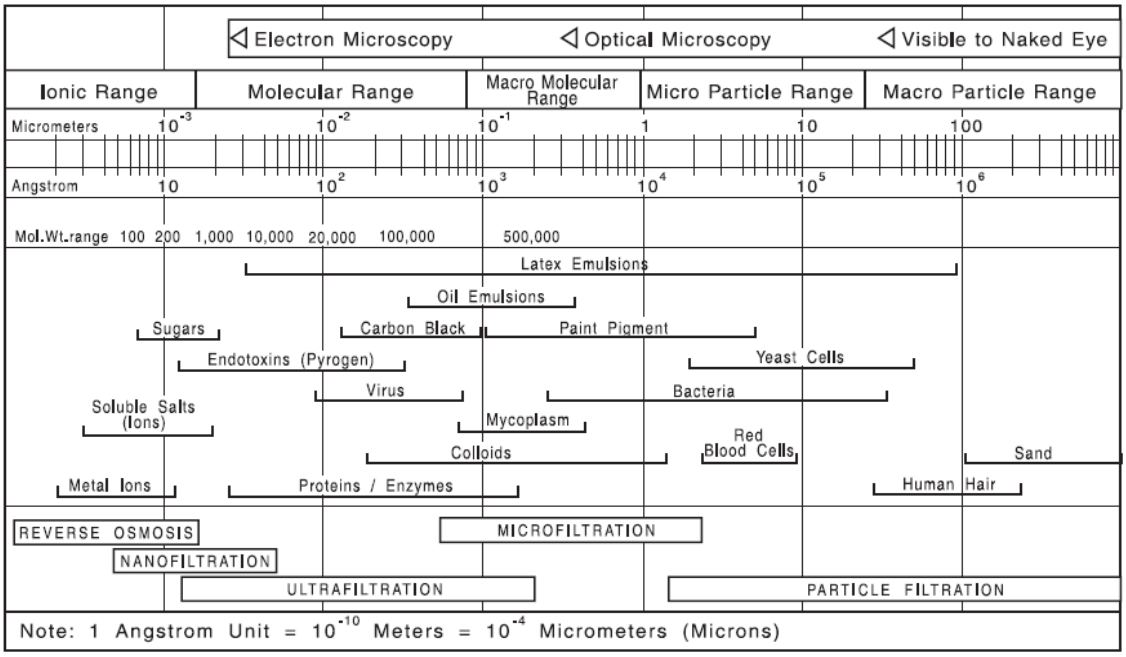
Figure II.1
Nanofiltration Plant - Pre Treatment

For the removal of small particles and dissolved salts, crossflow membrane filtration can be used. Crossflow membrane filtration is when a pressurized feed stream flows parallel to the membrane surface. A portion of the stream passes through the membrane, leaving behind the rejected particles. Since there is a continuous flow across the membrane surface, the rejected particles do not accumulate but instead are collected in a concentrate stream. Thus, one feed stream is separated into two streams: a low-saline and/or purified product called permeate, and a high saline or concentrated brine, called concentrate. A flow regulating valve, called a concentrate valve, controls the percentage of feedwater that goes to the concentrate stream and controls the permeate which will be obtained from the feed flow.

The proposed additional plant at the Town of Jupiter Water Treatment Facility will utilize nanofiltration elements. Nanofiltration membranes reject particles in the approximate size range of 1 nanometer (10 Angstroms). Figure II.2 presents particle sizes that can be removed by different types of crossflow membrane filtration. Organic molecules with molecular weights greater than 200-400 are rejected. Salts which have monovalent anions (e.g. sodium chloride or calcium chloride) have rejections of 20-80%, whereas salts with divalent anions (e.g. magnesium sulfate) have higher rejections of 90-98%. Nanofiltration elements are used to remove color, total organic carbon (TOC), and hardness, and to reduce total dissolved solids (TDS).

Figure II.2
Treatment Process Required for Various Particle Sizes



The new plant will utilize five 3,150 gpm membrane feed pumps to pump treated raw water through five nanofiltration membrane skids (see Figure II.3). Each skid contains two treatment "stages." Raw water is introduced to the first stage, producing permeate and concentrate, as discussed above. The concentrate produced by the first stage is then fed through the second stage producing additional permeate and concentrate. Permeate collected from the first and second stages of treatment is then sent for post-treatment consisting of degasification and chemical addition. The concentrate generated by the second stage is sent to a reuse facility. The concentrate reuse process is discussed later in this section.

The first stage consists of 378 elements with 63 vessels (six elements per vessel). The second stage consists of 108 elements with 18 vessels (six elements per vessel). The total number of elements for the initial installation will be 2,430 with room for an additional skid containing 486 elements if the additional capacity is needed. Each skid will produce a permeate capacity of 2.9 MGD, for an overall plant capacity of 14.5 MGD.

The membrane vessel configuration proposed for the Town's plant are of a unique design in that they use a center-port concept as opposed to a conventional arrangement. With a conventional design, raw water is essentially introduced at one end of the vessel and removed from the opposite end. With the center-port concept, the water is fed from either end of the vessel and discharged out the center. The latter arrangement is a relatively new concept (which has been used successfully in other countries) and is anticipated to lead to significant energy savings for the Town.

3. Product Water Treatment

Dissolved sulfide species can cause objectionable tastes and odors in finished water. Florida's groundwater supplies often have significant concentrations of dissolved hydrogen sulfide and bisulfide. Therefore, it is necessary to remove dissolved sulfide species from the permeate in order to reduce the possibility of taste and odor complaints. Since the nanofiltration process does not remove dissolved sulfide species, the permeate will need to be treated prior to distribution.

Dissolved sulfide can be removed from water in a variety of ways. The most common methods used are air stripping, aeration and oxidation. Air stripping is often accomplished in packed-tower systems. The nanofiltration plant will use packed tower air stripping (also called degasification) to remove dissolved sulfide from the permeate (see Figure II.4). The off-gas from the degasification process will be directed to a single-stage, packed tower scrubber system to prevent the release of hydrogen sulfide gas to the atmosphere (discussed later in this section).

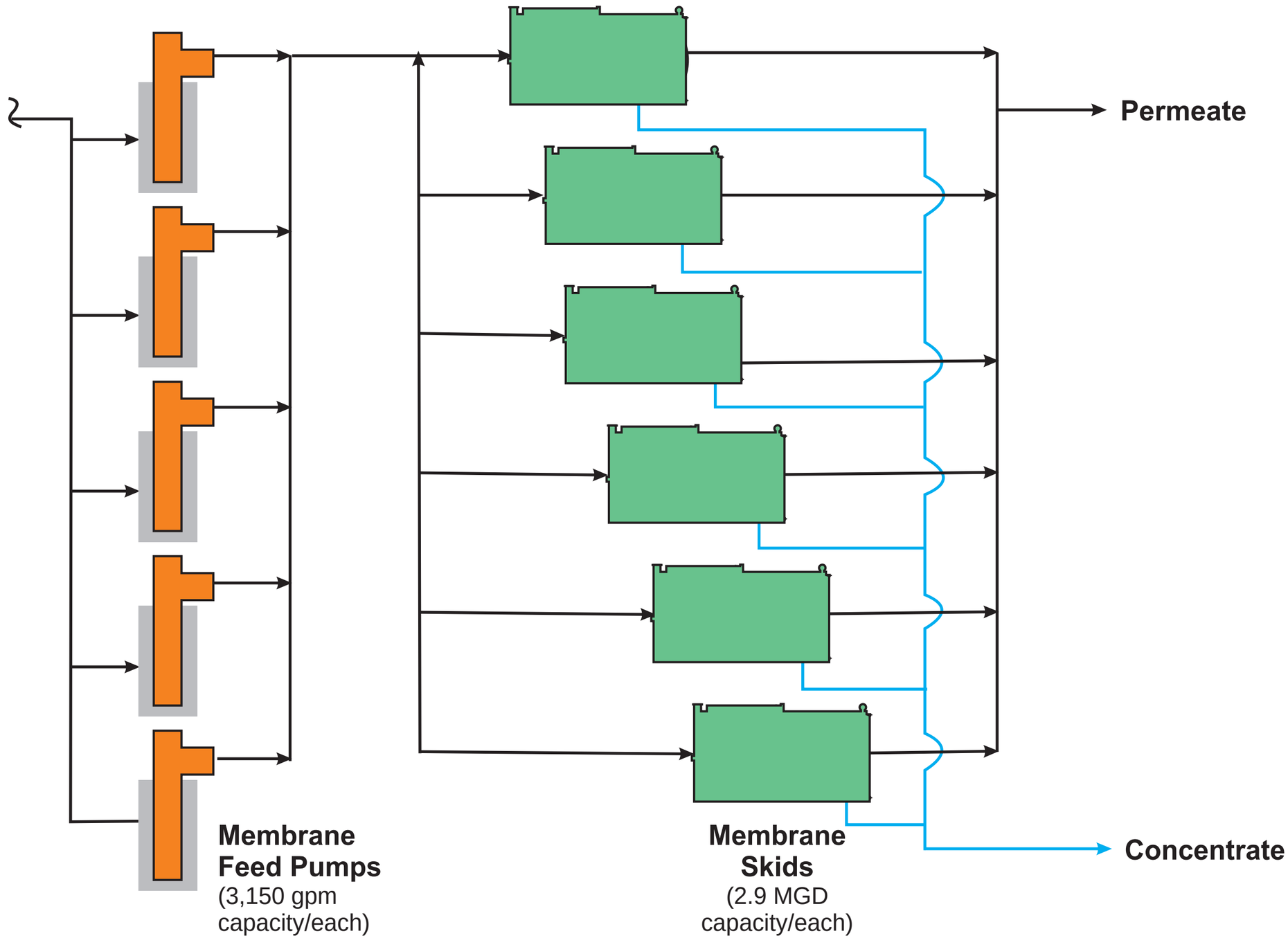


Figure II.3
Nanofiltration Plant - Membrane Treatment

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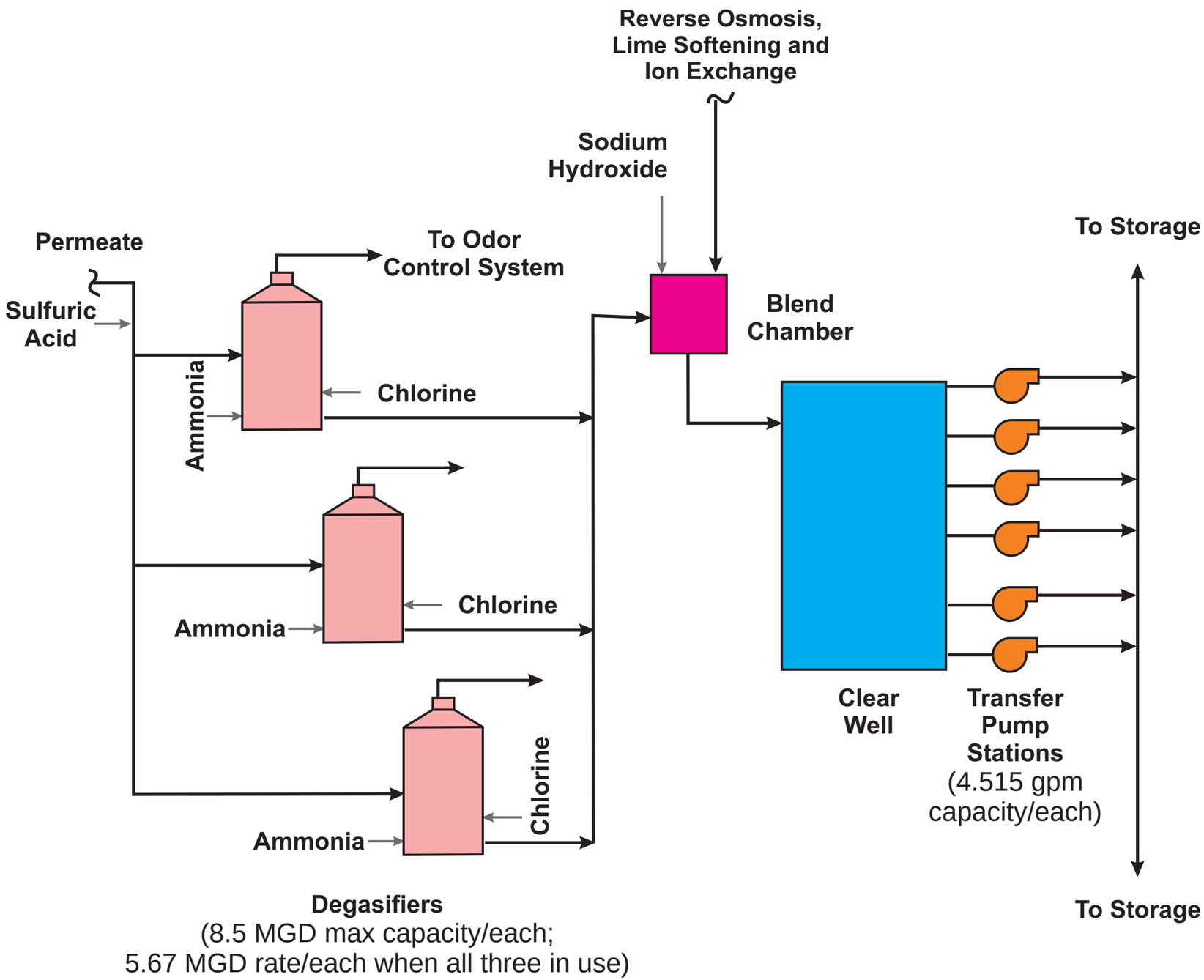

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Figure II.4
Nanofiltration Plant - Post Treatment

Packed tower air strippers work by the action of mass transfer across the gas-liquid interface. Hydrogen sulfide is removed from the liquid phase and transferred to the gas phase through the introduction of air into the packed tower. The air flows countercurrent to the direction of water flow. Permeate is introduced above the packing media and allowed to trickle down, whereas the air flow is directed from below through the media and out the exhaust at the top of the tower. The media provides a surface for the gas-liquid mass transfer to occur. The Town's plant will utilize three packed tower systems with a design capacity of 5.67 MGD each.

Stripped permeate is then disinfected with chlorine and the disinfected permeate is then mixed with finished water from the reverse osmosis, lime softening and ion exchange plants. Caustic is added to the blended water for final pH adjustment. This blended, treated flow is then pumped to ground storage tanks and ultimately to the distribution system for consumption.

4. Odor Control

The hydrogen sulfide removed during the degasification process is converted from a soluble form to a volatile form, which can lead to a "rotten egg" smell if sent directly to atmosphere without prior treatment. For the NF plant, an odor control system will convert the hydrogen sulfide in the odorous air back into solution (see Figure II.5).

The odor control system will utilize a single stage packed tower scrubber which is similar in concept to the degasification design. In this case, however, hydrogen sulfide is being transferred from the gas phase to the liquid phase. Packing is provided to increase the surface area for mass transfer. Air is introduced from the bottom of the tower and travels upwards through the media, whereas the scrubbing liquid is introduced at the top of the tower and trickles through the media via gravity. The scrubbing liquid is collected in a sump at the bottom of the tower and recirculated to the top of the tower. Sodium hydroxide and chlorine are added to maintain the desired pH and ORP (oxidation reduction potential). Clean air is then vented to atmosphere with minimal hydrogen sulfide levels. An odor abatement study completed in 2004 showed that a 90% removal efficiency would meet the goal of 7.3 parts per billion (ppb) of hydrogen sulfide at the facility property line. The anticipated efficiency of the new odor control system will be 95 to 96 percent.

A small amount of scrubbing liquid is drained from the sump to remove any precipitates or ions formed in the process. This hydrogen sulfide laden water will be sent to the facility's waste stream lift station (located on the south side of the site) where it will be pumped to the Loxahatchee River District (LRD) Wastewater Treatment Facility.

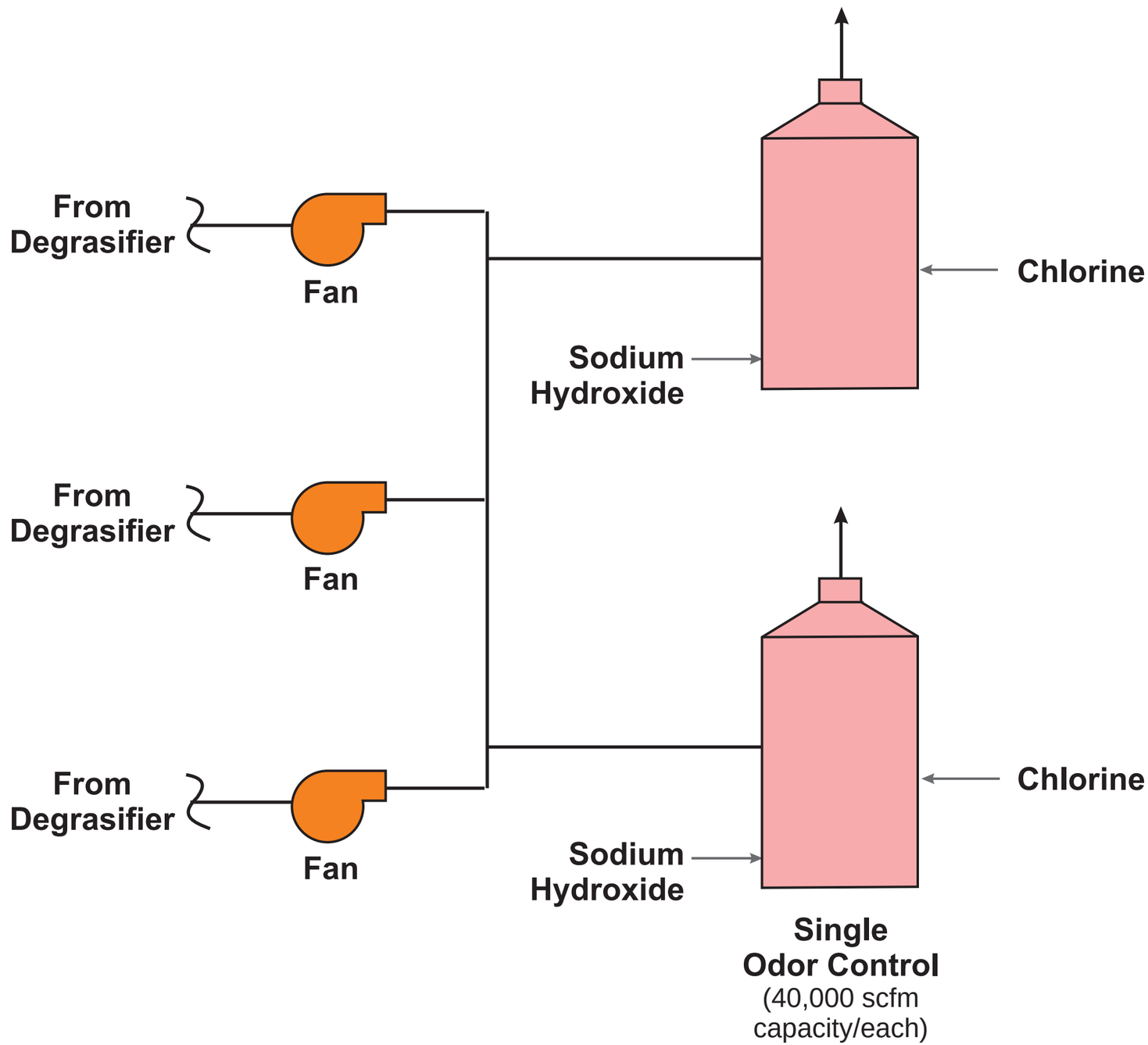

Figure II.5
Nanofiltration Plant - Odor Control

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5. Concentrate Disposal

The Town has entered into an agreement with the Loxahatchee River District (LRD) to provide concentrate to LRD's reuse facility. Nanofiltration concentrate will be piped to on-site ponds at LRD's facility where it will be blended with reuse water produced by the LRD facility. The blended reuse water will be distributed to customers for irrigation purposes. Residual pressure from the NF membrane skids is sufficient enough to transfer the concentrate to the LRD facility without additional pumping.

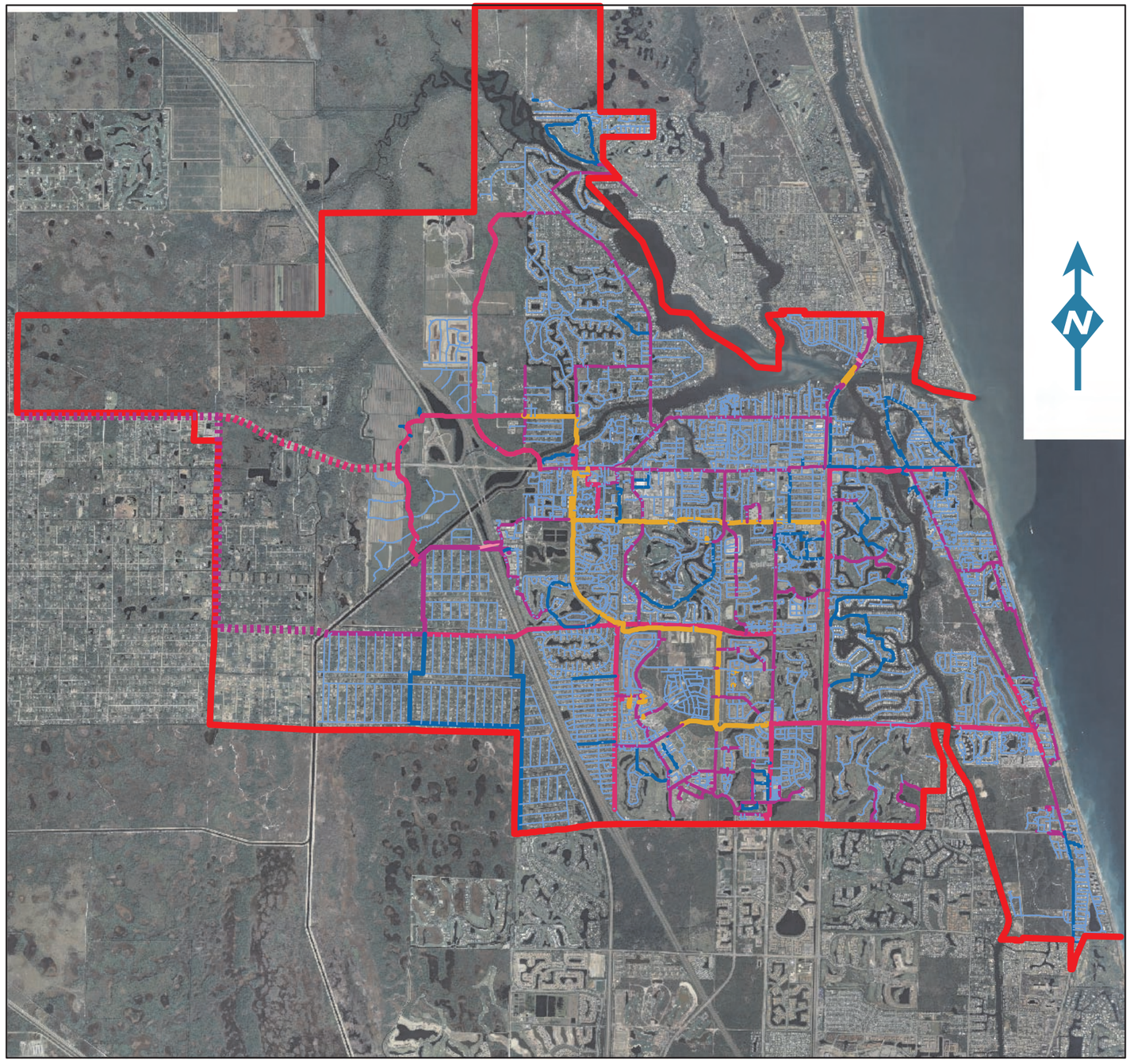
Should the situation ever arise that the LRD facility cannot accept the concentrate from the Town (due to water quality incompatible with its reuse program requirements or catastrophic damage to the conveyance pipeline), it is anticipated that the concentrate will be permitted to be discharged to the C-18 Canal via the existing R.O. concentrate outfall. The Town is currently holding discussions with FDEP for approval of emergency discharge of concentrate.

D. Future Water Storage, Transmission and Distribution Facilities

In order to serve the rapid growth within the service area and maintain a high level of service to existing customers, the Utility must continue to invest in its storage, transmission and distribution facilities. Primary goals to be achieved in this area for the upcoming planning period can generally be categorized as follows:

- Renewal and replacement of existing facilities to maintain a high level of service (adequate pressure, minimal disruption of service/line breaks, high quality product) to existing customers.
- New facilities to provide a higher level of service to existing areas which may experience lower than desired pressures under certain circumstances.
- New facilities to accommodate continued growth in the service area.

As such, the suite of improvements in Table II.5 is currently planned relative to the storage, transmission and distribution system. Figure II.6 shows existing and proposed transmission and distribution system piping. As indicated, the primary transmission system components yet to be completed are those in West Jupiter (along Jupiter Farms and Indiantown Roads).



JUPITER WATER UTILITIES

EXISTING AND PROPOSED TRANSMISSION

LEGEND:

- POTABLE WATER SERVICE AREA
- 8in OR LESS MAINS
- 10in MAINS
- 12in MAINS
- 14in MAINS
- 16in AND 18in MAINS
- 20in MAINS AND OVER
- 12in / 16in DASHED LINES FOR PROPOSED MAINS

10,000 Feet

NewWaterCADmap.pdf /.mxd
April 2007 Jupiter GIS

40516-112R047.cdr

Figure II.6
Existing and Proposed Transmission System

Table II.5
Future Water Storage, Transmission and Distribution Facilities

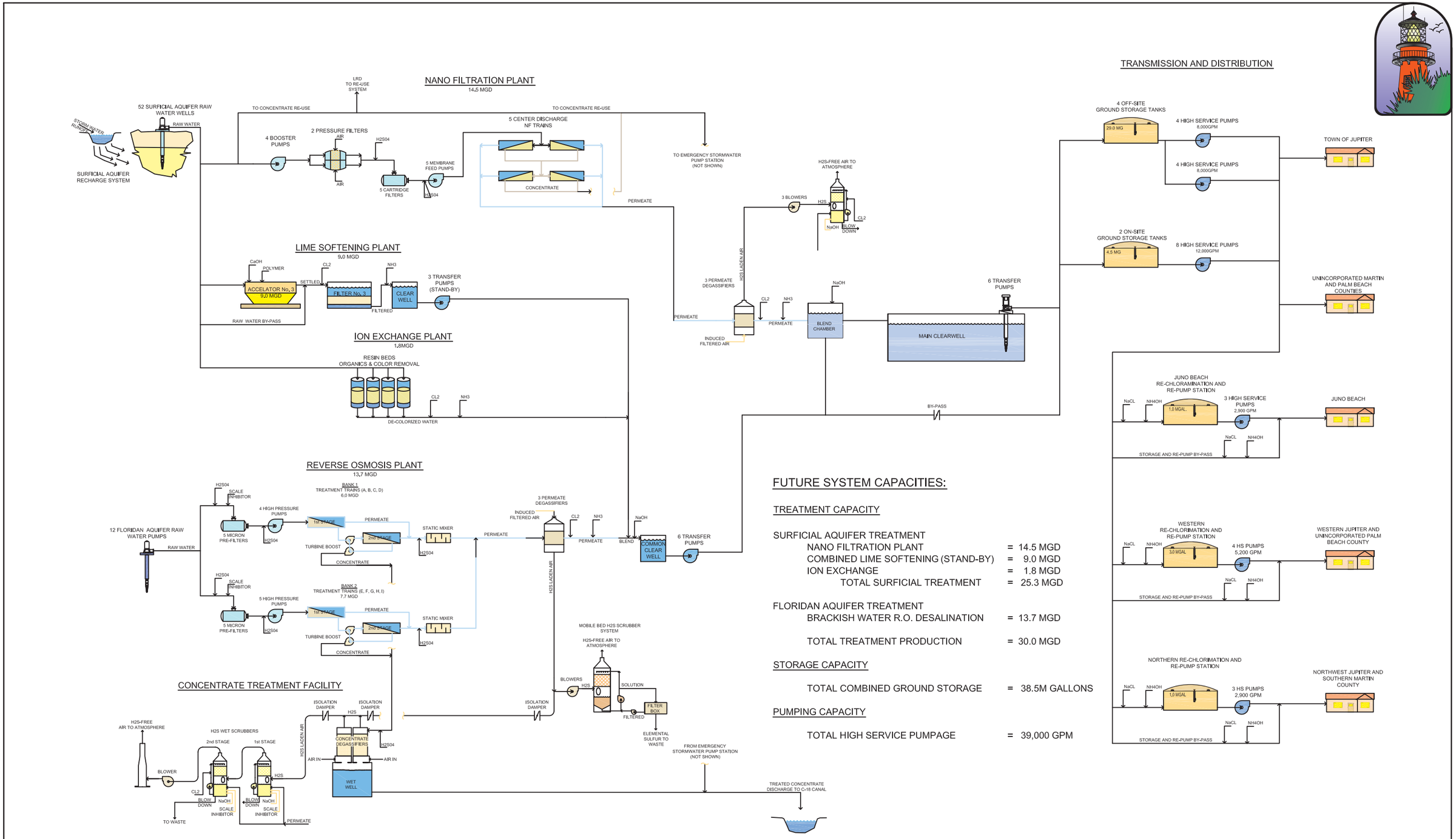
Project	Estimated Cost
Central Boulevard 8 MG Storage Tank	$3,600,000
Western Service Area Water Storage and Repumping Facility [1]	$4,615,400
South Martin County Repump Station	$2,200,000
Bluffs Area Transmission System	$304,000
West Jupiter Transmission	$5,725,000
Distribution System Renewal and Replacement (Subtotal)	$11,560,342
Jupiter River Estates	*$2,825,742*
North Jupiter	*$1,234,000*
Inlet Village	*$877,000*
Penn Park	*$509,000*
Juno Beach	*$1,205,000*
Loxahatchee River Road Area	*$912,450*
Fisherman's Landing	*$582,000*
Seneca Street	*$75,000*
Yacht Club Drive	*$522,250*
U.S. 1 Level Bridges	*$500,000*
Little Club	*$1,972,900*
Riverbend	*$345,000*
Total	**$28,004 ,742**

[1] *A portion of this project has already been completed, but the system will not be complete and operational until 2007.*

[2] *Additional information regarding project descriptions, funding sources and year(s) of funding is provided in Section V.*

[3] *The above do not include transmission and distribution system extensions/additions which are constructed by developers and ultimately deeded to the Town. Significant extensions/additions are currently being constructed in the Western Service Area (particularly Palm Beach County Estates and Parcel 19).*

The various future system components are indicated graphically in Figure II.7.



FUTURE SYSTEM CAPACITIES:

TREATMENT CAPACITY

SURFICIAL AQUIFER TREATMENT		
NANO FILTRATION PLANT	=	14.5 MGD
COMBINED LIME SOFTENING (STAND-BY)	=	9.0 MGD
ION EXCHANGE	=	1.8 MGD
TOTAL SURFICIAL TREATMENT	=	25.3 MGD
FLORIDAN AQUIFER TREATMENT		
BRACKISH WATER R.O. DESALINATION	=	13.7 MGD
TOTAL TREATMENT PRODUCTION	=	30.0 MGD

STORAGE CAPACITY

TOTAL COMBINED GROUND STORAGE	=	38.5M GALLONS

PUMPING CAPACITY

TOTAL HIGH SERVICE PUMPAGE	=	39,000 GPM

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Figure II.7
Water System Process Flow Diagram – Proposed Future Configuration

Chapter III

GIS System Update

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Chapter III
GIS System Update

GPS Field Data Collection and GIS Layer Spatial Correction for Water System

The Utility's Geographic Information System (GIS) has grown to become an irreplaceable tool for the management of the Town's potable water production and distribution systems. Over the past several years, the Town's GIS staff have developed a GIS dataset which provides the spatial location and a large array of essential attributes for the Town's 8,500+ pipe segments and 11,000+ valves, hydrants, meters, reducers and caps. This GIS dataset provides the sole basis for the Town's water atlas, which provides the Town's utility maintenance staff, contractors and consulting engineers with the basic information necessary to manage, maintain and extend the water distribution system.

As the water distribution system GIS dataset was developed using a variety of data sources, the spatial accuracy of individual facilities is less than what is desirable to support its many uses. To remedy this, the Town initiated a project to use Global Positioning System technology for locating each water distribution system facility to within submeter accuracy. To accomplish this effort, Northstar Geomatics, a Stuart, Florida based survey firm was contracted to ground-truth approximately 6,050 of the Town's dataset features.

GPS coordinates for utility point features were collected in the field using a Trimble GeoXT GPS Receiver/Data Collector with Differential GPS functionality. Potable water distribution system features included water valves (typically on mains of more than two inches in diameter) and hydrants. Required attributes gathered in the field included the X & Y, or latitude & longitude coordinates.

Northstar Geomatics attempted to locate all point features shown on Town system maps and GIS layers, and as directed by Town staff. Points that could not be recovered in the field through a visual inspection were attributed as "Not Found." A list of un-recovered features was forwarded to Town staff who then prepared documents and located these features in the field to enable GPS collection at a later time. Structures that were apparent in the field which were not shown on existing water system maps were also collected by Northstar Geomatics GPS field staff. In the event that GPS could not be utilized due to obstructions in communications between GPS units and orbiting GPS satellites, the location of a feature was determined from offsets of a GPS obtainable position, or from visual location of the feature based on provided digital aerial photography.

The GPS points collected in the field provided the spatial location for utility features in the GIS layers. Features in the Town's GIS dataset were subsequently repositioned to the coordinates collected in the field with GPS. All features that have been located and to which GPS coordinates have been assigned were moved to the collected coordinates.

Completed work/layers of data collected in the field and the resultant adjusted GIS layers were provided to the Town for review on a monthly basis (see Figure III.1).

The project was initiated in December 2003 and completed in September 2004.

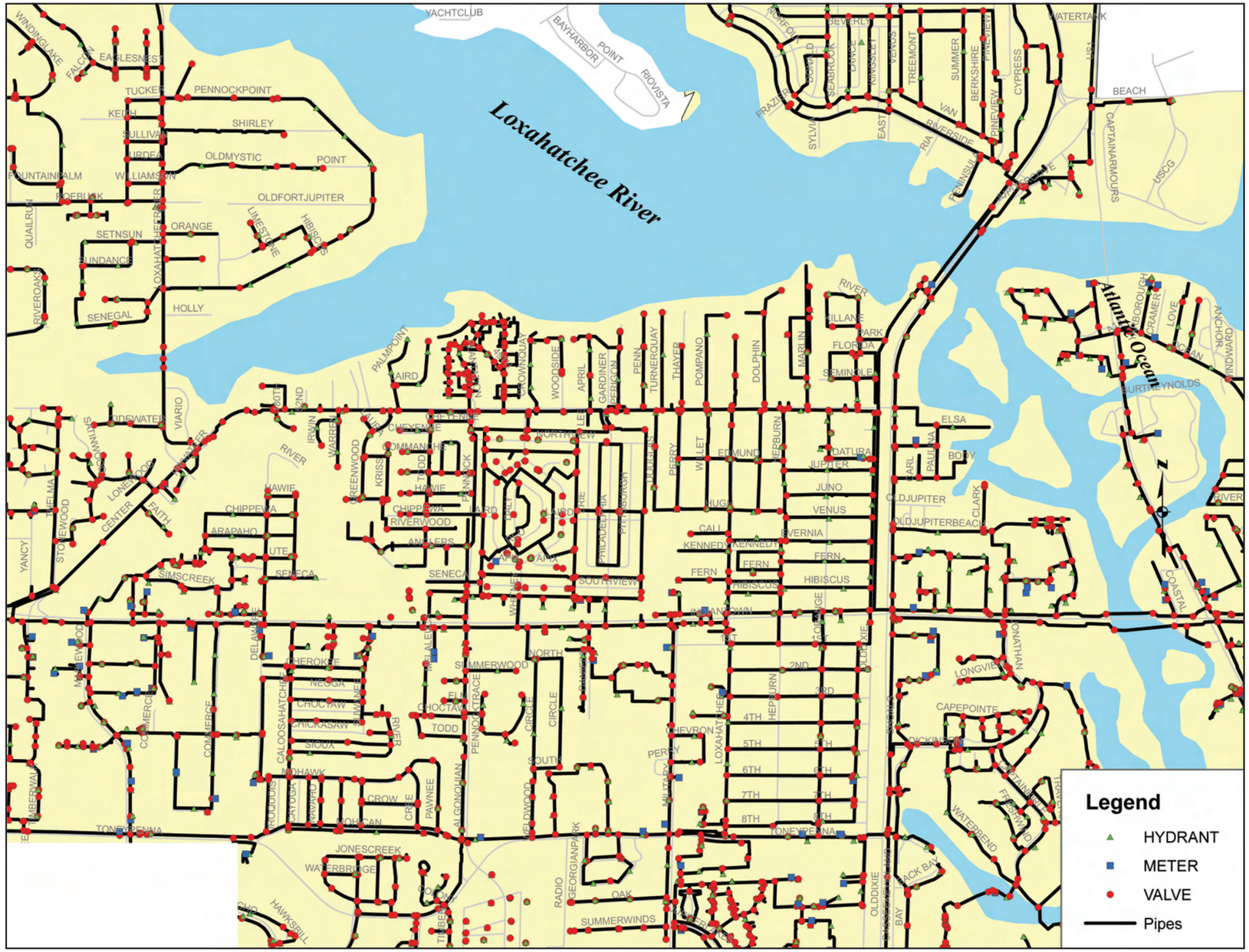

Figure III.1
Global Positioning System/
Geographic Information System Facilities (Typical)

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Chapter IV

Hydraulic Model Development and Use

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Chapter IV
Hydraulic Model Development and Use

The Town of Jupiter is currently providing potable water to approximately 75,000 people living in Jupiter, Tequesta, Juno Beach and unincorporated Palm Beach and Martin Counties. It operates a water treatment plant near the intersection of Indiantown Road and Central Boulevard which utilizes both lime softening, ion exchange and reverse osmosis (R.O.) treatment processes with a combined capacity of approximately 29 million gallons per day (mgd). The Town's water distribution system's network of pipes has grown steadily over the years to provide service to the Town's growing population and expanding business community. Until now, expansion of the distribution system has been accomplished without the benefit of a comprehensive water distribution system hydraulic model.

A hydraulic model, when calibrated correctly to reflect the hydraulic performance of the existing piping network, pumping systems and storage facilities, allows the Town to analyze the system to identify areas of low pressure and poor performance. Further, a hydraulic model assists the Town's staff and their consultants to design appropriate remedies and future network expansions that could be implemented under the Town's Capital Improvement Plan. To this end, a hydraulic model was developed, calibrated and used to analyze the Town's existing potable water distribution system. Areas of concern in terms of distribution pressure and fire flow capabilities were identified with the calibrated model using current water consumption demand and future water demand expected in 2010, when the Town's service area has achieved a near "built-out" condition. Capital improvement projects were identified that would mitigate specific distribution system deficiencies predicted by the model under 2010 demand conditions.

A. Existing System Description

The water distribution system consists of approximately 365 miles of pipelines as well as one remote one-million gallon ground storage tank and pump station northwest of Donald Ross Road and US 1 in Juno Beach. In addition, finished water storage capacity of 4.5 million gallons is provided on site at the Water Treatment Plant and 21 million gallons at the storage/high service pump facility on Central Boulevard. High service pumping facilities at the plant and on the west side of Central Boulevard supply the distribution system and operate to maintain system pressure (approximately 70 psi).

Based upon discussions with utility staff, together with the review of available system pressure records, the system appears to respond satisfactorily throughout most of the

service area under current conditions. However, areas with the most noted pressure deficiencies are in North Jupiter, north of the Loxahatchee River and in The Bluffs area, south to Juno Beach.

1. Distribution System Pipelines

For the purposes of this evaluation, the modeled distribution system consists of pipelines 6 inches in diameter and larger which deliver water to major areas of the Town. Therefore, localized distribution components consisting of lines less than 6 inches in diameter – fire hydrants and service lines – are not included in the distribution system analysis. In some cases, however, inclusion of lines 4 inches in diameter was necessary to complete network segments for proper performance of the network model. Figures IV.1 and IV.2 illustrate the Town's current distribution system by pipe diameter.

The distribution system includes pipe segments made primarily of four types of materials – ductile iron pipe, C-900 PVC, HDPE and asbestos cement. In general, asbestos cement pipe was installed from approximately 1957 to 1997, C-900 PVC from approximately 1971 to present, ductile iron pipe from approximately 1958 to present, and HDPE, primarily used for service connections, from approximately 1971 to present. Pipe sizes range from 2 to 30 inches in diameter. The distribution system originates at the Town's water treatment plant and extends easterly, northerly, westerly and southerly.

There are three functional crossings of the Intracoastal Waterway.

Location	Pipe Size/Type
• Indiantown Road	10 inch diameter HDPE
• Indiantown Road	16 inch diameter HDPE
• Frederick Small/Marcinski Roads	18 inch diameter ductile iron pipe

The Town recently completed negotiations with the Loxahatchee River Environmental Control District for the purchase of a previously unused 16-inch diameter pipe also crossing the Intracoastal Waterway at Frederick Small/Marcinski Roads. This crossing is not yet functional.

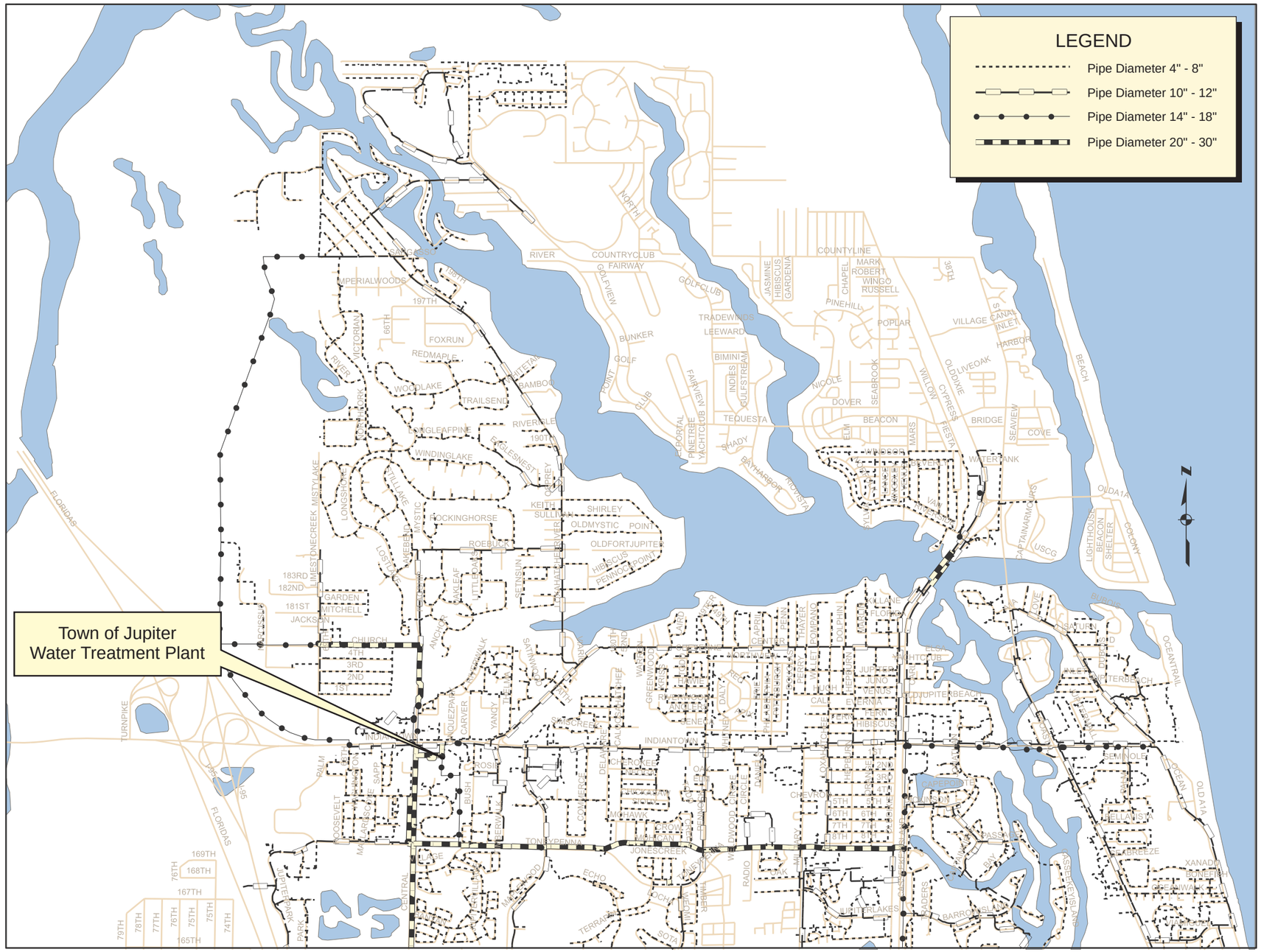

Figure IV.1
Water Distribution System - North

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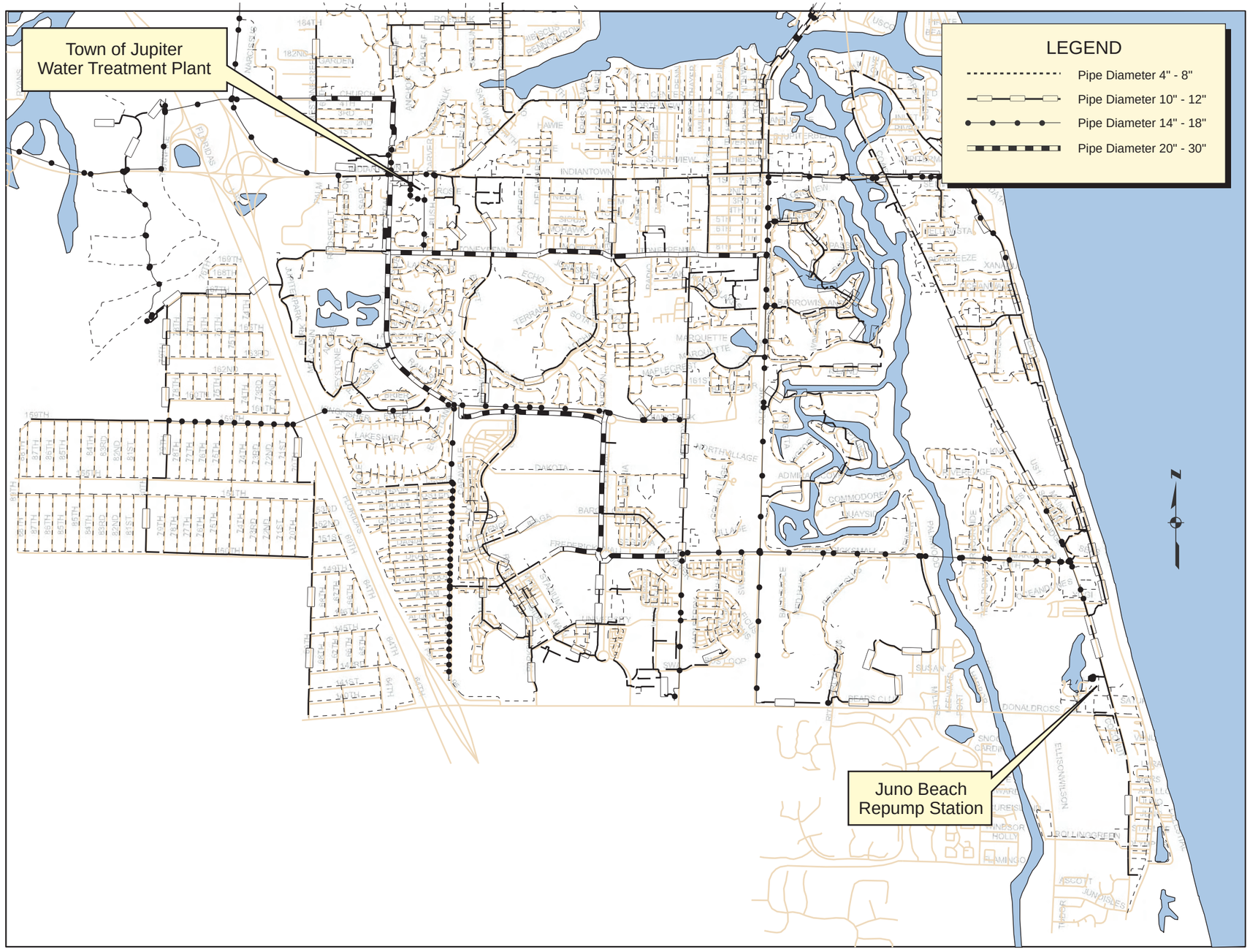

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Figure IV.2
Water Distribution System - South

There are also five crossings of various branches of the Loxahatchee River and the C-18 Canal.

Location	Pipe Size
• Alternate A1A	20 inch diameter (2 parallel lines)
• Island Way	12 inch diameter
• Island Way (C-18 Canal)	18 inch diameter
• Loxahatchee River Road	12 inch diameter
• Central Boulevard	24 inch diameter

2. Water Storage Facilities

The Town's water storage system consists of six ground storage tanks. Two are located at the Water Treatment Plant, three are located at the Central Boulevard High Service Pump Station and one is located at the Juno Beach Re-pump Station. Water is delivered from the Water Treatment Plant across the road to the ground storage tanks at the Central Boulevard High Service Pump Station via a dedicated 30-inch diameter line. Table IV.1 summarizes the finished water storage volume available at each facility. An additional 3 MG storage tank and repump station is currently under development on the south side of the C-18 canal, west of Florida's Turnpike.

Table IV.1
System Water Storage Capacity

Water Treatment Plant	1.5 MG
	3.0 MG
Central Boulevard	5.0 MG
	8.0 MG
	8.0 MG
Juno Beach Repump Station	1.0 MG
TOTAL	26.5 MG

3. High Service/Re-pump Facilities

Finished water is supplied to the transmission and distribution system through high service pumping systems located at the Water Treatment Plant and the Central Boulevard High Service Pump Station. In general, pumps are operated automatically, that is, started, stopped and speeds adjusted by the Water Treatment Plant's control system. The Water Treatment Plant has an array of eight high service pumps with drives that include both 150 hp and 200 hp motors. The existing Central Boulevard High Service

Pump Station has four pumps each rated at 200 hp. The second high service pump station, recently commissioned into service, at the Central Boulevard facility has two 200 hp pumps (with the provision for two more pumps to be added). The Juno Beach Re-pump facility has three high-service pumps, each rated at 75 hp. All pumps in the system can be operated manually from the Water Treatment Plant control room, or automatically, relying on automated control logic associated with programmable logic controllers (PLCs) located at each facility. Each pumping facility's control system is set to maintain a service pressure of 70 psi.

B. Distribution System Hydraulic Model

Network analysis is the process of analyzing a water distribution system through the use of a mathematical computer model. A database describing the network, operating parameters, and the spatial allocation of water demands used in conjunction with a network solution computer program comprises a model of the system.

The following describes the development of the steady state hydraulic analysis model of the distribution system, system water demand spatial allocation techniques, and model calibration procedures. The intent for this model was limited to simulating steady state analysis of the water distribution system, under peak hour and maximum day plus fire flow demand conditions.

The WaterCAD Version 7.0 hydraulic modeling application was used to construct and analyze the Town's water distribution system. WaterCAD's computational algorithm permits the simulation of system network pressures, pipe flow rates, hydraulic grades, tank levels and pumping rates using the Hazen-Williams or Darcy Weisbach friction equations. The model permits a steady state analysis predicting the flow in each pipe and the hydraulic grade at each system node. Extended period simulation can also be performed from a variable demand schedule to predict system pressures and tank water levels for final design parameter determinations and tank turnover estimates. The model is a useful tool for Town staff to evaluate future scenarios under a variety of conditions.

A model layout of the water distribution system was developed from the Town of Jupiter water atlas maps (dated January 2004) provided by the Town in both paper and electronic formats. All distribution mains with pipe diameters equal to or greater than 6 inches were digitized directly into the computer model using the Town's pipe GIS data layer as a background. Several pipes 4 inches in diameter considered to be critical to system operation were also included in the model network. Pipes considered to be critical included those that were necessary to complete network loops. The resulting network consisted of approximately 5,400 pipes and 2,900 pressure junction nodes.

The network node locations (pipe intersection points) were determined according to the Town's Water Atlas. Network nodes are located at the intersections of pipes and other locations where water demands were assigned to the system. For example, a node was placed at the Tequesta master meter location. United States Geological Survey (USGS) 5 foot GIS elevation data were used to establish grade elevations for each node location. Node elevations of buried pipelines in this analysis were assumed to be 3 feet below grade. High service pump station and repump station control pressures were set in the model at actual pressure transmitter elevations.

Initial pipeline friction factors (Hazen-Williams C-factors) were set at levels associated with average new piping, then adjusted as needed during the model calibration step to bring model pressure results inline with pressures measured in the field. The initial C-factors for the three types of pipe materials used in the distribution network, are shown in Table IV.2.

Table IV.2
Initial Hazen-Williams
Friction Coefficients (C-Factors)

Pipe Material	C-Factor
Ductile Iron	130
C-900 PVC	150
Asbestos Cement	140

C. System Water Demands

Based on 2004 data, the Town of Jupiter currently provides potable water service to more than 24,000 retail customers in the Town's Service Area and one wholesale customer. Water is billed directly to residents and businesses in Jupiter, Juno Beach, and unincorporated Palm Beach and Martin Counties. The Village of Tequesta is the only wholesale customer supplied by the system (allocation of 1.35 mgd).

1. Base Flow Demand

Base flow demand defines the water consumption spatial allocation throughout the Town's water distribution system. To accurately assign the base flow demand to the hydraulic model nodes, a GIS method was used that spatialized individual potable water accounts with their associated monthly consumption, then linked them to the nearest model pressure node.

The Town of Jupiter provided copies of the potable water account billing database for every month of 2004, the most recent year with a complete dataset. Consumption data for the month of April was chosen as it was the peak month for water demand in 2004.

Table IV.3 provides a representation of total monthly billed water sales for the Town of Jupiter for 2004.

Table IV.3
Total Potable Water Sales 2004 (Gallons)

Month	Retail	Wholesale	Total
January	432,814,000	42,659,000	450,283,000
February	353,726,000	42,913,000	414,107,000
March	445,658,000	47,136,000	485,515,000
April	527,626,000	42,352,000	577,493,000
May	380,386,000	39,718,000	469,975,000
June	460,289,000	40,994,000	520,974,000
July	513,059,000	41,669,000	554,729,000
August	421,041,000	39,485,000	460,527,000
September	355,922,000	29,148,000	385,071,000
October	326,969,000	39,931,000	366,900,000
November	413,564,\000	45,918,000	459,483,000
December	460,895,000	43,417,000	504,313,000

Account spatialization was achieved using a geocoding GIS procedure where potable water account service addresses were matched with street address ranges associated with the streets GIS data file provided by the Town. Figure IV.3 provides a representation of spatialized accounts across the Town's service area. Another GIS procedure was used to accumulate individual demands at model pressure nodes. The GIS results (water demands by node) were tabulated and then imported into the hydraulic model as the base flow demand, also referred to as average daily demand. The total base flow demand used in the model was 19.2 mgd.

2. Fire Flow Demand

A water distribution system must provide potable water to meet peak hour user demands as well as satisfy fire fighting demands which may occur throughout the system under Maximum Daily Flow conditions. The Insurance Services Office (ISO) establishes standards for required water flow for fire suppression purposes from fire hydrants. ISO is a private corporation that evaluates the public fire defenses of municipalities. The ISO periodically conducts fire flow tests, and based on the results, assigns an insurance classification to communities.

Fire flow demands depend upon many factors, including building use, type of construction, building height, floor area, and distance to nearby buildings. For example, fire flow requirements in residential structures no higher than two stories may range between 500

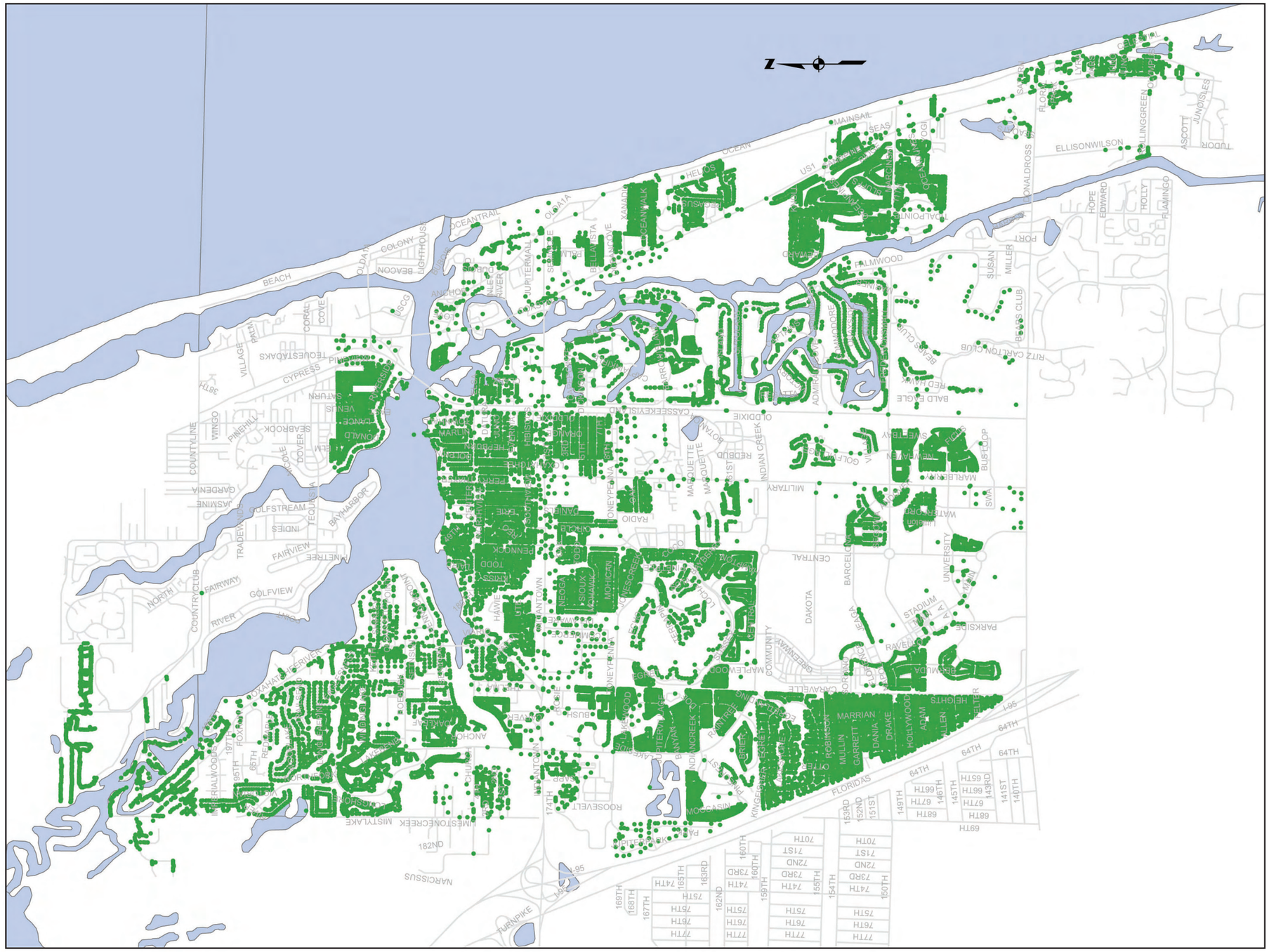

Figure IV.3
Potable Water Service Locations

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and 1,500 gpm, depending upon building spacing from adjacent structures, whereas institutional and industrial requirements may be up to 5,000 gpm. Table IV.4 summarizes typical fire protection criteria for various user categories.

Table IV.4
Fire Protection Evaluation Criteria

Land Use	Fire Flow (gpm)	Duration (hours)
Industrial	Up to 5,000	4
Shopping Centers	3,500 to 5,000	4
Multi-Story Residential/Commercial	3,500 to 5,000	4
Business Districts	2,000 to 3,500	3
Residential	500 to 1,500	2

For purposes of fire flow demand performance of the distribution system, three fire demand scenarios were assessed in conjunction with maximum day demands, as presented in Table IV.5.

Table IV.5
Fire Demand Simulations

Location	Required Fire Flow
Jupiter Medical Center	5,000 gpm
Haas Building	3,500 gpm
Bluffs Shopping Center	3,500 gpm

Results of the fire flow demand analyses were used to verify local distribution system performance and, where appropriate, evaluate the effectiveness of local system storage and pumps as a supplemental supply.

3. Year 2010 Water Demands

One of the more useful aspects of a distribution system hydraulic model is that it provides the ability for a utility to anticipate system modification requirements that would likely be needed some years into the future. This is typically done by estimating future changes in water demand associated with development and associated changes in population. Water demands for 2010 were incorporated into the model using Equivalent Residential Connection (ERC) estimates made by Town staff for planned new and redeveloped parcels within the Town's service area. New ERC demands were added to 2004 demands which were assumed to remain unchanged in 2010. The Town provided a GIS dataset that contained polygons representing each of these areas. Each polygon

had been assigned an ERC demand estimate by the Town where one ERC is equal to 10,500 gallons per month of billed potable water. Figure IV.4 illustrates the size and location of future development/redevelopment areas associated with 2010 water demand.

A very significant element of 2010 demand is the elimination of the Village of Tequesta bulk service agreement. This reduces base flow demand in the north Jupiter portion of the service area by approximately 1.4 mgd or about 3.36 mgd under peak hourly flow conditions.

The 2010 demand was incorporated into the model using GIS procedures that attached ERC demands with existing model nodes where new demands would likely tie-in. In the case of the Parcel 19 developments and Palm Beach Country Estates, new piping layouts provided by the Town were added to the model and new demands were attached to associated nodes.

4. Maximum Daily and Peak Hourly Flows

A conservative approach to distribution network analysis requires that the system be subject to demands that are greater than average as system flow requirements vary greatly on a daily, monthly and annual basis. For that reason, system performance is typically evaluated using both Maximum Daily Flow and Peak Hourly Flow demands. Distributed average demands for each model node are multiplied by both Maximum Daily Flow and Peak Hourly Flow peaking factors to provide the basis for testing the system under conditions of greater stress.

The Maximum Daily Flow peaking factor in this analysis is defined as the greatest daily flow for the 2004 calendar year divided by the average daily flow for the entire year. The Peak Hourly Flow peaking factor is defined as the greatest hourly flow for the 2004 calendar year divided by the average hourly flow for the year. The Maximum Daily Flow and Peak Hourly Flow peaking factors for this model were calculated from the 2004 Water Treatment Plant SCADA/HMI historical database provided by the Town and are as follows:

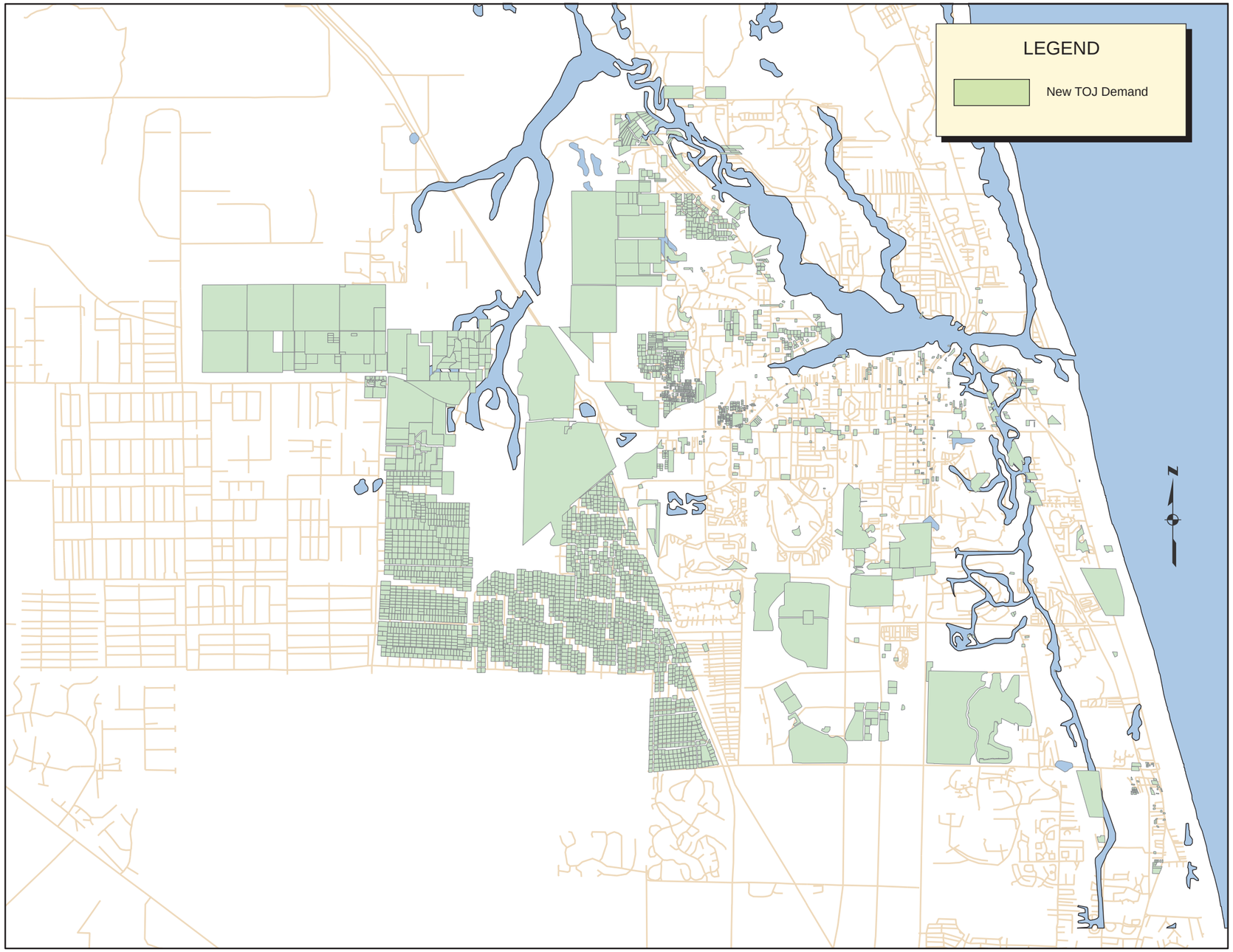

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Figure IV.4
Areas of New Demand - 2010

2004 Flow Data

	Peaking Factor	Flow (mgd)
Maximum Daily Flow	1.38	19.5
Peak Hourly Flow	2.24	31.5

Both are very close to industry "rule of thumb" values for Max Day and Peak Hourly Flow peaking factors for moderate sized distribution systems of 1.5 and 2.5, respectively.

In general, Peak Hour Demand scenarios were utilized to evaluate transmission system improvements and Maximum Daily Demand scenarios were used to assess system fire flow performance.

D. Hydraulic Model Calibration

The hydraulic model is designed to predict the system's present and future operational parameters under specific demand scenarios. Calibration of the model was accomplished using empirical pressure data collected from various locations around the service area and comparing it to model predictions. The accuracy of the model can be measured by how close the model's predictions are to observed and measured system conditions. Accuracy is improved by iterative modification of model attributes until conditions match to an acceptable degree (typically within 10%).

Town of Jupiter staff deployed an array of seven pressure recorders over a one-month period to 21 hydrant locations around the utility service area, as shown in Figure IV.5. To calibrate the model, recorded system pressures were compared against modeled results. "C" factors for specific classes of pipes were carefully adjusted and localized differential irrigation demands accounted for until the recorded and modeled system pressures converged within an acceptable range (typically within 10%). The final calibration results are provided in Table IV.6.

The American Water Works Association Manual M32, Distribution Network Analysis for Water Utilities, states that a model can be considered acceptably calibrated if it predicts performance within ten percent of the observed performance. Calibration results for this model had an average error of approximately three percent and hence are well within the recommended range of accuracy for the analysis of model scenarios.

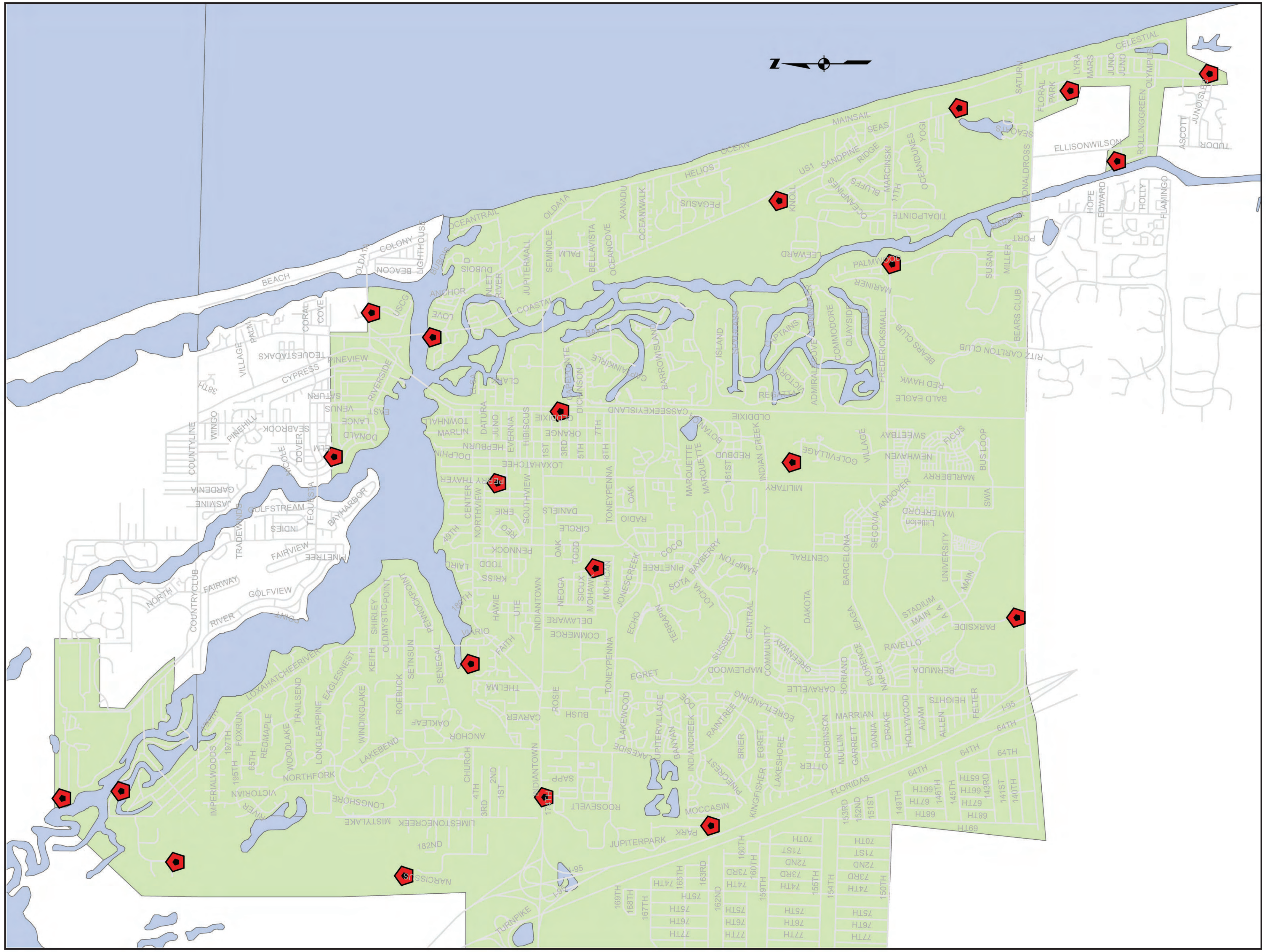

Figure IV.5

Pressure Monitoring Locations

Town of Jupiter Water Master Plan Update

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Table IV.6
Model Calibration Results

Location	Model Node	Field Pressure	Model Pressure	Percent Difference
Frederick Small x Palmwood	J-473	53.38	52.90	0.9%
US 1 at Ocean Royale	J-2943	44.63	42.89	3.9%
Indiantown Rd. x 68th Terrace	J-636	63.50	66.17	4.2%
2nd Avenue x Old Dixie	J-995	52.53	53.16	1.2%
Douglas Drive	J-1038	53.24	54.70	2.8%
Tidewater x Loxahatchee River Road	J-1075	56.50	60.41	6.9%
SE North Passage Way (Martin Co.)	J-1144	49.60	48.54	2.1%
Merritt Way (Martin Co.)	J-1155	53.70	53.42	0.5%
N. End of Jupiter Community Park	J-1207	66.40	63.33	4.6%
End of Seashore Dr. (Bluffs)	J-1383	46.40	48.67	4.9%
North Village Way	J-1714	56.22	56.15	0.1%
Parkside x Donald Ross Road	J-1764	58.20	54.56	6.3%
Island Country Estates (Martin Co.)	J-2081	53.94	51.25	5.0%
S. End of Jupiter Park of Commerce	J-2321	61.88	59.83	3.3%
1001 Mohawk Street	J-2605	60.13	60.88	1.2%
River Terrace	J-2652	44.40	45.16	1.7%
Average Error				3.1%

E. Water Distribution System Evaluation

A series of model runs were made in an effort to uncover significant deficiencies in network performance and to support the development of a schedule of intermediate and long-term capital improvements to the system. The following analysis scenarios were addressed with the calibrated model.

1. Existing System Peak Hourly Flow
2. Existing System Fire Flows (Maximum Daily Flow)
3. 2010 Peak Hourly Flow
4. 2010 Fire Flows (Maximum Daily Flow)
5. Existing System plus 16” Fredrick Small/Marcinski Road Parallel Crossing (Peak Hourly Flow)
6. Marcinski Road In-line Booster Station w/ 16” Parallel Crossing (Peak Hourly Flow), Eastern and Western Alignments.
7. West Jupiter Farms/PBCWUD Interconnect (Peak Hourly Flow)
8. South Martin County (Section 28) Repump Station (Peak Hourly Flow)

The scope of the system analysis was specifically limited to the distribution system piping network which consists of pipes 6 inches in diameter or greater. Distribution system pipelines consisting of pipes less than 6 inches in diameter, including fire and service lines, were typically excluded.

In addition to the delivery of adequate volume, the potable water system must also deliver adequate pressure for consumers and for fire protection purposes. Assessment criteria for system pressures are summarized in Table IV.7.

Table IV.7
Distribution System Assessment Criteria

System Pressure	Assessment Criteria
Normal Pressure at WTP	70 psi
Minimum Pressure - Non-Fire	45 psi at service
Minimum Pressure - Fire Flows	20 psi at hydrant

Assessments of existing system performance and proposed improvements based upon the above spectrum of scenarios and assessment criteria are presented in the following sections.

1. Existing Distribution Network – 2004 Demand

In general, the highest system pressure is maintained in the vicinity of the Water Treatment Plant. Under peak demand conditions, areas of low pressure, roughly between 35 psi and 45 psi, occur only in and around the Bluffs development at US 1 and Marcinski Road and in the north Jupiter area on the north side of the Loxahatchee River (see Figures IV.6 and IV.7).

The area of low pressure that runs through the Bluffs area is due to its relatively high elevation (25 to 40 ft NGVD), its distance from the Water Treatment Plant, and the limited number of Intracoastal Waterway pipe crossings available to provide water to the service area along the coast. Low pressures in the north Jupiter area are due to the large demand associated with the Village of Tequesta bulk connection at Old Dixie Highway.

Table IV.8 presents the results of the Fire Flow analysis for the existing piping network under 2004 Maximum Daily Flow conditions for the representative high (fire flow) demand locations discussed previously in this Chapter.

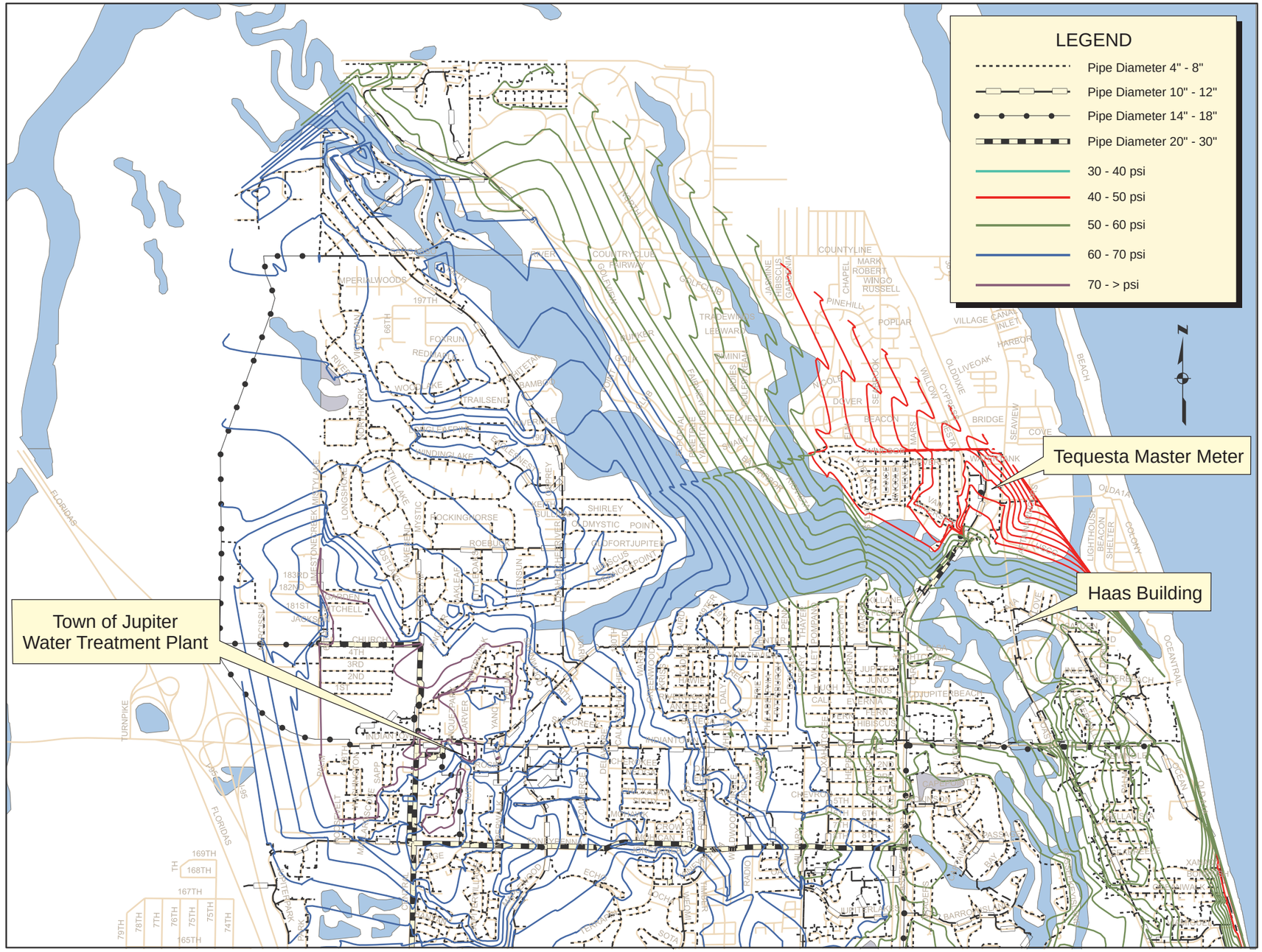

Figure IV.6
Existing Network Performance
2004 PHF - North

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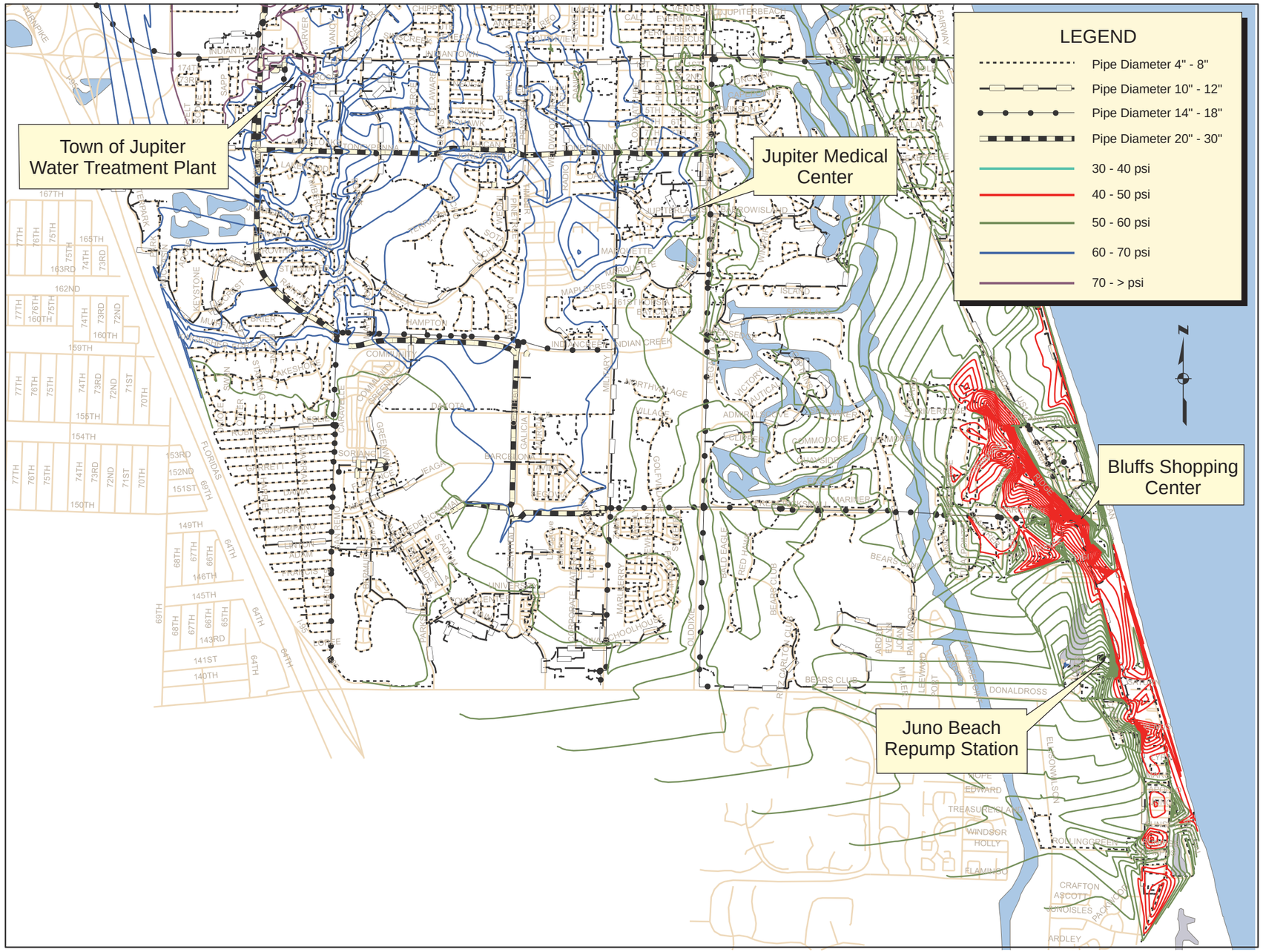

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Figure IV.7
Existing Network Performance
2004 PHF - South

Table IV.8
Fire Flow Analysis Results for Existing Piping Network - 2004

Location	Needed Fire Flow	Fire Flow Available	Residual Pressure
Jupiter Medical Center	5,000 gpm	6,000 gpm	46 psi
Bluffs Shopping Center	3,500 gpm	3,896 gpm	20 psi
Hass Building	3,500 gpm	5,000 gpm	30 psi

Under Maximum Daily Flow conditions, the Fire Flow requirements at all three locations, the Jupiter Medical Center, the Bluffs Shopping Center and the Haas Building were met. However, residual pressure at the Bluffs Shopping Center was only 20 psi, the minimum allowable.

2. 2010 Distribution Network Demand

In 2010, a net increase of about 3.9. mgd (Average Daily Flow) is expected across the Town's extended service area. Average Daily Demand will increase by about 1.5 mgd or 3.5 mgd Peak Hourly Flow due to the service area being extended to include areas west of the Florida's Turnpike including Palm Beach County Estates, Parcel 19 and portions of Jupiter Farms east of Jupiter Farms Road. The only new source of supply for this area is the Western Repump Station (to be completed in 2007). The Western Repump Station will be equipped with a 3.0 mgd ground storage tank and a 3.6 mgd pump station. Additionally, the completion of other substantial residential and commercial developments west of the Intracoastal Waterway, and others in south Martin County along the Island Way corridor and in Abacoa, will attract flow and pressure away from those portions of the service area east of the Intracoastal Waterway. The increase will be mitigated by the expiration of the bulk sale contract with the Village of Tequesta which has an average daily flow of about 1.4 mgd and the upsizing of the primary main on Riverside Drive from 8" to 12".

The net impact of the additional 2010 demand is considerable, especially in those areas east of the Intracoastal Waterway (see Figures IV.8 and IV.9). Under Peak Hour conditions in 2010, nearly all areas east of the ICW have pressures of less than 55 psi with several areas less than 45 psi. While fire flow requirements of 3,500 gpm at the Bluffs shopping center are able to be met under Maximum Daily Flow conditions, customers residing along the ridge running from coastal Juno Beach to just north of The Bluffs would experience very low pressures at the tap under Peak Hour Flow conditions. Limited portions of The Bluffs area and Juno Beach would experience Peak Hour pressures less than 35 psi.

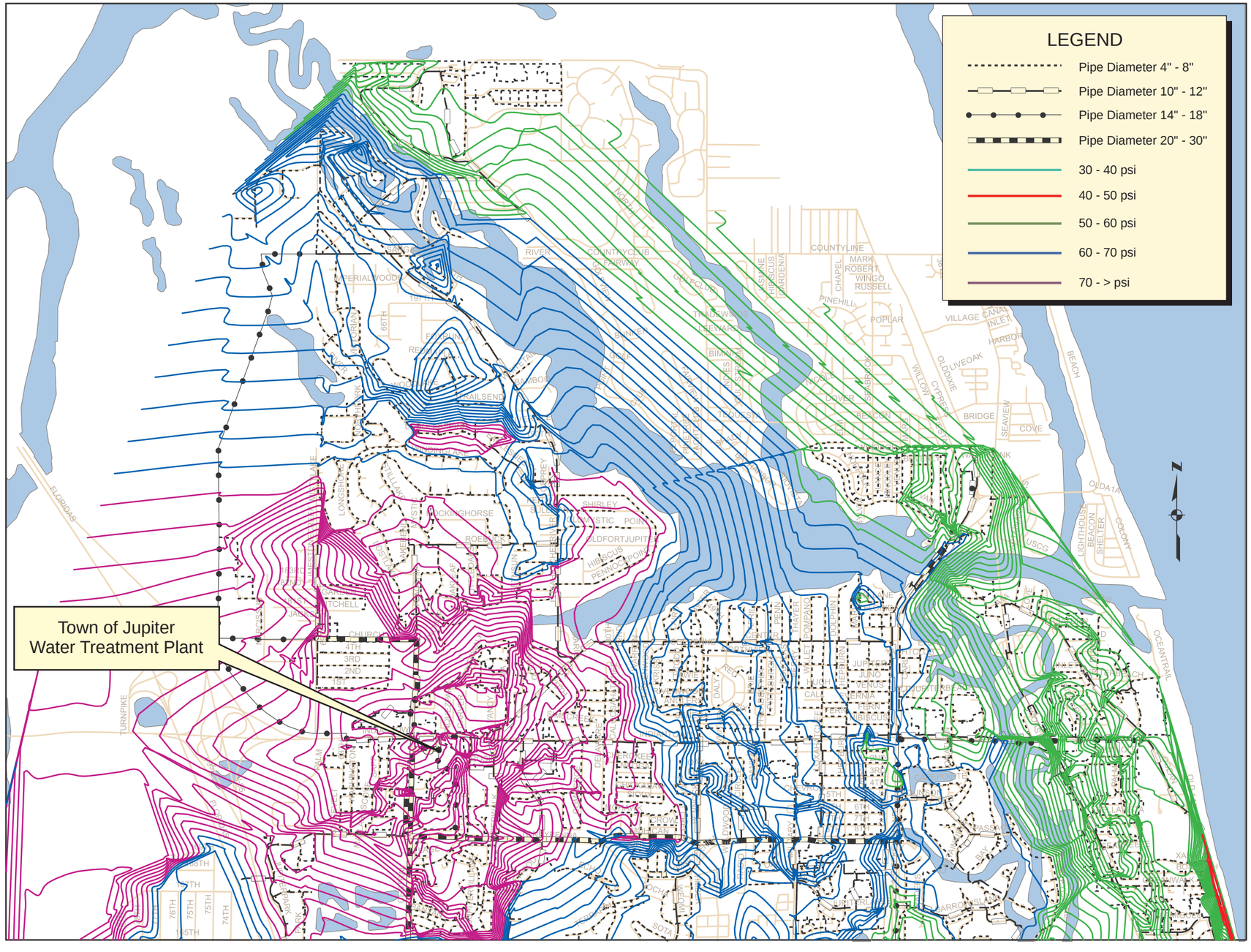

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Figure IV.8
Network Performance
2010 PHF - North

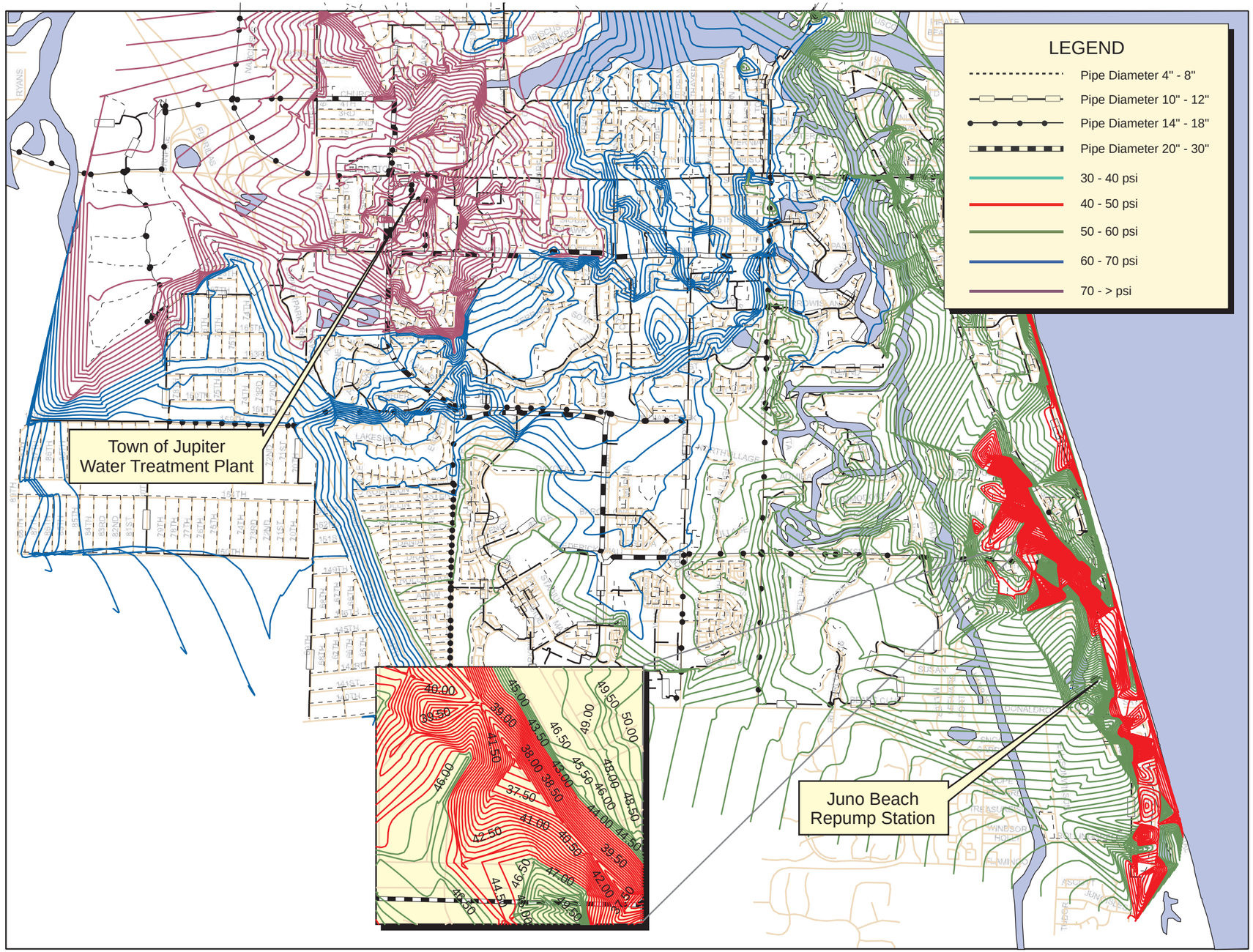

Figure IV.9
Network Performance
2010 PHF - South

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F. Capital Needs Assessment

Beyond being a practical analytical tool for evaluating the impacts of current and future water demands on distribution system performance, a successfully configured and calibrated water distribution system hydraulic model is very useful for quantifying the effectiveness of modifications to the system, both those that are already accounted for in the Town's current CIP, and those proposed for mitigating problems uncovered in the previously discussed analysis. The hydraulic analysis discussed in the previous section indicates that the principal area of concern is in the eastern service area, north and south of Marcinski Road where large areas have 2010 Peak Hourly Flow pressures that fall below the Town's minimum residual pressure threshold of 45 psi. This section addresses capital improvements to mitigate low pressures and evaluates other system modifications that are contemplated by the Town to improve system reliability and performance.

1. Bluffs Area Transmission System

Early in 2005, Town officials began considering the purchase of an existing 16-inch diameter pipe crossing of the Intracoastal Waterway (ICW), installed by the Loxahatchee River Environmental Control District (LRD) for reclaimed water distribution, but never used. The 16-inch diameter pipe is parallel and runs adjacent to the existing 18-inch diameter potable water main crossing currently in service, running from the eastern terminus of Frederick Small Road to the western terminus of Marcinski Road on the eastern shore of the ICW (see Figure IV.10). An important aspect of incorporating the LRD 16-inch diameter pipe into the Town's distribution network is its potential value as a backup to the three existing ICW crossings, (one at Marcinski Road and two at Indiantown Road). Should one of the existing crossings fail, especially the one at Marcinski Road, flow and pressure conditions could be maintained at least at current conditions with the 16" crossing. Without it, service to customers in the southeastern portion of the service area would be critically affected.

A scenario implementing the 16-inch diameter parallel crossing was analyzed with the model to determine its efficacy in improving flow and pressure under Peak Hour conditions. In the model, the parallel line begins at the intersection of Frederick Small Road and Bears Club Road and ends at US Highway 1, with tie-ins to some of the 8-inch diameter branch connections supplying developments to the north and south of the existing 18-inch diameter main and east of the 16-inch diameter main running along US Highway 1. The analysis showed that the parallel pipe provided only marginal benefit with respect to local pressures, about 1 psi (see Figures IV.11 and IV.12). Water velocities in the new pipe were less than 2 feet/second indicating that the existing 18-inch diameter crossing was not causing a substantial bottleneck to flow across the ICW. While use of the parallel 16-inch diameter parallel line did little to significantly improve service pressures east of the ICW, its value relative to redundancy and reliability is significant.

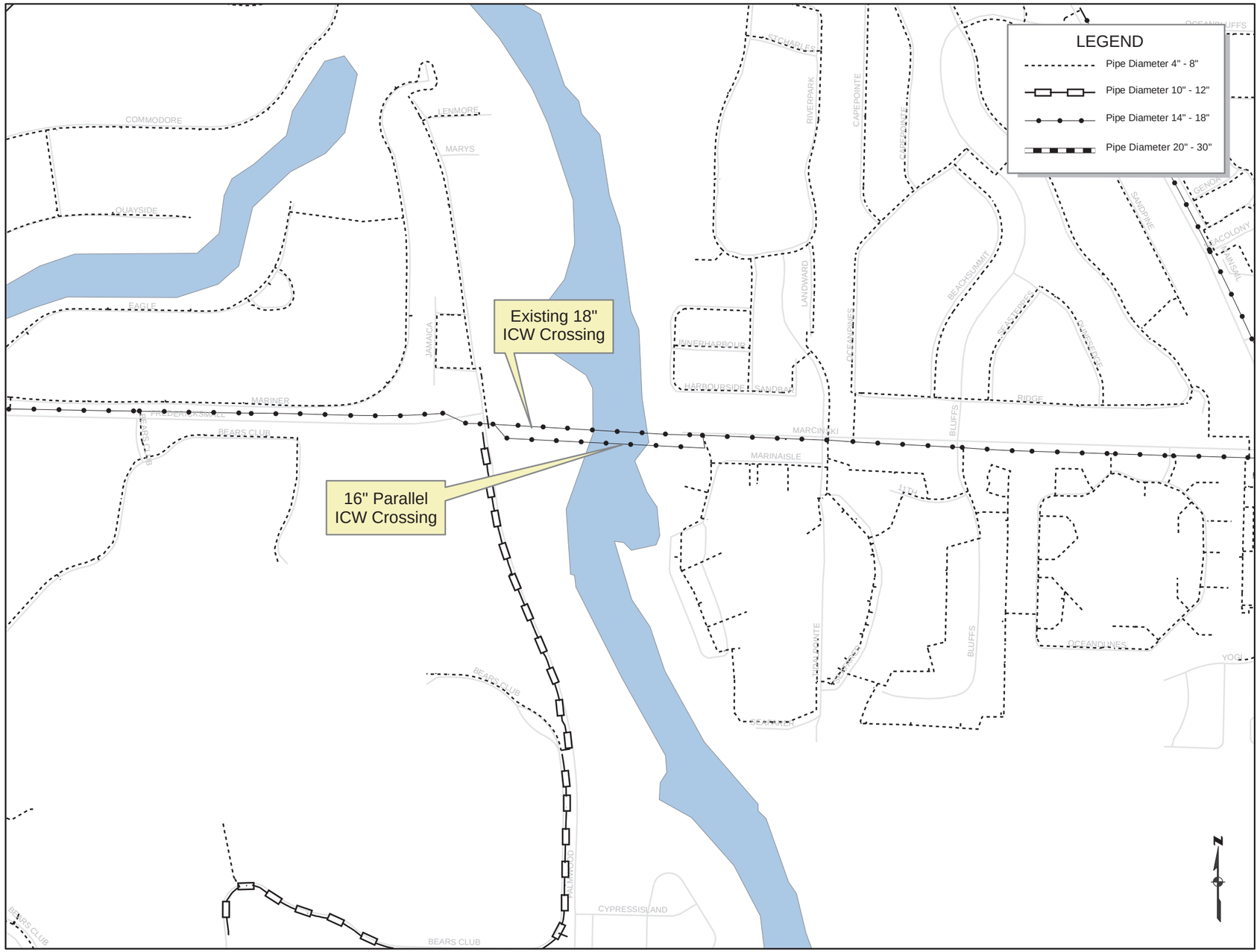

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Figure IV.10
Location of 16-inch
Parallel ICW Crossing

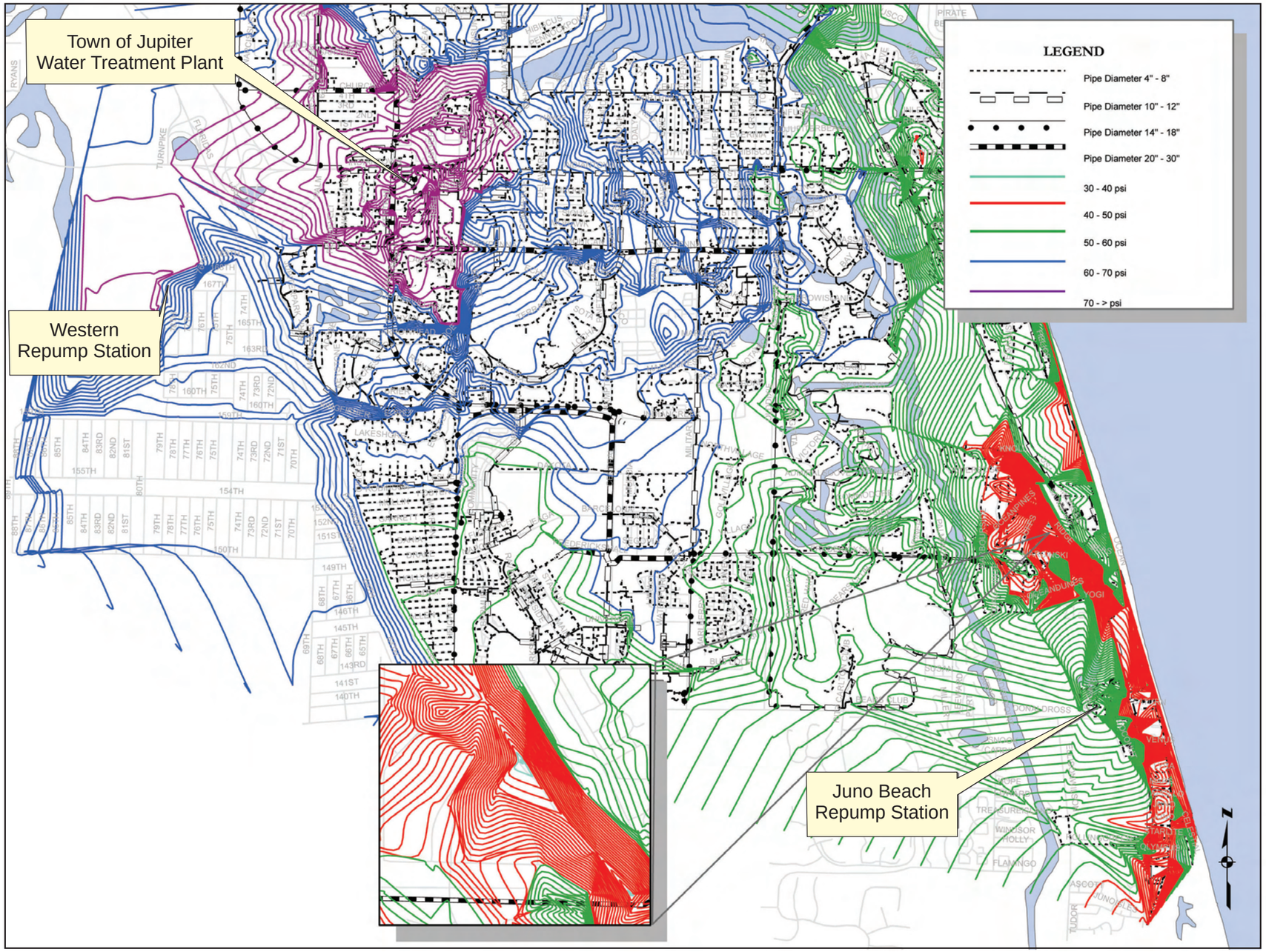

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Figure IV.11
Network Performance without
16-inch Parallel Crossing - 2010

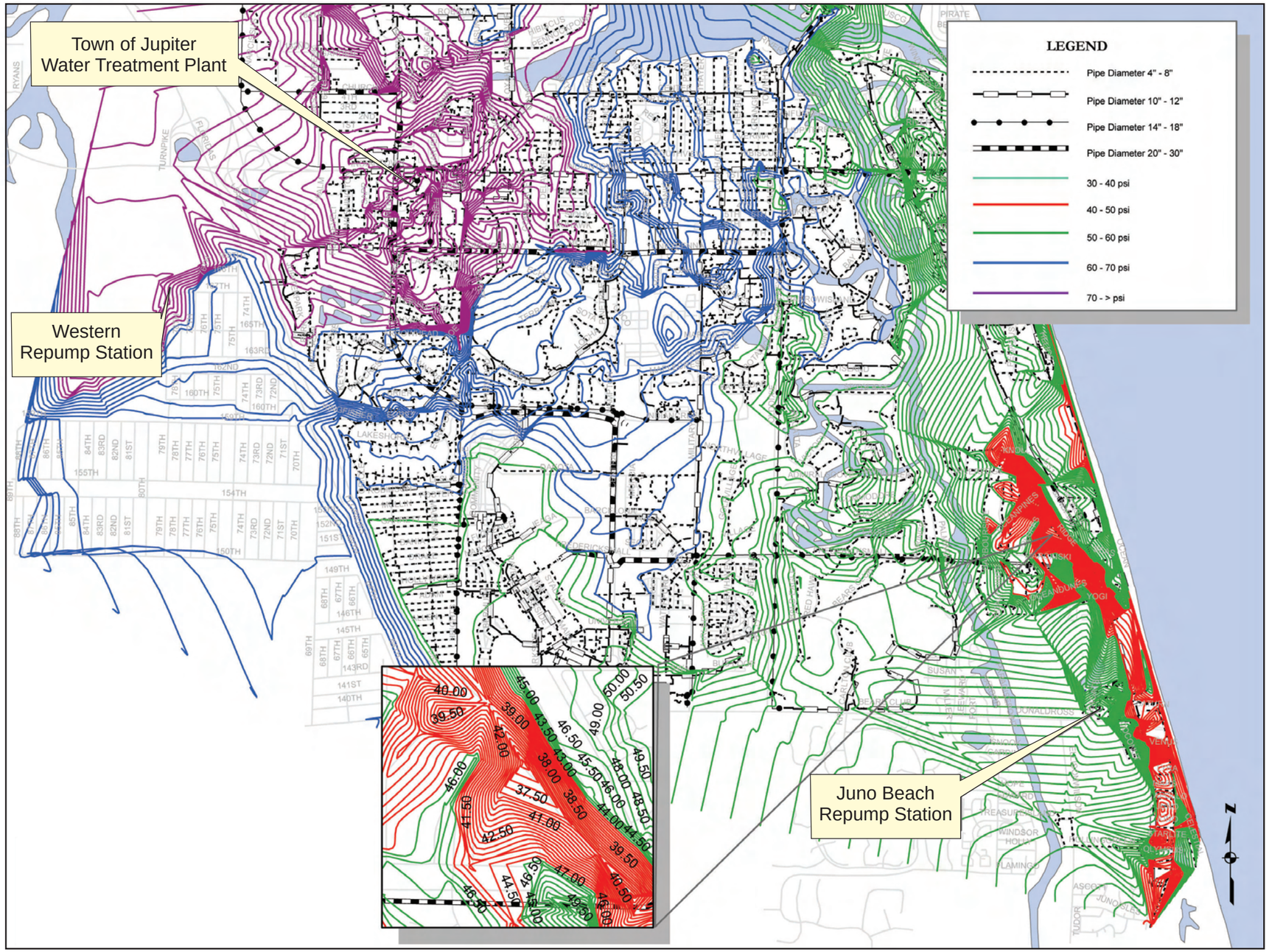

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Figure IV.12
Network Performance with
16-inch Parallel Crossing - 2010

Hence, optimal tie-in locations to the existing 18-inch diameter main would be at or near Palmwood Road on the west side of the ICW and Marina Isle Way on the east.

2. Bluffs Booster Pump Station

A direct means of improving pressure performance in The Bluffs area would be to construct a booster pump station on the 18-inch diameter line running along Frederick Small and Marcinski Roads that would be designed to maintain a station discharge pressure of 70 psi. In four model scenarios, the booster station was alternatively sited at both the western end of Marcinski Road and at the eastern end of Frederick Small Road, each operating with two pumps (and a third standby) on an 18-inch diameter header. The impact of the proposed parallel 16-inch diameter ICW crossing was evaluated for each site alternative.

Figure IV.13 shows the locations of two alternative sitings of the in-line booster pump station, one at the eastern end of Frederick Small Road, on the western shore of the ICW, and the other at the western end of Marcinski Road, on the eastern shore of the ICW. The alternative locations were analyzed (hydraulically) in anticipation that when implemented, siting considerations might favor one site over the other.

The impact of implementing an in-line booster pump station is dramatic. Under the peak hourly flow conditions, without the station, the lowest pressure shown by the model is approximately 35 psi. Implementing a booster pump station increases the area's minimum pressure by approximately 9 psi without the 16-inch parallel crossing and by approximately 11 psi with it.

A review of Figures IV.14, IV.15 and IV.16 shows that “siting” the in-line booster pump station on the east or west side of the ICW has little effect on system performance. Incorporation of the 16-inch parallel crossing with the booster station also has little effect on downstream pressures. Without the 16-inch parallel crossing the lowest pressure in the southeastern portion of the service area is approximately 44 psi. When the 16-inch parallel crossing is used, the lowest pressure in the area is approximately 46 psi.

To test the importance of the 16-inch parallel line as a backup crossing, the model was run at 2010 peak hourly flow with the existing 18 inch crossing closed, simulating a pipe failure (without the 16-inch parallel line in service). This model run indicated that such a failure would result in significant pressure losses east of the ICW. Minimum pressures near Indiantown Road were approximately 20 psi, and in the south, in Juno Beach, pressured dropped to near 10 psi.

Based on the relatively minor existing pressure deficiency predicted and the relatively high cost of the inline booster pump station, the Town may wish to consider monitoring

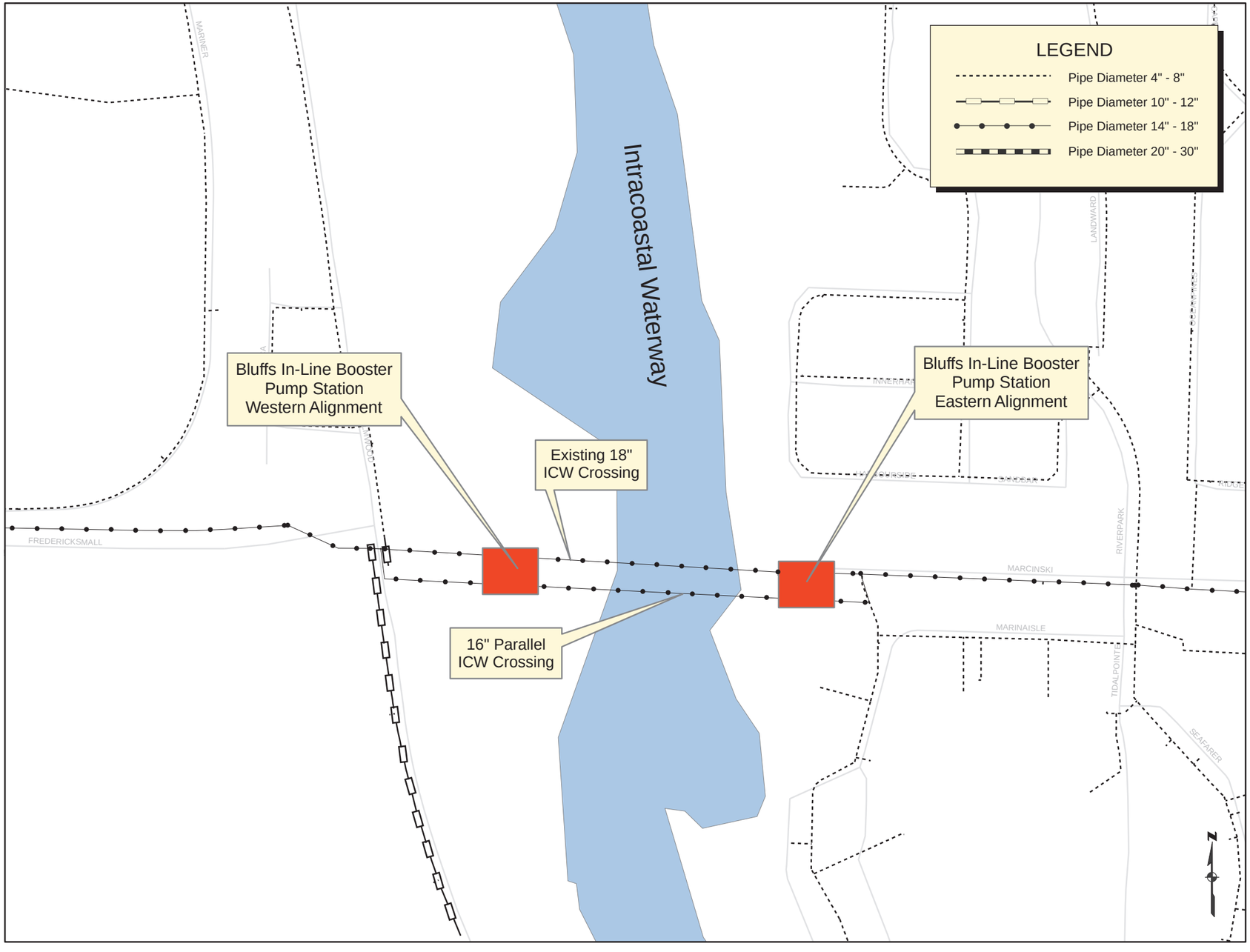

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Figure IV.13
Bluffs In-Line Booster Pump Station
Alternative Alignments

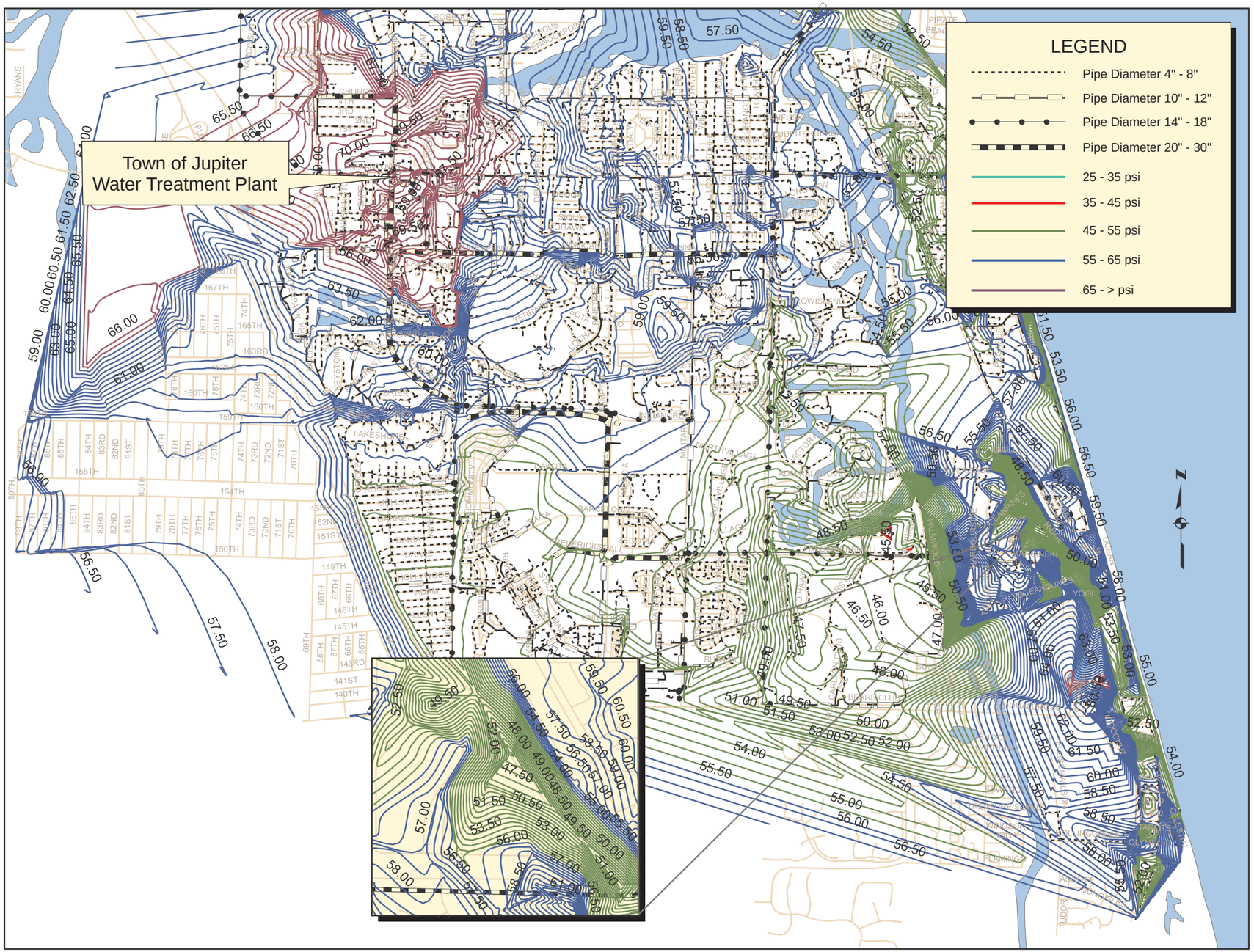

Figure IV.14
Network Performance with Bluffs Booster Pump Station East ICW Alignment - 2010

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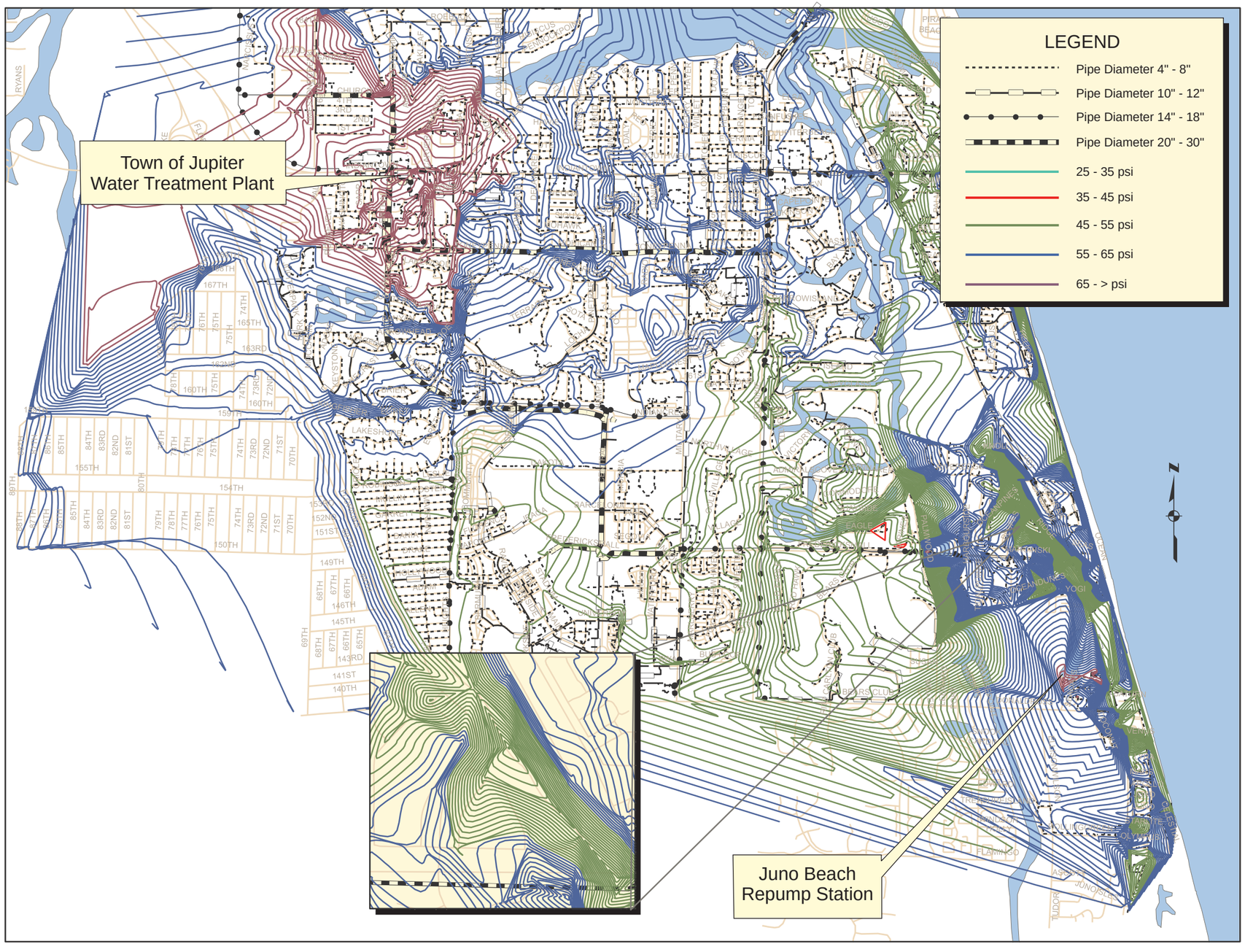

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Figure IV.15
Network Performance with Bluffs Booster Pump Station - West ICW Alignment - 2010

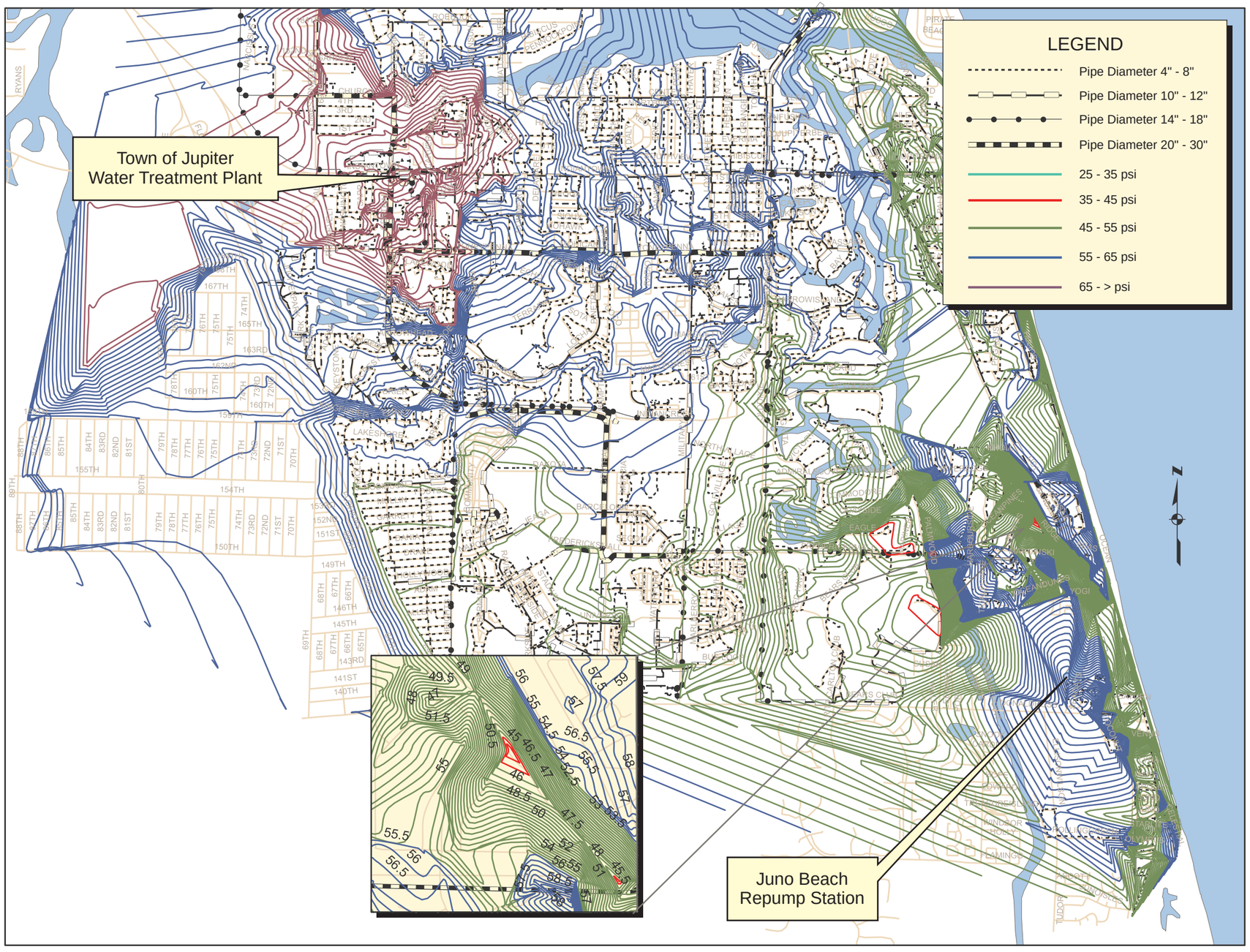

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Figure IV.16
Network Performance with Bluffs Booster Pump Station
West ICW Alignment - 2010 - No Parallel ICW Crossing

water pressures along the coastal ridge for the next five years or so to see how the system pressures change. The selection of that timeframe is based on the trend of slowed development such that buildout conditions are not likely to be achieved by 2010. In the meantime, localized pressure issues, if they exist, could be dealt with using remediation efforts such as the elimination of double residential services. At the next five year update of the Water Masterplan (or sooner if necessitated by pressure data collected) demand growth can be revisited and the system remodeled to determine what if any action (such as proceeding with the booster pump station) is appropriate.

3. South Martin County Repump Station

A ground storage tank and repump station similar to the Juno Repump Station has been proposed for the South Martin County area (along the Island Way Corridor) in order to address expected impacts of residential development on distribution system performance in the northwest Jupiter and south Martin County area. A facility similar to the Juno Repump Station was sited just north of Jupiter Community Park.

Figures IV.17 and IV.18 show that the north Loxahatchee River Road/Martin County portion of the service area experiences service pressures greater than 50 psi, well above the Town's 45 psi minimum. This is likely due to the new 16-inch diameter Island Way main that provides sufficient flow and pressure to the northwest portion of the service area and produces a very flat hydraulic gradient. Minimum pressure in the Little Club area is above 50 psi without the proposed pump station. However, the South Martin County Repump Station would prove extremely valuable in the case of failure or shutdown for maintenance purposes of any of the three river/canal crossings supplying the northwest portion of the service area. Figure IV.19 shows that if the 24-inch diameter Central Boulevard crossing were to fail, minimum pressures in Martin County would drop to as low as 37 psi. With this repump station in service, Figure IV.20 shows that minimum service pressures would only drop to 46 psi, under peak hourly flow conditions.

G. Improvement Implementation

This Section presents a summary of the estimated costs of recommended improvements for the water distribution system. As “existing system” model runs presented previously indicate, no improvements to the distribution system are required to address current water demands. The existing network, storage and pumping facilities satisfy minimum pressure and fire flow requirements in all portions of the current service area. All recommended improvements address water consumption demands in the year 2010 when the service area will have achieved a “build-out” status, hence, all improvements would be implemented by that time.

Costs presented in this Section are order-of-magnitude estimates based on published cost literature, past vendor quotes, and past experience with similar sized systems. The

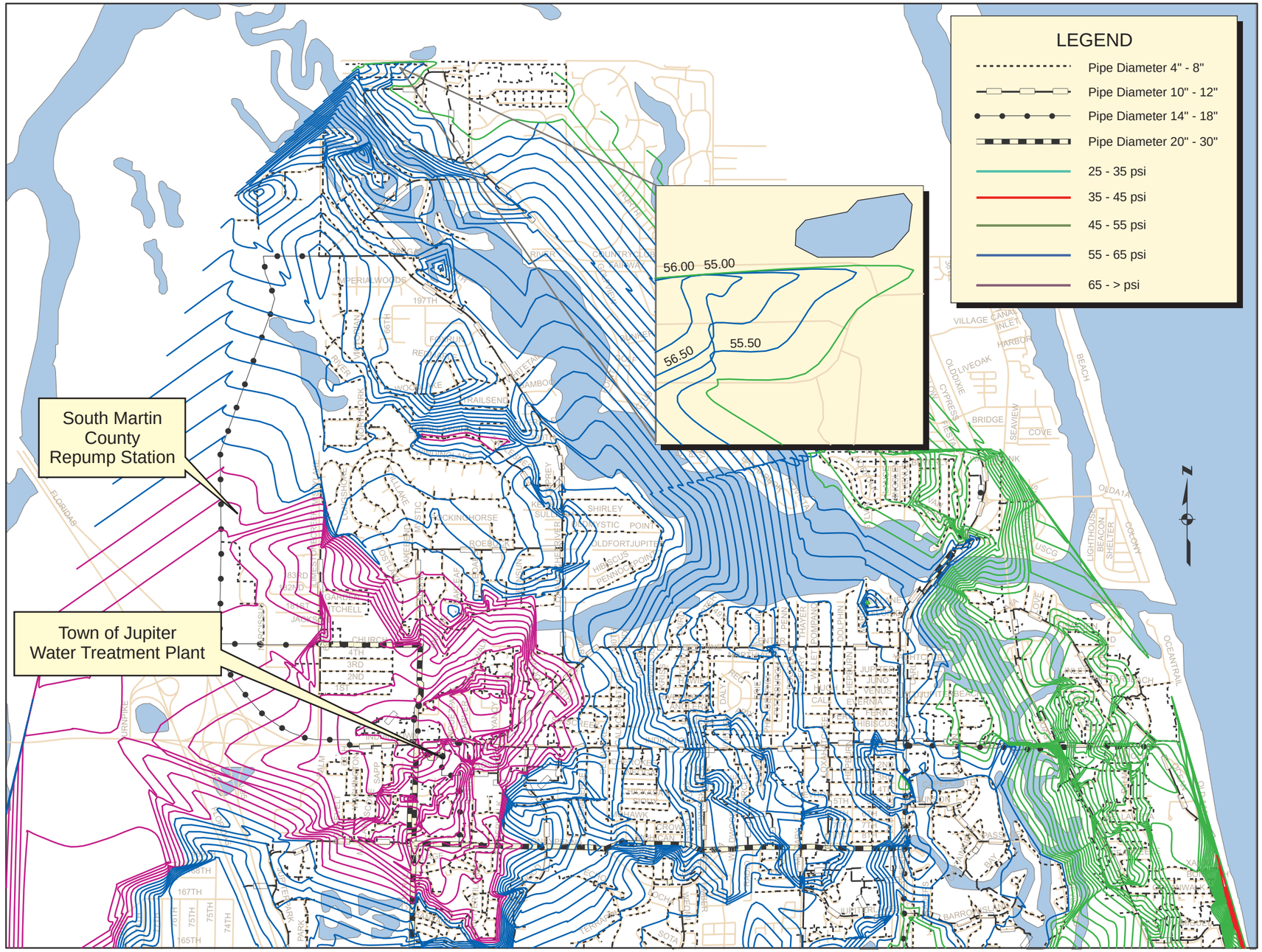

Figure IV.17
Network Performance with
South Martin County Repump Station - 2010

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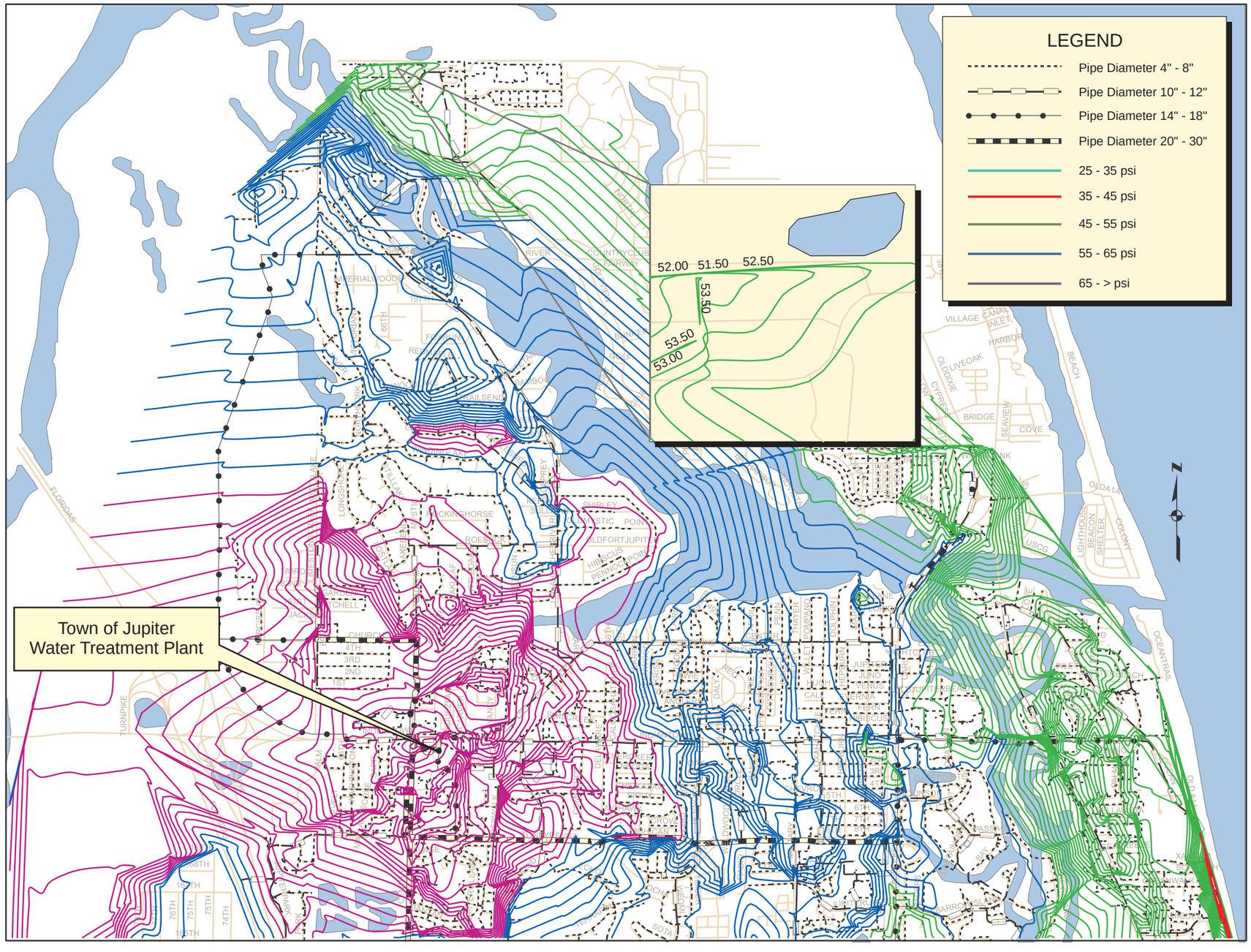

Figure IV.18
Network Performance without
South Martin County Repump Station - 2010

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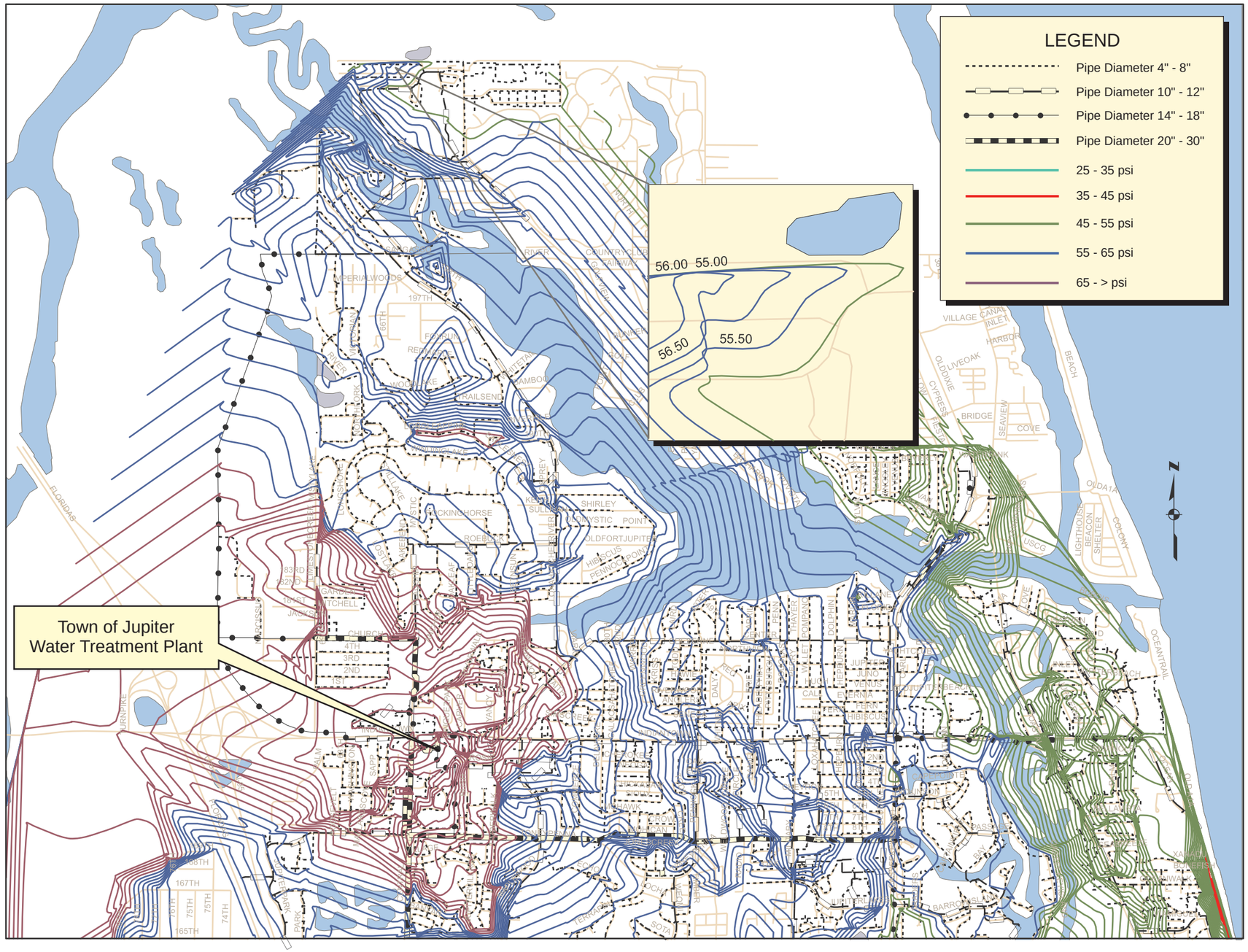

Figure IV.19
Network Performance without South Martin County Repump Station and Failed Central Blvd 24-inch Main - 2010

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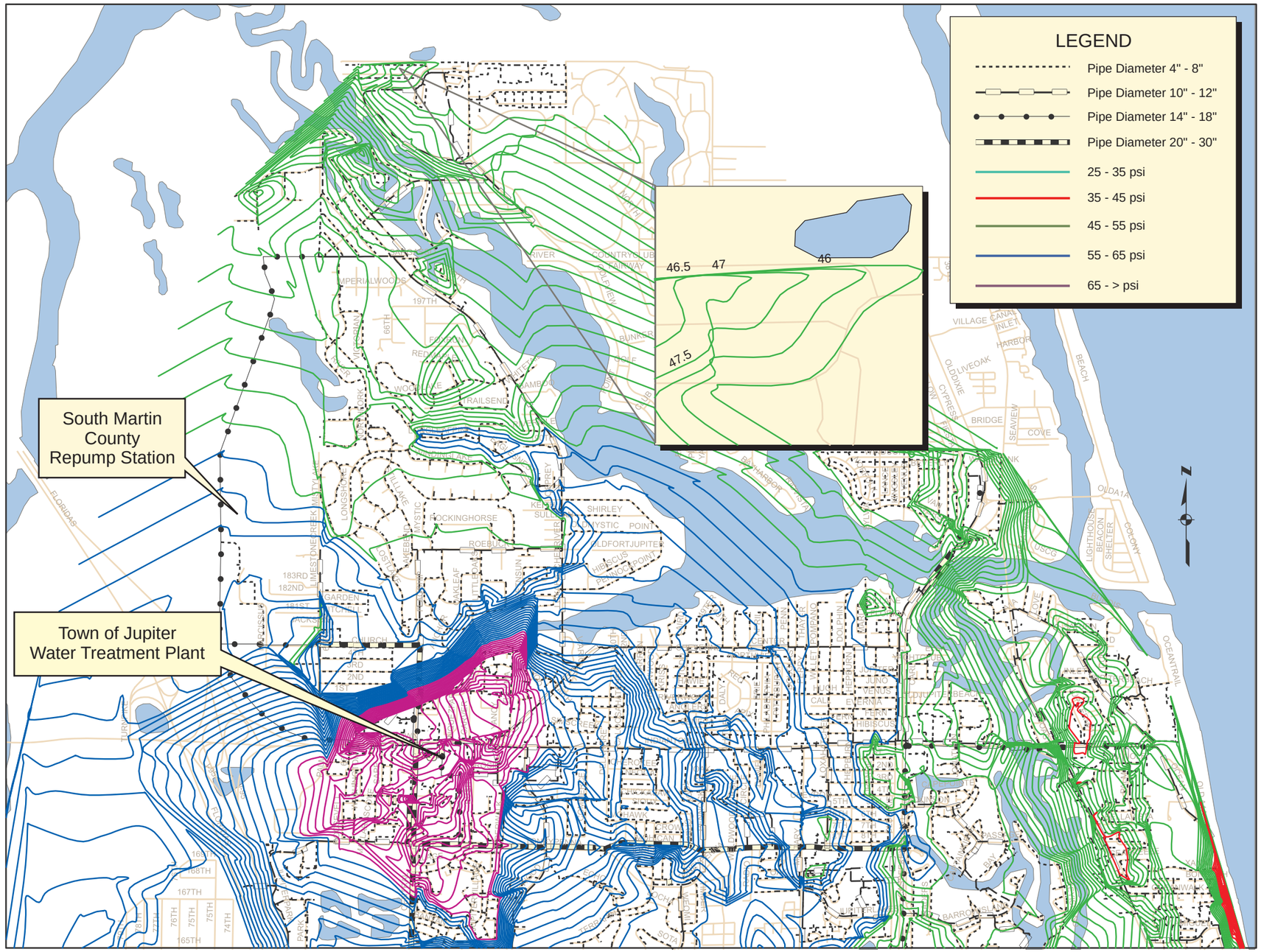

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Figure IV.20
Network Performance with South Martin County Repump Station and Failed Central Blvd 24-inch Main - 2010

accuracy of this type of cost estimate typically ranges from -30 percent to +50 percent. Costs are indexed to the 2005 Engineering News-Record (ENR) Construction Cost Index. The estimates include a contingency allowance but do not include engineering, legal and administration.

Water distribution system improvements identified through the hydraulic modeling are summarized in Table IV.9. These do not include transmission and distribution improvements associated with system expansion/or renewal and replacement.

Table IV.9
Water Distribution System Capital Improvements

Improvement Name	Capital Cost
Bluffs Area Transmission System	$ 304,000
Bluffs Booster Pump Station	$ 1,900,000
South Martin County Repump Station	$ 2,200,000

Chapter V

Identification / Prioritization of Capital Improvements

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Environmental Engineers & Scientists

Chapter V
Identification/Prioritization of Capital Improvements

The Town of Jupiter Water System maintains a Capital Improvement Program (CIP) which allows for forward planning of necessary upcoming system extensions and upgrades. For technical and financial planning purposes, the currently proposed projects have been prioritized into 5 and 10 year programs. Tables V.1 and V.2 identify projects in the 1-5 year and 6-10 year plans respectively.

The total costs for the 5 and 10 year programs are budgeted at $101,512,915 and $8,899,800 respectively (for a total of approximately $110.4 million). Accounting for work completed, this compares favorably with the data used by Public Resources Management Group (capital value of approximately $109.5 million) in their 2007 “Capacity Charge Sufficiency Analysis”.

Table V.1
5 Year CIP (2008 - 2012)

	Project Description	Funding Source FY	Estimated Capital Cost
Operating System Re-programming	Re-write existing SCADA software and PLC programming for water plant facilities including wells, high service pumps, tanks and treatment plants to provide a more reliable and efficient operating system.	Renewal and Replacement 2007	$400,000
Water Utilities Security Improvements	Completion and filing of vulnerability assessment with USEPA and initial implementation of recommended security enhancements to utilize facilities.	Connection Charges 2007	$600,000
Water Treatment Plant Structure Hardening	It was determined after the hurricanes of 2004 that the R.O. plant and control room require additional hardening to better protect the treatment and control room facilities from structural failure in winds over 110 mph.	Renewal and Replacement, Plant Capacity Charges 2007	$1,200,000
Western Service Area Water Storage and Repumping Facility	Construct 3MG water storage tank and repumping facilities west of I-95.	Off-Site Transmission Fees 2007-2008	$4,615,400
Rehabilitation of RO Wells 5, 6, 7, 8, 9 and 10	RO Well No. 6 has experienced a significant decline in water quality over the last several years to the point of being unusable. The project includes squeeze grouting RO Well No. 6 plus the re-piping of eight wells to eliminate the well isolation valves which continue to cause significant operational and maintenance issues.	Renewal and Replacement 2007-2008	$605,000
ABACOA Surficial Aquifer Wells	New facility to power Wellfield #3 surficial wells located within the ABACOA Development. Electrical, Mechanical, Sitework, etc. for the completion of nine additional surficial wells in Wellfield #3 and drilling of 4 new wells.	Plant Capacity Charges 2007–2008	$7,217,196
Jupiter River Estates Distribution Improvements	Replacement of existing asbestos cement watermains and galvanized backyard services which are nearing the end of their useful lives.	Renewal and Replacement 2007-2008	$2,825,742
Little Club Area Distribution Improvements	Replacement of existing asbestos cement watermains which are nearing the end of their useful lives.	Renewal and Replacement 2007-2008	$1,972,900

Table V.1
5 Year CIP (2008 - 2012)

	Project Description	Funding Source FY	Estimated Capital Cost
Seneca Street Water-main Replacement	Replacement of undersized 2-inch water-main.	Renewal and Replacement 2007-2008	$75,000
Surface Water Recharge Improvements	Improvements to enhance the effectiveness of the Town's surficial wellfield recharge system, including two pump stations, a force main, and power system upgrades.	Connection Charges 2007-2008	$2,937,900
Bluff's Area Transmission System	Acquisition and connection of an existing 16" ICW crossing previously constructed by the Loxahatchee River District. Needed to provide redundancy for service to the southeasterly portion of the service area.	Off-Site Transmission Fees 2007-2008	$304,000
Construct 14.5 MGD Nanofiltration Plant	• Construction of the 14.5 MGD (expandable to 17 MGD) Nanofiltration Water Treatment Plant. Included are the following elements: • Existing Warehouse Demolition (Complete) • Waste Stream Lift Station (Complete) • Transfer/Raw Water Piping Relocation (Complete) • Emergency Stormwater Pump Station Relocation (In Process) • Raw Water Boost and Pretreatment • Treatment, Post Treatment, Odor Control • Concentrate Reuse • Bulk Caustic Relocation Control Room Modifications	Bond Proceeds, Plant Capacity Charges, and Renewal and Replacement Funds 2007–2009	$44,449,621
Surficial Aquifer Well Rehabilitation	Concentrated effort to rehabilitate the Town's existing surficial aquifer wellfield facilities in preparation for the Nanofiltration Plant.	Renewal and Replacement 2007–2009	$900,000

Table V.1
5 Year CIP (2008 - 2012)

	Project Description	Funding Source FY	Estimated Capital Cost
Modifications to Phase II (1997) RO	The RO plant consists of 8 treatment trains, four of which were constructed in 1997 and four in 1999, and one in 2006. This project includes replacement of the membranes in Bank II as they reach their 10 year useful life; replacing energy recovery turbines (ERTs) in Bank II with newer, more energy efficient models, and rehabilitating Bank II's 10 year old feed water pumps, all of which proved to be beneficial improvements on Bank I	Renewal and Replacement 2007–2009	$764,256
Water Treatment Plant Warehouse	Construction of a 6,700 square foot water treatment plant warehouse to replace the warehouse which was demolished to facilitate the nanofiltration plant construction. The project also includes the demolition of WTP II (Lime Softening).	Renewal and Replacement, Plant Capacity Charges 2007–2010	$2,035,000
North Limestone Creek Wellfield	Construction of a Surficial Raw Water Main from the proposed Wellfield #4 (along Island Way north of Indiantown Road) to the WTP. Construction of six new surficial wells north of Indiantown Road.	Plant Capacity Charges 2007-2010	$5,919,700
North Jupiter Distribution System Improvements - Phase II	2007: Installation of a new 12" line on Riverside Dr. to reinforce low pressure and fire flow concerns. 2007: Installation of a new 12" line on Seabrook to coordinate with proposed sidewalk installation; and relocation of rear yard services and enhance fire protection. 2010: Replace existing water main west of Seabrook to eliminate rear yard services and enhance fire protection.	Renewal and Replacement 2007–2011	$1,234,000
Radio Read Water Metering System	Complete the on-going conversion to change out all manual read meters with radio read meters.	Renewal and Replacement 2007–2011	$4,339,500
Large Meter Replacement	Replace large compound meters that fail to record flows with high accuracy models.	Renewal and Replacement 2007–2012	$1,000,000
Deepen RO Well No. 4	Deepening of the currently unusable RO well to improve productivity and water quality.	Renewal and Replacement 2007-2012	$690,000

Table V.1
5 Year CIP (2008 - 2012)

	Project Description	Funding Source FY	Estimated Capital Cost
Riverbend Distribution Improvements	Replacement of existing asbestos cement watermains which are nearing the end of their useful lives.	Renewal and Replacement 2008	$345,000
Inlet Village Water Main Replacement	The replacement of existing asbestos cement water mains concurrent with street reconstruction and redevelopment.	Renewal and Replacement 2008–2010 Developer Participation 2009–2010	$877,000
Yacht Club Drive Area Distribution Improvements	This project includes the elimination of old asbestos cement piping and galvanized services on East Center Street, Elsa Road, Paulina and Body Court with new 6" PVC pipe and poly services which will increase pressure and improve fire protection.	Renewal and Replacement 2009-2010	$522,250
Loxahatchee River Road Area Water Distribution System Rehabilitation	Improve fire protection and service to the area. The existing waterlines in the vicinity of Tucker, Keith, Sullivan, Urdee and Williamson Roads are 3" and 4" diameter asbestos cement pipes in need of replacement.	Renewal and Replacement 2010-2012	$912,450
Construction of 8 MG Water Storage Tank	Construction of the fourth, and final, water storage tank on the Central Boulevard storage/pump station site.	Off-Site fees 2011	$3,600,000
Fisherman's Landing Water Main Replacement	The existing 6" and 8" asbestos cement waterlines in this area are nearing the end of their useful lives and should be replaced with either ductile iron, or PVC.	Renewal and Replacement 2011	$582,000
Water Main Replacement – U.S. 1 Level Bridges	Replacement of existing water lines concurrent with FDOT's replacement of the bridge structures.	Renewal and Replacement 2011-2012	$500,000
Penn Park Distribution Improvements	The existing waterlines in this area are nearing the end of their useful lives. Increasing number of line breaks requires the installation of new waterlines.	Renewal and Replacement 2012	$509,000
South Martin County Repump Station	Construction of a 1.0 MG water storage tank and repumping facilities in South Martin County (along the Island Way Corridor)	Off-Site Transmission Fees 2012	$2,200,000

Table V.1
5 Year CIP (2008 - 2012)

	Project Description	Funding Source FY	Estimated Capital Cost
Additional Water Interconnect with Seacoast Utilities	Construction of a third potable water interconnect with Seacoast Utilities (locations is West end of Donald Ross Road).	Off-Site Transmission Fees 2012	$250,000
West Jupiter Transmission	Construction of approximately 7 miles of 12-inch and 16-inch transmission main serving West Jupiter	Off-Site Transmission Fees 2012	$5,725,000
Juno Beach Distribution System Improvements	The existing waterlines are nearing the end of their 30 year useful life. Increasing number of line breaks due to the condition of the asbestos cement pipe coupled with old 2" galvanized backyard services require the renewal and replacement effort.	Renewal and Replacement 2012	$1,205,000

[1] *Anticipated to be a cooperative project with SFWMD, and potentially FDOT.*

[2] *Funding allocations prior to FY 2008 are all noted as 2007.*

[3] *All costs are in 2007 dollars and should be escalated annually based on reasonable market variation.*

Table V.2
10 Year CIP (2013 - 2017)

Project Name	Project Description	Funding Source FY	Estimated Capital Cost
Onsite Hypochlorite Generation	Partial conversion from chlorine gas to OSG (4,500 lbs/day system).	Plant Capacity Charges 2013	$2,500,000
Bluffs Booster Pump Station	As verified within the distribution system hydraulic modeling, construction of a booster pump station near the ICW would serve as a direct means of improving system pressure performance in the vicinity of the Bluffs.	Off-Site Fees 2013	$1,900,000
Utilities Field Operations Warehouse Expansion	Expansion of Utilities Field Operations Warehouse (2,320 s.f.) as originally site planned.	Off-Site Fees 2013	$793,500
Surface Water Recharge Improvements (Phase 2)	Improvement to the Surficial Aquifer Recharge System through installation of a conduit in the FDOT Right of Way to more efficiently deliver recharge water from the regional system.	Plant Capacity Charges 2013	$2,000,000 [1]
Surficial Aquifer Well Rehabilitation	Continued effort to rehabilitate the Town's existing surficial aquifer wellfield facilities.	Renewal and Replacement 2013–2016	$900,000
RO Treatment Plant Motor Control Center Upgrade	Replace the existing 505/RO Plant Control System.	Renewal and Replacement 2014	$806,300

[1] *Anticipated to be a cooperative project with SFWMD, and potentially FDOT.*

Chapter VI

Anticipated Regulatory Impacts on Utility

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Chapter VI
Anticipated Regulatory Impacts on Utility

Background

The Town of Jupiter (Town) requested Boyle Engineering Corporation (Boyle) to assist the Town with issues related to their drinking water distribution system, specifically with regards to water quality regulations. To respond to the challenges of the Safe Drinking Water Act (SDWA), the Town of Jupiter Water Utilities (Town) has initiated a program to plan for future facilities that include performing engineering studies and design efforts to support the Town's Master Plan.

The Town owns and operates its water supply system, treatment facilities, and distribution system. Existing water treatment facilities consist of three separate treatment processes that utilize two separate raw water sources. The 13.5 mgd lime-softening (LS) and 1.8 mgd ion-exchange (IX) treatment facilities treat fresh water supply from the 150 to 200 foot deep surficial aquifer. The LS WTP uses lime and polymers to remove hardness, turbidity and iron. The IX WTP uses an anion resin to remove color from the raw water and is then blended with the reverse osmosis (RO) plant permeate to add hardness and alkalinity to the finished water. The 13.7 mgd RO treatment facility treats brackish water from wells drilled approximately 1500 to 2000 feet into the Floridan Aquifer. Currently the Town is in the process of adding a nanofiltration (NF) plant to treat water from the surficial aquifer, in accordance with the Town's Water Utilities Master Plan (FY 2001 – 2002 Update). The Town of Jupiter regularly submits primary and secondary drinking water analyses to FDEP, as required.

The *Water System Regulatory Compliance Review* by Boyle Engineering Corporation is included as Appendix F.

Chapter VII

Utility Financial Issues Update

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Chapter VII
Utility Financial Issues Update

Introduction

As part of the Water Master Plan Update, several issues related to the financial component of the utility were evaluated. These issues included the following:

- Utility Asset Valuation
- Connection Charge Sufficiency Analysis
- Renewal and Replacement Requirements Evaluation

Separate deliverables have been previously provided to the Town relative to these items, and full copies of those reports are included in Appendices C and D. The following is a brief summary from those reports, as they relate to the items listed above.

A. Utility Asset Valuation

Asset Valuation Background and Summary

The Town of Jupiter Utilities Department uses its Water Master Plan as a guide to the expansion, operation, and maintenance of its water system. As part of this 2007 update to the Plan, the Town authorized Hazen and Sawyer (H&S) to conduct a valuation of the water transmission and distribution system assets.

This section presents the findings of the valuation. Its contents have been previously transmitted to the Town along with an updated asset database.

A valuation process was developed using the following information:

- Existing water system GIS attribute tables including asset type, size, material, length, and year of installation

- Asset service life schedules from Florida Administrative Code Chapter 25-30, Rules of the Florida Public Service Commission (FL PSC)

- The Engineering News Record (ENR) construction cost index (CCI) for developing estimates of original construction cost

- Unit cost information for construction of asset types based on recent and historical bid data and related experience

Using the above input data for reference and calculations, the database containing the GIS attribute information was expanded to estimate replacement cost, original cost, annual and accumulated depreciation, a present valuation using replacement cost adjusted for asset age, and a present valuation using original cost adjusted for asset age.

Table VII.1 summarizes the results of this asset valuation for water transmission and distribution system components.

Table VII.1
Water Transmission and Distribution System
Asset Valuation Results Summary

Quantity	Pipes ($/1,000)	Hydrants, Valves, Meters, Reducers ($/1,000)	Meters not in Database ($/1,000)	Combined Total ($/1,000)
Replacement Cost	$124,622	$15,033	$12,000	$151,655
Annual Depreciation for Replacement Cost	$2,990	$491	$600	$4,081
Accumulated Depreciation for Replacement Cost	$52,862	$7,650	$6,000	$66,512
Present Valuation Using Replacement Cost	$71,760	$7,383	$6,000	$85,143
Original Cost	$71,573	$9,055	$8,604	$89,233
Annual Depreciation for Original Cost	$1,716	$298	$430	$2,443
Accumulated Depreciation for Original Cost	$25,573	$3,944	$4,302	$33,819
Present Valuation Using Original Cost	$46,000	$5,112	$4,302	$55,414

Note: Represents estimated construction cost only. Cost based on May 2006 data/valuation.

The remainder of this section provides discussion and detail concerning the valuation process, and is organized into the following sections:

- Valuation Process
- Results
- Key Assumptions and Considerations

Valuation Process

GIS Attribute Tables

The Town provided two separate water system GIS attribute tables for use in the project. The first consisted of pipes only, and the second contained hydrants, valves, meters, and reducers. These asset tables identified each asset using a unique identification (ID) number and were populated for the following descriptive fields:

- Asset type
- Size
- Material
- Length (for pipes only)
- Year of installation

These attribute tables provided a starting point for the valuation process.

Algorithms

Both databases containing the GIS attribute information were expanded with algorithms designed to estimate various quantities as defined in Table VII.2.

Reference Tables

The above-referenced algorithms make use of a series of *Reference Tables* for key information. Table VII.3 outlines the purpose of each *Reference Table*.

The algorithms employ the Reference Tables to “look up” variables used in the calculations.

Table VII.2
Quantities Estimated Using GIS Attribute Information

Quantity	Definition
Replacement Cost (RC)	The estimated cost to replace the asset if it was acquired/installed today = $(AssetType \times AssetQuantity \times UnitCost_{Present})$
Annual Depreciation for RC (ANNDRC) [1, 2]	$\frac{RC - SalvageValue}{UsefulLife}$
Accumulated Depreciation for RC ($ACCD_{RC}$)	$(ANND_{RC} \times AssetAge)$
Present valuation using RC (RC adjusted for asset age)	$RC - ACCD_{RC}$ or $RC \times \left(\frac{UsefulLife - AssetAge}{UsefulLife}\right)$
Original Cost (OC)	The cost actually paid when the asset was acquired/installed, estimated using RC adjusted via the ENR CCI = $RC \times \left(\frac{CCI_{InstallationYear}}{CCI_{Present}}\right)$
Annual Depreciation for OC (ANNDOC) [1, 2]	$\frac{OC - SalvageValue}{UsefulLife}$
Accumulated Depreciation for OC (ACCDOC)	$(ANND_{OC} \times AssetAge)$
Present valuation using OC (OC adjusted for asset age)	$OC - ACCD_{OC}$ or $OC \times \left(\frac{UsefulLife - AssetAge}{UsefulLife}\right)$

[1] *FL PSC useful life schedules define Salvage Value for all of the subject assets to be zero*

[2] *Uses Straight Line Depreciation method*

Note: If material and construction costs had remained constant over time, RC would equal OC

Table VII.3
Reference Tables

Reference Table	Purpose	Independent Variable(s)	Dependent Variable
ENR Construction Cost Index	Provides a means of translating construction costs from past to present or present to past	Installation year	Construction cost multiplier
FL PSC Useful Life Schedule	Defines the period of time over which each asset will be depreciated	Asset type	Useful life
Construction Unit Cost	Allows construction cost to be estimated for transmission/distribution system assets	Asset type and diameter	Unit cost

Process

Using the GIS attribute tables as a starting point, the following actions were completed:

- The GIS attribute tables were combined into a single file in Microsoft Excel.
- The Reference Tables were added as separate tabs to the Microsoft Excel file.
- Columns were added to the Microsoft Excel file to generate each of the quantities listed in Table VII.2.
- The above-described algorithms were used to calculate values for each quantity, making use of the Reference Tables to look up specific variables as needed.

For transmission and distribution system assets added to the Town's system in the future, the GIS attribute information should be added in the appropriate asset information column at the bottom of the database, and the person inputting the data should "copy" and "paste" the formulas contained in the remaining columns so as to populate the remaining columns.

As the database is currently configured, new lines should be inserted above the final line of asset data so that formulas and references "see" the new data. The same is true of the ENR index numbers for future years. It should be noted that the degree of "user-friendliness" could be considerably enhanced if desired for future use, particularly if the database is used within MS Access software as opposed to MS Excel.

Construction unit costs and Florida PSC schedules can be modified within the corresponding reference tables as desired. The database will automatically adjust for these new numbers provided that modifications to these two reference tables are limited to the

existing numbers themselves and the size and organization of the tables are not modified.

Results

The asset valuation described herein results in valuations for transmission and distribution system assets as summarized for groups of assets in the opening section of this memorandum, and as shown for individual assets in the updated GIS attribute database.

The updated database also provides a means to incorporate and account for transmission and distribution system assets added to the system in the future. Algorithms could be modified to accommodate individual condition assessment ratings in the future if desired.

Key Assumptions and Considerations

1. The Construction Unit Cost *Reference Table* does not discriminate based on material of construction. For example, an 8-inch ductile iron pipe is assumed to cost as much to install as an 8-inch PVC pipe. While this is not strictly accurate in every case, it is nonetheless appropriate in these circumstances because the price differences of different material choices would not significantly affect the total cost of a transmission and distribution system infrastructure construction project. This is especially true because the site-specific circumstances that affect actual construction pricing (traffic, utility conflicts, surface restoration, etc.) cannot be individually determined within the scope of this project.

2. The ENR CCI is an average index based on 20 United States cities, and does not reflect possible cost differentials among cities.

3. Pipe crossings, including aerial crossings of canals and jack-and-bore crossings of railroads and highways, are not distinguishable in the GIS attribute table and were treated as regular piping installations. In reality, however, different construction costs would apply to such system components.

4. Formulas and references created within the database incorporate certain assumptions and simplifications to accommodate the individual assets for which information on diameter, length, material, or age was missing. Each such assumption/simplification seeks to provide an average value so that errors will cancel one another out. Non-numeric or missing diameters are assumed to be 8 inches (6 inches in the case of hydrants). Non-numeric or missing installation years are calculated to be mid-way between the present year and 1950. Non-numeric or zero lengths are assumed to be 5 feet (it was assumed that missing

or zero lengths probably corresponded to shorter pipe lengths associated with hydrants). The useful life for unknown pipe materials is assumed to be a composite value provided by the FL PSC schedules for "mains" in general, and reducers and any other fittings are assumed to have this same useful life. The construction unit cost for any other fitting is assumed to be the same as that assigned for a reducer. It should be emphasized that, in the event that the Town elects to enhance the user-friendliness of this database for future use, additional features including drop-down menus could be added to force the population of primary data using *allowable* values only.

5. Approximately 24,000 existing water meters had not been entered into the database at the time of this assessment, and therefore valuations could not be calculated using actual data for these meters. Instead, an estimate was arrived at for these meters based on the assumption that they are on average 1-inch in diameter (primarily single-family residential in nature) and 10 years old.

B. Connection Charge Sufficiency Analysis

As a part of the utility update, Public Resources Management Group, Inc. (PRMG) used data provided by the Town consultants to perform an analysis relative to the sufficiency of current system Capacity Charges (including Off-site Transmission Fees).

The following is a summary of data and assumptions utilized in this analysis:

- Current Total Capacity Charges for Service Zones One, Two and Three are $2,557, $2,557 and $3,037 respectively.
- Estimated ERCs remaining to buildout (2010) are approximately 13,000.
- Estimated revenue for expansion related capital from service area growth of approximately $36 million.
- Estimated expansion related capital expenditures for the system (based on Town provided data) of $40,116,860.
- Total Principal on Outstanding Parity Bonds of $45,950,000 and expansion related portion of said bonds of $41,757,680.

Table VII.4 provides an accounting, based on the preceding and other data, of expansion related costs and funds. Based on this data, it can be seen that the "Adjusted Net Available for Other Capital Project Funding" is approximately $300,000. Accordingly, PRMG provided the following summary observations and recommendations:

"The current Capacity Charges may not be sufficient to fund the remaining capital expenditures considered as expansion-related and the principal component of the outstanding bonds considered as expansion-related, if considered as a cost to be recovered from growth. Accordingly, the Town should evaluate the possibility of adjusting the Capacity Charges to recover the remaining expansion-related costs where possible and practical."

Table VII.4
Expansion-Related Costs and Available Funds

Expansion-Related Project Costs:	Amount
Capacity Expenditures	$40,116,850
Expansion Component of Outstanding Parity Bonds	$41,757,680
Total Expansion-Related Project Costs	$81,874,540
Sources of Funds:	
Estimated Capacity Charges on Account	$14,598,186
Anticipated Capacity Charges	$35,929,442
Avail. Bond Proceeds Allocable Expansion Projects	$11,098,010
Total Sources Before Additional Net Revenues	$61,625,638
Net Available for Other Capital Project Funding	($20,248,902)
Additional Revenue Generated by New Customers	$20,562,016
Adjusted Net Available for Other Project Capital Project Funding	$313,114

The complete letter report prepared by PRMG is included in Appendix D.

C. Renewal and Replacement Requirements Evaluation

As a part of the utility update, PRMG also used data provided by the Town and Town consultants to perform an evaluation of Renewal and Replacement (R&R) funding requirements.

The Town has made a policy decision to fund R&R at a rate greater than the minimum required by any bond covenants.

The Town has essentially instituted a policy of providing R&R deposits based upon the approximate depreciation of the water systems fixed assets. For fiscal year 2006 this amounted to almost $3.9 million. Because the deposits for R&R are paid by existing customers for expenses to be incurred in the future, PRMG has proposed (to the Town) a policy which considers the timing of R&R expenditures in order to leverage rates and

most equitably divide costs between current and future rate payers. In addition the policy considers the basis for valuing the asset to be upgraded or replaced and the ability to maintain budgetary simplicity. The resulting policy included the following:

1. Asset R&R based on replacement costs (not original cost).

2. Asset R&R should be based on average asset service life. Those assets with short service lives (less than or equal to 15 years) should be fully funded via R&R deposits.

3. Assets with long service lives (over 15 years) should be funded through a combination of R&R deposits and issuance of future debt. This helps split cost equitably between current and future utility rate payers.

4. Funding of major periodic/recurrent operating expenditures (for example RO membrane elements) should continue to be funded through specific reserves, separate from asset R&R.

Based on the asset valuation performed for the purpose of this Master Plan Update, estimations of annual R&R deposit requirements were made. Table VII.5 summarizes some of the data and results from the analysis.

Table VII.5
Summary of R&R Deposit Requirements

Adjusted System Fixed Assets		
Original Cost	$198,443,493	
Replacement Cost	$347,903,365	
Difference	$124,513,393	
Replacement Cost Breakdown		
Short Service Life (<15 years)	$54,233,252	(15.6%)
Long Service Life (>15 years)	$293,670,113	(84.4%)
Net Asset R&R Expenditures	$68,970,216	
Proposed Annual R&R Deposits		
Short Service Life Assets (100% Funded)	$4,523,000	
Long Service Life Assets (50% Funded)	$2,677,000	
Total Recommended Deposit	$7,200,000	

The $7.2 million annual deposit is a significant increase over the current deposit of approximately $3.9 million. This is due primarily to an update to the system's asset valuation, which had previously not included a significant portion of distribution system assets. Because of the significant increase, it has been recommended that the increase to the proposed $7.2 million deposit be phased in over a period not to exceed seven years.

The Town should create an R&R Reserve in order to receive said depreciation funds, such that there is clear delineation of the monies necessary to replace the Town's aging infrastructure.

Appendix A

Ten Year Water Supply Plan

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Appendix A
Ten Year Water Supply Plan

Prelude

In 2002, the Florida Legislature took strides to improve regional and local water supply planning. Added to local government comprehensive planning requirements was the need to prepare a "Water Supply Facilities Work Plan" covering a 10 year planning period (10-Year Water Supply Plan). This requirement applies to local governments that meet the following criteria:

- Have responsibility for some or all of its water supply
- Is located within the jurisdiction of a water management district which has prepared a Regional Water Supply Plan

The Town meets both of these criteria and thus is required to comply with the requirement to develop a 10-Year Water Supply Plan. This plan must have been coordinated with the SFWMD's Regional Water Supply Plan and must be incorporated into the Potable Water Sub-element of Town's Comprehensive Plan.

Requirements of the plan include that the Town do the following:

- Project its 10-year water supply needs
- Identify how the needs will be met (especially relative to source adequacy)
- Develop or revise a 5-Year Capital Improvement Plan (necessary during the first five years of the 10-year plan) needed to meet the goals/objectives of the Water Supply Plan.

The following information has been prepared accordingly.

1.0 Existing Facilities

This section of the Ten Year Water Supply plan presents an overview of existing facilities used by the Town of Jupiter to obtain, treat, and distribute water to its customer base. The Town of Jupiter limits and service area are shown in Figure A.1. Raw water supply, water treatment, and distribution facilities are described herein.

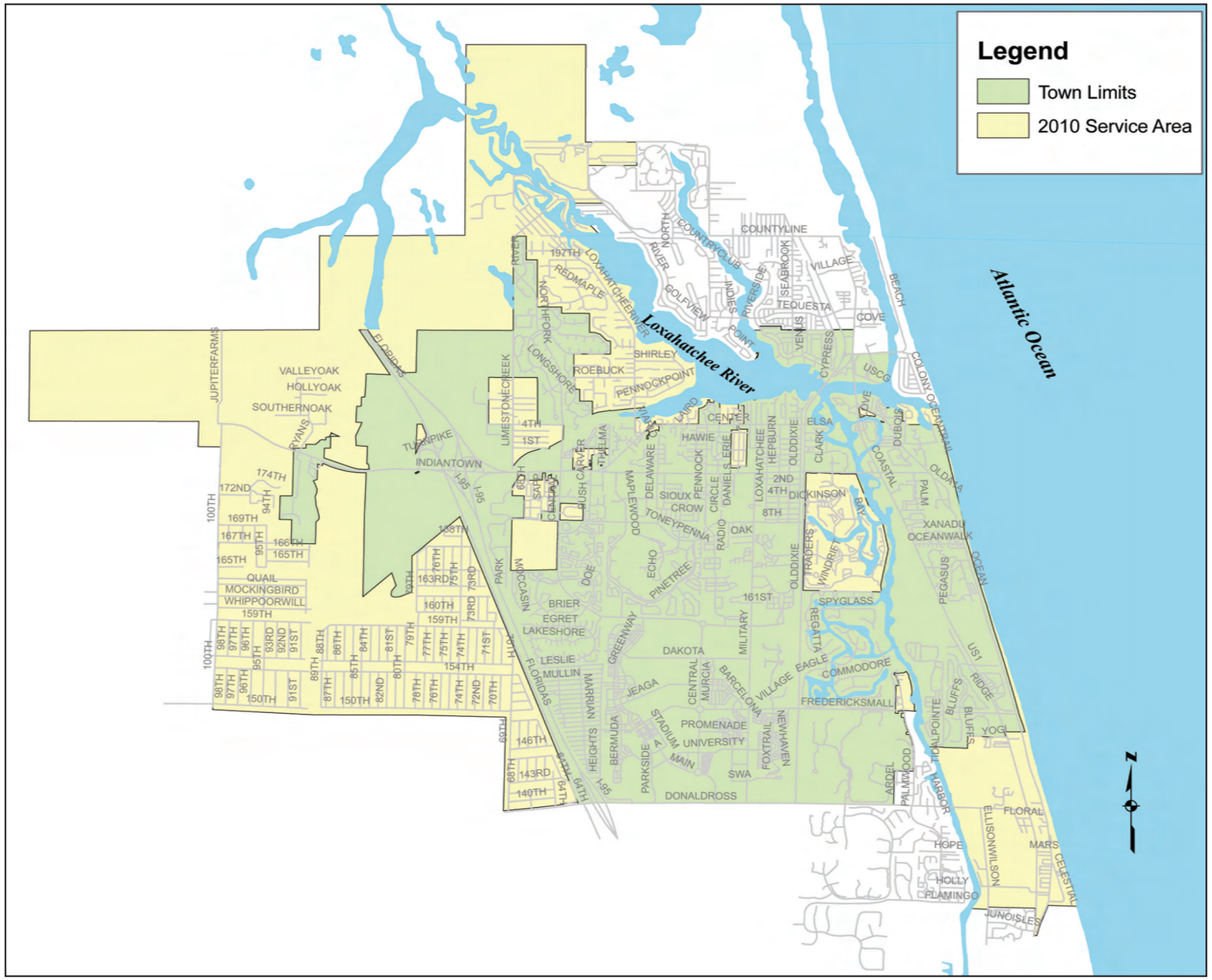

Figure A.1
Existing Water Service Area

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1.1 Raw Water Supply

The Town of Jupiter's raw water supply is provided from two groundwater sources; the surficial aquifer system and a deeper aquifer system known as the Floridan Aquifer System. Raw water is pumped from the wells to separate water treatment facilities for treatment prior to distribution and consumption. Figures A.2 and A.3 show the location of the raw water supply wells (surficial and Floridan respectively).

1.1.1 Sources

Historically, the surficial aquifer system has provided the majority of the Town's raw water supply. The Town has 52 surficial aquifer wells (nine of which are currently being equipped for production) that supply water to the Lime Softening and Ion Exchange plants. The Town has also moved forward with development of alternative water supplies that include the use of the Floridan Aquifer System to supplement the raw water supply. Thirteen Floridan Aquifer wells have been constructed to date (11 are currently in service – one has been abandoned due to its location with respect to the proposed nanofiltration plant and two are in need of rehabilitation). These wells provide brackish water which is treated using a reverse osmosis membrane process.

<u>Surficial Source</u>

Raw water from surficial aquifer comes from three existing wellfields, which are comprised of 52 wells. These wells typically range in depth from 140 to 220 feet and produce flows anywhere from 140 to 900 gpm/each. Nine (9) of the wells in Wellfield No. 3 are currently being equipped for production and a future Wellfield No. 4 is planned to coincide with ongoing development along the Island Way Corridor. Figure A.2 shows the location of existing surficial wells.

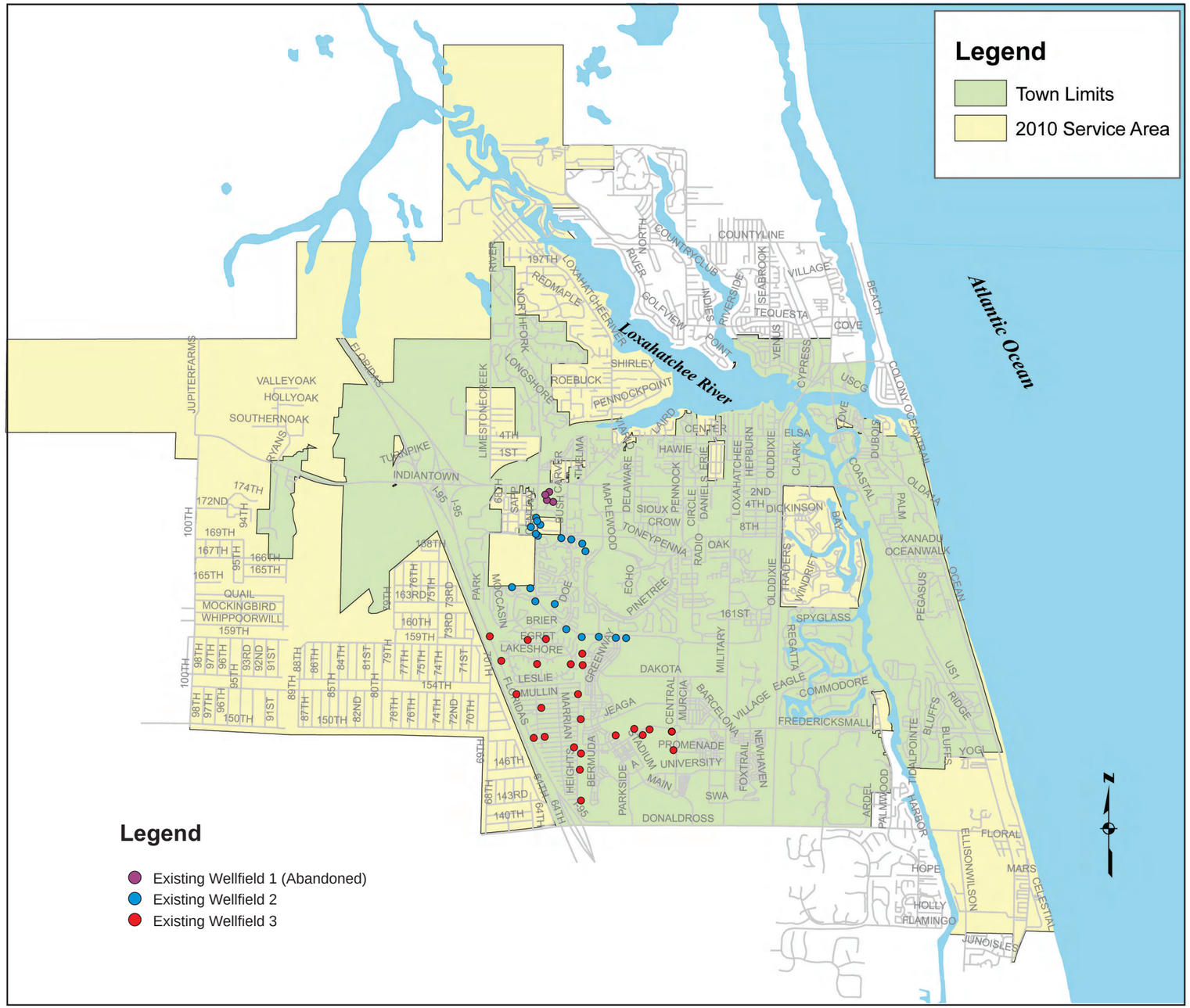

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Figure A.2
Existing Surficial Wells

Existing Surficial Well.

Floridan Source

Raw water from the Floridan Aquifer comes from 11 existing R.O. wells (there are two additional wells – one which has been abandoned and one that is currently not producing). These wells typically range in depth from 1,017 to 1,465 feet and produce flows anywhere from 1,000 to 2,040 gpm/each. Figure A.3 shows the location of existing R.O. (Floridan) Wells.

Floridan Aquifer Well.

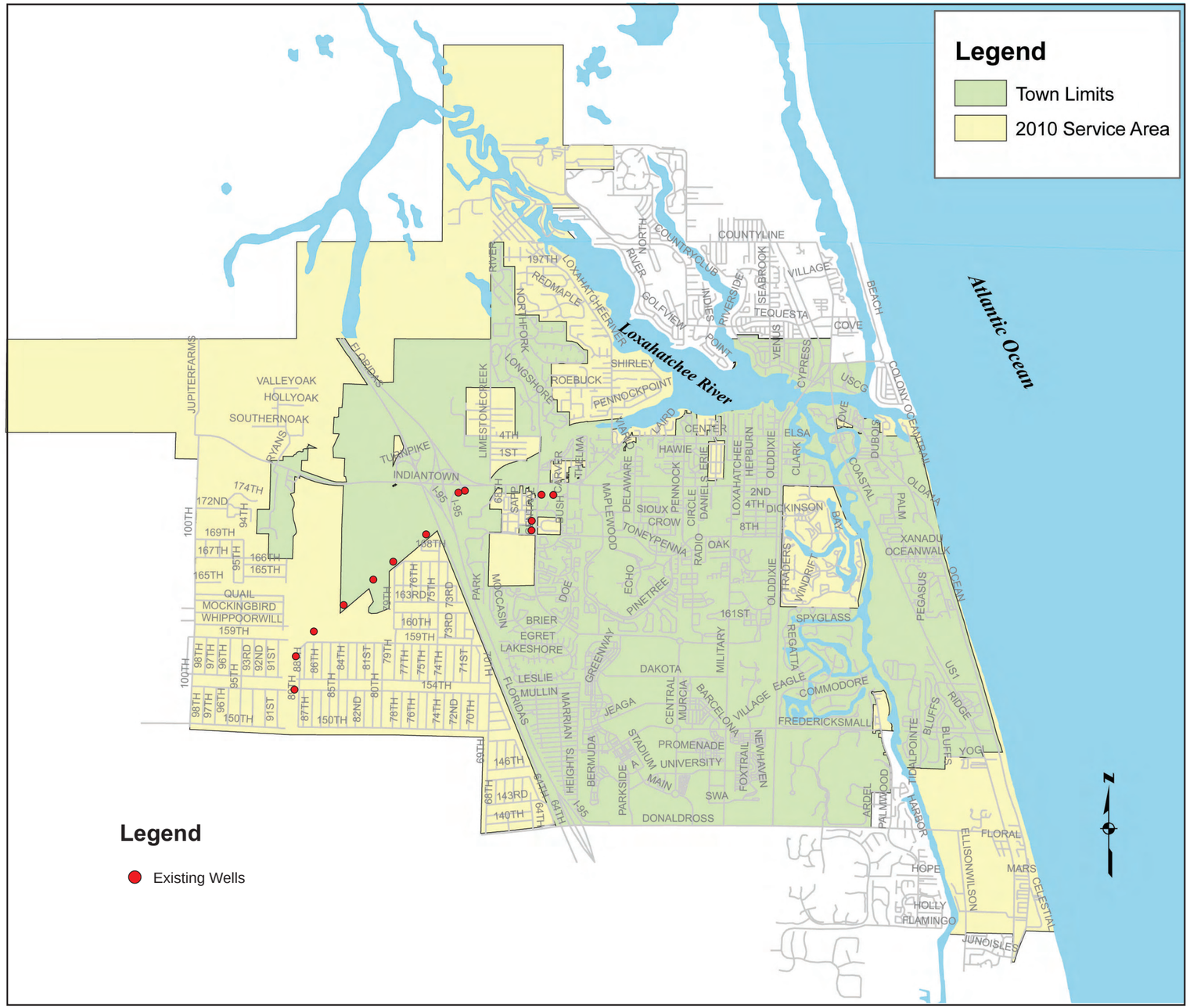

Figure A.3
Existing Floridan Wells

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1.2 Water Treatment Facilities

The Town's existing water treatment facilities, located at 17403 Central Boulevard, consist of three separate processes; lime softening, reverse osmosis and ion exchange. Each of the processes is permitted by the Florida Department of Environmental Protection (FDEP) and have rated capacities as shown in Table A.1.

Table A.1
Existing Rated Plant Capacities

Facility	FDEP Permitted Capacity (MGD)
Lime Softening	13.5
Reverse Osmosis	13.7
Ion Exchange	1.8
Total	**29.0**

The lime softening facility consists of a 4.5 MGD unit (constructed in 1976) and a 9.0 MGD unit (constructed in 1978). The reverse osmosis treatment facility consists of Bank I (Trains A-D), rated at 6.0 MGD (constructed in 1990), Bank II (Trains E-H), rated at 6.0 MGD (constructed in 1996) and of Train I rated at 1.7 MGD (constructed in 2006). The ion exchange system consists of one unit (constructed in 1999) rated at 1.8 MGD.

Lime Softening and Reverse Osmosis Plants

The reverse osmosis facility is capable of producing 13.7 MGD of finished water. The system has a permitted daily withdrawal allocation from the South Florida Water Management District of 17.9 MGD (max month basis) from the Floridian Aquifer, which allows the system the ability to produce 13.7 MGD of R.O. product water at the recovery rate (75%) of the process.

In 1999, a 1.8 MGD ion exchange treatment system was constructed. The ion exchange plant produces water of increased alkalinity and low color which when blended with the lime softened and RO permeate waters improves the chemical and aesthetic characteristics of the total blended finish water.

Ion Exchange Plant

In summary, the water treatment facilities currently consist of three (3) separate processes (lime softening, ion exchange, and reverse osmosis) that treat raw water from two sources to meet current production demands. The freshwater treatment system is capable of treating 13.5 MGD through the use of the lime softening filtration units and 1.8 MGD through the ion exchange system. The brackish water treatment system is capable of producing 13.7 MGD. All facilities are operated from the R.O. plant control room and the treated water from each of the three plants is blended in the R.O. clear well before being pumped to storage or distributed to Jupiter's water customers. The Water Treatment Plant is currently capable of producing a total of 29.0 MGD of finished water for distribution.

1.3 Water Storage, Transmission and Distribution Facilities

1.3.1 Existing System Description

The existing water storage, distribution and transmission system consists of approximately 365 miles of pipelines. Table A.2 identifies the approximate length of pipeline (that was utilized in the model) by diameter. Additional facilities include a remote one-million gallon ground storage tank and pump station northwest of Donald Ross Road and US 1 in Juno Beach; finished water storage capacity of 4.5 million gallons on site at the Water Treatment Plant; and 21 million gallons of storage capacity at the storage/high service pump facility on Central Boulevard. High service pumping facilities at the plant and on the west side of Central Boulevard supply the distribution system and operate to maintain system pressure.

Table A.2
Transmission/Distribution Pipeline Data

Pipe Diameter (Inches)	Length (Feet)	Length (Miles)
Unidentified	15,259	2.89
2	104,489	19.79
3	7,294	1.38
4	98,637	18.68
6	543,857	103.00
8	646,619	122.47
10	108,313	20.51
12	226,896	42.97
14	396	0.08
16	57,349	10.86
18	17,452	3.31
20	4,155	0.79
24	44,247	8.38
30	703	0.13
Total	**1,875,666**	**355.24**

** Some pipe segments in the Town's database included no data relative to pipe diameter.*

Based upon discussions with utility staff, together with the review of available system pressure records, the system appears to maintain adequate pressure throughout most of the service area under current conditions. However, areas with the most noted pressure deficiencies are in the North Jupiter Service Area and in the Bluffs area (south to Juno Beach).

Pipelines

The distribution system includes pipe segments made of primarily four types of materials – ductile iron, C-900 PVC, HDPE and asbestos cement. In general, asbestos cement pipe was installed from approximately 1957 to 1997. C-900 PVC from approximately 1971 to present, ductile iron pipe from approximately 1958 to present, and HDPE, primarily used for service connections, from approximately 1971 to present. Pipe sizes range from 2 to 30 inches in diameter. The distribution system originates at the Town's water treatment plant and extends in all directions. There are three functional crossings of the Intracoastal Waterway, as follows:

Location	Pipe Size/Type
• Indiantown Road	10 inch diameter HDPE
• Indiantown Road	16 inch diameter HDPE
• Frederick Small/ Marcinski Roads	18 inch diameter ductile iron pipe

The Town recently completed negotiations with the Loxahatchee River District for the purchase of a previously unused 16-inch diameter pipe also crossing the Intracoastal Waterway at Frederick Small/Marcinski Roads. This cross is not yet functional. There are also five crossings of various branches of the Loxahatchee River and the C-18 Canal, as follows:

Location	Pipe Size
• Alternate A1A	20 inch diameter (2 parallel lines)
• Island Way	12 inch diameter
• Island Way (C-18)	18 inch diameter ductile iron pipe
• Loxahatchee River Road	12 inch diameter
• Central Boulevard	24 inch diameter

Water Storage Facilities

The Town's water storage system consists of six ground storage tanks located at the Water Treatment Plant, at the Central Boulevard High Service Pump Station and at the Juno Beach Re-pump Station. Water is delivered from the Water Treatment Plant across the road to the ground storage tanks at the Central Boulevard High Service Pump Station via a dedicated 30-inch diameter line. Table A.3 summarizes the finished water storage volume available at each facility.

Table A.3
System Water Storage Capacity

Water Treatment Plant	1.5 MG
	3.0 MG
Central Boulevard	5.0 MG
	8.0 MG
	8.0 MG
Juno Beach Repump Station	1.0 MG
Total	**27.5 MG**

High Service/Re-pump Facilities

Finished water is supplied to the transmission and distribution system through high service pumping systems located at the Water Treatment Plant and the Central Boulevard High Service Pump Station. In general, pumps are operated automatically, that is, started, stopped and speeds adjusted by the Water Treatment Plant's control system. The Water Treatment Plant has an array of eight high service pumps with drives that include both 150 hp and 200 hp motors. The Central Boulevard storage/high service facility includes two High Service Pump Stations. The first station has four pumps each rated at 200 hp. The second high-service pump station (recently constructed) at the Central Boulevard facility has two 200 hp pumps and can accommodate two future 200 hp pumps. The Juno Beach Re-pump facility has three high-service pumps, each rated at 75 hp. All pumps in the system can be operated manually from the Water Treatment Plant control room, or automatically, relying on automated control logic associated with programmable logic controllers located at each facility. Each pumping facility's control system is set to maintain a service pressure of 70 psi.

Figures A.4 and A.5 identify various components of the Town's current storage, transmission and distribution systems.

Recent System Additions/Upgrades

Since completion of the FY 2001-2002 Master Plan Update, the following are significant assets which have been added to the Utilities Storage, Transmission and Distribution System:

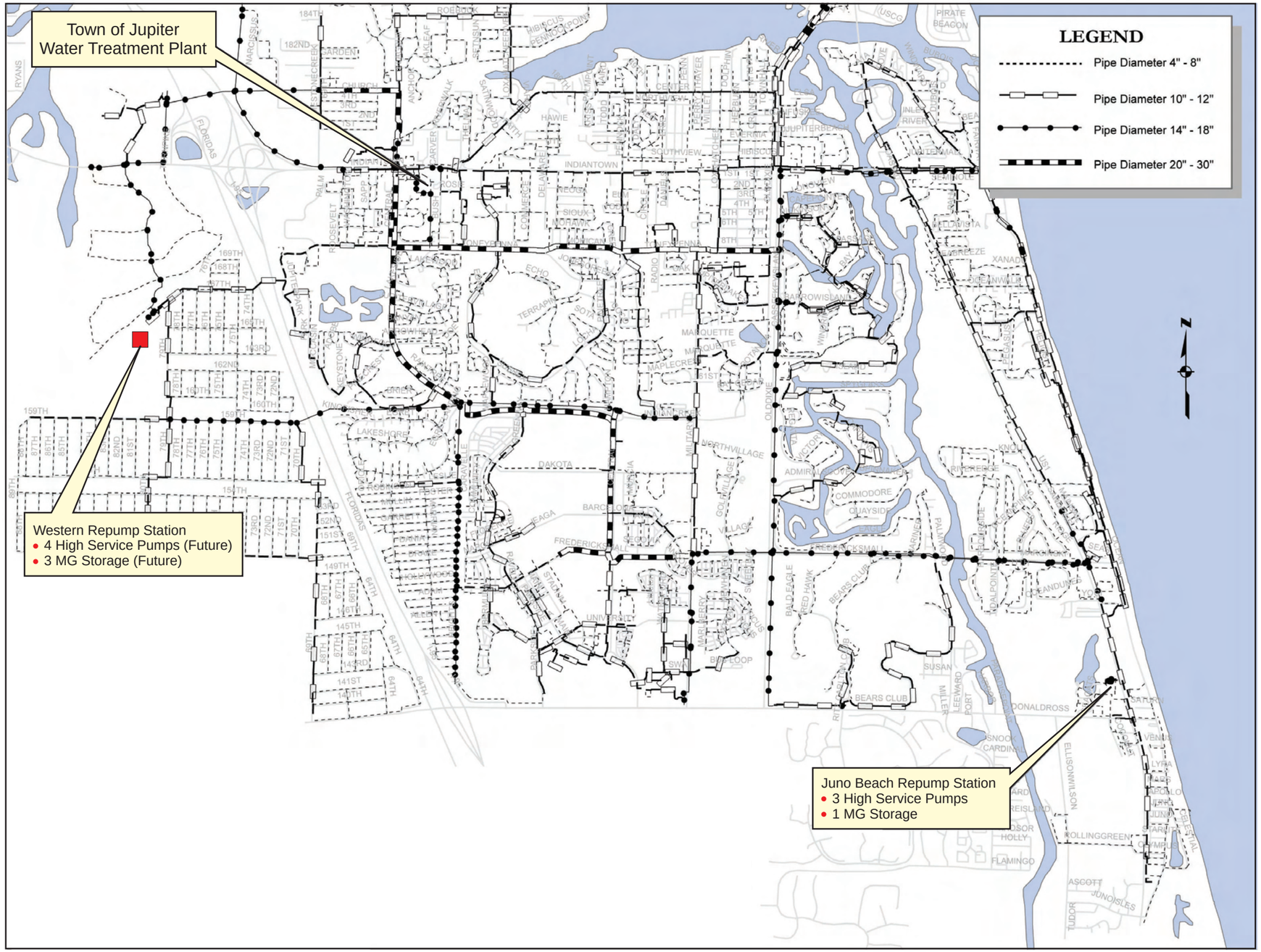

Figure A.4
Storage, Transmission
and Distribution System – South

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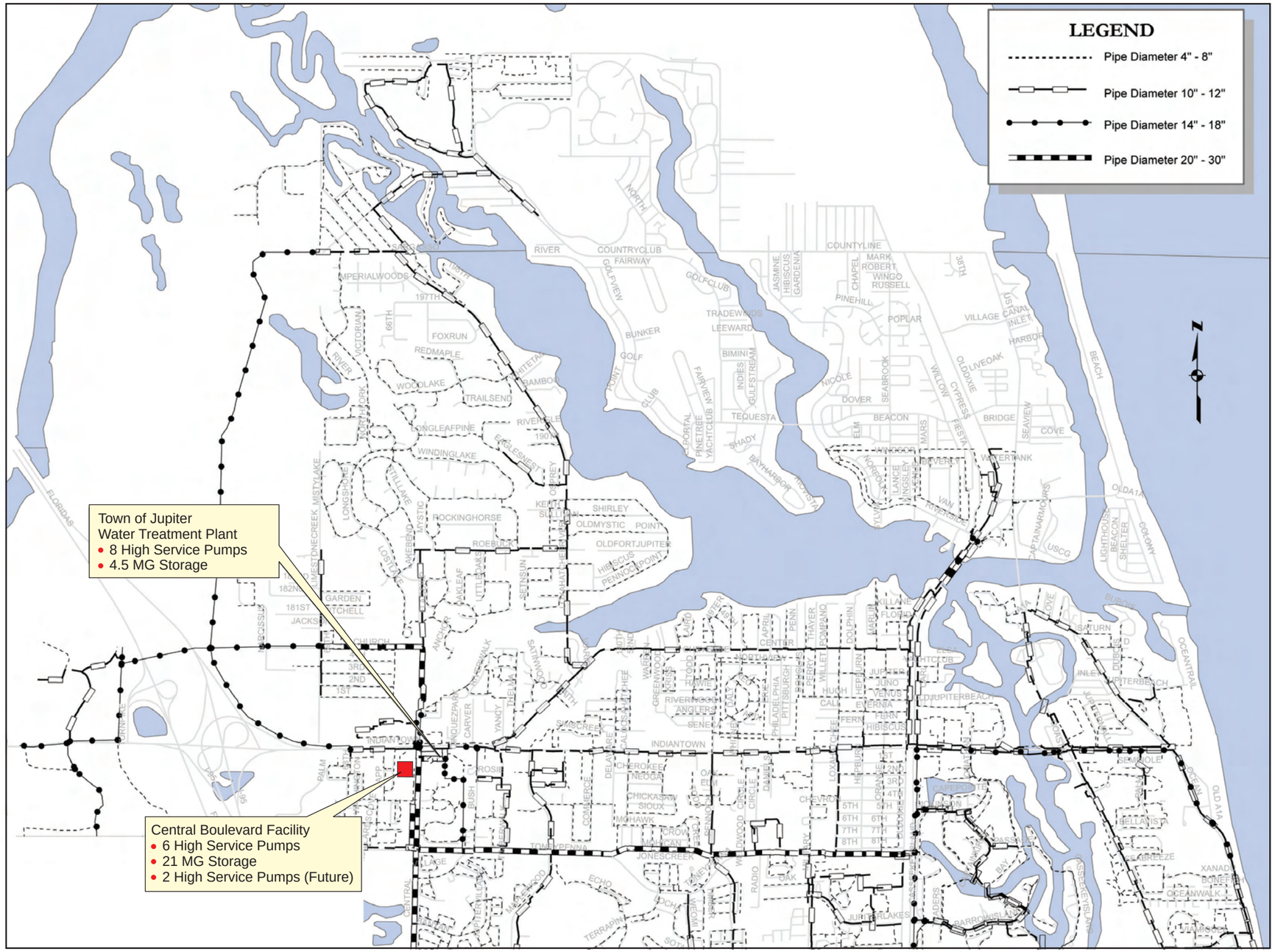

Figure A.5
Storage, Transmission
and Distribution System – North

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- Significant Transmission and Distribution Piping, notably in ABACOA, along the Island Way Corridor, and in various new developments within Town.
- Acquisition of the North Service Area Distribution System from the Village of Tequesta and significant upgrades to that area.
- A second Loxahatchee River crossing at the Alternate A1A bridge.
- Completion of a new 5 MG Ground Storage Tank on the Central Boulevard site.
- Installation of additional high service pumps at the Water Treatment Plant site.
- Construction of a new High Service Pump Station at the Central Boulevard site.

1.4 Emergency Supplies

Emergency supplies are provided via interconnects with adjacent utilities. The Town has interconnects with the following utilities:

- Seacoast Utilities
- Village of Tequesta

As necessary, the Town can provide water to or receive water from neighboring communities through these interconnections.

2.0 Capacity and Projected Demands

The existing permitted withdrawal approved by SFWMD Water Use Permit No. 50-00010-W is summarized in Table A.4. It is important to note that the permit, which expires in 2024, includes a reduction in allocation from the surficial aquifer source starting in October 2009.

Table A.4
Existing Permitted Water Use (MGD)

	Total	Surficial Aquifer	Floridan Aquifer
Through Oct. 2009			
Max month (daily) [1]	35.70	20.60	18.50
Annual avg. (daily	25.13	13.00	12.13
Oct. 2009 to 2024			
Max month (daily) [1]	31.20	12.70	18.50
Annual avg. (daily)	22.78	10.65	12.13

[1] *Based on 30 days / month*

In addition, the Town has a second Water Use Permit (No. 50-01584-W). This permit, which was most recently reissued September 9, 2004 (expiring September 9, 2009), is for Diversion and Impoundment Use of an allocation of 3,650 million gallons per year from the SFWMD C-18 Canal. The maximum monthly allocation is 304 million gallons. The water which is siphoned from the C-18 Canal into the South Indian River Water Control District (SIRWCD) Outfall Canal can then be distributed into the Town's surficial wellfield recharge system (see Figure A.6). Unfortunately, the limiting conditions of the permit include specific combinations of physical conditions which must be satisfied before a withdrawal from the C-18 may be made, and due to these conditions, water is very rarely available from this source (certainly nowhere near the permitted allocation).

The current WUP will require modification prior to the October 2009 milestone for reduction in allocation from the surficial aquifer. This was acknowledged during the negotiations for the permit renewal in 2004. As part of the permit modification process needed to maintain the full surficial allocation, the Town will have to document historical use (and thus need). It is also expected that water from the regional water management system will help justify the continued withdrawal of the full allocation from the surficial aquifer.

2.1.1 Raw Water Capacity

There are 52 existing surficial aquifer wells (nine of which are currently being equipped for production) that have a total pumping capacity of 20 MGD (limited by hydraulics of the overall surficial transmission system). Up to six (6) surficial aquifer wells may possibly be added in the future. The 11 existing Floridan aquifer wells can provide up to 23 MGD of brackish water for reverse osmosis treatment (note that there are two additional wells – one that has been abandoned and one that requires rehabilitation before being put back into service). Tables A.5 and A.6 summarize the Town's surficial and Floridan wells respectively. Table A.7 provides a summary of wells with Emergency Power.

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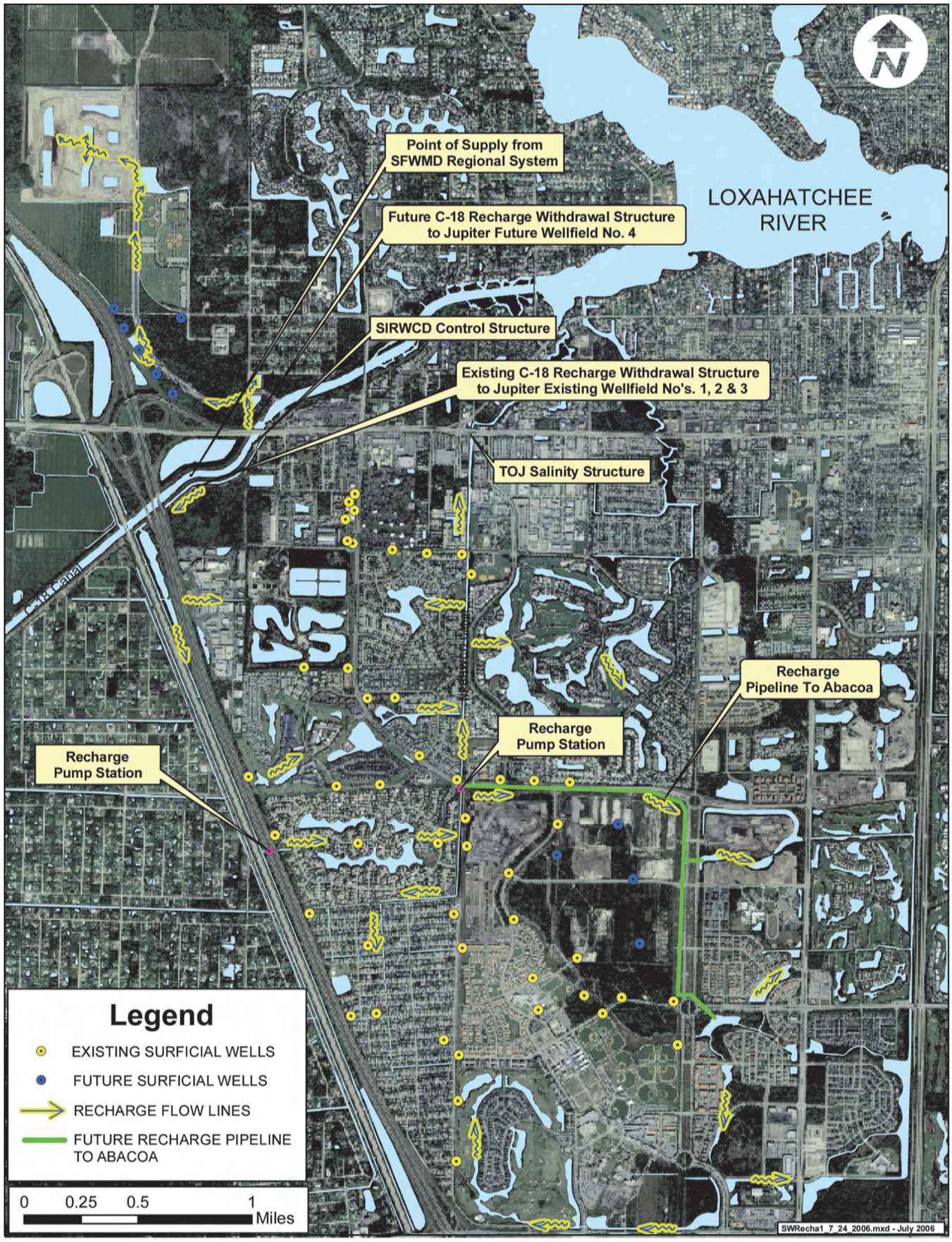

Figure A.6
Surficial Wellfield Recharge System

Table A.5
Surficial Wellfield Capacity Data

Wellfield No. 2		Wellfield No. 3		Wellfield No. 4 (Future)	
Well No.	**Safe Yield Capacity**	**Well No.**	**Safe Yield Capacity**	**Well No.**	**Safe Yield Capacity**
6	300	23	300	56	367
7	300	24	500	57	367
8	300	25	280	58	367
9	300	26	360	59	367
10	300	27	300	60	367
11	300	28	300	62	367
12	700	29	260	**Total**	**2,202 gpm**
13	350	30	300		**3.17 MGD**
14	350	32	300		
15	350	33	300		
16	430	34	300		
17	420	39	750		
18	300	40	500		
19	400	41	500		
20	589	42	500		
21	350	43	500		
22	350	44	400		
31	300	45	400		
35	500	46	750		
36	500	47	500		
37	300	48	450		
38	300	49	400		
Total	**8,289 gpm**	50	400		
	11.94 MGD	51	600		
		52	700		
		53	500		
		54	600		
		55	1000		
		67	500		
		68	900		
		Total	**14,350 gpm**		
			20.66 MGD		

Table A.6
Floridan Well Capacity

Well ID	Location	Design Flow Rate (GPM)	Design Flow Rate (MGD)	Emergency Power Source	Emergency Power (GPM)	Emergency Power (MGD)
RO-1	Water Plant	Abandoned	0.00	Abandoned	0	0.00
RO-2	Wellfield 2	2000	2.88	Booster Pumps	1533.5	2.21
RO-3	Wellfield 2	2000	2.88	Booster Pumps	1533.5	2.21
RO-4	Water Plant	1000	0.00	O.O.S.	0	0.00
RO-5	C-18 West of Turnpike	1100	1.58	Western Repump	1100	1.58
RO-6	C-18 West of Turnpike	1300	1.87	Western Repump	1300	1.87
RO-7	C-18 West of Turnpike	1800	2.59	Booster Pumps	0	0
RO-8	C-18 West of Turnpike	1100	1.58	Western Repump	1100	1.58
RO-9	C-18 West of Turnpike	1100	1.58	Western Repump	1100	1.58
RO-10	C-18 West of Turnpike	1100	1.58	Booster Pumps	0	0
RO-11	C-18 West of Turnpike	1500	2.16	Western Repump	1500	2.16
RO-12	C-18 West of Turnpike	1500	2.16	Western Repump	1500	2.16
RO-13	C-18 West of Turnpike	1500	2.16	Western Repump	1500	2.16
Totals		**17,000**	**23.0**		**12,167**	**17.51**

Table A.7
Raw Water Supply on Emergency Power, Summary of Surficial and Floridan Sources

Town of Jupiter Average Day Demand	17 MGD	
Town of Jupiter Build Out Average Day Demand	21 MGD	
Shallow Well Supply on Emergency Power	16.5 MGD	(Including wells on ABACOA generator.)
Shallow Well Finished Water (@ 85% Recovery)	14.0 MGD	
Floridan Well Supply on Emergency Power	21.1 MGD	
Floridan Well Finished Water (@ 75% Recovery)	15.8 MGD	
Total Raw Water Supply on Emergency Power	37.6 MGD	
Total Finished Water available from Raw Water Sources On Emergency Power	29.9 MGD	

FAC 62-555.320: Standby power must be provided to operate all source, treatment and pumping facilities necessary to deliver water meeting all applicable primary or secondary standards at rate greater than or equal to average day demand.

Raw Water Supply on Emergency Power meets DEP requirements for projected build out average day demands.

Based on the above, and assuming facilities are maintained, it appears that the existing raw water pumping system has the capacity required to satisfactorily meet current and short term demands. The Town has independent raw water transmission systems for both water supply sources.

2.1.1 Treatment Capacity

The present treatment capacity includes the Lime Softening, Reverse Osmosis and Ion Exchange Facilities. Current permitted capacities are as follow:

Present Treatment Capacity	
Lime Softening	13.5 MGD
Reverse Osmosis	13.7 MGD
Ion Exchange	1.8 MGD
Total Permitted Capacity	**29.0 MGD**

The Town is in the process of adding a 14.5 MGD Nanofiltration Facility that will in part supplant current lime softening capacity as noted below.

	Existing	Future	
Lime Softening	13.5 MGD	0.0 MGD	(9.0 MGD as standby)
Ion Exchange	1.8 MGD	1.8 MGD	
Nano-filtration	0.0 MGD	14.5 MGD	(Expandable to 17 MGD)
Reverse Osmosis	13.7 MGD	13.7 MGD	
Total Permitted Capacity	**29.0 MGD**	**30.0 MGD**	

2.1.3 Disposal Capacity

Disposal of concentrate from the reverse osmosis WTP is via surface water discharge to the C-18 Canal. Disposal of regenerant from the Ion Exchange Facility is to the Loxa-hatchee River District Wastewater Treatment Facility. Future nanofiltration concentrate is permitted for blending with wastewater effluent for reuse purposes.

2.2 Projected Demands

Future demands have been projected by the Town through the 2025 planning horizon. In 2025, annual average finished water demands are projected to be almost 21 MGD. Table A.8 presents the anticipated growth and demand projections from 2010 through the 2025 planning horizon in 5-year increments.

Table A.8
Future Demand Projections

	2010	2015	2020	2025
Finished Water	17.05	18.77	19.90	20.94
Raw Water	22.21	24.23	25.56	26.79

3.0 Water Use Permit (WUP)

3.1 Permit Duration

Raw water withdrawals are permitted by the SFWMD under WUP No. 50-00010-W. The permit, which has a duration of 20 years, was last issued on November 10, 2004 with expiration on November 11, 2024.

3.2 Allocations

The WUP contains specific details regarding permitted withdrawals. Quantity and source are described and monitored to ensure compliance with permit conditions. A summary of permit allocations is presented as follows (note that allocations change in 2009):

Source Classification – Groundwater

- Surficial Aquifer
- Floridan Aquifer System

<u>Allocations through October 14, 2009</u>

- Total Annual Allocation – 9,172 million gallons
- Total Maximum Month Allocation – 1,070 million gallons
- Total Surficial Aquifer Annual Allocation – 4,745 million gallons
- Total Floridan Aquifer Allocation – 4,427 million gallons
- Total Maximum Month Allocation (Surficial) – 617 million gallons
- Total Maximum Month Allocation (Floridan) – 555 million gallons

Allocations from October 15, 2009 to October 14, 2024

- Total Annual Allocation – 8,314 million gallons
- Total Maximum Month Allocation – 935 million gallons
- Total Surficial Aquifer Annual Allocation – 3,887 million gallons
- Total Floridan Aquifer Annual Allocation – 4,427 million gallons
- Total Maximum Month Allocation (Surficial) – 380 million gallons
- Total Maximum Month Allocation (Floridan) – 555 million gallons

4.0 Water Supply Service Area

The Town's service area encompasses approximately 45 square miles. At this time, there are no plans to expand the service area. Figure A.1 shows the Town's limits and service area.

The Town provides finished water service to all Jupiter residents. It also provides water to residents in Juno Beach, Tequesta, and portions of unincorporated Martin and Palm Beach Counties.

5.0 Projected Water Demands

5.1 5-year Projections

As presented in Table A.8, the 2015 projected annual average daily demand is 18.77 MGD. This value is a finished water projection, and treatment efficiency must be taken into account to determine actual raw water demands (see Table A.8).

5.2 Build-out Projections

The 2025 build-out finished water demand is 20.94 MGD on an annual average day basis. Again, treatment efficiencies must be considered to establish build-out raw water demands.

6.0 Assessment of Water Supply

The Town's water supply needs are currently met through its existing WUP. However, the reduction in allocation from the surficial aquifer (October 2009) must be addressed. The current WUP will require modification prior to the October 2009 milestone for reduction in allocation from the surficial aquifer. This was acknowledged during the negotiations for the permit renewal in 2004. As part of the permit modification process needed to maintain the full surficial allocation, the Town will have to document historical use (and thus need). It is also expected that water from the regional water management system will help justify the continued withdrawal of the full allocation from the surficial aquifer.

Northern Palm Beach County Regional Water Management Plan

The SFWMD and USACOE are currently in the early phases of a regional plan to provide water in Northern Palm Beach County to meet environmental and public water supply needs. Currently the project is in the Alternatives Formulation phase. This phase will establish various alternatives formulated from combinations of “Management Measures”. Discussions with SFWMD staff and consultants have indicated that a total of approximately 50 cfs is likely to be allocated to Jupiter and Seacoast Utilities for wellfield recharge purposes. At this time that allocation is presumably in all proposed alternatives, and accordingly, the Town has also discussed with SFWMD staff and consultants the appropriateness of proceeding with Cooperative Agreement(s) with the SFWMD for the implementation of other infrastructure (for surface water conveyance) which may be necessary to utilize water from the regional systems once it becomes available. At this time the point of delivery of the water is expected to be the SFWMD C-18 Canal.

7.0 Consistency with Regional Water Supply Plan

The Town of Jupiter's plan for long-term water supply is consistent with the regional water supply plan (Lower East Coast Water Supply Plan) being facilitated by the SFWMD.

The Town has an identified plan, supported by its Ten-Year Capital Improvement Plan, to provide supply, treatment, transmission, storage and distribution of the projected buildout water demand for the utility's service area. The suite of projects necessary to meet this objective was coordinated with the SFWMD to ensure their incorporation into and consistency with the Lower East Coast Water Supply Plan (LECWSP).

By providing notice of these projects, to SFWMD, these specific projects should meet the requirements of Senate Bill 444 for funding considerations, namely:

- Utilities must identify "specific water supply projects" instead of just a "menu of water source options".
- Projects specifically identified in the regional water supply plan become available for increased alternative supply funding (80% of funding reserved for projects listed in regional water supply plans).

A listing of the Town's proposed projects which were supplied to SFWMD for inclusion in the plan is shown in Table A.9, "LEC Proposed Water Supply Projects". Table A.10 includes additional projects slated in the 10-year planning period which are deemed necessary to meet the Town’s water supply, treatment, storage and transmission needs.

A key to the ensured success of the Town's plan is the provision of raw water from the regional system to help support the Town's surficial aquifer wellfield. For over 20 years,

the Town has had a consumptive use permit from SFWMD to divert water from the C-18 Canal to the surface water recharge system. While the permit provides for up to 3,650 MG per year, the conditions of use are so onerous that little to no withdrawal has been possible. The regional plan provides for approximately 50 cfs to be delivered to Northern Palm Beach County Utilities (presumably 25 cfs for Town of Jupiter and 25 cfs for Seacoast). The water to be made available to Jupiter would likely be delivered through the C-18 Canal. This would allow the Town to then realize the necessary withdrawal from the C-18 to support its Surficial Aquifer Recharge System. The Town has been coordinating this issue with the SFWMD and its consultants and is proceeding with the planning and design of facilities to utilize this allocation of resource.

Table A.9
LEC Proposed Water Supply Projects (FY07-25)

Source of Water/Alternative or Traditional	Current Status of Project as of 10/05	Other Entities Involved	Feasibility Study Completed or Underway	Total Estimated Construction Cost ($million)	Water Made Available (MGD)
Project: 1.7 MGD Brackish Water Reverse Osmosis Treatment Expansion - Construct final brackish RO treatment train in existing RO Process Building					
FAS	Project is under construction	N/A	Feasibility Study Completed	13.00	1.7
Project: North Limestone Creek Wellfield - Construct 6 surficial aquifer wells, raw water transmission piping and emergency power.					
SAS	Project is in planning stage	N/A	Feasibility Study Completed	3.00	3.2
Project: Rehabilitation of R/O Wells 5, 6, 7, 8, 9, & 10 - Squeeze grout Well RO-6 and repipe up to six RO wells to eliminate the well isolation valves which continue to inhibit production					
FAS	Project is under construction	N/A	Feasibility Study Completed	0.45	0.5 +/-
Project: Surface Water Recharge Improvements (Phase 1) - Enhance the effectiveness of the surface water discharge system which diverts excess stormwater from E to W into wellfields to aid in aquifer recharge and preventing salt water intrusion					
SW Runoff normally wasted to tide	Project is in design/permitting	SIRWCD, NPBCID, NPBHWCD	Feasibility Study Underway	1.00	2.5
Project: Construct 14.5 MGD Nanofiltration Plant - Construct new 14.5 MGD Nanofiltration Plant to replace Lime Softening, recycling of NF by-product concentrate for irrigation and aquifer recharge					
SAS, NF By-Product Concentrate	Project is in design/permitting stage.	SIRWCD, Loxahatchee River District (possible)	Feasibility Study Underway	37.00	10-20
Project: Modifications to Phase II (1997) RO Plant - Replace RO Plant membranes installed in 1997 to maintain BWRO production.					
FAS	Project is in planning stage	N/A	Feasibility Study Underway	0.75	3.0
Project: Surficial Aquifer Well Rehabilitation - Rehabilitate Town's existing aquifer wellfield facilities to improve production capabilities					
SAS	Project is in planning stage	N/A	Feasibility Study Underway	0.90	1.0 +/-

Table A.10
Additional 10-year Planning Period Projects

Project Name	Project Description	Funding Source FY	Estimated Capital Cost
Western Service Area Water Storage and Repumping Facility	Construct 3MG water storage tank and re-pumping facilities west of I-95.	Off-Site Transmission Fees 2007-2008	$4,615,400
ABACOA Surficial Aquifer Wells	New facility to power Wellfield #3 surficial wells located within the ABACOA Development. Electrical, Mechanical, Sitework, etc. for the completion of nine additional surficial wells in Wellfield #3 and drilling of 4 new wells.	Plant Capacity Charges 2007–2008	$7,217,196
Bluff's Area Transmission System	Acquisition and connection of an existing 16" ICW crossing previously constructed by the Loxahatchee River District. Needed to provide redundancy for service to the southeasterly portion of the service area.	Off-Site Transmission Fees 2007-2008	$304,000
Deepen RO Well No. 4	Deepening of the currently unusable RO well to improve productivity and water quality.	Renewal and Replacement 2007-2012	$690,000
Construction of 8 MG Water Storage Tank	Construction of the fourth, and final, water storage tank on the Central Boulevard storage/pump station site.	Off-Site fees 2011	$3,600,000
South Martin County Repump Station	Construction of a 1.0 MG water storage tank and repumping facilities in South Martin County (along the Island Way Corridor)	Off-Site Transmission Fees 2012	$2,200,000
Additional Water Interconnect with Seacoast Utilities	Construction of a third potable water interconnect with Seacoast Utilities (locations is West end of Donald Ross Road).	Off-Site Transmission Fees 2012	$250,000
West Jupiter Transmission	Construction of approximately 7 miles of 12-inch and 16-inch transmission main serving West Jupiter	Off-Site Transmission Fees 2012	$5,725,000
Bluffs Booster Pump Station	As verified within the distribution system hydraulic modeling, construction of a booster pump station near the ICW would serve as a direct means of improving system pressure performance in the vicinity of the Bluffs.	Off-Site Transmission Fees 2013	$1,900,000

Table A.10
Additional 10-year Planning Period Projects

Project Name	Project Description	Funding Source FY	Estimated Capital Cost
Surface Water Recharge Improvements (Phase 2)	Improvement to the Surficial Aquifer Recharge System through installation of a conduit in the FDOT Right of Way to more efficiently deliver recharge water from the regional system.	Plant Capacity Charges 2013	$2,000,000 [1]
Surficial Aquifer Well Rehabilitation	Continued effort to rehabilitate the Town's existing surficial aquifer wellfield facilities.	Renewal and Replacement 2013–2016	$900,000

[1] *Anticipated to be a cooperative project with SFWMD, and potentially FDOT.*

Appendix B

Water Use Permits

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

COPY 03-06

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
3301 Gun Club Road, West Palm Beach, Florida 33406 • (561) 686-8800 • FL WATS 1-800-432-2045 • TDD (561) 697-2574
Mailing Address: P.O. Box 24680, West Palm Beach, FL 33416-4680 • www.sfwmd.gov

CON 24

Permit No. 50-00010-W
Application No. 030303-17

November 17, 2004

JUPITER TOWN OF
(JUPITER TOWN OF)
210 MILITARY TRAIL
JUPITER, FL 33458

Dear Permittee:

Enclosed is your Permit as authorized by the Governing Board of the South Florida Water Management District at its meeting on November 10, 2004.

Special Conditions to your Permit require reports to be filed with this District. Please read these Conditions and use the enclosed form(s), as applicable, for your submittal of these required reports.

If you have any questions, please do not hesitate to contact this office.

Sincerely,

Elizabeth Veguilla

Elizabeth Veguilla
Deputy Clerk
Environmental Resource Regulation Department

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT
WATER USE PERMIT NO. RE-ISSUE 50-00010-W

(NON - ASSIGNABLE)

FORM #0998
(Rev. 5/03)

Date Issued: 10-NOV-2004 Expiration Date: November 11, 2024

Authorizing: THE CONTINUATION OF AN EXISTING USE OF GROUNDWATER FROM THE FLORIDAN AQUIFER SYSTEM AND SURFICIAL AQUIFER SYSTEM FOR PUBLIC WATER SUPPLY USE WITH AN ANNUAL ALLOCATION OF 8314 MILLION GALLONS.

Located In: Palm Beach County, S35,36/T40S/R41E
S21,22,27,31-36/T40S/R42E
S31/T40S/R43E
S1-6,8-17,20-24/T41S/R42E
S5-8,17-21,28,29/T41S/R42E

Issued To: JUPITER TOWN OF
(JUPITER TOWN OF)
210 MILITARY TRAIL
JUPITER, FL 33458

This Permit is issued pursuant to Application No. 030303-17, dated March 3, 2003, for the Use of Water as specified above and subject to the Special Conditions set forth below. Permittee agrees to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims or liabilities which may arise by reason of the construction, maintenance or use of activities authorized by this permit. Said application, including all plan and specifications attached thereto, is by reference made a part hereof.

Upon written notice to the permittee, this permit may be temporarily modified, or restricted under a Declaration of Water Shortage or a Declaration of Emergency due to Water Shortage in accordance with provisions of Chapter 373, Fla. Statutes, and applicable rules and regulations of the South Florida Water Management District.

This Permit may be permanently or temporarily revoked, in whole or in part, for the violation of the conditions of the permit or for the violation of any provision of the Water Resources Act and regulations thereunder.

This Permit does not convey to the permittee any property rights nor any privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation, or requirement affecting the rights of other bodies or agencies.

Limiting Conditions are as follows:
SEE PAGES 2 - 10 OF 10 (37 LIMITING CONDITIONS).

Filed with the Clerk of the South Florida Water Management District

On 10-NOV-2004

By Dizzanette Verguille
Deputy Clerk

South Florida Water Management District, by its Governing Board

By
ACTING DISTRICT CLERK

BOARD OF SOUTH FLORIDA WATER MANAGEMENT DISTRICT
STATE OF FLORIDA
SEAL
ESTABLISHED 1949

LIMITING CONDITIONS

1. This permit shall expire on November 11, 2024.

2. Application for a permit modification may be made at any time.

3. Water use classification:

   Public water supply

4. Source classification:

   Ground water from:
   Floridan Aquifer System
   Surficial Aquifer System

5. The Annual allocation shall not exceed 9172 MG through October 14, 2009.

   The maximum monthly allocation shall not exceed 1070 MG through October 14, 2009.

   The following limitations to average annual withdrawals from specific sources are stipulated: through October 14, 2009.
   Floridan Aquifer System: 4427 MG
   Surficial Aquifer System: 4745 MG

   The following limitations to maximum month withdrawals from specific sources are stipulated: through October 14, 2009.
   Floridan Aquifer System: 555 MG
   Surficial Aquifer System: 617 MG

   The annual allocation shall not exceed 8314 MG from October 15, 2009 to October 14, 2024.

   The maximum monthly allocation shall not exceed 935 MG from October 15, 2009 to October 14, 2024.

   The following limitations to average annual withdrawals from specific sources are stipulated: from October 15, 2009 to October 14, 2024.
   Floridan Aquifer System: 4427 MG
   Surficial Aquifer System: 3887 MG

   The following limitations to maximum month withdrawals from specific sources are stipulated: from October 15, 2009 to October 14, 2024.
   Floridan Aquifer System: 555 MG
   Surficial Aquifer System: 380 MG

6. In the event of a declared water shortage, water withdrawal reductions will be ordered by the District in accordance with the Water Shortage Plan, Chapter 40E-21, F.A.C. The Permittee is advised that during a water shortage, pumpage reports shall be submitted as required by Chapter 40E-21, F.A.C.

7. Withdrawal Facilities:

   Ground Water - Existing:

1 - 14" X 1500' X 1480 GPM Well Cased To 1073 Feet
1 - 16" X 1373' X 2040 GPM Well Cased To 1065 Feet
1 - 16" X 1520' X 1500 GPM Well Cased To 1235 Feet
1 - 16" X 1540' X 1500 GPM Well Cased To 1295 Feet
1 - 16" X 1615' X 2000 GPM Well Cased To 1017 Feet
1 - 16" X 1617' X 1500 GPM Well Cased To 1224 Feet
1 - 16" X 1660' X 1300 GPM Well Cased To 1465 Feet
1 - 16" X 1662' X 2000 GPM Well Cased To 1330 Feet
1 - 16" X 1665' X 1100 GPM Well Cased To 1451 Feet
1 - 16" X 1673' X 2000 GPM Well Cased To 1032 Feet
1 - 10" X 140' X 250 GPM Well Cased To 117 Feet
1 - 10" X 140' X 330 GPM Well Cased To 121 Feet
1 - 10" X 155' X 350 GPM Well Cased To 120 Feet
1 - 10" X 156' X 230 GPM Well Cased To 127 Feet
1 - 10" X 160' X 300 GPM Well Cased To 105 Feet
1 - 10" X 194' X 300 GPM Well Cased To 105 Feet
1 - 10" X 200' X 300 GPM Well Cased To 120 Feet
1 - 10" X 202' X 360 GPM Well Cased To 103 Feet
1 - 10" X 205' X 300 GPM Well Cased To 105 Feet
1 - 10" X 205' X 300 GPM Well Cased To 120 Feet
1 - 10" X 207' X 300 GPM Well Cased To 105 Feet
1 - 10" X 220' X 260 GPM Well Cased To 120 Feet
1 - 12" X 140' X 440 GPM Well Cased To 138 Feet
1 - 12" X 140' X 460 GPM Well Cased To 135 Feet
1 - 12" X 145' X 280 GPM Well Cased To 140 Feet
1 - 12" X 148' X 500 GPM Well Cased To 142 Feet
1 - 12" X 148' X 520 GPM Well Cased To 142 Feet
1 - 12" X 150' X 750 GPM Well Cased To 110 Feet
1 - 12" X 150' X 900 GPM Well Cased To 110 Feet
1 - 12" X 158' X 170 GPM Well Cased To 125 Feet
1 - 12" X 165' X 370 GPM Well Cased To 130 Feet
1 - 12" X 165' X 550 GPM Well Cased To 132 Feet
1 - 12" X 175' X 255 GPM Well Cased To 130 Feet
1 - 12" X 175' X 315 GPM Well Cased To 130 Feet
1 - 12" X 177' X 285 GPM Well Cased To 120 Feet
1 - 12" X 185' X 325 GPM Well Cased To 110 Feet
1 - 12" X 200' X 430 GPM Well Cased To 136 Feet
1 - 12" X 201' X 270 GPM Well Cased To 117 Feet
1 - 12" X 201' X 635 GPM Well Cased To 130 Feet
1 - 16" X 148' X 220 GPM Well Cased To 104 Feet
1 - 16" X 153' X 385 GPM Well Cased To 138 Feet
1 - 16" X 153' X 450 GPM Well Cased To 137 Feet
1 - 16" X 161' X 190 GPM Well Cased To 144 Feet
1 - 8" X 113' X 330 GPM Well With Unknown Cased Depth
1 - 8" X 122' X 230 GPM Well Cased To 118 Feet
1 - 8" X 125' X 300 GPM Well Cased To 118 Feet
1 - 8" X 142' X 300 GPM Well Cased To 110 Feet
1 - 8" X 142' X 300 GPM Well Cased To 118 Feet
1 - 8" X 143' X 300 GPM Well Cased To 112 Feet
1 - 8" X 147' X 140 GPM Well Cased To 120 Feet
1 - 8" X 150' X 300 GPM Well Cased To 110 Feet
1 - 8" X 152' X 300 GPM Well Cased To 114 Feet
1 - 8" X 156' X 195 GPM Well Cased To 110 Feet
1 - 8" X 160' X 255 GPM Well Cased To 110 Feet
1 - 8" X 165' X 200 GPM Well Cased To 110 Feet
1 - 8" X 180' X 300 GPM Well Cased To 138 Feet
2 - 12" X 150' X 400 GPM Wells Cased To 110 Feet
2 - 12" X 150' X 500 GPM Wells Cased To 110 Feet

Ground Water - Proposed:

3 - 16" X 1500' X 1000 GPM Wells Cased To 1050 Feet
1 - 12" X 150' X 300 GPM Well Cased To 110 Feet
1 - 12" X 150' X 750 GPM Well Cased To 110 Feet
4 - 12" X 150' X 500 GPM Wells Cased To 110 Feet
6 - 12" X 150' X 367 GPM Wells Cased To 110 Feet

8. Permittee shall mitigate interference with existing legal uses that was caused in whole or in part by the permittee's withdrawals, consistent with the approved mitigation plan. As necessary to offset the interference, mitigation will include pumpage reduction, replacement of the impacted individual's equipment, relocation of wells, change in withdrawal source, or other means.

Interference to an existing legal use is defined as an impact that occurs under hydrologic conditions equal to or less severe than a 1 in 10 year drought event that results in the:

(1) Inability to withdraw water consistent with provisions of the permit, such as when remedial structural or operational actions not materially authorized by existing permits must be taken to address the interference; or

(2) Change in the quality of water pursuant to primary State Drinking Water Standards to the extent that the water can no longer be used for its authorized purpose, or such change is imminent.

9. Permittee shall mitigate harm to existing off-site land uses caused by the permittee's withdrawals, as determined through reference to the conditions for permit issuance. When harm occurs, or is imminent, the District will require the permittee to modify withdrawal rates or mitigate the harm. Harm as determined through reference to the conditions for permit issuance, includes:

(1) Significant reduction in water levels on the property to the extent that the designed function of the water body and related surface water management improvements are damaged, not including aesthetic values. The designed function of a water body is identified in the original permit or other governmental authorization issued for the construction of the water body. In cases where a permit was not required, the designed function shall be determined based on the purpose for the original construction of the water body (e.g. fill for construction, mining, drainage canal, etc.)

(2) Damage to agriculture, including damage resulting from reduction in soil moisture resulting from consumptive use; or

(3) Land collapse or subsidence caused by reduction in water levels associated with consumptive use.

10. Permittee shall mitigate harm to the natural resources caused by the permittee's withdrawals, as determined through reference to the conditions for permit issuance. When harm occurs, or is imminent, the District will require the permittee to modify withdrawal rates or mitigate the harm. Harm, as determined through reference to the conditions for permit issuance includes:

(1) Reduction in ground or surface water levels that results in harmful

lateral movement of the fresh water/salt water interface,

(2) Reduction in water levels that harm the hydroperiod of wetlands,

(3) Significant reduction in water levels or hydroperiod in a naturally occurring water body such as a lake or pond,

(4) Harmful movement of contaminants in violation of state water quality standards, or

(5) Harm to the natural system including damage to habitat for rare or endangered species.

11. If any condition of the permit is violated, the permit shall be subject to review and possible modification, enforcement action, or revocation.

12. Authorized representatives of the District shall be permitted to enter, inspect, and observe the permitted system to determine compliance with special conditions.

13. The Permittee is advised that this permit does not relieve any person from the requirement to obtain all necessary federal, state, local and special district authorizations.

14. The permit does not convey any property right to the Permittee, nor any rights and privileges other than those specified in the Permit and Chapter 40E-2, Florida Administrative Code.

15. Permittee shall submit all data as required by the implementation schedule for each of the limiting conditions to: S.F.W.M.D., Supervising Hydrogeologist - Post-Permit Compliance, Water Use Regulation Dept. (4320), P.O. Box 24680, West Palm Beach, FL 33416-4680.

16. Prior to withdrawing water as authorized by this Permit, the Permittee shall provide the results of the calibration testing of the identified water accounting method(s) and equip all existing and proposed withdrawal facilities with approved water use accounting method(s) pursuant to Section 4.1 of the Basis of Review for Water Use Permit Applications.

17. Every five years from the date of Permit issuance, the Permittee shall submit re-calibration data on each water pumping accounting facility, for those Permittees whose accounting method(s) require re-calibration.

18. The permittee shall maintain records of daily withdrawals from each well. Monthly withdrawals for each well and maximum monthly withdrawals for each wellfield and for the entire system for each month shall be submitted to the District quarterly.

19. The Permittee shall notify the District within 30 days of any change in service area boundary. If the Permittee will not serve a new demand within the service area for which the annual allocation was calculated, the annual allocation may then be subject to modification and reduction.

20. Permittee shall implement the wellfield operating plan described in District staff report prepared in support of recommendation for permit issuance.

21. Permittee shall determine unaccounted-for distribution system losses.

Losses shall be determined for the entire distribution system on a monthly basis. Permittee shall define the manner in which unaccounted-for losses are calculated. Data collection shall begin within six months of Permit issuance. Loss reporting shall be submitted to the District on a yearly basis from the date of Permit issuance.

22. Permittee shall maintain an accurate flow meter at the intake of the water treatment plant for the purpose of measuring daily inflow of water.

23. The Water Conservation Plan required by Section 2.6.1 of the Basis of Review for Water Use Permit Applications within the South Florida Water Management District, must be implemented in accordance with the approved implementation schedule.

24. The Permittee's monitoring plan shall be implemented as follows:

    The permittee shall make monthly measurements of the chloride concentrations in each production well and shall submit this data to the District in the month following data collection.

25. The Water Conservation Plan required by Section 2.6.1 of the Basis of Review for Water Use Permit Applications within the South Florida Water Management District, must be implemented in accordance with the approved implementation schedule.

26. If a proposed well location is different from a location specified in the application, the Permittee shall submit to the District an evaluation of the impact of pumpage from the proposed well location on adjacent existing legal uses, pollution sources, environmental features, the saline water interface, and water bodies one month prior to all new well construction. The Permittee is advised that the proposal must be in compliance with all permitting criteria and performance standards in effect at the time of submittal, and that a formal modification of the permit shall be required if the withdrawals from the well location will result in an environmental or resource impact significantly greater than that anticipated in the permit review process.

27. If at any time there is an indication that the well casing, valves, or controls leak or have become inoperative, repairs or replacement shall be made to restore the system to an operating condition. Failure to make such repairs shall be cause for filling and abandoning the well, in accordance with procedures outlined in Chapters 40E-3 and 40E-30, Florida Administrative Code.

28. Permittee shall secure a well construction permit prior to construction, repair, or abandonment of all wells, as described in Chapters 40E-3 and 40E-30, Florida Aministrative Code.

29. The Permittee shall submit to the District an updated Well Description Table (Table A) within one month of completion of the proposed wells identifying the actual total and cased depths, pump manufacturer and model numbers, pump types, intake depths and type of meters.

30. Within six months of permit issuance, the Permittee shall implement the following saline water intrusion monitoring program:

    The permittee shall continue to monitor and submit the data from the salt water intrusion (SALT) monitoring program to the District on a monthly basis. These data shall include water levels, referenced to

would apply to the project based on current District allocation rules and updated population and per capita use rates. In the event the permit allocation is greater than the allocation provided for under District rule, the permittee shall apply for a letter modification to reduce the allocation consistent with District rules and the updated population and per capita use rates to the extent they are considered by the District to be indicative of long term trends in the population and per capita use rates over the permit duration. In the event that the permit allocation is less than allowable under District rule, the permittee shall apply for a modification of the permit to increase the allocation if the permittee intends to utilize an additional allocation, or modify its operation to comply with the existing conditions of the permit.

35. In the event of a District declared water shortage covering the Town of Jupiter service area, the permittee is authorized to increase the utilization of the Floridan aquifer wells over the allocation included in Limiting Condition No. 5 unless otherwise directed in the applicable water shortage order. The water used from the Florida aquifer during the declared water shortage shall not be counted in the calculation of the annual and maximum month use for the purpose of determining compliance with Limiting Condition No. 5.

36. Within 6 months of permit issuance, the permittee shall submit the results of a well inventory that identifies all centrifugal pumps for uses which are specifically exempted by Chapter 40E-2 F.A.C. and that are existing at the time of permit issuance in areas where the Town's permitted drawdown is expected to result in groundwater levels of 20 feet below land surface or greater. Should the TOJ pumpage cause interference with existing legal uses, mitigation shall be required pursuant to District rules and Limiting Condition No. 8.

37. The permittee shall construct and operate Wellfield 4 by November 11, 2009. Construction and operation includes facilities and appurtenances needed to pump, treat and distribute potable water to customers. Failure to comply shall be the basis for a modification to this permit. Prior to operation of Wellfield 4, the Parcel 19 permit (Permit No. 50-00547-W) must be withdrawn by the permittee.

South Florida Water Management District
Quarterly Pumpage Report

Form 0188b
Rev. 12/01

This report must be completed and submitted to the South Florida Water Management District as required by your Permit.

Permitted System: _____ Permit No: _____

Address: _____ Phone No: _____

City: _____ State: _____ Zip: _____

Gallons Used, (MG)

	Ground Water		Surface Water		Reclaimed	
Month/Year	Total Pumped	Max Daily	Total Pumped	Max Daily	Total Pumped	Max Daily
1						
2						
3						

(Please choose one of the following.)
Accounting method: flow meter, time clock, fuel, other (Please specify on next line.) _____

_____

Date of last bi-annual calibration (as required by permit): _____

Name of Person Completing Form: _____

Signature: _____ Date: _____

SEND TO:

South Florida Water Management District
Attn: Water Use 4320
Post Office Box 24680
West Palm Beach, FL 33416-4680

FORM #0200
Rev. 5/93

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
WATER USE PERMIT NO. RE-ISSUE 50-01584-W

(NON - ASSIGNABLE)

Date Issued: 09-SEP-2004 Expiration Date: September 9, 2009

Authorizing: THE CONTINUATION OF AN EXISTING USE OF SFWMD CANAL (C-18) FOR DIVERSION AND IMPOUNDMENT USE WITH AN ANNUAL ALLOCATION OF 3650 MILLION GALLONS.

Located In: Palm Beach County, S3,4,9,10/T41S/R42E

Issued To: JUPITER TOWN OF
(JUPITER TOWN OF RECHARGE SYSTEM)
210 MILITARY TRAIL
JUPITER, FL 33458

This Permit is issued pursuant to Application No. 030310-23, dated March 10, 2003, for the Use of Water as specified above and subject to the Special Conditions set forth below. Permittee agrees to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims or liabilities which may arise by reason of the construction, maintenance or use of activities authorized by this permit. Said application, including all plan and specifications attached thereto, is by reference made a part hereof.

Upon written notice to the permittee, this permit may be temporarily modified, or restricted under a Declaration of Water Shortage or a Declaration of Emergency due to Water Shortage in accordance with provisions of Chapter 373, Fla. Statutes, and applicable rules and regulations of the South Florida Water Management District.

This Permit may be permanently or temporarily revoked, in whole or in part, for the violation of the conditions of the permit or for the violation of any provision of the Water Resources Act and regulations thereunder.

This Permit does not convey to the permittee any property rights nor any privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation, or requirement affecting the rights of other bodies or agencies.

Limiting Conditions are as follows:
SEE PAGES 2 - 7 OF 7 (25 LIMITING CONDITIONS).

Filed with the Clerk of the South Florida Water Management District

On ORIGINAL SIGNED BY:
By ELIZABETH VEGUILLA
DEPUTY CLERK

South Florida Water Management District, by its Governing Board

By ORIGINAL SIGNED BY:
GARRETT WALLACE
ACTING DISTRICT CLERK

LIMITING CONDITIONS

1 . This permit shall expire on September 9, 2009.

2 . Application for a permit modification may be made at any time.

3 . Water use classification:

Diversion and Impoundment into Non-District Facilities.

4 . Source classification:

Surface Water from:
ENCON PERIMETER DITCH
NPBHWCD Outfall Canal
SFWMD Canal (C-18)
SIRWCD East Header Canal
SIRWCD Outfall Canal

5 . Annual allocation shall not exceed 3650 MG.

Maximum monthly allocation shall not exceed 304 MG.

6 . In the event of a declared water shortage, water withdrawal reductions will be ordered by the District in accordance with the Water Shortage Plan, Chapter 40E-21, F.A.C. The Permittee is advised that during a water shortage, pumpage reports shall be submitted as required by Chapter 40E-21, F.A.C.

7 . Withdrawal Facilities:

Surface Water - Existing:

1 - 6" x 5 HP X 600 GPM axial flow Pump

1 - 18" x 50' reinforced concrete pipe Culvert
1 - 24" x 125' reinforced concrete pipe Culvert
1 - 24" x 50' reinforced concrete pipe Culvert
1 - 36" x 450' reinforced concrete pipe Culvert
1 - 5.7" x 4.1" x 250' gated spillway Culvert
2 - 36" x 350' reinforced concrete pipe Culverts
2 - 72" x 108" x 620' concrete box Culverts

8 . Permittee shall mitigate interference with existing legal uses that was caused in whole or in part by the permittee's withdrawals, consistent with the approved mitigation plan. As necessary to offset the interference, mitigation will include pumpage reduction, replacement of the impacted individual's equipment, relocation of wells, change in withdrawal source, or other means.

Interference to an existing legal use is defined as an impact that occurs under hydrologic conditions equal to or less severe than a 1 in 10 year drought event that results in the:

(1) Inability to withdraw water consistent with provisions of the permit, such as when remedial structural or operational actions not materially authorized by existing permits must be taken to address the interference; or

(2) Change in the quality of water pursuant to primary State Drinking

Water Standards to the extent that the water can no longer be used for its authorized purpose, or such change is imminent.

9. Permittee shall mitigate harm to existing off-site land uses caused by the permittee's withdrawals, as determined through reference to the conditions for permit issuance. When harm occurs, or is imminent, the District will require the permittee to modify withdrawal rates or mitigate the harm. Harm as determined through reference to the conditions for permit issuance, includes:

(1) Significant reduction in water levels on the property to the extent that the designed function of the water body and related surface water management improvements are damaged, not including aesthetic values. The designed function of a water body is identified in the original permit or other governmental authorization issued for the construction of the water body. In cases where a permit was not required, the designed function shall be determined based on the purpose for the original construction of the water body (e.g. fill for construction, mining, drainage canal, etc.)

(2) Damage to agriculture, including damage resulting from reduction in soil moisture resulting from consumptive use; or

(3) Land collapse or subsidence caused by reduction in water levels associated with consumptive use.

10. Permittee shall mitigate harm to the natural resources caused by the permittee's withdrawals, as determined through reference to the conditions for permit issuance. When harm occurs, or is imminent, the District will require the permittee to modify withdrawal rates or mitigate the harm. Harm, as determined through reference to the conditions for permit issuance includes:

(1) Reduction in ground or surface water levels that results in harmful lateral movement of the fresh water/salt water interface,

(2) Reduction in water levels that harm the hydroperiod of wetlands,

(3) Significant reduction in water levels or hydroperiod in a naturally occurring water body such as a lake or pond,

(4) Harmful movement of contaminants in violation of state water quality standards, or

(5) Harm to the natural system including damage to habitat for rare or endangered species.

11. If any condition of the permit is violated, the permit shall be subject to review and possible modification, enforcement action, or revocation.

12. Authorized representatives of the District shall be permitted to enter, inspect, and observe the permitted system to determine compliance with special conditions.

13. The Permittee is advised that this permit does not relieve any person from the requirement to obtain all necessary federal, state, local and special district authorizations.

14. The permit does not convey any property right to the Permittee, nor any

rights and privileges other than those specified in the Permit and Chapter 40E-2, Florida Administrative Code.

15. Permittee shall submit all data as required by the implementation schedule for each of the limiting conditions to: S.F.W.M.D., Supervising Hydrogeologist - Post-Permit Compliance, Water Use Regulation Dept. (4320), P.O. Box 24680, West Palm Beach, FL 33416-4680.

16. Prior to withdrawing water as authorized by this Permit, the Permittee shall provide the results of the calibration testing of the identified water accounting method(s) and equip all existing and proposed withdrawal facilities with approved water use accounting method(s) pursuant to Section 4.1 of the Basis of Review for Water Use Permit Applications.

17. Daily withdrawals, separated by each source as stated on the permit, shall be submitted to the District on a monthly basis. The water accounting method and means of calibration shall be stated on each report.

18. The Dependent secondary users listed herein must advise the District and the diversion and impoundment permittee prior to any change in demands.

19. The diversion and impoundment system permittee is responsible for all violations of diversion and impoundment permit terms, except the violations of the dependent secondary users.

20. Within 90 days of the diversion and impoundment permittee agreeing to the inclusion of a dependent secondary user consistent with the requirements in Section 2.7.3.A., the diversion and impoundment permittee is responsible for submitting a request for a permit modification to the District to include the dependent secondary user.

21. All dependent secondary users must comply with the terms of their agreement with the diversion and impoundment entity and applicable terms of this permit.

22. Withdrawals from the C-18 canal shall occur only when the stage in the SIRWCD Outfall Canal is below +10.5 feet NGVD at Structure 'A' and only when the stage in the SIRWCD East Header Canal is below +10.0 feet NGVD subject to the following criteria:

    a.) The stage in the C-18 canal is above +14.0 feet NGVD at stucture S-46 during the wet season months extending from May 15 through October 15.

    b.) The stage in the C-18 canal is above +14.5 feet NGVD at structure S-46 during the dry season months extending from October 15 through May 15, or when the permittee receives written approval from the District.

23. Diversion of excess surface water into the ENCON percolation pond system via Structure 'G' and SIRWCD Canal 'J' shall occur only during periods when the stage of the SIRWCD East Header Canal is greater than +10.0 feet NGVD.

24. The permittee shall cease diversion of water from the SIRWCD East Header Canal into the recharge system when the water level in the

SIRWCD East Header Canal is below +10.0 feet NGVD.

25. The permittee shall continue to maintain a high security manually operated gate at Structure 'A', located between the SIRWCD East Header Canal and the C-18 canal, which would allow the setting of specific flow rates as required under this permit. The structure shall be operated in accordance with the criteria listed in Limiting Condition 23. The permittee shall notify the District in writing prior to the operation of the structure. The permittee shall record daily withdrawal quantities and daily upstream and downstream water levels referenced to feet NGVD. This data shall be reported to the District monthly in the month following data collection. When required by the District, Structure 'A' shall be placed on the District's telemetry system.

NOTICE OF RIGHTS

Section 120.569(1), Fla. Stat. (1999), requires that "each notice shall inform the recipient of any administrative hearing or judicial review that is available under this section, s. 120.57, or s. 120.68; shall indicate the procedure which must be followed to obtain the hearing or judicial review, and shall state the time limits which apply." Please note that this Notice of Rights is not intended to provide legal advice. Not all the legal proceedings detailed below may be an applicable or appropriate remedy. You may wish to consult an attorney regarding your legal rights.

Petition for Administrative Proceedings

1. A person whose substantial interests are affected by the South Florida Water Management District's (SFWMD) action has the right to request an administrative hearing on that action. The affected person may request either a formal or an informal hearing, as set forth below. A point of entry into administrative proceedings is governed by Rules 28-106.111 and 40E-1.511, Fla. Admin. Code, (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109), as set forth below. Petitions are deemed filed upon receipt of the original documents by the SFWMD Clerk.

a. Formal Administrative Hearing: If a genuine issue(s) of material fact is in dispute, the affected person seeking a formal hearing on a SFWMD decision which does or may determine their substantial interests shall file a petition for hearing pursuant to Sections 120.569 and 120.57(1), Fla. Stat. or for mediation pursuant to Section 120.573, Fla. Stat. within 21 days, except as provided in subsections c. and d. below, of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-106.201(2), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

b. Informal Administrative Hearing: If there are no issues of material fact in dispute, the affected person seeking an informal hearing on a SFWMD decision which does or may determine their substantial interests shall file a petition for hearing pursuant to Sections 120.569 and 120.57(2), Fla. Stat. or for mediation pursuant to Section 120.573, Fla. Stat. within 21 days, except as provided in subsections c. and d. below, of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-106.301(2), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

c. Administrative Complaint and Order: If a Respondent objects to a SFWMD Administrative Complaint and Order, pursuant to Section 373.119, Fla. Stat. (1997), the person named in the Administrative Complaint and Order may file a petition for a hearing no later than 14 days after the date such order is served. Petitions must substantially comply with the requirements of either subsection a. or b. above.

d. State Lands Environmental Resource Permit: Pursuant to Section 373.427, Fla. Stat., and Rule 40E-1.511(3), Fla. Admin. Code (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109(2)(c)), a petition objecting to the SFWMD's agency action regarding consolidated applications for Environmental Resource Permits and Use of Sovereign Submerged Lands (SLERPs), must be filed within 14 days of the notice of consolidated intent to grant or deny the SLERP. Petitions must substantially comply with the requirements of either subsection a. or b. above.

e. Emergency Authorization and Order: A person whose substantial interests are affected by a SFWMD Emergency Authorization and Order, has a right to file a petition under Sections 120.569, 120.57(1), and 120.57(2), Fla. Stat., as provided in subsections a. and b. above. However, the person, or the agent of the person responsible for causing or contributing to the emergency conditions shall take whatever action necessary to cause immediate compliance with the terms of the Emergency Authorization and Order.

f. Order for Emergency Action: A person whose substantial interests are affected by a SFWMD Order for Emergency Action has a right to file a petition pursuant to Rules 28-107.005 and 40E-1.611, Fla. Admin. Code, copies of which are attached to this Notice of Rights, and Section 373.119(3), Fla. Stat., for a hearing on the Order. Any subsequent agency action or proposed agency action to initiate a formal revocation proceeding shall be separately noticed pursuant to section g. below.

g. Permit Suspension, Revocation, Annulment, and Withdrawal: If the SFWMD issues an administrative complaint to suspend, revoke, annul, or withdraw a permit, the permittee may request a hearing to be conducted in accordance with Sections 120.569 and 120.57, Fla. Stat., within 21 days of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-107.004(3), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

2. Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the SFWMD's final action may be different from the position taken by it previously. Persons whose substantial interests may be affected by

any such final decision of the SFWMD shall have, pursuant to Rule 40E-1.511(2), Fla. Admin. Code (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109(2)(c)), an additional 21 days from the date of receipt of notice of said decision to request an administrative hearing. However, the scope of the administrative hearing shall be limited to the substantial deviation.

3. Pursuant to Rule 40E-1.511(4), Fla. Admin. Code, substantially affected persons entitled to a hearing pursuant to Section 120.57(1), Fla. Stat., may waive their right to such a hearing and request an informal hearing before the Governing Board pursuant to Section 120.57(2), Fla. Stat., which may be granted at the option of the Governing Board.

4. Pursuant to Rule 28-106.111(3), Fla. Admin. Code, persons may file with the SFWMD a request for extension of time for filing a petition. The SFWMD, for good cause shown, may grant the extension. The request for extension must contain a certificate that the petitioner has consulted with all other parties, if any, concerning the extension and that the SFWMD and all other parties agree to the extension.

CIRCUIT COURT

5. Pursuant to Section 373.617, Fla. Stat., any substantially affected person who claims that final agency action of the SFWMD relating to permit decisions constitutes an unconstitutional taking of property without just compensation may seek judicial review of the action in circuit court by filing a civil action in the circuit court in the judicial circuit in which the affected property is located within 90 days of the rendering of the SFWMD's final agency action.

6. Pursuant to Section 403.412, Fla. Stat., any citizen of Florida may bring an action for injunctive relief against the SFWMD to compel the SFWMD to enforce the laws of Chapter 373, Fla. Stat., and Title 40E, Fla. Admin. Code. The complaining party must file with the SFWMD Clerk a verified complaint setting forth the facts upon which the complaint is based and the manner in which the complaining party is affected. If the SFWMD does not take appropriate action on the complaint within 30 days of receipt, the complaining party may then file a civil suit for injunctive relief in the 15th Judicial Circuit in and for Palm Beach County or circuit court in the county where the cause of action allegedly occurred.

7. Pursuant to Section 373.433, Fla. Stat., a private citizen of Florida may file suit in circuit court to require the abatement of any stormwater management system, dam, impoundment, reservoir, appurtenant work or works that violate the provisions of Chapter 373, Fla. Stat.

DISTRICT COURT OF APPEAL

8. Pursuant to Section 120.68, Fla. Stat., a party who is adversely affected by final SFWMD action may seek judicial review of the SFWMD's final decision by filing a notice of appeal pursuant to Florida Rule of Appellate Procedure 9.110 in the Fourth District Court of Appeal or in the appellate district where a party resides and filing a second copy of the notice with the SFWMD Clerk within 30 days of rendering of the final SFWMD action.

LAND AND WATER ADJUDICATORY COMMISSION

9. A party to a "proceeding below" may seek review by the Land and Water Adjudicatory Commission (FLAWAC) of SFWMD's final agency action to determine if such action is consistent with the provisions and purposes of Chapter 373, Fla. Stat. Pursuant to Section 373.114, Fla. Stat., and Rules 42-2.013 and 42-2.0132, Fla. Admin. Code, a request for review of (a) an order or rule of the SFWMD must be filed with FLAWAC within 20 days after rendition of the order or adoption of the rule sought to be reviewed; (b) an order of the Department of Environmental Protection (DEP) requiring amendment or repeal of a SFWMD rule must be filed with FLAWAC within 30 days of rendition of the DEP's order, and (c) a SFWMD order entered pursuant to a formal administrative hearing under Section 120.57(1), Fla. Stat., must be filed no later than 20 days after rendition of the SFWMD's final order. Simultaneous with filing, a copy of the request for review must be served on the DEP Secretary, any person named in the SFWMD or DEP final order, and all parties to the proceeding below. A copy of Rule 42-2.013, Fla. Admin. Code is attached to this Notice of Rights.

PRIVATE PROPERTY RIGHTS PROTECTION ACT

10. A property owner who alleges a specific action of the SFWMD has inordinately burdened an existing use of the real property, or a vested right to a specific use of the real property, may file a claim in the circuit court where the real property is located within 1 year of the SFWMD action pursuant to the procedures set forth in Subsection 70.001(4)(a), Fla. Stat.

LAND USE AND ENVIRONMENTAL DISPUTE RESOLUTION

11. A property owner who alleges that a SFWMD development order (as that term is defined in Section 70.51(2)(a), Fla. Stat. to include permits) or SFWMD enforcement action is unreasonable, or unfairly burdens the use of the real property, may file a request for relief with the SFWMD within 30 days of receipt of the SFWMD's order or notice of agency action pursuant to the procedures set forth in Subsections 70.51(4) and (6), Fla. Stat.

MEDIATION

12. A person whose substantial interests are, or may be, affected by the SFWMD's action may choose mediation as an alternative remedy under Section 120.573, Fla. Stat. Pursuant to Rule 28-106.111(2), Fla. Admin. Code, the petition for mediation shall be filed within 21 days of either written notice through mail or posting or

publication of notice that the SFWMD has or intends to take final agency action. Choosing mediation will not affect the right to an administrative hearing if mediation does not result in settlement.

Pursuant to Rule 28-106.402, Fla. Admin. Code, the contents of the petition for mediation shall contain the following information:

(1) the name, address, and telephone number of the person requesting mediation and that person's representative, if any;

(2) a statement of the preliminary agency action;

(3) an explanation of how the person's substantial interests will be affected by the agency determination; and

(4) a statement of relief sought.

As provided in Section 120.573, Fla. Stat. (1997), the timely agreement of all the parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Fla. Stat., for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within 60 days of the execution of the agreement. If mediation results in settlement of the dispute, the SFWMD must enter a final order incorporating the agreement of the parties. Persons whose substantial interest will be affected by such a modified agency decision have a right to petition for hearing within 21 days of receipt of the final order in accordance with the requirements of Sections 120.569 and 120.57, Fla. Stat., and SFWMD Rule 28-106.201(2), Fla. Admin. Code. If mediation terminates without settlement of the dispute, the SFWMD shall notify all parties in writing that the administrative hearing process under Sections 120.569 and 120.57, Fla. Stat., remain available for disposition of the dispute, and the notice will specify the deadlines that then will apply for challenging the agency action.

VARIANCES AND WAIVERS

13. A person who is subject to regulation pursuant to a SFWMD rule and believes the application of that rule will create a substantial hardship or will violate principles of fairness (as those terms are defined in Subsection 120.542(2), Fla. Stat.) and can demonstrate that the purpose of the underlying statute will be or has been achieved by other means, may file a petition with the SFWMD Clerk requesting a variance from or waiver of the SFWMD rule. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have concerning the SFWMD's action. Pursuant to Rule 28-104.002(2), Fla. Admin. Code, the petition must include the following information:

(a) the caption shall read:
Petition for (Variance from) or (Waiver of) Rule (Citation)

(b) The name, address, telephone number and any facsimile number of the petitioner;

(c) The name, address telephone number and any facsimile number of the attorney or qualified representative of the petitioner, (if any);

(d) the applicable rule or portion of the rule;

(e) the citation to the statue the rule is implementing;

(f) the type of action requested;

(g) the specific facts that demonstrate a substantial hardship or violation of principals of fairness that would justify a waiver or variance for the petitioner;

(h) the reason why the variance or the waiver requested would serve the purposes of the underlying statute; and

(i) a statement of whether the variance or waiver is permanent or temporary, If the variance or waiver is temporary, the petition shall include the dates indicating the duration of the requested variance or waiver.

A person requesting an emergency variance from or waiver of a SFWMD rule must clearly so state in the caption of the petition. In addition to the requirements of Section 120.542(5), Fla. Stat. pursuant to Rule 28-104.004(2), Fla. Admin. Code, the petition must also include:

a) the specific facts that make the situation an emergency; and

b) the specific facts to show that the petitioner will suffer immediate adverse effect unless the variance or waiver is issued by the SFWMD more expeditiously than the applicable timeframes set forth in Section 120.542, Fla. Stat.

WAIVER OF RIGHTS

14. Failure to observe the relevant time frames prescribed above will constitute a waiver of such right.

28-106.201 INITIATION OF PROCEEDINGS
(INVOLVING DISPUTED ISSUES OF MATERIAL FACT)

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding, and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and

(f) A demand for relief.

28-106.301 INITIATION OF PROCEEDINGS
(NOT INVOLVING DISPUTED ISSUES OF MATERIAL FACT)

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding, and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and

(e) A demand for relief.

28-107.004 SUSPENSION, REVOCATION, ANNULMENT, OR WITHDRAWAL

(3) Requests for hearing filed in accordance with this rule shall include:

(a) The name and address of the party making the request, for purposes of service;

(b) A statement that the party is requesting a hearing involving disputed issues of material fact, or a hearing not involving disputed issues of material fact; and

(c) A reference to the notice, order to show cause, administrative complaint, or other communication that the party has received from the agency.

42-2.013 REQUEST FOR REVIEW PURSUANT TO SECTION 373.114 OR 373.217

(1) In any proceeding arising under Chapter 373, F.S., review by the Florida Land and Water Adjudicatory Commission may be initiated by the Department or a party by filing a request for such review with the Secretary of the Commission and serving a copy on any person named in the rule or order, and on all parties to the proceeding which resulted in the order sought to be reviewed. A certificate of service showing completion of service as required by this subsection shall be a requirement for a determination of sufficiency under Rule 42-2.0132. Failure to file the request with the Commission within the time period provided in Rule 42-2.0132 shall result in dismissal of the request for review.

(2) The request for review shall identify the rule or order requested to be reviewed, the proceeding in which the rule or order was entered and the nature of the rule or order. A copy of the rule or order sought to be reviewed shall be attached. The request for review shall state with particularity:

(a) How the order or rule conflicts with the requirements, provisions and purposes of Chapter 373, F.S., or rules duly adopted thereunder;

(b) How the rule or order sought to be reviewed affects the interests of the party seeking review;

(c) The oral or written statement, sworn or unsworn, which was submitted to the agency concerning the matter to be reviewed and the date and location of the statement, if the individual or entity requesting the review has not participated in a proceeding previously instituted pursuant to Chapter 120, F.S., on the order for which review is sought;

(d) If review of an order is being sought, whether and how the activity authorized by the order would substantially affect natural resources of statewide or regional significance, or whether the order raises issues of policy, statutory interpretation, or rule interpretation that have regional or statewide significance from a standpoint of agency precedent, and all the factual bases in the record which the petitioner claims support such determination(s); and

(e) The action requested to be taken by the Commission as a result of the review, whether to rescind or modify the order, or remand the proceeding to the water management district for further action, or to require the water management district to initiate rulemaking to adopt, amend or repeal a rule.

28-107.005 EMERGENCY ACTION

(1) If the agency finds that immediate serious danger to the public health, safety, or welfare requires emergency action, the agency shall summarily suspend, limit, or restrict a license.

(2) the 14-day notice requirement of Section 120.569(2)(b), F. S., does not apply and shall not be construed to prevent a hearing at the earliest time practicable upon request of an aggrieved party.

(3) Unless otherwise provided by law, within 20 days after emergency action taken pursuant to paragraph (1) of this rule, the agency shall initiate a formal suspension or revocation proceeding in compliance with Sections 120.569, 120.57. and 120.60, F.S.

40E-1.611 EMERGENCY ACTION

(1) An emergency exists when immediate action is necessary to protect public health, safety or welfare; the health of animals, fish or aquatic life; the works of the District; a public water supply, or recreational, commercial, industrial, agricultural or other reasonable uses of land and water resources.

(2) The Executive Director may employ the resources of the District to take whatever remedial action necessary to alleviate the emergency condition without the issuance of an emergency order, or in the event an emergency order has been issued, after the expiration of the requisite time for compliance with that order.

Appendix C

Asset Valuation Technical Memorandum

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

DATE: May 4, 2006

MEMORANDUM

TO: Mr. David Brown, Utilities Director, Town of Jupiter

FROM: Ethan Heijn

SUBJECT: Water Transmission and Distribution System Asset Valuation

PROJECT BACKGROUND AND SUMMARY

The Town of Jupiter Utilities Department uses its Water Master Plan as a guide to the expansion, operation, and maintenance of its water system. As part of a 2005 update to the Plan, the Town authorized Hazen and Sawyer (H&S) to conduct a valuation of the water transmission and distribution system assets.

The valuation work was authorized under Work Order No. 111. This memorandum presents the findings of the H&S valuation, and together with the updated asset database constitutes the deliverable for this project.

H&S developed a valuation process using the following information:

- Existing water system GIS attribute tables including asset type, size, material, length, and year of installation
- Asset service life schedules from Florida Administrative Code Chapter 25-30, Rules of the Florida Public Service Commission (FL PSC)
- The Engineering News Record (ENR) construction cost index (CCI) for developing estimates of original construction cost
- Unit cost information for construction of asset types based on recent and historical bid data and related experience

Using the above input data for reference and calculations, the database containing the GIS attribute information was expanded to estimate replacement cost, original cost, annual and accumulated depreciation, a present valuation using replacement cost adjusted for asset age, and a present valuation using original cost adjusted for asset age.

Table 1 summarizes the results of this asset valuation for water transmission and distribution system components.

Table 1. Water Transmission and Distribution System Asset Valuation Results Summary				
Quantity	**Pipes ($/1,000)**	**Hydrants, Valves, Meters, Reducers ($/1,000)**	**Meters not in Database ($/1,000)**	**Combined Total ($/1,000)**
Replacement Cost	$124,622	$15,033	$12,000	$151,655
Annual Depreciation for Replacement Cost	$2,990	$491	$600	$4,081
Accumulated Depreciation for Replacement Cost	$52,862	$7,650	$6,000	$66,512
Present Valuation Using Replacement Cost	$71,760	$7,383	$6,000	$85,143
Original Cost	$71,573	$9,055	$8,604	$89,233
Annual Depreciation for Original Cost	$1,716	$298	$430	$2,443
Accumulated Depreciation for Original Cost	$25,573	$3,944	$4,302	$33,819
Present Valuation Using Original Cost	$46,000	$5,112	$4,302	$55,414
Note: Represents estimated construction cost only				

The remainder of this memorandum provides discussion and detail concerning the valuation process, and is organized into the following sections:

- *Valuation Process*
- *Results*
- *Key Assumptions and Considerations*

VALUATION PROCESS

GIS Attribute Tables

The Town provided two separate water system GIS attribute tables for use in the project. The first consisted of pipes only, and the second contained hydrants, valves, meters, and reducers. These asset tables identified each asset using a unique identification (ID) number and were populated for the following descriptive fields:

- Asset type
- Size

- Material
- Length (for pipes only)
- Year of installation

These attribute tables provided a starting point for the valuation process.

Algorithms

Both databases containing the GIS attribute information were expanded with algorithms designed to estimate various quantities as defined in **Table 2** below.

Table 2. Quantities Estimated Using GIS Attribute Information

Quantity	Definition
Replacement Cost (RC)	The estimated cost to replace the asset if it was acquired/installed today = $\left(AssetType \times AssetQuantity \times UnitCost_{Present}\right)$
Annual Depreciation for RC ($ANND_{RC}$) [1, 2]	$\frac{RC - SalvageValue}{UsefulLife}$
Accumulated Depreciation for RC ($ACCD_{RC}$)	$\left(ANND_{RC} \times AssetAge\right)$
Present valuation using RC (RC adjusted for asset age)	$RC - ACCD_{RC}$ <u>or</u> $RC \times \left(\frac{UsefulLife - AssetAge}{UsefulLife}\right)$
Original Cost (OC)	The cost actually paid when the asset was acquired/installed, estimated using RC adjusted via the ENR CCI = $RC \times \left(\frac{CCI_{InstallationYear}}{CCI_{Present}}\right)$
Annual Depreciation for OC ($ANND_{OC}$) [1, 2]	$\frac{OC - SalvageValue}{UsefulLife}$
Accumulated Depreciation for OC ($ACCD_{OC}$)	$\left(ANND_{OC} \times AssetAge\right)$
Present valuation using OC (OC adjusted for asset age)	$OC - ACCD_{OC}$ <u>or</u> $OC \times \left(\frac{UsefulLife - AssetAge}{UsefulLife}\right)$

[1] FL PSC useful life schedules define *Salvage Value* for all of the subject assets to be zero
[2] Uses Straight Line Depreciation method
Note: If material and construction costs had remained constant over time, RC would equal OC

Reference Tables

The above-described algorithms make use of a series of *Reference Tables* for key information. **Table 3** outlines the purpose of each *Reference Table*. **Attachment A** contains a printed copy of each *Reference Table*.

Table 3. Reference Tables

Reference Table	Purpose	Independent Variable(s)	Dependent Variable
ENR Construction Cost Index	Provides a means of translating construction costs from past to present or present to past	Installation year	Construction cost multiplier
FL PSC Useful Life Schedule	Defines the period of time over which each asset will be depreciated	Asset type	Useful life
Construction Unit Cost	Allows construction cost to be estimated for transmission / distribution system assets	Asset type and diameter	Unit cost

The algorithms employ the *Reference Tables* to "look up" variables used in the calculations.

Process

Using the GIS attribute tables as a starting point, the following actions were completed:

- The GIS attribute tables were combined into a single file in Microsoft Excel.
- The *Reference Tables* were added as separate tabs to the Microsoft Excel file.
- Columns were added to the Microsoft Excel file to generate each of the quantities listed in Table 2.
- The above-described algorithms were used to calculate values for each quantity, making use of the *Reference Tables* to look up specific variables as needed.

For transmission and distribution system assets added to the Town's system in the future, the GIS attribute information should be added in the appropriate asset information column at the bottom of the database, and the person inputting the data should "copy" and "paste" the formulas contained in the remaining columns so as to populate the remaining columns.

As the database is currently configured, new lines should be inserted <u>above</u> the final line of asset data so that formulas and references "see" the new data. The same is true of the ENR index numbers for future years. It should be noted that the degree of "user-friendliness" could

be considerably enhanced if desired for future use, particularly if the database is used within MS Access software as opposed to MS Excel.

Construction unit costs and Florida PSC schedules can be modified within the corresponding reference tables as desired. The database will automatically adjust for these new numbers provided that modifications to these two reference tables are limited to the existing numbers themselves and the size and organization of the tables are not modified.

RESULTS

The asset valuation described herein results in valuations for transmission and distribution system assets as summarized for groups of assets in the opening section of this memorandum, and as shown for individual assets in the updated GIS attribute database.

The updated database also provides a means to incorporate and account for transmission and distribution system assets added to the system in the future. Algorithms could be modified to accommodate individual condition assessment ratings in the future if desired.

KEY ASSUMPTIONS AND CONSIDERATIONS

1. The Construction Unit Cost *Reference Table* does not discriminate based on material of construction. For example, an 8-inch ductile iron pipe is assumed to cost as much to install as an 8-inch PVC pipe. While this is not strictly accurate in every case, it is nonetheless appropriate in these circumstances because the price differences of different material choices would not significantly affect the total cost of a transmission / distribution system infrastructure construction project. This is especially true because the site-specific circumstances that affect actual construction pricing (traffic, utility conflicts, surface restoration, etc.) cannot be individually determined within the scope of this project.
2. The ENR CCI is an average index based on 20 United States cities, and does not reflect possible cost differentials among cities.
3. Pipe crossings, including aerial crossings of canals and jack-and-bore crossings of railroads and highways, are not distinguishable in the GIS attribute table and were treated as regular piping installations. In reality, however, different construction costs would apply to such system components.
4. Formulas and references created within the database incorporate certain assumptions and simplifications to accommodate the individual assets for which information on diameter, length, material, or age was missing. Each such assumption/simplification seeks to provide an average value so that errors will cancel one another out. Non-numeric or missing *diameters* are assumed to be 8 inches (6 inches in the case of hydrants). Non-numeric or missing *installation years* are calculated to be mid-way between the present year and 1950. Non-numeric or zero *lengths* are assumed to be 5 feet (it was assumed that missing or zero lengths probably corresponded to shorter pipe lengths associated with hydrants). The useful life for unknown pipe *materials* is assumed to be a composite value provided by the FL PSC schedules for “mains” in general, and reducers and any other

fittings are assumed to have this same useful life. The construction unit cost for any other fitting is assumed to be the same as that assigned for a reducer. It should be emphasized that, in the event that the Town elects to enhance the user-friendliness of this database for future use, additional features including drop-down menus could be added to force the population of primary data using allowable values only.

5. Approximately 24,000 existing water meters had not been entered into the database at the time of this assessment, and therefore valuations could not be calculated using actual data for these meters. Instead, an estimate was arrived at for these meters based on the assumption that they are on average 1-inch in diameter (primarily single-family residential in nature) and 10 years old.

c: Amanda Barnes
Rob Taylor
Chris Meline
File 40516-111

Attachment A
Reference Tables

Town of Jupiter
Water Transmission and Distribution System Asset Valuation
Reference Table 1 - ENR Construction Cost Index

Year	Construction Cost Index (annual average)	$CCI_{year\ shown}$ / $CCI_{current\ year}$
1950	510	0.07
1951	543	0.07
1952	569	0.07
1953	600	0.08
1954	628	0.08
1955	660	0.09
1956	692	0.09
1957	724	0.09
1958	759	0.10
1959	797	0.10
1960	824	0.11
1961	847	0.11
1962	872	0.11
1963	901	0.12
1964	936	0.12
1965	971	0.13
1966	1019	0.13
1967	1074	0.14
1968	1155	0.15
1969	1269	0.17
1970	1381	0.18
1971	1581	0.21
1972	1753	0.23
1973	1895	0.25
1974	2020	0.26
1975	2212	0.29
1976	2401	0.31
1977	2576	0.34
1978	2776	0.36
1979	3003	0.39
1980	3237	0.42
1981	3535	0.46
1982	3825	0.50
1983	4066	0.53
1984	4146	0.54
1985	4195	0.55
1986	4295	0.56
1987	4406	0.58
1988	4519	0.59
1989	4615	0.60
1990	4732	0.62
1991	4835	0.63
1992	4985	0.65
1993	5210	0.68
1994	5408	0.71
1995	5471	0.72
1996	5620	0.74
1997	5826	0.76
1998	5920	0.78
1999	6059	0.79
2000	6221	0.82
2001	6343	0.83
2002	6538	0.86
2003	6695	0.88
2004	7314	0.96
2005	7630	1.00

Town of Jupiter
Water Transmission and Distribution System Asset Valuation
Reference Table 2 - Florida Public Service Commission Useful Life Schedule

Description		Average Service Life in Years (Class A & B Utilities)	Net Salvage Value	Note
Mains		43	0	1
Galvanized steel pipe and fittings	STL	35	0	
Plastic pipe	C900	45	0	2
Plastic pipe	HDPE	45	0	2
Plastic pipe	PVC	45	0	2
Plastic pipe	POLY	45	0	2
Asbestos cement pipe	AC	40	0	
Cast or ductile iron pipe	DIP	40	0	
Valves and valve boxes	VALVE	25	0	
Fire mains		33	0	
Meters and meter installations	METER	20	0	
Hydrants	HYDRANT	45	0	
Backflow prevention devices		15	0	

Notes:
1 - Denotes composite life
2 - assumes use of AWWA standard pipe

Town of Jupiter
Water Transmission and Distribution System Asset Valuation
Reference Table 3 - Construction Unit Cost

Item	Unit Type	Unit Cost ($)
Pipe	$ / (inch-diameter)(lf)	8
Hydrant	$ / each	2,500
Valve	$ / (inch-diameter)(each)	150
Meter	$ / (inch-diameter)(each)	500
Reducer	$ / (inch-diameter)(each)	30

Appendix D

PRMG Letter Report (Financial Issues)

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Public Resources Management Group, Inc.
Utility, Rate, Financial and Management Consultants

September 24, 2007

Mr. Robert B. Taylor, Jr., P.E.
Senior Principal Engineer
Hazen and Sawyer, P.C.
2101 Corporate Blvd.
Boca Raton, FL 33431

Subject: **Town of Jupiter – Capital Funding Issues**

Dear Rob:

As you know, the issue of funding ongoing renewals and replacements for a utility system such as the Town of Jupiter's (the "Town") water utility system (the "System") continues to be a critical issue facing utility managers today. As utility systems age and regulations increase relative to water quality standards, the necessity to adequately fund for the renewal, replacement, betterment and upgrades of such utility plant assets (referred to as "Asset R&R") is paramount to the overall operation and financial creditworthiness of a utility system. Furthermore, since the capital expenditures are applied to existing (constructed) assets or are for capital deficiencies (for example as the result of the need to implement a new treatment process to meet a revised or new regulation or standard), the funding of such capital expenditures generally is for the benefit of the existing customer or ratepayer and not applicable to meet the needs of system growth or new capacity demands. However, it is also recognized that to the extent excess capacity in such existing facilities exists, prudent cost recovery practices suggest that such increase in costs allocable to the unused capacity can be recovered from system growth.

The Water Utility Department for the Town (the "Water Utility") understands these issues regarding the funding of ongoing asset replacement and the ability of water connection charges (commonly referred to as impact fees or capacity charges) to fund growth-related capital expenditures, and recognized that a funding policy should be developed. Accordingly, and at the request of and with assistance by Hazen and Sawyer, Public Resources Management Group, Inc. (PRMG) has updated our previous analysis prepared during the Fiscal Year 2006 to evaluate: i) any change to the an annual funding requirement from existing rates for ongoing Asset R&R and ii) to estimate whether the present System Capacity Charges will be adequate to meet the expansion-related capital expenditures as identified by the Water Utility. The remainder of this letter presents this analysis for your consideration.

Funding of Asset R&R Requirements

Historically, and as you are aware, most utilities in Florida have funded Asset R&R by deposits into a dedicated Renewal and Replacement Fund or Capital Account. This is also a general covenant recognized in the adoption of a bond resolution or indenture that states that funds need

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to be deposited into a separate account / fund for the purpose of renewals, replacements, betterments, and extensions of utility assets. The rate covenants, as identified in Resolution No. 38-88, as amended and supplemented, which authorized the issuance of the outstanding utility revenue bonds[1] (the "Bond Resolution") of the Town recognizes a funding requirement which amounts to the lesser of i) five percent (5%) of the Gross Revenues (as defined in the Bond Resolution) received in the immediately preceding fiscal year; ii) $500,000; or iii) an other amount as may be recommended by the Qualified Independent Consultant and approved by the Town Council. The general purpose of this covenant is for the benefit of the bond holders and to provide a funding mechanism to have monies available for plant replacement such that utility service can be provided during the bond term and revenues can be generated (debt repaid) by the use of such assets. It should be noted that the requirements of the Bond Resolution for the Town and for other utilities that have a similar covenant as a result of use of revenue bond financing for utility capital improvements should be considered as a minimum funding level and, in most instances, such funding levels are not usually considered as being adequate over the long-term (assets generally have service life in excess of a bond repayment term). The Town has recognized the need to fund Asset R&R in an amount greater than the funding requirements of the Bond Resolution (i.e., items i and ii above relative to the funding requirement) and prudently has developed a funding policy that provides deposits approximating the depreciation expense reported for the System's fixed assets in service. For the Fiscal Year 2007, the budgeted deposit for Asset R&R from System rates was $5,366,227 which represents approximately 22.9% of the total budgeted System revenues (exclusive of Capacity Charges).

Recognizing that the funding of a depreciation expense equivalent is based solely on original cost and other factors may affect the level of funds to be recognized annually for capital re-investment, an Asset R&R funding policy has been developed for consideration by the Town. Because the deposit of funds for Asset R&R is paid by existing rate payers and may be for expenditures that occur sometime in the future, one must consider the timing of such expenditures and the ability to leverage rates to minimize the overall rate impact upon the users of the System. Additionally, since the renewal, replacement, betterment and upgrade of System utility plant is in today's dollars and not the original cost of when the utility plant was first placed into service as reflected in the financial statements for reporting purposes, consideration must be given to the current cost liabilities facing the Town relative to Asset R&R. Finally, the annual funding for Asset R&R must be simple such that it can be easily budgeted on a yearly basis and be periodically adjusted.

[1] The outstanding bonds issued pursuant to the Bond Resolution (all on a parity) include the i) Water Revenue Refunding Bonds, Series 1998 (the "Series 1998 Bonds"); ii) Water Revenue Refunding Bonds, Series 2002 (the "Series 2002 Bonds"); and iii) Water Utility System Improvement Bonds, Series 2003 (the "Series 2003 Bonds" and, collectively for all bonds, the "Outstanding Parity Bonds").

Recognizing the above referenced objectives, the proposed annual accrual policy for funding Asset R&R reflects the following parameters:

1. In order to have a better match of funding to expenditure requirements, the funding of Asset R&R should be based on the estimated replacement cost of such assets as opposed to the original cost when such assets were placed into service.

2. The funding of Asset R&R should recognize the average service life of such assets. Asset R&R for those assets which are considered by the Water Utility to have a short service life (15 years or less) should be fully funded due the frequency of asset replacement.

3. The funding of Asset R&R for System utility plant considered to have a long asset service life (over 15 years) is generally for major plant facilities (such as a water treatment plant structure) and should be funded recognizing a blend of pay-as-you-go funding and the leveraging of rates by the issuance of debt or other forms of financing to minimize existing customer rate impacts.

4. In addition to the funding of Asset R&R, and based on a review of the Fiscal Year 2008 Budget for the Water Utility, the Town has established specific reserves for recurring specific capital expenditures that are periodically incurred by the Water Utility. These reserves are for the replacement of the Reverse Osmosis membranes and the Ion Exchange Resin which are necessary for the continued operation of the water treatment plant facilities. It is recommended that where a capital expenditure is identified by the Town which is a periodic but recurring expenditure of the System, the Town continue to establish and fund such reserves independently for such major capital expenditure items. These reserves would be in addition to the Asset R&R and would be dedicated to a specific expenditure purpose.

Based on the above parameters, PRMG has developed an Asset R&R funding level for consideration by the Town which is shown on Tables 1 and 2 at the end of this letter report. Table 1 summarizes the existing System's fixed assets as of September 30, 2006 and the corresponding accumulated depreciation on such assets in order to estimate the remaining service life from a financial reporting standpoint. It should be noted that in the development of the fixed asset analysis during our review in 2006, it came to the attention of the Town and Hazen and Sawyer that a large component of the System was not included in the fixed asset report because the assets had been contributed to the Town primarily by developers pursuant to the Town's service extension policy. Because such utility plant is now a part of the System and must be eventually replaced or upgraded, the fixed assets associated with the contributed plant must be recognized in the Asset R&R analysis. As shown on Table 1, the adjustment to the System's fixed assets (gross plant in service) to recognize the contributed plant was approximately $89,232,000 (same adjustment as reflected in the 2006 analysis) and was a material adjustment to the reported plant in service facility costs.

Subsequent to the identification of the System's fixed assets currently in service, Hazen and Sawyer identified the estimated current replacement cost (new) for such assets based on engineering estimates and current costs of construction which have been updated for the current analysis. Table 2 at the end of this letter report summarizes the result of this analysis on a functional basis. Table 2 also categorizes the functional System's fixed assets as having a short or long-service life as defined above. PRMG considers these service life distinctions as being reasonable for Asset R&R funding purposes. Finally and as shown on Table 2, PRMG has not recognized the value of land in the Asset R&R analysis since this asset represents a plant site and was assumed to not need replacement. As can be seen on Table 2 and as summarized below, the difference between the original cost and the estimated replacement cost (based on current costs for the System's fixed assets) is material and illustrates the need to consider current period costs as opposed to original costs in the Asset R&R funding analysis.

	Utility Plant in Service [1]		
	Original Cost	**Estimated Replacement Cost**	**Difference**
Total System's Fixed Assets	$198,796,568	$347,903,365	
Less Land	(353,075)	---	
Adjusted System's Fixed Assets	$198,443,493	$347,903,365	$124,513,393

[1] Amounts shown derived from Table 2 at the end of this letter report.

Based on the reported average service lives for each functional component of the System's fixed assets, the allocation of replacement cost between the short- and long-service life periods was calculated. As can be seen below, the System's fixed assets considered as having a long-service life comprise the majority of the System's fixed assets, which would be expected since the majority of the assets are for transmission and distribution piping and treatment plants that generally have a long service life.

	Replacement Cost [1]	**Percent of Total**
Short-Service Life (<15 years)	$54,233,252	15.59%
Long-Service Life (>15 years)	293,670,113	84.41%
Totals	$347,903,365	100.00%

[1] Amounts shown derived from Table 2 at the end of this letter report.

Recognizing the service lives and the replacement costs of the System's fixed assets as shown on Table 2, the estimated annual deposit from rates for ongoing Asset R&R is proposed to be $7,200,000. As shown on Table 2, it is recommended that the Town consider i) fully funding the full annual replacement cost of the short-service live assets estimated at $4,523,000; and ii) funding annually the long-service life assets at a 50% reserve level or $2,677,000 with the remainder being financed by debt financing or other leveraging instrument. This will allow for

the sufficient accrual of funds for Asset R&R, limit overall increases in rates (when compared to full Asset R&R funding), and will promote the overall creditworthiness of the System since the Town will not be relying exclusively on debt to meet its ongoing capital needs. This amount represents an annual deposit to an Asset R&R fund and should be made whether there are expenditures required for that particular year. As shown below, the Town has identified approximately $68,970,000 in Asset R&R projects which will need to be financed over the next several years from the fund established by the annual rate deposits (and with available monies currently on deposit in the System). As can be seen, there is and will continue to be a need for the financing of Asset R&R projects over the long-term which makes maintaining a proper funding level a best management practice and a necessity for the Water Utility.

	Amount
Total Asset R&R Expenditures [1]	$68,970,216
Less Use of Available Bond Proceeds [2]	---
Net Asset R&R Expenditures from Rates	$68,970,216

[1] Amount shown derived from information included on Table 5 at the end of this letter report.
[2] Amount shown derived from information included on Table 3 at end of this letter report and recognizes that no Series 2003 Bonds proceeds are available for funding any non-expansion-related capital projects for the System.

Our recommendation represents an increase in the Asset R&R funding level currently being employed by the Town of approximately $1,830,000 annually (from approximately $5,370,000 to $7,200,000) which is a substantial increase in the revenue requirements to the existing ratepayer. Therefore, in order to limit the economic effects to the existing rate payers, it is recommended that the Town consider phasing the Asset R&R funding increase over a period not to exceed five years until it reaches the recommended annual Asset R&R funding requirement. It is further recommended that the Town initially increase the Asset R&R funding in the next budget cycle (Fiscal Year 2008) to approximately $5,500,000 in order to i) recover the full annual replacement cost of the short-service life assets estimated at $4,523,000 as shown on Table 2 and ii) fund approximately 35% to 40% of the long-service life Asset R&R component. The remainder of the increase in the annual Asset R&R funding from rates could be phased in equally over the remaining period until the full annual Asset R&R funding requirement of $7,200,000 is achieved. It is recognized that the funding of the Asset R&R to the recommended level will depend on revenue margins/rates being produced by the System, but a phase-in period not to exceed 5 years is considered prudent by PRMG.

In addition to the annual funding level, there are other issues regarding Asset R&R funding to be considered by the Town. These issues deal with the use of the funds and annual funding updates. With respect to the use of the monies accrued by the Town for Asset R&R, such funds are assumed to only be used for Asset R&R purposes which could include the payment of non-expansion debt service on financed projects as well as pay-as-you-go capital funding. It is recommended that the Town not finance any Asset R&R for the utility plant that have a short-

service life and that a pay-as-you-go concept be utilized for these items. This will improve the overall equity position of the System and limit the need for additional long-term financing which is earmarked in the recommended policy for long-service life asset replacement only. Additionally and in order to have a hedge against inflationary impacts on the cost of construction, it is recommended that the Town internally restrict the interest earnings on any monies available in the Asset R&R fund to remain in the fund for the exclusive benefit of Asset R&R. Although the earnings would be considered as being available for meeting the rate covenants for Bond Resolution compliance purposes, this would provide a limited surety that sufficient funds wound be available for Asset R&R capital expenditures. Additionally, this would allow the Town time to periodically update the replacement cost analysis for capital funding purposes in the future. With respect to the updates, we would recommend that the replacement cost analysis be updated at least every five years to determine the required Asset R&R funding requirements.

Capacity Charge Sufficiency Analysis

In addition to the review of the annual funding requirements for Asset R&R needs, PRMG was also requested to update our previous review the sufficiency of the current System Capacity Charges and Off-Site Transmission Fees (collectively, the "Capacity Charges"). The purpose of this review was to determine, based on the anticipated capital expansion needs of the System, if the current charges provide sufficient funds to meet those needs. The Capacity Charges which was relied upon in the evaluation of the sufficiency of the revenues to meet the capital needs are summarized below:

	Assumed System Capacity Charges [1][2]		
	Service Area One	**Service Area Two**	**Service Area Three**
Capacity Charge	$2,017	$2,017	$2,017
Off-site Transmission Fee	540	540	1,020
Total Capacity Charges	$2,557	$2,557	$3,037

[1] Amounts shown provided by Town and recognize the application of the recent index adjustment which became effective May 15, 2007; amounts shown do not include administrative fees or other fees such as meter installation charges.

[2] Amounts shown were indexed for inflationary allowances in accordance with general Town rate policies each year of the forecast period shown on Table 3 until build-out of the respective service areas.

In order to evaluate the sufficiency of the Capacity Charges, a forecast of the potential development/redevelopment of the System service areas was conducted. Based on information initially provided by Hazen and Sawyer and as updated by the Town, it was estimated that there are approximately 13,000 equivalent residential connections (ERCs) remaining to connect to the System and that the service area would be fully built-out by the end of the Fiscal Year 2020 (which reflects an extension in the build-out timeline when compared to the previous analysis preformed in 2006). Table 3 at the end of this letter report provides a summary of the ERCs by

service area and the connection curve assumed during the remainder of the development period (i.e., until Fiscal Year 2020). It was necessary to project the ERC growth by service area since the Capacity Charges are different and the growth in the sub-service areas could be different as well. As shown on Table 3 at the end of this letter report, the anticipated growth of the System service areas is estimated, based on current Capital Charge levels, to produce approximately $37,300,000 in additional funds for financing expansion-related capital projects or to pay the expansion-component of the outstanding debt attributable to the System.

In addition to the assumed growth of the service area, it was also necessary to determine the expansion-related capital improvements for the System and the available funding sources for financing such improvements. With respect to the capital expenditures considered as expansion-related, Table 5 at the end of this letter report provides a summary of the capital plan of the Town and identifies the remaining estimated expenditures assumed to be expansion-related. As can be seen on Table 5, the expansion-related capital expenditures for the System are estimated by the Town to be $43,710,803. The significant capital components that comprise the expansion-projects are summarized below:

	Expansion-Project Cost [1]	**Percent of Total Expansion Project Cost**
Total Expansion Projects	$44,961,112	
Specific Primary Projects [2]:		
North Limestone Creek Well field	$5,919,700	13.17%
Area 1 Transmission Network (East of I-95)	2,215,000	4.93%
Area 2 Transmission Network (West of I-95)	2,530,000	5.63%
14.5 MGD Nanofiltration WTP	7,299,877	16.24%
Western Service Area Storage / Repumping	2,930,550	6.52%
Abacoa Surficial Aquifer Wells	4,950,758	11.01%
8 MG Water Storage Tank Construction	3,600,000	8.01%
South Martin County Re-pump Station	2,200,000	4.89%
Bluffs Booster Pump Station	2,400,000	5.34%

[1] Amounts shown derived from Table 5 at the end of this letter report.
[2] Amounts only reflect cost component of capital project considered by the Town to be expansion-related and is not the total capital cost of the project.

In addition to the capital projects that the Town anticipates to construct that are considered as expansion-related, the Town has issued utility revenue bonds to fund such capital expenditures. Based on the capital expenditure program identified for each series of bond financings, the Town estimated the amount of the Outstanding Parity Bonds that were considered as being expansion-related. As can be seen on Table 6 and as summarized below, the Town has outstanding in the principal amount $45,950,000 of Outstanding Parity Bonds pledged for repayment from the Net Revenues of the System, of which approximately 91% or $41,757,680 is considered as being issued for expansion-related capital projects.

Summary of Principal Amount of System Outstanding Parity Bonds

	Total Principal Amount Outstanding [1]	Expansion Component of Amount Outstanding [2]
Series 1998 Bonds	$10,900,000	$9,810,000
Series 2002 Bonds	10,205,000	7,102,680
Series 2003 Bonds	24,845,000	24,845,000
Total Bonds Outstanding	$45,950,000	$41,757,680
Percent Expansion-Related		90.88%

[1] Outstanding principal amount of debt shown derived from Table 6 at the end of this letter report.
[2] Amounts reflect only that portion of the outstanding principal that is estimated by the Town to be expansion-related which could be payable from Capacity Charges.

Based on the anticipated funds to be received from new growth within the System's service areas, the funds on hand for expansion-related capital projects, and the estimate of expansion-related capital needs and debt service payments, PRMG anticipates that the current Capacity Charges may not be sufficient to meet the expansion needs of the System. This observation is supported by the data shown on Table 3 at the end of this letter report and is summarized below:

	Amount
Expansion-Related Project Costs:	
Capacity Expenditures [1]	$40,116,860
Expansion Component of Outstanding Parity Bonds [2]	41,757,680
Total Expansion-Related Project Costs	$81,874,540
Sources of Funds:	
Estimated Capacity Charges on Account [3]	$14,598,186
Anticipated Capacity Charges [4]	35,929,442
Available Bond Proceeds Allocable Expansion Projects [5]	11,098,010
Total Sources before Additional Net Revenues	61,625,638
Net Available for Other Capital Project Funding	($20,248,902)
Additional Revenue Generated by Water Customers [6]	$20,562,016
Adjusted Net Available for Other Capital Project Funding	$313,114

[1] Amount shown derived from Table 5 at the end of this letter report.
[2] Amount shown derived from Table 6 at the end of this letter report.
[3] Amount shown provided by the Town.
[4] Amount shown derived from Table 3 at the end of this letter report. Amount i) includes both capacity charges and off-site transmission fee receipts; ii) allowance for meter installation fees received from new growth; and iii) the recognition of prepaid capacity fees as provided by the Town.
[5] Amount shown derived from Table 3 and based on available Series 2003 Bonds proceeds and the expansion-factor for such bonds as provided by the Town.
[6] Amount shown derived from Table 4 at the end of this letter report; reflects estimated amount of expansion-related principal component of debt funded from rate revenues from existing and new customers.

As can be seen above and assuming that the outstanding bond principal allocable to the expansion of the System (not including the interest expense associated with such bonds) is a cost to be funded from future Capacity Charges, PRMG currently is of the opinion that the existing charges (to be recovered from growth through the planning period ending 2020 as calculated on Table 4) may not be sufficient to fund all the identified capital expenditure project / debt costs. However, if one gives recognition to the additional debt funding derived from the rate revenues from both the existing and new customers to be served (including new customer connections) during the remainder of the build-out period; it appears that the amount of funds received may be sufficient to finance the identified expansion-related expenditures. PRMG would recommend that the Town continue to monitor the receipt of its Capacity Charges and the payment of debt service (recommended within the next twelve months), especially now that the cost of the water plant expansions and upgrades have been identified and are underway and still comprise a significant component of the capital program for the System.

Observations and Recommendations

Based on the analyses performed and the assumptions relied upon herein, PRMG provides the following observations and recommendations for consideration by the Town:

1. The current funding level used by the Town for Asset R&R is based on a "depreciation equivalent" basis which results in a higher funding level than that required by the Bond Resolution but is not considered as being totally sufficient based on the estimated current replacement costs of the System assets.

2. The recommended annual funding level for Asset R&R is $7,200,000.

3. If not done already, such funds should be segregated in a separate account established by the Town for the purpose of Asset R&R projects and all interest earnings on such funds should remain in such fund to allow a mechanism to capture the inflationary impacts on the cost of construction.

4. Due to the amount of change in the annual funding requirement for Asset R&R, it is recommended that the Town consider phasing in the requirement (paid from rates) over a five-year time frame. The first year (Fiscal Year 2008) should approach the $5,500,000 threshold which allows for the full recovery of short-service live assets and a partial (approximately 35% - 40%) of long-service live asset requirements.

5. The current Capacity Charges and the funding of expansion-related debt from utility service rates appear to be sufficient to fund the remaining capital expenditures considered as expansion-related and the principal component of the outstanding bonds considered as expansion-related, if considered as a cost to be recovered from growth. The Town should continue to monitor expansion-related recovery funds to determine if there exists a possibility to adjust the Capacity Charges to recover the remaining expansion-related costs where possible and practical.

We appreciate the opportunity to be of service to both the Town and Hazen and Sawyer in the update of our previous analysis relative to the Town's Asset R&R policy and the review of the Capacity Charges and would like to express our appreciation to both the Town and Hazen and Sawyer for assisting us with our review.

Very truly yours,

Public Resources Management Group, Inc.

Robert J. Ori
President

RJO/dlm
Attachments

cc: Howard C. Osterman

TABLES

Table 1
Town of Jupiter

Summary of Existing System Fixed Assets and Utility Plant Adjustments

Line No.		Gross Fixed Assets as of Sept. 30, 2006 (1)	Adjustment to Reported Plant In Service (2)	As Adjusted Gross Fixed Assets	Estimated Service Life (Years) (3)	Engineering Service Life (Years) (4)	Existing Plant Accum. Deprc. Sept. 30, 2006 (1)	Adjustment to Reported Accum. Depreciation (2)	As Adjusted Accumulated Depreciation	Annual Depr. Exp. - Reported Plant (1) (5)	Adjustment to Reported Depr. Expense (2) (5)	As Adjusted Annual Depr. Expense	Estimated Asset Age - Account Vintage-Yrs. (6)
1	Land	$ 353,075	$ -	$ 353,075	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	Water Treatment Plant	48,370,431	-	48,370,431	37.0	37.0	$ 12,579,696	$ -	$ 12,579,696	$ 1,080,424	-	$ 1,080,424	11.6
3	Buildings	6,386,226	-	6,386,226	30.0	30.0	2,533,452	-	2,533,452	212,836	-	212,836	11.9
4	Juno Booster Pumping Station	1,737,622	-	1,737,622	37.0	37.0	615,243	-	615,243	46,963	-	46,963	13.1
5	Other Improvements	1,169,361	-	1,169,361	15.0	15.0	316,984	-	316,984	64,014	-	64,014	5.0
6	Transmission and Distribution	22,943,425	71,573,000	94,516,425	60.0	70.0	4,885,036	26,765,883	31,650,919	336,462	1,192,883	1,529,345	20.7
7	Water Supply Wells	17,732,820	-	17,732,820	20.0	15.0	9,832,595	-	9,832,595	829,631	-	829,631	11.9
8	Pumps	4,099,327	-	4,099,327	10.0	10.0	4,102,897	-	4,102,897	409,933	-	409,933	10.0
9	Roads	-	-	-	7.0	7.0	-	-	-	-	-	-	0.0
10	Vehicles	732,295	-	732,295	7.0	7.0	465,226	-	465,226	81,474	-	81,474	5.7
11	Furniture, Fixtures, and Equipment	1,892,002	-	1,892,002	12.0	10.0	1,165,885	-	1,165,885	141,627	-	141,627	8.2
12	Meters	4,147,984	8,604,000	12,751,984	15.0	10.0	2,803,536	4,875,600	7,679,136	243,915	573,600	817,515	9.4
13	Hydrants	-	9,055,000	9,055,000	60.0	60.0	-	4,094,917	4,094,917	-	150,917	150,917	27.1
14	Totals	$ 109,564,568	$ 89,232,000	$ 198,796,568			$ 39,300,550	$ 35,736,400	$ 75,036,950	$ 3,447,279	$ 1,917,400	$ 5,364,679	

(1) Amounts shown based on information provided by the Town and assumed to reflect the total fixed assets placed into service at original cost; reflects gross fixed assets and has not been reduced for depreciation expense.

(2) Amounts shown reflect the addition of plant considered as contributed capital that was not originally reflected in the Town Fixed Asset Records, based on the Water Transmission and Distribution System Asset Valuation prepared by Hazen and Sawyer dated January 31, 2006; accumulated depreciation expense as provided adjusted for one additional year of use (reduction in service life).

(3) Reflects estimated service life used for the determination of annual depreciation expense for financial reporting purposes.

(4) Reflects estimated service life from a service availability standpoint based on engineering judgment and service needs as estimated by Hazen and Sawyer.

(5) Depreciation Expense is based on the estimated service life used by the Town for financial reporting purposes and not the engineering service life; plant additions made during the year are depreciated using the half-year convention.

(6) Calculated by dividing the accumulated depreciation reserve by the annual depreciation expense.

Table 2
Town of Jupiter

Development of Renewal and Replacement Fund Deposit

Line No.		As Adjusted Gross Fixed Assets (1)	Engineering Service Life (Years) (1)	Current Replacement Cost (2)	Asset Stratification 15 Yrs. Or Less	Asset Stratification More than 15 Yrs.	Annual Accrual per Service Life 15 Yrs. Or Less	Annual Accrual per Service Life More than 15 Yrs.
1	Land	$ 353,075	n/a	n/a	n/a	n/a		
2	Water Treatment Plant	48,370,431	37.0	$ 71,128,505	$ -	$ 71,128,505	$ -	$ 1,922,392
3	Buildings	6,386,226	30.0	9,485,036	-	9,485,036	-	316,168
4	Juno Booster Pumping Station	1,737,622	37.0	2,685,801	-	2,685,801	-	72,589
5	Other Improvements	1,169,361	15.0	1,380,801	1,380,801	-	92,053	-
6	Transmission and Distribution	94,516,425	70.0	188,080,345	-	188,080,345	-	2,686,862
7	Water Supply Wells	17,732,820	15.0	26,337,375	26,337,375	-	1,755,825	-
8	Pumps	4,099,327	10.0	5,715,811	5,715,811	-	571,581	-
9	Roads	-	7.0	-	-	-	-	-
10	Vehicles	732,295	7.0	885,063	885,063	-	126,438	-
11	Furniture, Fixtures, and Equipment	1,892,002	10.0	2,484,855	2,484,855	-	248,486	-
12	Meters	12,751,984	10.0	17,429,347	17,429,347	-	1,742,935	-
13	Hydrants	9,055,000	60.0	22,290,426	-	22,290,426	-	371,507
14	Totals	$ 198,796,568		$ 347,903,365	$ 54,233,252	$ 293,670,113	$ 4,537,318	$ 5,369,518

	Funding Percentage Recognized:	Cash Funded	Debt Funded					
15	Assets At or Less than 15 Years Average Service Life ==>	100.0%	0.0%				100.00%	
16	Assets Greater than 15 Years Average Service Life =====:	50.0%	50.0%					50.00%
17	Renewal and Replacement Funding						$ 4,537,318	$ 2,684,759
18	Total Calculated Deposit							$ 7,222,077
19	Rounded Deposit Recommended						$ 4,523,000	$ 2,677,000
20	Total Rounded Deposit							$ 7,200,000

(1) Amounts derived from Table 1.

(2) Replacement Cost based on an average construction index of =====> 3.38% .
The cost based on the engineering service life, adjusted for the average vintage life, to obtain replacement cost at time of assumed retirement.

Table 3
Town of Jupiter

Evaluation of Recovery of Capital Expansion Costs

Line No.		Service Area No. 1 Capacity/Off-Site Fee CPI Index	Rate per ERC (1	ERCs	% Growth	Recovery	Service Area No. 2 Capacity/Off-Site Fee CPI Index	Rate per ERC (1	ERCs	% Growth	Recovery	Service Area No. 3 Capacity/Off-Site Fee CPI Index	Rate per ERC (1	ERCs	% Growth	Recovery	Total Cost Recovery
	Capacity Charge Cost Recovery																
	Capacity Charge:																
1	Estimated ERCs to Serve Build-out of Service Area (per 2008 estimates) (2			1,784.6					7,570.5					3,678.9			
	Less Assumed Allowance for System Adjustments or Growt																
2	Percent Growth			0.00%			#######		0.00%					0.00%			
3	Estimated ERCs Receiving Service During Fiscal Year 200			-					-					-			
4	Net Change in ERCs Served			1,784.6					7,570.5					3,678.9			
5	Fiscal Year 2007 (Average Fee)		$ 1,977.00	103	5.75%	$ 202,869		$ 1,977.00	435	5.75%	$ 860,596		$ 1,977.00	212	5.75%	$ 418,208	
6	Fiscal Year 2008 (Average Fee)	2.70%	2,030.00	151	8.44%	305,759	2.70%	2,030.00	639	8.44%	1,297,069	2.70%	2,030.00	310	8.44%	630,313	$ 2,233,141
7	Fiscal Year 2009 (Average Fee)	2.00%	2,071.00	157	8.82%	325,979	2.00%	2,071.00	668	8.82%	1,382,844	2.00%	2,071.00	324	8.82%	671,996	2,380,819
8	Fiscal Year 2010 (Average Fee)	2.00%	2,112.00	164	9.21%	347,132	2.00%	2,112.00	697	9.21%	1,472,577	2.00%	2,112.00	339	9.21%	715,602	2,535,311
9	Fiscal Year 2011 (Average Fee)	2.00%	2,154.00	171	9.59%	368,642	2.00%	2,154.00	726	9.59%	1,563,828	2.00%	2,154.00	353	9.59%	759,945	2,692,415
10	Fiscal Year 2012 (Average Fee)	2.00%	2,197.00	164	9.21%	361,103	2.00%	2,197.00	697	9.21%	1,531,843	2.00%	2,197.00	339	9.21%	744,402	2,637,348
11	Fiscal Year 2013 (Average Fee)	2.00%	2,241.00	160	8.98%	359,136	2.00%	2,241.00	680	8.98%	1,523,501	2.00%	2,241.00	330	8.98%	740,348	2,622,985
12	Fiscal Year 2014 (Average Fee)	2.00%	2,286.00	143	8.00%	326,368	2.00%	2,286.00	606	8.00%	1,384,493	2.00%	2,286.00	294	8.00%	672,797	2,383,658
13	Fiscal Year 2015 (Average Fee)	2.00%	2,332.00	143	8.00%	332,935	2.00%	2,332.00	606	8.00%	1,412,352	2.00%	2,332.00	294	8.00%	686,336	2,431,623
14	Fiscal Year 2016 (Average Fee)	2.00%	2,379.00	134	7.50%	318,417	2.00%	2,379.00	568	7.50%	1,350,766	2.00%	2,379.00	276	7.50%	656,408	2,325,591
15	Fiscal Year 2017 (Average Fee)	2.00%	2,427.00	134	7.50%	324,842	2.00%	2,427.00	568	7.50%	1,378,020	2.00%	2,427.00	276	7.50%	669,652	2,372,514
16	Fiscal Year 2018 (Average Fee)	2.00%	2,476.00	89	5.00%	220,933	2.00%	2,476.00	379	5.00%	937,228	2.00%	2,476.00	184	5.00%	455,448	1,613,609
17	Fiscal Year 2019 (Average Fee)	2.00%	2,526.00	36	2.00%	90,158	2.00%	2,526.00	151	2.00%	382,462	2.00%	2,526.00	74	2.00%	185,858	658,478
18	Fiscal Year 2020 (Average Fee at Build-out)	2.00%	2,577.00	36	2.00%	91,978	2.00%	2,577.00	151	2.00%	390,184	2.00%	2,577.00	74	2.00%	189,611	671,773
19	Totals			1,785	100.00%	$ 3,976,251			7,571	100.00%	$ 16,867,763			3,679	100.00%	$ 8,196,924	$ 27,559,265
	Off-site Transsmission Fees:																
20	Fiscal Year 2007 (Average Fee)		$ 529.00	103	5.75%	$ 54,283		$ 529.00	435	5.75%	$ 230,276		$ 1,000.00	212	5.75%	$ 211,537	$ 496,096
21	Fiscal Year 2008 (Average Fee)	2.70%	543.00	151	8.44%	81,787	2.70%	543.00	639	8.44%	346,950	2.70%	1,027.00	310	8.44%	318,883	747,620
22	Fiscal Year 2009 (Average Fee)	2.00%	554.00	157	8.82%	87,201	2.00%	554.00	668	8.82%	369,916	2.00%	1,048.00	324	8.82%	340,054	797,171
23	Fiscal Year 2010 (Average Fee)	2.00%	565.00	164	9.21%	92,864	2.00%	565.00	697	9.21%	393,942	2.00%	1,069.00	339	9.21%	362,206	849,012
24	Fiscal Year 2011 (Average Fee)	2.00%	576.00	171	9.59%	98,578	2.00%	576.00	726	9.59%	418,182	2.00%	1,090.00	353	9.59%	384,559	901,319
25	Fiscal Year 2012 (Average Fee)	2.00%	588.00	164	9.21%	96,645	2.00%	588.00	697	9.21%	409,979	2.00%	1,112.00	339	9.21%	376,775	883,399
26	Fiscal Year 2013 (Average Fee)	2.00%	600.00	160	8.98%	96,154	2.00%	600.00	680	8.98%	407,899	2.00%	1,134.00	330	8.98%	374,634	878,687
27	Fiscal Year 2014 (Average Fee)	2.00%	612.00	143	8.00%	87,374	2.00%	612.00	606	8.00%	370,652	2.00%	1,157.00	294	8.00%	340,519	798,545
28	Fiscal Year 2015 (Average Fee)	2.00%	624.00	143	8.00%	89,087	2.00%	624.00	606	8.00%	377,919	2.00%	1,180.00	294	8.00%	347,288	814,294
29	Fiscal Year 2016 (Average Fee)	2.00%	636.00	134	7.50%	85,125	2.00%	636.00	568	7.50%	361,113	2.00%	1,204.00	276	7.50%	332,205	778,443
30	Fiscal Year 2017 (Average Fee)	2.00%	649.00	134	7.50%	86,865	2.00%	649.00	568	7.50%	368,494	2.00%	1,228.00	276	7.50%	338,827	794,186
31	Fiscal Year 2018 (Average Fee)	2.00%	662.00	89	5.00%	59,070	2.00%	662.00	379	5.00%	250,584	2.00%	1,253.00	184	5.00%	230,483	540,137
32	Fiscal Year 2019 (Average Fee)	2.00%	675.00	36	2.00%	24,092	2.00%	675.00	151	2.00%	102,202	2.00%	1,278.00	74	2.00%	94,033	220,327
33	Fiscal Year 2020 (Average Fee at Build-out)	2.00%	689.00	36	2.00%	24,592	2.00%	689.00	151	2.00%	104,321	2.00%	1,304.00	74	2.00%	95,946	224,859
34	Totals			1,785	100.00%	$ 1,063,717			7,571	100.00%	$ 4,512,429			3,679	100.00%	$ 4,147,949	$ 9,724,095
35	Plus Meter Installation Fees for Growth (3)																$ 4,236,050
36	Less Prepayments at 5,655 ERCs at 50% (4)																(5,589,968)
37	Estimated Capacity Charges on Deposit at September 30, 2006 (5)																$ 14,598,186
38	Less Encumbrances to Prior Period Project																-
39	Net Available Capacity Charge																$ 14,598,186
40	Series 2003 Bonds Construction Fund Balance Estimated as of September 30, 2006 (5)																$ 11,098,010
41	Expansion Percentage (Available for Expansion Projects) (6																100.00%
42	Net Construction Fund Balance Allocable to Expansio																$ 11,098,010
43	Less Encumbrances to Prior Period Project																-
44	Less Amount of Proceeds Used for Other Capital Project																-
45	Net Available Construction Fund Balanc																$ 11,098,010
46	Total Available for Expansion-related Project																$ 61,625,639
	Expansion Project Requirements																
47	Total Expansion-related Capital Expenditures (7)																$ 40,116,860
48	Expansion-related Debt Service Principal Requirements (8																41,757,680
49	Total Expansion-related Project Expenditure																$ 81,874,540
50	Net Funds Available for Other Expansion Capital Funding																$ (20,248,902)
	Adjustment for Debt Recovery from New Customer																
51	Debt Service Contributions from ERCs Served (9)																$ 20,562,016
52	Adjusted Net Funds Available																$ 313,115

Footnotes on Page 2 of 2

Table 3

Town of Jupiter

Evaluation of Recovery of Capital Expansion Costs

(1) Amounts shown reflect average Capacity Charges and Off-site Transmsission Fees assumed to be in effect for year (8 months at previous year and 4 months at current rate; assumes rate change every June 1st of each Fiscal Year).

(2) Equivialent residential connection (ERC) estimates originally provided by Hazen and Sawyer as part of capital planning process and adjusted based on estimates provided by Town through service area build-out; connection curve estimated based on discussions with Town and recognizing a build-out of the service area by Fiscal Year 2020.

(3) Meter installation fees for new connections recognized since such costs are included as a component of the CIP; rates not escalated since cost in CIP not escalated for this line item (long-term expenditure item).

(4) Per information provided by the Town, there are approximately 650 ERCs that have paid in full and 5,755 that have paid 50% of the Capacity and and Off-site Charges. Such amounts were reduced by growth assumed for the Fiscal Year 2008 and assumes that all prepaid capacity fees connected first with the remainder being those future ERCs that prepaid 50% of such fees. Prepayments calculated as follows: 650 + 5,755 - 750 growth for 2007 = 5,655.

(5) As provided by Town; reflects unencumbered funds available for capital projects.

(6) Expansion percentage based on capital funding requirements as projected by the Town for each series of bonds as identified in the Town's Capital Improvement Plan.

(7) Amounts shown derived from Table 5.

(8) Amounts shown derived from Table 6.

(9) Amounts shown derived fromTable 4.

Table 4
Town of Jupiter

Recovery of Costs From Rates - Debt Component

Line No.		Amount	Percent
	Total Water Revenue Requirements		
	Operating Expenses and Departmental Capital (1)		
1	Administration	$ 3,648,384	15.57%
2	Plant Operations	7,522,817	32.11%
3	Field Operations	1,487,452	6.35%
4	Contingency	250,000	1.07%
5	Total Operating Expenses and Departmental Capital	12,908,653	55.09%
	Transfers and Reserves		
6	Transfer for Capital Improvements (2)	5,366,227	22.90%
7	Transfer to the General Fund	1,039,892	4.44%
8	Transfer to Membrane Replacement Reserve	100,000	0.43%
9	Transfer to Ion Exchange Resin Replacement Reserve	25,000	0.11%
10	Transfer to Debt Service Sinking Fund	3,991,444	17.04%
11	Total Revenue Requirements	$ 23,431,216	100.00%

		ERCs	Amount
	Debt Service Recovery Future Customers		
12	Average Water Sales per Single Family Residence (gallons) (3)		10,500
13	Average Monthly Bill (4)		$ 28.35
14	Percent Allocable to Debt Service (5)		$ 4.83
15	Principal Component of Total Remaining Debt Payments (6)		63.31%
16	Percent of Principal Payments Allocated to Expansion		90.88%
17	Allocation of Principal Component in Rate		$ 2.78
	Total ERC's Connected (Cumulative) and Debt Cost Recovery	39,793	
18	Fiscal Year 2008	40,893	$ 1,364,193
19	Fiscal Year 2009	42,043	1,402,543
20	Fiscal Year 2010	43,243	1,442,590
21	Fiscal Year 2011	44,493	1,484,288
22	Fiscal Year 2012	45,693	1,524,335
23	Fiscal Year 2013	46,864	1,563,381
24	Fiscal Year 2014	47,907	1,598,166
25	Fiscal Year 2015	48,949	1,632,951
26	Fiscal Year 2016	49,927	1,665,563
27	Fiscal Year 2017	50,904	1,698,174
28	Fiscal Year 2018	51,556	1,719,914
29	Fiscal Year 2019	51,817	1,728,611
30	Fiscal Year 2020	52,078	1,737,307
31	Total Debt Cost Recovery		$ 20,562,016

(1) Amounts shown derived from the Town's Fiscal Year 2007 Budget for the Utility System.

(2) Reflects funding of depreciation expense equivalent as reflected in such Fiscal Year for the Utility System.

(3) Amounts shown based on information provided by the Town and represents average flow for a monthly ERC equivalent of 10,500 (350 gallons per day times 30 days per month).

(4) Based on rates anticipated to become effective recognizing the application of the 2006 Index adjustment.

(5) Estimated percent allocable to debt service shown on line 10.

(6) Amounts derived from information on Table 6.

Table 5
Town of Jupiter

Summmary of Capital Expenditures and Identification of Expansion-related Projects

Line No.		Project Type	Expansion / Replacement / Other	Total Project Appropriations	Project Adjustments (2) Adjustments	Project Adjustments (2) As Adjusted	Amount Spent Thru 2006	Allocable to Water Utility: Remaining Expansion Projects Recognized	Allocable to Water Utility: Replacement Projects Recognized
	Community Investment Project Descripition (1)								
1	Building Improvements	O&M	Other	$ 8,921	$ -	$ 8,921	$ 8,921	$ -	$ -
2	Machinery & Equipment	O&M	Other	5,759,729	-	5,759,729	496,879	-	-
3	Software	O&M	Other	2,179,231	-	2,179,231	120,916	-	-
4	Improvements other than Buildings	O&M	Other	317,209	-	317,209	266,073	-	-
5	RO Treatment Plant Expansion	O&M	Other	11,367	-	11,367	11,367	-	-
6	Meter Replacements	O&M	Other	36,918	-	36,918	36,918	-	-
7	Professional Services	CC	Expansion	993,500	-	993,500	78,500	915,000	-
8	Improv Other than Bldgs/Wireless Data Transmission	O&M	Other	51,136	-	51,136	-	-	-
9	Large Meter Replacement	R&R	Replacement	2,917,000	-	2,917,000	135,856	-	2,781,144
10	Land Assessments	CC	Expansion	42,055	-	42,055	42,055	-	-
11	Meters	OS	Other (3)	3,962,754	-	3,962,754	501,346	-	-
12	Ion Exchange Resin Replacement	R&R	Replacement	400,000	-	400,000	-	-	400,000
13	Meter Replacement	R&R	Replacement	2,731,738	-	2,731,738	169,004	-	2,562,734
14	Meter & Tap Supplies	OS	Other (3)	624,435	-	624,435	337,491	-	-
15	Jupiter Village Watermain Loop	R&R	Replacement	62,827	-	62,827	62,827	-	-
16	RO Treatment Plant Expansion	R&R	Replacement	1,925	-	1,925	1,925	-	-
17	Surface Water Recharge Improvements	CC	Expansion	1,851,500	-	1,851,500	147,786	1,703,714	-
18	Surface Water Recharge Improvements	GRT	Other	1,086,400	-	1,086,400	-	-	-
19	Abacoa Surficial Aquifer Wells Ph II	CC	Expansion	2,141,490	-	2,141,490	117,782	2,023,708	-
20	Abacoa Surficial Aquifer Wells Ph II	CC	Expansion	2,985,048	-	2,985,048	57,998	2,927,050	-
21	Juno Facility Improvements	OS	Expansion	95	-	95	95	-	-
22	Little Club Area Distribution Improvements	R&R	Replacement	1,972,900	-	1,972,900	38,908	-	1,933,992
23	North Limestone Creek Wellfield	CC	Expansion	3,824,700	-	3,824,700	-	3,824,700	-
24	North Limestone Creek Wellfield	CC	Expansion	2,095,000	-	2,095,000	-	2,095,000	-
25	North Jupiter Service Area	R&R	Replacement	1,300	-	1,300	1,300	-	-
26	North Jupiter Service Area	OS	Expansion	931	-	931	931	-	-
27	Surficial Aquifer Well Telemetry Improvements	CC	Expansion	-	-	-	-	-	-
28	Surficial Aquifer Well Telemetry Improvements	CC	Expansion	617,448	-	617,448	617,448	-	-
29	8 MG Ground Storage Tank & Additional HS Pumps	OS	Expansion	1,273,447	-	1,273,447	1,070,895	202,552	-
30	8 MG Ground Storage Tank & Additional HS Pumps	OS	Expansion	1,036,613	-	1,036,613	1,036,613	-	-
31	High Speed Service Pumps 13 & 14	OS	Expansion	324,683	-	324,683	-	324,683	-
32	Microbiological Lab Reconconstruction	R&R	Replacement	319	-	319	319	-	-
33	Water Transmission Network East of I-95 - Area 2	OS	Expansion	1,775,000	-	1,775,000	-	1,775,000	-
34	Water Transmission Network East of I-95 - Area 2	OS	Expansion	440,000	-	440,000	-	440,000	-
35	Jon Dickinson State Park/Boy Scout Water Dist Imprvmts	O&M	Other	11,907	-	11,907	-	-	-
36	Riverbend Distribution System Improvements	R&R	Replacement	345,000	-	345,000	34,200	-	310,800
37	Water Treatment Plant Aesthetic Enhancements	R&R	Replacement	350,000	-	350,000	239,095	-	110,905
38	North Jupiter Distribution System Improvements - Ph II	R&R	Replacement	1,234,679	-	1,234,679	48,006	-	1,186,673
39	Bluffs Area Water Transmission System	OS	Expansion	304,000	-	304,000	100,000	204,000	-
40	Water Transmission Network West of I-95 - Area 3	OS	Expansion	2,530,000	-	2,530,000	-	2,530,000	-
41	Utilities Consumptive Use Permit (Wetland Mitigation)	CC	Expansion	250,000	-	250,000	178,671	71,329	-
42	Indian Creek Parkway (ICP) Transmission Main	OS	Expansion	-	-	-	-	-	-
43	Seneca Street Watermain Replacement	R&R	Replacement	75,000	-	75,000	2,590	-	72,410
44	Jupiter Inlet Village Watermain Replacement	R&R	Replacement	478,500	-	478,500	-	-	478,500
45	Jupiter Inlet Village Watermain Replacement	PVT	Other	398,500	-	398,500	-	-	-
46	Juno Beach Distribution System Improvements	R&R	Replacement	1,205,000	-	1,205,000	-	-	1,205,000
47	Rehabilitation of R/O Wells 2, 3, 5, 6.7 8. 9 & 10	R&R	Replacement	605,000	-	605,000	61,358	-	543,642
48	A-1-A Water Main Replacement	R&R	Replacement	412,916	-	412,916	250	-	412,666
49	Water Treatment Plant Structure Hardening	O&M	Other	1,200,000	-	1,200,000	-	-	-
50	Mod to Phase II (1997) RO Plant	R&R	Replacement	1,936,256	-	1,936,256	-	-	1,936,256
51	Jupiter River Estates Distribution Improvements	R&R	Replacement	2,825,742	-	2,825,742	-	-	2,825,742
52	WTP Operating System Reprogramming	R&R	Replacement	400,000	-	400,000	-	-	400,000
53	Radio Read Water Metering Systems	R&R	Replacement	4,339,500	-	4,339,500	-	-	4,339,500
54	Replace Water Main on C-18 Canal Bridge	R&R	Replacement	180,622	-	180,622	141,722	-	38,900
55	Mod to Phase I (1990) RO Plant	R&R	Replacement	2,140,671	-	2,140,671	1,124,241	-	1,016,430
56	RO Treatment Plant Motor Control Ctr Upgrade	R&R	Replacement	2,448,207	-	2,448,207	558,207	-	1,890,000
57	Misc Water System Improvements	R&R	Replacement	188,138	-	188,138	188,138	-	-
58	Variable Frequency Drive Replacement	R&R	Replacement	480,518	-	480,518	480,518	-	-
59	Hibiscus & Fern Street Distribution Sys Improvements	R&R	Replacement	142,515	-	142,515	54,031	-	88,484
60	Deepen RO Well No. 4	R&R	Replacement	483,105	-	483,105	15,823	-	467,282
61	Construct 14.5 MGD Nanofiltration Plant	CC	Expansion	7,083,467	-	7,083,467	3,808,494	3,274,973	-
62	Construct 14.5 MGD Nanofiltration Plant	CC	Expansion	4,028,938	-	4,028,938	4,034	4,024,904	-
63	Construct 14.5 MGD Nanofiltration Plant	RR	Replacement	33,337,216	-	33,337,216	137,980	-	33,199,236
64	Water Utilities Security Improvements - Ph II	CC	Expansion	224,374	-	224,374	-	224,374	-
65	Water Utilities Security Improvements - Ph II	CC	Expansion	300,000	-	300,000	121,623	178,377	-
66	1.7 MGD Brackish Water RO Treatment Expansion	CC	Expansion	8,885,282	-	8,885,282	8,351,836	533,446	-
67	1.7 MGD Brackish Water RO Treatment Expansion	CC	Expansion	456,035	-	456,035	56,035	400,000	-
68	1.7 MGD Brackish Water RO Treatment Expansion	GRT	Other	359,000	-	359,000	-	-	-
69	Eastview Manor	R&R	Replacement	696,573	-	696,573	696,573	-	-
70	Repair to RO Process Bldg	R&R	Replacement	5,492	-	5,492	5,492	-	-
71	Water Treatement Plant Warehouse	R&R	Replacement	770,000	-	770,000	-	-	770,000
72	Water Treatement Plant Warehouse	CC	Expansion	770,000	-	770,000	-	770,000	-
73	Surficial Aquifer Well Rehabilitation	R&R	Replacement	900,000	-	900,000	-	-	900,000
74	Emergency Power to C-18 Floridan Aquifer Wells	OS	Expansion	914,313	-	914,313	914,313	-	-
75	Emergency Power to C-18 Floridan Aquifer Wells	CC	Expansion	304,674	-	304,674	304,674	-	-
76	West Service Area Water Storage & Repumping Fac	OS	Expansion	2,045,546	-	2,045,546	1,325,659	719,887	-
77	West Service Area Water Storage & Repumping Fac	OS	Expansion	1,915,400	-	1,915,400	-	1,915,400	-
78	West Service Area Water Storage & Repumping Fac	CC	Expansion	700,000	-	700,000	404,737	295,263	-

Table 5
Town of Jupiter

Summmary of Capital Expenditures and Identification of Expansion-related Projects

Line No.		Project Type	Expansion / Replacement / Other	Total Project Appropriations	Project Adjustments (2) Adjustments	Project Adjustments (2) As Adjusted	Amount Spent Thru 2006	Allocable to Water Utility: Remaining Expansion Projects Recognized	Allocable to Water Utility: Replacement Projects Recognized
79	Admin Offices - Town Hall Expansion	O&M	Replacement	1,285,000	-	1,285,000	-	-	1,285,000
80	WTP Process Control Room Improvements	R&R	Replacement	-	-	-	-	-	-
81	Lox River Road Area Distribution System Rehab	R&R	Replacement	912,450	-	912,450	-	-	912,450
82	Fisherman's Landing Watermain Replacement	R&R	Replacement	582,000	-	582,000	-	-	582,000
83	Utilities Field Operations Waterhouse Expansion	OS	Expansion	793,500	-	793,500	-	793,500	-
84	Yacht Club Dr Area Distribution System Improvements	R&R	Replacement	522,250	-	522,250	-	-	522,250
85	Penn Park Distribution System Improvements	R&R	Replacement	509,000	-	509,000	-	-	509,000
86	Water Line Replacement - US 1 Level Bridges	R&R	Replacement	5,289,220	-	5,289,220	-	-	5,289,220
87	Distribution System Improvements - Location TBD	R&R	Replacement	-	-	-	-	-	-
88	Construct 8 MG Storage Tank - Central Blvd PS Site	OS	Expansion	3,600,000	-	3,600,000	-	3,600,000	-
89	South Martin County Repump Station	OS	Expansion	2,200,000	-	2,200,000	-	2,200,000	-
90	Bluffs Booster Pump Station	OS	Expansion	1,900,000	-	1,900,000	-	1,900,000	-
91	Additional Inconnect with Seacoast Utilities	OS	Expansion	250,000	-	250,000	-	250,000	-
92	Computer/ Equipment/Communications Room	O&M	Other	168,188	-	168,188	-	-	-
93	Fiber Optic Network Computer/ Equipment/Communications Room	O&M	Other	264,892	-	264,892	-	-	-
94	Town Security System Replacement & Upgrade (IS)	O&M	Other	200,000	-	200,000	-	-	-
95	Total Capital Project Expenditures - Recognized as Expansion-related			$148,666,205	$ -	$148,666,205	$ 24,718,453	$ 40,116,860	$ 68,970,216

(1) Amounts shown derived from Utilities CIP Project Summary as prepared by the Town dated 7/9/2007.
(2) Project cost adjustments include i) changes in the CIP as delineated by the Town after the preparation of the CIP document and ii), if any, changes in cost based on analysis of current construction costs and estimated project estimates as developed by Hazen and Sawyer.
(3) Amounts shown classified as other because such amounts will be funded directly from Meter Fees recovered from new development; Meter Fees are not considered as a capacity fee in this analysis.

Table 6
Town of Jupiter

Determination of Debt Service Payments Allocated to Expansion Projects

Line No.		Series 1998 Bonds Principal	Series 1998 Bonds Interest	Series 1998 Bonds Total	Series 2002 Bonds Principal	Series 2002 Bonds Interest	Series 2002 Bonds Total	Series 2003 Bonds Principal	Series 2003 Bonds Interest	Series 2003 Bonds Total	Combined Debt Service Principal Only	Combined Debt Service Prin. & Interest
	Total Debt Service Payments											
1	Fiscal Year 2008	555,000	530,113	1,085,113	750,000	471,388	1,221,388	550,000	1,126,943	1,676,943	1,855,000	3,983,443
2	Fiscal Year 2009	575,000	505,831	1,080,831	775,000	444,013	1,219,013	560,000	1,113,743	1,673,743	1,910,000	3,973,586
3	Fiscal Year 2010	605,000	480,675	1,085,675	810,000	414,175	1,224,175	580,000	1,096,943	1,676,943	1,995,000	3,986,793
4	Fiscal Year 2011	630,000	453,450	1,083,450	840,000	381,775	1,221,775	600,000	1,073,018	1,673,018	2,070,000	3,978,243
5	Fiscal Year 2012	660,000	425,100	1,085,100	875,000	347,335	1,222,335	625,000	1,048,268	1,673,268	2,160,000	3,980,703
6	Fiscal Year 2013	685,000	393,750	1,078,750	910,000	310,585	1,220,585	650,000	1,025,768	1,675,768	2,245,000	3,975,103
7	Fiscal Year 2014	720,000	359,500	1,079,500	945,000	271,455	1,216,455	675,000	1,001,393	1,676,393	2,340,000	3,972,348
8	Fiscal Year 2015	760,000	323,500	1,083,500	1,000,000	229,875	1,229,875	700,000	975,068	1,675,068	2,460,000	3,988,443
9	Fiscal Year 2016	795,000	285,500	1,080,500	1,040,000	177,375	1,217,375	725,000	947,068	1,672,068	2,560,000	3,969,943
10	Fiscal Year 2017	835,000	245,750	1,080,750	1,100,000	121,475	1,221,475	755,000	917,343	1,672,343	2,690,000	3,974,568
11	Fiscal Year 2018	875,000	204,000	1,079,000	1,160,000	62,350	1,222,350	790,000	885,633	1,675,633	2,825,000	3,976,983
12	Fiscal Year 2019	580,000	160,250	740,250	-	-	-	825,000	851,663	1,676,663	1,405,000	2,416,913
13	Fiscal Year 2020	610,000	131,250	741,250	-	-	-	865,000	810,413	1,675,413	1,475,000	2,416,663
14	Fiscal Year 2021	640,000	100,750	740,750	-	-	-	905,000	767,163	1,672,163	1,545,000	2,412,913
15	Fiscal Year 2022	670,000	68,750	738,750	-	-	-	955,000	721,913	1,676,913	1,625,000	2,415,663
16	Fiscal Year 2023	705,000	35,250	740,250	-	-	-	1,000,000	674,163	1,674,163	1,705,000	2,414,413
17	Fiscal Year 2024	-	-	-	-	-	-	1,050,000	624,163	1,674,163	1,050,000	1,674,163
18	Fiscal Year 2025	-	-	-	-	-	-	1,105,000	571,663	1,676,663	1,105,000	1,676,663
19	Fiscal Year 2026	-	-	-	-	-	-	1,155,000	519,175	1,674,175	1,155,000	1,674,175
20	Fiscal Year 2027	-	-	-	-	-	-	1,210,000	464,313	1,674,313	1,210,000	1,674,313
21	Fiscal Year 2028	-	-	-	-	-	-	1,265,000	406,838	1,671,838	1,265,000	1,671,838
22	Fiscal Year 2029	-	-	-	-	-	-	1,330,000	346,750	1,676,750	1,330,000	1,676,750
23	Fiscal Year 2030	-	-	-	-	-	-	1,390,000	283,575	1,673,575	1,390,000	1,673,575
24	Fiscal Year 2031	-	-	-	-	-	-	1,455,000	217,550	1,672,550	1,455,000	1,672,550
25	Fiscal Year 2032	-	-	-	-	-	-	1,525,000	148,438	1,673,438	1,525,000	1,673,438
26	Fiscal Year 2033	-	-	-	-	-	-	1,600,000	76,000	1,676,000	1,600,000	1,676,000
27	Totals	$ 10,900,000	$ 4,703,419	$ 15,603,419	$ 10,205,000	$ 3,231,800	$ 13,436,800	$ 24,845,000	$ 18,694,958	$ 43,539,958	$ 45,950,000	$ 72,580,177
28	Expansion Factor (1)	90.00%		90.00%	69.60%		69.60%	100.00%		100.00%	90.88%	92.22%
29	Debt Service Allocated to Expansion	$ 9,810,000		$ 14,043,077	$ 7,102,680		$ 9,352,013	$ 24,845,000		$ 43,539,958	$ 41,757,680	$ 66,935,048

(1) Amounts shown based on preliminary estimates of project funding requirements per bond financing as developed by the Town.

Appendix E

Capacity Reservation Report

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Town of Jupiter Utilities
Capacity Reservation Report
June 30, 2007

Flow Projections based on Capacity Reservations:

	ERC	MGD ADF
* Capacity served as of 06/30/2007	39,969.6	13.99
Bulk Service Commitment (Tequesta)	3,857.1	1.35
SubTotal: Capacity Presently Served	43,826.7	15.34
Additional Capacity Reserved (but not in service as of this date)	8,441.8	2.95
Total	52,268.5	18.29

Actual Flows:

Permitted Plant Capacity as of this date	29.00
Average Daily Flow (ADF) from Treatment Plant Over the Previous 12 months:	16.86
Peak Daily Flow (PDF) from Treatment Plant Over the Previous 12 months	21.47
% Ratio of PDF to Permitted Plant Capacity	74.0%

* Capacity served total based on number of Equivalent Residential Connections (ERC) served multiplied by 350 GPD/ERC

Notes:	Bermudiana Agreement added	38.8 ERC
	Chivers Agreement added	6.2 ERC
	Palm Beach Country Estates Agreement added	1545.0 ERC
	Juno Beach - Mercury Rising Agreement added	6.4 ERC

c: Howard Osterman
David Brown
Keith Templeman
Paul Jurczak
Amanda Barnes

Appendix F

Town of Jupiter
Water System Regulatory
Compliance Review

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Town of Jupiter
Water System Regulatory Compliance Review

Prepared For:

Town of Jupiter
210 Military Trail
P.O. Box 8900
Jupiter, FL 33468

Prepared By:

Boyle Engineering Corporation
320 E. South Street
Orlando, FL 32801

22003.20

October 2006

Table of Contents

Table of Contents ii
List of Tables iii
1.0 Introduction 1
1.1 Background 1
1.2 Scope of Work 1
1.3 Hydraulic Modeling 2
2.0 Regulatory Review 3
2.1 Regulatory Review 3
2.2 Potable Water Regulations 3
2.3 State Potable Water Regulations 4
2.4 Federal Safe Drinking Water Regulations 10
3.0 Initial Distribution System Evaluation 13
3.1 Stage 2 Disinfection Byproducts Rule 13
4.0 Conclusions & Recommendations 16
4.1 Conclusions 16
4.2 Recommendations 16
Appendix A – Potable Water Regulations A-1
A.1 Overview A-1
A.2 USEPA Regulations A-1
A.3 FDEP Regulations A-18
A.4 Summary of Florida Drinking Water Standard Water Quality Components A-25
A.5 Proposed Regulatory Issues A-32
Appendix B - Potable Water Regulations Tables – Jupiter Compliance B-1

List of Tables

TABLE 2-1: Relevant State Potable Water Regulations Associated with FDEP Chapter 62-555 5
TABLE 2-2: Well Site Information 6
TABLE 2-3: Town Status Relative to FDEP Chapter 62-555 Requirements 8
TABLE 2-4: FDEP Chapter 62-555.320 Total Sulfide Treatment Recommendations 9
TABLE 2-5: Relevant Federal Potable Water Regulations Associated with USEPA SDWA 11
TABLE 2-6: Town Status Relative to USEPA SDWA Rule Requirements 12
TABLE 3-1: USEPA Schedule Numbers 15
TABLE 3-2: IDSE Compliance Schedule 15
TABLE 3-3: Compliance Monitoring Schedule 15
TABLE 4-1: Concerns for Jupiter Compliance* 17
TABLE A-1: CCR Requirements for Reporting Arsenic Levels A-3
TABLE A-2: Contaminant Candidate List A-5
TABLE A-3: Pre-1997 NPDWR A-8
TABLE A-4: UCMR Monitoring List A-11
TABLE A-5: Radionuclide Drinking Water Standards A-12
TABLE A-6: MCLs and MRDLs for DBPs A-15
TABLE A-7: Sulfide Water Quality Level and Treatment A-20
TABLE A-8: FDEP Regulations for IOCs (1) A-26
TABLE A-9: FDEP Regulations for VOCs (1) A-27
TABLE A-10: FDEP Regulations for SOCs (1) A-29
TABLE A-11: FDEP Regulations for Radionuclide Contaminants (1) A-30
TABLE A-12: FDEP Regulations for Microbiological Contaminants (1) A-31
TABLE A-13: FDEP Regulations for Secondary Contaminants (1) A-33
TABLE B-1: Applicability of Current Drinking Water Regulations* B-1
TABLE B-2: USEPA Drinking Water Standards and BAT for Regulated Contaminants* B-2
TABLE B-3: USEPA* Standards for Disinfectants† B-5
TABLE B-4: USEPA* National Secondary Drinking Water Contaminant Standards B-5
TABLE B-5: USEPA* Drinking Water Advisories† B-6
TABLE B-6: Regulatory Requirements Affecting Community Water Systems B-7

1.0 Introduction

1.1 Background

The Town of Jupiter (Town) requested Boyle Engineering Corporation (Boyle) to assist the Town with issues related to their drinking water distribution system, specifically with regards to water quality regulations. To respond to the challenges of the Safe Drinking Water Act (SDWA), the Town of Jupiter Water Utilities (Town) has initiated a program to plan for future facilities that include performing engineering studies and design efforts to support the Town's Master Plan.

The Town owns and operates its water supply system, treatment facilities, and distribution system. Existing water treatment facilities consist of three separate treatment processes that utilize two separate raw water sources. The 13.5 mgd lime-softening (LS) and 1.8 mgd ion-exchange (IX) treatment facilities treat fresh water supply from the 150 to 200 foot deep Surficial Aquifer. The LS WTP uses lime and polymers to remove hardness, turbidity and iron. The IX WTP uses an anion resin to remove color from the raw water and is then blended with the reverse osmosis (RO) plant permeate to add hardness and alkalinity to the finished water. The 13.7 mgd RO treatment facility treats brackish water from wells drilled approximately 1500 to 2000 foot into the Floridan Aquifer. Currently the Town is in the process of adding a nanofiltration (NF) plant to treat water from the surficial aquifer in accordance with the Town's Master Plan.

The Town is now capable of producing 29 million gallons a day of drinking water accommodating more than 80,000 people living in Jupiter, Juno Beach, Tequesta and unincorporated areas of Palm Beach and Martin Counties.

1.2 Scope of Work

Boyle's work comprises of water quality regulatory review related to the Town's water distribution system. Specific tasks accomplished included:

Review Distribution System Water Quality Data. Boyle reviewed the following data and information with regards to SDWA-regulated water quality parameters (as reported to the Florida Department of Environmental Protection (FDEP) and Palm Beach County Department of Health):

- Disinfection Byproducts (Total Trihalomethanes and Haloacetic Acids) Reports. Up to three years of DBP reports were evaluated. Total values and speciation numbers were reviewed with respect to water quality and locations within the distribution system.
- Primary and Secondary standards.
- Total coliform results (past three years of data was reviewed).
- Lead and copper results for homeowner taps.

Provide Regulatory Review. Boyle provided to the Town a summary of significant regulatory actions in the past 24 months and anticipated schedule of significant regulatory actions through 2010. Boyle was to

provide an opinion as to the impacts with Town's compliance with specific SDWA Rules affecting distribution system compliance with regards to water quality and the following rules:

1. Primary and Secondary Standards;
2. Lead and Copper Rule;
3. Total Coliform Rule;
4. Phase VI-b SOC and VOCs;
5. Radionuclides;
6. Consumer Confidence Report,
7. Unregulated Contaminants Monitoring Rule.
8. Proposed Stage 2 D/DBP rule (to include IDSE's);
9. Proposed Sulfate Rule; and,
10. Proposed Groundwater Disinfection Rule.

1.3 Hydraulic Modeling

Hazen and Sawyer Environmental Engineers and Scientists (Hazen and Sawyer) developed a technical memorandum in November 2005 for the Town of Jupiter regarding the Town's water distribution system hydraulic model. The Town's water distribution system's pipe network has grown gradually over the years to accommodate the Town's growing population. The expansion of the distribution system has been accomplished in the Town without a complex distribution system hydraulic model.

A hydraulic model was developed, calibrated and used to analyze the Town's existing drinking water distribution system including piping, storage facilities, and pumping systems (Hazen & Sawyer, 2006). This model will allow Town planners to examine the existing system and recognize areas of poor performance. It will also assist the Town engineers and their consultants to design and plan future facility improvements. Some areas of concern such as distribution pressure and fire flow capabilities were identified by the calibrated model using current water consumption demand for 2010.

2.0 Regulatory Review

2.1 Regulatory Review

This Section presents State and Federal regulatory requirements of concern for the Town of Jupiter (Town) to recognize. Florida Department of Environmental Protection (FDEP) and United States Environmental Protection Agency (USEPA) regulations were reviewed. Regulatory requirements were prepared for the Town with respect to potable water.

2.2 Potable Water Regulations

The Town of Jupiter (Town) is regulated by the FDEP who enforces Safe Drinking Water Act (SDWA) rule requirements. **Appendix A** presents a narrative review of the state and federal potable water regulations. The SDWA Amendments of 1996 (1996 SDWA) developed by USEPA sought to address numerous long-standing problems impeding the nation's primary drinking water protection program. The expense associated with implementing drinking water regulations underscores the need for water purveyors to have a sound scientific and information basis for decision-making.

Under the mandated Amendments to the 1996 SDWA, regulatory control has and will continue to increase, in terms of both number and types of contaminants being regulated and acceptable contaminant concentrations. Newer provisions of the SDWA are more restrictive than those in the past. Today, more emphasis has to be placed on compliance with water quality regulations at the consumer tap. Moreover, public water purveyors are under increased demands to maintain consumer confidence and manage water quality in distribution systems that are expanding as a result of economic and population growth.

As regulations continue to be developed, especially in reference to USEPA proposed Ground Water Rule (GWR) and FDEP Chapter 62-555 (rule implementation in Florida), water utilities using groundwater, such as the Town, are preparing for them by implementing total quality management programs to:

- Control consumption
- Increase productivity
- Enhance consumer attitudes

The purpose of this section is to review existing drinking water supply and treatment performance regulations relative to water quality and operations. The objectives of this section are as follows:

- Review FDEP and USEPA regulations (existing and future), relative to potable water use.
- Present regulatory impacts relative the Town's potable water system.
- Indicate which specific components of the SDWA the Town could have challenges complying with based on the Town's current condition. The Town's existing condition will be reviewed for compliance with current and proposed regulations.

2.3 State Potable Water Regulations

FDEP potable water regulation impacts are presented in this section. **Table 2-1** presents action items relative to the new state potable water regulations developed under FDEP Chapter 62-555. Effective compliance dates are also presented for reference.

2.3.1 Well Site Information

Table 2-2 provides a summary of the Town's well site information showing well number, type of account (either generator or Florida Power & Light (FPL)), location (address) and FPL meter number.

2.3.2 FDEP Rules - Impacts

Table 2-3 provides a summary of the FDEP rules and their status to the Town with each impact is further described below:

- Address H_2S treatment for new wells per provisions under FDEP 62-555. Treatment depends upon H_2S levels in the raw water as shown is **Table 2-4**. Existing wells are exempt from treatment requirements if they were installed and permitted before August 28, 2003; however, FDEP may enforce treatment requirements if consumer complaints are received on the quality of water related to H_2S levels.
- Finished water storage must be provided in an amount equal to 25% of permitted maximum day demand plus fire flow storage.
- Materials of construction in future WTP construction projects in contact with drinking water and drinking water chemicals must be compliant with NSF 61.
- Future WTP facilities must remain operational and accessible during a 25-year flood and be resistant to damage in a 100-year flood.
- Continue to develop an isolation valve and fire hydrant exercise program. Continue to exercise auxiliary equipment in accordance with FDEP requirements.
- Provide 4-log inactivation of viruses per CT requirements if any groundwater well is considered microbially contaminated or if the well is susceptible to microbial contamination.
- Continue to disinfect water such that disinfection is not open to atmosphere and contamination.
- The Town had performed a cleaning program in February 2004 for the ground storage tanks (GSTs), clearwells and other storage. The next scheduled cleaning is planned for 2009. It was noted by staff during the cleaning procedures that the Juno tank had the most benthic layer build-up in the system, primarily due to what is believed by staff to be poor tank hydraulics. It is recommended that the Town further evaluate this tank for improvements with respect to hydraulics.

2.0 Regulatory Review

TABLE 2-1: Relevant State Potable Water Regulations Associated with FDEP Chapter 62-555

Parameter	Action Items	Effective Date
Monitoring Issue		
H_2S	☐ Monitor future wells for sulfide to determine potential treatment requirements. ☐ Consider sampling existing wells for sulfide.	August 28, 2003
Capacity Analysis Report	☐ Prepare Capacity Analysis Report for FDEP by effective date.	August 28, 2004
Design Issue		
H_2S Treatment Requirement	☐ Sample future constructed wells.	August 28, 2003
Auxiliary Power	☐ Evaluate adequacy of auxiliary power	December 31, 2005
Finished Water Storage	☐ Provide a minimum of 25% of maximum day demand finished water in addition to design fire flow finished water storage capacity	August 28, 2003
NSF 61 rated Materials of Construction and Drinking Water Chemicals in contact with drinking water.	☐ Provide chemical systems that are NSF 61 compliant as part of any future WTP expansion or construction	August 28, 2003
Flood Protection	☐ Maintain existing flood protection and provide flood protection on all future facilities	August 28, 2003
Maintenance Issue		
Isolation Valves and Auxiliary Equipment	☐ Review and revise, as appropriate, valve and auxiliary equipment exercise program as recommended by equipment manufacturers	August 28, 2003
Elevated Storage Tanks (EST); Hydropneumatic Tanks; Ground Storage Tanks (GSTs)	☐ Review and revise, as appropriate, an annual repair inspection program. ☐ Clean ESTs and hydropneumatic tanks annually. ☐ Inspect GSTs, ESTs and HTP for structural and coating integrity every five (5) years (must be performed by a Florida licensed engineer).	August 28, 2003
Disinfection for Groundwater		
Virus Inactivation CT	☐ Review CT requirements to provide 4 log inactivation for bacteria and viruses.	August 28, 2003
No Open Tank Disinfection	☐ Continue to maintain disinfection in GSTs	August 28, 2003
Open Tank Disinfection	☐ Provide treatment that reliably achieves at least 4 log inactivation or removal of viruses before or at the first customer at all flow rates	December 31, 2005

2.0 Regulatory Review

TABLE 2-2: Well Site Information

Well #	Generator Account #	Address	FPL Meter #
6	Generator #7		
7	Generator #7		
8	Generator #4		
9	Generator #4		
10	Generator #4		
11	Generator #4		
12	Generator #2		
13	Generator #2		
14	Generator #2		
15	Generator #3		
16	Generator #3		
17	Generator #3		
18	Generator #3		
19	Generator #2		
20	47510-25141	1795 Central Blvd	6N14984
21	Generator #3		
22	Generator #3		
23	57854-25215	6030 Robinson St	6N90829
24	77033-20262	6142 Pompano St	6N70650
25	77373-29248	6343 Drake St	6N61862
26	77333-20241	6451 Drake St	6N61863
27	37574-28259	6411 Barbara St	6N24555
28	77594-27276	6493 Robinson St	6N60926
29	Generator #3		
30	Generator #3		
31	Generator #3		
32	Generator #3		
33	Generator #3		
34	Generator #3		
35	69080-39198	1602 Central Blvd	5N17095
36	97399-74153	1602 Central Blvd	6N44742
37	47510-25141	1795 Central Blvd (same as 20)	6N14984
38	Generator #3		
39	Reserved for future well		
40	Reserved for future well		
41	Reserved for future well		
42	Reserved for future well		
43	Reserved for future well		
44	Reserved for future well		
45	Reserved for future well		
46	Reserved for future well		
47	Reserved for future well		
48	66013-37303	4001 Main St	6N70167
49	64452-93472	1997 Frederick Small Rd	6N10888
50	26395-81418	3601 Heights Blvd	6N61835

TABLE 2-2: Well Site Information –cont'd

Well #	Generator Account #	Address	FPL Meter #
51	83422-96475	3748 Greenwood Dr	DN92324
52	43747-71105	1251 Frederick Small Rd	6N45568
53	47748-92196	1057 Frederick Small Rd	6N60906
54	62414-61059	1337 Frederick Small Rd	6N10885
55	22834-20277	4286 Central Blvd	6N05759
56	Reserved for future well		
57	Reserved for future well		
58	Reserved for future well		
59	Reserved for future well		
60	Reserved for future well		
61	Reserved for future well		
62	Reserved for future well		
63	Reserved for future well		
64	Reserved for future well		
65	Reserved for future well		
66	Reserved for future well		
67	74564-47122	4501 Heights Blvd	6N36562
68	01282-12156	5001 Heights Blvd	6N31006
R.O. Wells			
2	Generator #4		
3	Generator #4		
5	Generator #9		
6	Generator #9		
7	43831-03241	7000 N 174th Ct	6NL6452
8	Generator #9		
9	Generator #9		
10	(no number)		6N01486
11	Generator #9		
12	Generator #9		
13	Generator #9		
Generators			
1	74158-20104	17403 Central Blvd	SV72405
2	28707-28181	Tony Penna Well House 12	6N61860
3	87010-21100	Central Well Field #4 Well House #15	6V34351
4	64208-22170	2534 Jupiter Gardens Blvd	SV79040
5 Juno	52792-85554	14255 US Highway 1	DNL2134
6 RO	74198-29101	17403 Central Blvd	SV77040
7	60678-94102	620 Central Blvd	6V51059
8 RO		17403 Central Blvd	
9	31090-67144	Western Repump	6V72132

2.0 Regulatory Review

TABLE 2-3: Town Status Relative to FDEP Chapter 62-555 Requirements

Parameter	Requirement	Facility Design Compliance Issues	Compliant	Action
H_2S Monitoring	Wells to be monitored for H_2S. If limits exceeded, treatment required on wells permitted after 2003.	☐ Existing Wells prior to 8/28/03 ☐ New wells permitted after 8/28/03	Yes Yes	Monitor and provide treatment if required
Facilities	Auxiliary Power to be provided to meet for Average Daily Flows by Dec. 2005	☐ Source – Wells ☐ Treatment ☐ High-Service Pumping	Yes Yes Yes	None
	Finished Water Storage (25% of MDD plus design fire flow storage requirement)	☐ 25% MDD = 5.9 MGD MDD = 23.5 ☐ Storage = 26.5 MG	Yes	Confirm sizes for GST replacements
	Capacity Analysis – Does max. day exceed 75% of permitted maximum day operation?	☐ Current MDD is 29 MGD at capacity	Yes	Town completing WTP expansion
	Chemical Systems – Materials to be NSF 61 approved.	☐ New construction after 8/28/03	Yes	Town specifies accordingly
	Flood Protection: Accessible at 25-year flood level	☐ Source ☐ Treatment ☐ Pumping Facilities	Yes Yes Yes	Town continues to design accordingly
Maintenance	Isolation Valves and Auxiliary Equipment Exercise	☐ Isolation valve & hydrant ☐ Auxiliary power	Yes Yes	Perform annual review by May 2007; monthly on auxiliary equipment
	Elevated Storage Tanks, hydropneumatic tanks and ground storage tanks	☐ Maintained (annually) ☐ Cleaned (5 yrs) ☐ Inspected (5 yrs)	Yes Yes Yes	2002 last inspected; Tanks cleaned in 2004; Next inspection 2008
Disinfection for Groundwater	4 log inactivation for bacteria and viruses per CT requirements.	☐ CT requirements apply if wells are considered microbially contaminated or susceptible to microbial contamination.	Yes	Review CT calculations to determine if Tracer Testing to confirm CT is required
	Disinfection not in open tanks	☐ Tanks covered	Yes	None

Source – Town of Jupiter

TABLE 2-4: FDEP Chapter 62-555.320 Total Sulfide Treatment Recommendations

Potential for Impacts without Total Sulfide Removal	Source Water Sulfide Level	Potential Water Treatment Technique
Low	Total Sulfide (TS) < 0.3 mg/L; or Dissolved Iron (DI) < 0.1 mg/L[1]	Direct chlorination[2]
Moderate	0.3 mg/L ≤ TS ≤ 0.6 mg/L @ pH ≤ 7.2	Conventional aeration[3] (maximum removal efficiency ≈ 40% to 50%)
	0.3 mg/L ≤ TS ≤ 0.6 mg/L @ pH > 7.2	Conventional aeration with pH adjustment (maximum removal efficiency ≈ 40% to 50%)
Significant	0.6 mg/L ≤ TS ≤ 3.0 mg/L @ pH ≤ 7.2	Forced Draft Aeration[3] (maximum removal efficiency ≈ 90%)
	0.6 mg/L ≤ TS ≤ 3.0 mg/L @ pH > 7.2	Forced Draft Aeration with pH adjustment [4, 5] (maximum removal efficiency ≈ 90%)
Very Significant	TS > 3.0 mg/L	Packed Tower Aeration with pH adjustment [4, 5] (maximum removal efficiency ≈ 90%)

Note – These recommendations are to be used as guidance and not as a requirement.

1) High iron content raises concern if chlorination alone is used and significant dissolved oxygen exists in the source water. Filtration may be required to remove particulate iron prior to water distribution.
2) Direct chlorination of sulfide in water in the pH range normally found in potable sources produces $S^{o}_{(s)}$ and increased turbidity. Finished-water turbidity should not be more than two nephelometric turbidity units (NTU) greater than raw-water turbidity.
3) Increased dissolved oxygen entrained during aeration may increase corrosivity.
4) Reduction of alkalinity during pH adjustment and high dissolved oxygen entrained during aeration may increase corrosivity. Corrosion control treatment such as pH adjustment, alkalinity recovery, or use of inhibitors may be required.
5) High alkalinity will make pH adjustment more costly, and use of other treatment may be in order. Treatment that preserves the natural alkalinity of the source water may enhance the stability of finished water.

2.4 Federal Safe Drinking Water Regulations

This section presents federal SDWA potable water regulations impacts. **Table 2-5** provides a summary of the federal potable water regulations relative to USEPA SDWA. **Table 2-6** provides a summary of the USEPA rules and their status to the Town with each impact is further described below:

- Continue to issue complete Consumer Confidence Reports (CCRs) by July 1 of each year.
- Continue to monitor and report TTHMs and HAA5. Comply with TTHM MCL of 80 μg/L and HAA5 MCL of 60 μg/L.
- Submitted Emergency Response plan to USEPA in 2004.
- Continue to monitor and report on radionuclides using gross alpha as an indicator. If gross alpha > 5 pCi/L then monitoring for radium and uranium is required
- Continue to monitor and report on arsenic. The arsenic MCL decreased from 50 μg/L to 10 μg/L in January 2005.
- Confirm CT requirements from the proposed GWR anticipated to be implemented to FDEP's Chapter 62-555. The promulgation date for this rule was delayed and is expected to be fall 2006.
- Prepare for Radon Rule. The Radon Rule has two MCLs. The radon MCL is proposed at 4,000 pCi/L if FDEP elects to abate indoor radon risk. If not, the Town must elect whether to treat for a radon MCL of 300 pCi/L or to abate indoor radon risk and maintain a radon MCL of 4,000 pCi/L.
- Prepare for Stage 2 D/DBPR Individual Distribution System Evaluation (IDSE). The Stage 2 D/DBPR will require an IDSE to determine appropriate DBP monitoring locations. Monitoring will change from a running annual average (RAA) basis to a locational RAA (LRAA) basis. The promulgation date for this rule is January 2006.

TABLE 2-5: Relevant Federal Potable Water Regulations Associated with USEPA SDWA

Regulations	Action Items	Effective Date
Existing		
CCR Rule	☐ Provide CCR annually.	August 19, 1998
UCMR	☐ Monitor List 1 contaminants per USEPA requirements.	January 11, 2001
Stage 1 D/DBPR	☐ Monitor for TTHMs and HAA5.	January 1, 2002 (TTHM) January 1, 2004 (TTHM and HAA5)
Bioterrorism Act	☐ Submit Emergency Response Plan within 6 months of VA submittal.	December 30, 2004
Radionuclides Rule	☐ Monitor for gross alpha. o If < 5 pCi/L, no further action. o If > 5 pCi/L, monitor for combined radium and uranium.	December 8, 2003
Promulgated		
Stage 2 D/DBPR	☐ Evaluate the effect of IDSE and LRAA. Specifically, monitor DBP formation potential, with emphasis on HAA5, with contact time.	January 2006
Arsenic Rule	☐ Review compliance sampling to verify arsenic <10 ug/L.	January 23, 2005
Proposed		
Ground Water Rule	☐ Monitor GWR for change in proposed requirements from what is required in FDEP 62-555.	August 2006
Radon Rule	☐ Establish radon monitoring program.	December 2007 (proposed)

2.0 Regulatory Review

TABLE 2-6: Town Status Relative to USEPA SDWA Rule Requirements

Parameters	Requirement	Facility Design Compliance Issues	Compliant	Actions
Effective Rules:	Consumer Confidence Reports (CCRs)	☐ Issue Annual CCRs	Yes	Distributed Annually since 1998
	Disinfection/ Disinfectant Byproducts Rule (D/DBPR)	☐ THMs < 80 µg/L ☐ HAAs < 60 µg/L	Yes Yes	Perform IDSE for non-compliant systems
	Stage 2 D/DBPR	☐ IDSE ☐ LRAA	--- ---	Formulate Action Plan[1]
	VA/Emergency Response Plan	☐ Submit VA and ERP	Yes	Submitted 2004
	Radionuclides	☐ Gross Alpha < 5 pCi/L ☐ Uranium < 30 mg/L	Yes[2]	Continue sampling
	Arsenic	☐ Arsenic < 10 mg/L	Yes	Sampling program begun 2002
Proposed Rules:	Ground Water Rule	Regulations delayed	---	Likely to not pose an issue for Town
	Radon Rule	Regulation delayed	---	**Sampling program has not begun**

[1] An evaluation on DBP formation may be required to determine sensitive locations.

[2] Town is not required to sample for uranium unless gross alpha > 5 pCi/L, per FDEP 62-550.

3.0 Initial Distribution System Evaluation

3.1 Stage 2 Disinfection Byproducts Rule

New requirements under the S2DBPR apply to community and nontransient noncommunity water systems that use or deliver water that has been treated with a primary or residual disinfectant other than UV light. The new Rule includes:

- Individual Distribution System Evaluation (IDSE) Plan, Monitoring and Report requirements
- Compliance Monitoring using sites identified in IDSE
- Compliance based on Locational Running Annual Average (LRAA)
- Consecutive system requirements

Significant in this rule is that USEPA has incorporated requirements and compliance deadlines for combined distribution systems and consecutive systems. USEPA has defined these systems as follows:

Combined Distribution System (CDS) - Interconnected distribution system consisting of the distribution system of wholesale systems and consecutive systems that receive finished water

Consecutive Systems - PWS that receives some or all of its finished water from one or more wholesale systems"

A *Schedule Number* has been assigned to each system for phasing in compliance with the S2 Rule. USEPA has defined the Schedule Numbers and they are shown in **Table 3-1**. The Town falls within schedule number 2 as highlighted.

3.1.1 Complying With IDSE Requirements

The Implementation Schedule first calls for systems to conduct an Initial Distribution system Evaluation (IDSE) which will determine the locations of high DBP concentrations throughout your distribution system. The Town can comply with this requirement in one of four ways:

1. Develop a Standard Monitoring (SM) Plan which uses existing maps, water quality data and operational data to identify monitoring locations expected to have high DBP results, then conduct the Standard Monitoring at those locations for one year at the frequency identified in the S2 Rule. For systems with populations over 10,000, the frequency is every 60 days (every 2 months) at 8 or more sites, depending on population served. The Town must also continue to monitor under the S1DBPR during the period the Town conducts Standard Monitoring. Upon completion of the Standard Monitoring, the system must submit an IDSE report to the State that makes a recommendation on the locations for S2DBPR compliance monitoring.

2. Develop a System Specific Study (SSS) Plan which allows you to use existing monitoring results (if they meet criteria) or modeling to identify the locations of highest DBP concentrations. If

insufficient samples have been collected under existing monitoring, you are required to make up additional sampling. The IDSE report for a SSS must make a recommendation and provide the basis and justification for locations for S2DBPR compliance monitoring. The State can reject the data submitted under a SSS, and the system must then conduct Standard Monitoring and submission of an IDSE Report.

3. Submit 40/30 Certification, indicating that all Stage 1 DBPR compliance samples were ≤0.040 mg/L for TTHM and ≤ 0.030 mg/L for HAA5 AND there were no monitoring violations under Stage 1 DBPR.

4. Submit a Very Small System Waiver (VSSW) request. Applies only to systems serving <500 persons AND who have complied with Stage 1 DBPR monitoring requirements.

There is no IDSE requirement for systems submitting the 40/30 Certification, a VSSP or if it is a NTNCWS serving less than 10,000 connections. The IDSE schedule is shown in **Table 3-2**. The Town of Jupiter falls within schedule 2 as highlighted.

3.1.2 Compliance Monitoring Requirements

After completion and submittal of the IDSE report, systems must update their DBP Monitoring Plan to reflect new locations and monitoring under S2DBPR, and submit this to the State prior to initiating compliance monitoring. The Town must conduct monitoring with S2DBPR according to the schedule in **Table 3-3** according to schedule number 2.

TABLE 3-1: USEPA Schedule Numbers

If your system serves a population of:	You are on schedule number:
≥100,000 OR belongs to a CDS in which the largest systems serves 100,000 or more	1
50,000-99,999 OR belongs to a CDS in which the largest system serves 50,000 to 99,999 people	2
10,000-49,999 OR belongs to a CDS in which the largest system serves 10,000 to 49,999 people	3
<10,000 and not connected to a larger system	4

TABLE 3-2: IDSE Compliance Schedule

Schedule Number	Population	Submit SM Plan or SSS Plan or 40/30 Certification by:	Complete Standard Monitoring or SSS By:	Submit final IDSE Report by:
1	≥100,000	Oct 1, 2006	Sept 30, 2008	Jan 1, 2009
2	50,000-99,999	April 1, 2007	Mar 31, 2009	July 1, 2009
3	10,000-49,999	Oct 1, 2007	Sept 30, 2009	Jan 1, 2010
4	<10,000	April 1, 2008	Mar 31, 2010	July 1, 2010
Wholesale and consecutive systems comply at the same time as the system with the earliest compliance date in the combined distribution system (CDS).				

TABLE 3-3: Compliance Monitoring Schedule

Schedule Number	If your system serves a population of:	You must comply with S2DBPR monitoring by:
1	≥100,000	April 1, 2012
2	50,000-99,999	October 1, 2012
3	10,000-49,999	October 1, 2013
4	<10,000	**October 1, 2013 if** no ***Cryptosporidium*** **monitoring is required** Or October 1, 2014 if *Cryptosporidium* monitoring is required
Wholesale and consecutive systems comply at the same time as the system with the earliest compliance date in the combined distribution system (CDS).		

4.0 Conclusions & Recommendations

4.1 Conclusions

1. The Town remains compliant with the SDWA, exceeding the majority of requirements. The Town consistently produces the highest of quality drinking water and effectively distributes the water to its customers with minimal resulting customer complaints.

2. A review of impending and future regulations was performed relative to the Town's drinking water system. **Table 4-1** identifies those contaminants that the Town should be acutely understanding and continue to monitor and analyze for these chemicals in their source water and finished water supplies.

4.2 Recommendations

1. Address new wells for H_2S treatment per the provisions of FDEP 62-555.

2. Materials of construction in future WTP construction projects that are in direct contact with drinking water and drinking water chemicals must be compliant with NSF 61.

3. Continue to develop an isolation valve and fire hydrant exercise program. Continue to exercise auxiliary equipment in accordance with FDEP requirements.

4. Prepare to implement IDSE requirements per schedule number 2, using the method of developing a standard monitoring plan which uses existing maps, water quality data and operational data to identify monitoring locations expected to have high DBP levels, then conduct the standard monitoring at those locations for one year at the frequency identified in the Rule.

5. Plan to maintain and use the existing ion exchange process for alkalinity and buffering benefits, until that time the NF plant is operational and buffering of RO plant with IX and its impact on stability can be further evaluated.

6. A blending study should be conducted to identify operating criteria for when the new plant is commissioned.

TABLE 4-1: Concerns for Jupiter Compliance*

Contaminant	Regulation	Future Compliance
Total Coliforms	TCR	See Note No.1
Copper	LCR	Medium
Lead	LCR	Medium
Corrosivity	---	Medium
Bromate	D/DBP	Medium
Chlorite	D/DBP	Medium
Bromodichloromethane	D/DBP	Medium
Bromoform	D/DBP	Medium
Chloroform	D/DBP	Medium
Dibromochloromethane	D/DBP	Medium
Total Trihalomethanes (TTHMs)	D/DBP	Medium
Monochloroacetic acid	D/DBP	Medium
Dichloroacetic acid	D/DBP	Medium
Trichloroacetic acid	D/DBP	Medium
Monobromoacetic acid	D/DBP	Medium
Dibromoacetic acid	D/DBP	Medium
Haloacetic acids (HAA5)	D/DBP	Medium

Note No. 1: Probability of compliance is medium for coliform if chloramines are used for secondary disinfection, and the probability of compliance is high if free chlorine is used for secondary disinfection.

* **Appendix B** provides complete listing. Table values presented in **Table 4-1** show areas of concern.

Appendix A – Potable Water Regulations

A.1 Overview

The original SDWA, signed into law in December 1974 (Public Law 93-523), represented the first drinking water regulations that applied to all public water systems in the United States. These regulations authorized the USEPA to set the following:

- National health-related primary drinking water standard maximum contaminant levels (MCLs)
- Drinking water standard secondary maximum contaminant levels (SMCLs) for contaminants that may adversely affect the aesthetic quality of drinking water
- Special studies
- Research, development, and oversight implementation of the SDWA

In addition to implementing health-related primary drinking water regulations, the SDWA also authorized the USEPA to develop secondary regulations for contaminants that may adversely affect the aesthetic quality of drinking water. These SMCLs were promulgated in 1979 without federal enforcement provisions; however, they allow individual states to enforce the standards if so desired. Currently in Florida, the FDEP is responsible for enforcing the Federal MCLs and SMCLs.

In 1986, Congress passed legislation that amended most of the original 1974 SDWA. The 1986 amendments added six new sections to the original SDWA. Additional regulations passed in 1996 were created to strengthen existing regulations, to provide new drinking water quality regulations, and included public involvement and annual reporting requirements. The USEPA is still in the process of creating, proposing, reviewing and promulgating new drinking water quality regulations, which will continue to significantly impact water treatment practices and water utility operations throughout the United States for many years to come.

The 1996 SDWA Amendments revised the requirements for the USEPA's long-term regulatory agenda in terms of identification of contaminants for regulatory consideration. The 1996 SDWA Amendments now require USEPA to identify contaminants that would be candidates for regulatory consideration, and from this list, determine whether regulatory action is appropriate or inappropriate for at least five contaminants within five (5) year increments. The first regulatory determinations must occur within 5 years of the SDWA Amendments, and every 5 years thereafter.

A.2 USEPA Regulations

The following section discusses new regulations recently promulgated or is expected to be promulgated in 2004. Promulgation of a rule means that the rule has become effective per the terms defined within the body of the regulation and an effective date is established for compliance.

A.2.1 Arsenic

The Drinking Water Standard for Arsenic was promulgated January 22, 2001. However, USEPA

withdrew the rule on April 23, 2001 and the promulgation date was extended to February 22, 2002, pending reassessment to "maximize health risk reduction benefits at a cost that is justified by the benefits". On October 31, 2001, the USEPA announced its decision to move forward in implementing the new Arsenic standard. The previous MCL for arsenic was 0.05 milligrams per liter (mg/L) (50 micrograms per liter (μg/L)), which was established as a part of the National Primary Drinking Water Regulations (NPDWR). The maximum contaminant level goal (MCLG) for arsenic is set at zero, and the new MCL is set at 0.01 mg/L (10 μg/L). Arsenic is naturally occurring in the environment, and specifically in groundwater supplies. Inorganic arsenic is developed when arsenic in its natural form combines with oxygen, chlorine, or sulfur.

The USEPA effective date of the Arsenic rule is January 23, 2006, which is when all systems must begin monitoring and complying with the 10 μg/L MCL. However, for Florida water systems, this date was advanced to January 1, 2005 at the discretion of the FDEP. Consumer Confidence Report (CCR) requirements (described in next section) were issued as part of this rule for the reporting of arsenic levels. **Table A-1** depicts the arsenic reporting requirements in the CCR.

A.2.2 Consumer Confidence Reports

With the passage of the 1996 SDWA amendments, the USEPA requires each community water system to provide customers with a CCR at least once a year. The final CCR rule was issued on August 19, 1998. At a minimum, major provisions to be included in the CCRs are as follows:

- Information on the source water of the water system.
- Explanation of the contaminants that may reasonably be expected to be present in drinking water and that the presence of contaminants in drinking water does not necessarily indicate a health risk.
- Telephone number for the USEPA toll-free hot line - (800) 426-4791 - that consumers can call for more information about contaminants and potential health effects.
- Definitions of the terms "MCL," "MCLG," "variances," and "exemptions".
- Whether any regulated contaminants is detected in the water by the PWS, and if so, the MCLG, MCL, and the level of the contaminant in the water system.
- In the case of a violation of the MCL for any regulated contaminant during the year concerned, a statement of the health concerns that resulted in the regulation of the contaminant.
- Information on compliance with NPDWR.
- Statement of whether the system is operating under a variance or exemption, and the basis on which the variance or exemption was granted.
- Information on the levels of unregulated contaminants for which monitoring is required, including levels of *Cryptosporidium* and radon where States determine they may be found.

TABLE A-1: CCR Requirements for Reporting Arsenic Levels

CCR Due Date	Detected System Arsenic Levels	CCR Requirement
July 1, 2001	25 μg/L ≥ Arsenic ≥ 50 μg/L	Include educational statement per the amended §141.154(b) in Federal Register 40 Code of Federal Regulations (CFR) Parts 9, 141, and 142 issued Monday January 22, 2001.
Beginning July 1, 2002	5 μg/L ≥ Arsenic ≥ 10 μg/L	Include educational statement per the amended §141.154(b) in Federal Register 40 CFR Parts 9, 141, and 142 issued on January 22, 2001.
From July 1, 2002 to January 1, 2005	10 μg/L ≥ Arsenic ≥ 50 μg/L	Include arsenic health effects language specified in 40 CFR Part 141 Appendix C to Subpart O as part of the Inorganic Contaminants issued on January 22, 2001
After January 1, 2005	Meet MCL for arsenic of 10 μg/L	Failure to meet this MCL constitutes an MCL violation same as for any other contaminant

Another section of the rule allows for the addition of information related to the education of the public for up to three detected unregulated contaminants. This section also allows for additional statements in the CCR regarding regulated contaminants when the MCLs are changed by new rules. Prior to the effective date of those new rules, statements can be made, similar to those described in the description of the arsenic rule, providing information when the water exceeds the proposed MCL but has not exceeded the existing MCL.

The first CCR was due within the first 13 months following the effective date of the rule. Each subsequent CCR is required to be published by July 1 for the previous year's water quality. The City is fully compliant and has provided customers annual CCRs since 1998.

A.2.3 Contaminant Candidate List

The Drinking Water Contaminant Candidate List (CCL) was first issued on March 2, 1998 in the Federal Register. The CCL contains many contaminants that are not yet regulated under the NPDWR or SDWA. There are 50 chemicals and 10 microorganisms (or microbiological groups) included on the CCL, as indicated in **Table A-2**. The Chemical Abstracts Service Registry Number (CASRN) is included with each chemical contaminant. The CAS Registry is a database containing approximately 22 million chemicals and biochemicals.

The contaminants contained in the CCL include, but are not limited to, those substances listed in the National Secondary Drinking Water Regulations (NSDWR), Section 141(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The contaminants are currently unregulated, but may be subject to future regulation.

Table A-2 contains a list of contaminants on the CCL. The contaminants are broken up into different priorities. The three priorities on the CCL are (1) regulatory determination, (2) research priority, and (3) occurrence priorities. The USEPA must then select a minimum of five (5) contaminants from the regulatory determination list and review these on whether they should be added to the NPDWR or the NSDWR list.

A preliminary determination was published in the June 3, 2002 Federal Register containing the following contaminants:

- Acanthamoeba
- aldrin
- dieldrin
- hexachlorobutadiene
- manganese
- metribuzin
- naphthalene

TABLE A-2: Contaminant Candidate List

Contaminant Name	CASRN* Number	Priority
Microbiological		
Acanthamoeba	N/A	Regulatory Determination [1]
Adenoviruses	N/A	Research [2t,a], Occurrence [3]
Aeromonas hydrophila	N/A	Research [2h,t], Occurrence [3]
Caliciviruses	N/A	Research [2h,t,a], Occurrence [3]
Coxsackieviruses	N/A	Research [2t], Occurrence [3]
Cyanobacteria (blue-green algae), other freshwater algae, and their toxins	N/A	Research [2h,t,a], Occurrence [3]
Echoviruses	N/A	Research [2t], Occurrence [3]
Helicobacter pylori	N/A	Research [2h,t,a], Occurrence [3]
Microsporidia (Enterocytozoon and Septata)	N/A	Research [2h,t,a], Occurrence [3]
Mycobacterium avium intracellulare (MAC)	N/A	Research [2h,t]
Chemical		
1,1,2,2-tetrachloroethane	79-34-5	Regulatory Determination [1]
1,2,4-trimethylbenzene	95-63-6	Regulatory Determination [1]
1,1-dichloroethane	75-34-3	Regulatory Determination [1]
1,1-dichloropropene	563-58-6	Research [2h]
1,2-diphenylhydrazine	122-66-7	Occurrence [3]
1,3-dichloropropane	142-28-9	Research [2h]
1,3-dichloropropene	542-75-6	Regulatory Determination [1]
2,4,6-trichlorophenol	88-06-2	Research [2a], Occurrence [3]
2,2-dichloropropane	594-20-7	---
2,4-dichlorophenol	120-83-2	Research [2a], Occurrence [3]
2,4-dinitrophenol	51-28-5	Research [2a], Occurrence [3]
2,4-dinitrotoluene	121-14-2	Occurrence [3]
2,6-dinitrotoluene	606-20-2	Occurrence [3]
2-methyl-Phenol (o-cresol)	95-48-7	Research [2a]
Acetochlor	34256-82-1	Research [2a]
Alachlor ESA and other acetanilide pesticide degradation products	N/A	Occurrence [3]
Aldrin	309-00-2	Regulatory Determination [1]
Aluminum	7429-90-5	Research [2h,t]
Boron	7440-42-8	Regulatory Determination [1]
Bromobenzene	108-86-1	Regulatory Determination [1]
DCPA mono-acid degradate	887-54-7	Research [2h], Occurrence [3]
DCPA di-acid degradate	2136-79-0	Research [2h], Occurrence [3]
DDE	72-55-9	Occurrence [3]
Diazinon	333-41-5	Occurrence [3]
Dieldrin	60-57-1	Regulatory Determination [1]
Disulfoton	298-04-4	Occurrence [3]
Diuron	330-54-1	Occurrence [3]
EPTC (s-ethyl-dipropylthiocarbamate)	759-94-4	Occurrence [3]
Fonofos	944-22-9	Research [2a], Occurrence [3]

Contaminant Name	CASRN* Number	Priority
Hexachlorobutadiene	87-68-3	Regulatory Determination [1]
p-Isopropyltoluene (p-cymene)	99-87-6	Regulatory Determination [1]
Linuron	330-55-2	Occurrence [3]
Manganese	7439-96-5	Regulatory Determination [1]
Methyl bromide	74-83-9	Research [2h]
Methyl t-butyl ether (MTBE)	1634-04-4	Research [2h,t], Occurrence [3]
Metolachlor	51218-45-2	Regulatory Determination [1]
Metribuzin	21087-64-9	Regulatory Determination [1]
Molinate	2212-67-1	---
Naphthalene	91-20-3	Regulatory Determination
Nitrobenzene	98-95-3	Occurrence [3]
Organotins	N/A	Regulatory Determination [1]
Perchlorate	N/A	Research [2h,t,a], Occurrence [3]
Prometon	1610-18-0	Occurrence [3]
RDX	121-82-4	Research [2a], Occurrence [3]
Sodium	7440-23-5	Research [2h]
Sulfate	14808-79-8	Regulatory Determination [1]
Terbacil	5902-51-2	Occurrence [3]
Terbufos	13071-79-9	Occurrence [3]
Triazines and degradation products of triazines (including, but not limited to Cyanazine and atrazine-desethyl)	Including, but not limited to, 21725-46-2 and 6190-65-4	Regulatory Determination [1]
Vanadium	7440-62-2	Regulatory Determination [1]

*CASRN Number = Chemical Abstracts Service Registering Number

1. Regulatory determination priority contaminants in the CCL notice. These contaminants are subject to regulatory review and development.
2. Research priority contaminants in the CCL notice. These contaminants are subject to research for data in the areas of health (h), treatment (t), or analytical (a) methods.
3. Occurrence priorities in the CCL notice. These contaminants are subject to research to obtain occurrence data in public water systems.

- sodium
- sulfate

A final determination was published in the July 18, 2003 Federal Register that no regulatory action was appropriate at that time for these contaminants.

The CCL must be updated and issued every five (5) years following the first CCL. The second CCL should be published in 2003. To help in the development of the CCLs, the EPA established the National Drinking Water Contaminant Occurrence Database (NCOD), which stores data on the occurrence of regulated and unregulated contaminants. The NCOD will help to identify contaminants in need of regulatory action.

The NCOD is also responsible for reviewing the NPDWR at a minimum of every six (6) years. The standards that are reviewed include the 68 NPDWRs and the Total Coliform Rule (TCR). The first review, which was completed and published on July 18, 2003, only covers the NPDWR as they were before 1997 (pre-1997 NPDWR). The EPA decided that the TCR should be revised to adjust the monitoring requirements to reduce the economic burden while maintaining public health. **Table A-3** provides a list of contaminants on the NPDWR that were reviewed as part of the first six-year review.

A.2.4 Unregulated Contaminant Monitoring Rule Revisions

The Unregulated Contaminant Monitoring Rule (UCMR) was first issued on September 17, 1999. The USEPA has revised the UCMR. This rule has been supplemented on March 2, 2000, January 11, 2001, September 4, 2001, March 12, 2002, and October 29, 2002.

The USEPA has revised the UCMR. The purpose of the UCMR is to obtain reliable data for unregulated contaminants to support decisions on whether or not to regulate contaminants in drinking water. The data generated will be used by the USEPA to evaluate and prioritize contaminants on the Drinking Water CCL. The rule includes the following:

- Three different lists of contaminants based on the availability of established analytical methods
- Requirements for all large public water systems and a representative sample of small PWS to monitor for those contaminants on List 1
- Requirements for selected large and small PWS to monitor for those contaminants on List 2
- Requirements to submit the monitoring data to USEPA and the States for inclusion in the Drinking Water NCOD
- Requirements to notify consumers of the availability of the results of monitoring
- Requirements to include detected contaminants in CCRs

TABLE A-3: Pre-1997 NPDWR

Contaminant	MCL (mg/L)	MCLG (mg/L)
Inorganics		
Antimony	0.006	0.006
Asbestos	7.0 mf/L	7.0 mf/L
Barium	2.0	2.0
Beryllium	0.004	0.004
Cadmium	0.005	0.005
Chromium	0.1	0.1
Copper	1.3	1.3
Cyanide	0.2	0.2
Fluoride	4.0	4.0
Lead	0.015	Zero
Mercury	0.002	0.002
Nitrate	10.0	10.0
Nitrite	1.0	1.0
Selenium	0.05	0.05
Thallium	0.002	0.0005
Organics		
Acrylamide	0.05% dosed at 1.0 mg/L	Zero
Alachlor	0.002	Zero
Atrazine	0.003	0.003
Benzene	0.005	Zero
Benzo(a)pyrene	0.0002	Zero
Carbofuran	0.04	0.04
Carbon tetrachloride	0.005	Zero
Chlordane	0.002	Zero
2,4-D	0.07	0.07
Dalapon	0.2	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Zero
o-Dichlorobenzene	0.6	0.6
p-Dichlorobenzene	0.075	0.075
1,2-Dichloroethane	0.005	0.0
1,1-Dichloroethylene	0.007	0.007
cis-1,2-Dichloroethylene	0.07	0.07
trans-1,2-Dichloroethylene	0.1	0.1
Dichloromethane	0.005	Zero
1,2-Dichloropropane	0.005	Zero
Di(2-ethylhexyl)adipate	0.4	0.4
Di(2-ethylhexyl)phthalate	0.006	Zero
Dinoseb	0.007	0.007
2,3,7,8-TCDD (Dioxin)	0.00000003	Zero
Diquat	0.02	0.02
Endothall	0.1	0.1

Contaminant	MCL (mg/L)	MCLG (mg/L)
Endrin	0.002	0.002
Epichlorohydrin	0.01% dosed at 20.0 mg/L	Zero
Ethylbenzene	0.7	0.7
Ethylene dibromide	0.00005	Zero
Glyphosate	0.7	0.7
Heptachlor	0.0004	Zero
Heptachlor epoxide	0.0002	Zero
Hexachlorobenzene	0.001	Zero
Hexachlorocyclopentadiene	0.05	0.05
Lindane	0.0002	0.0002
Methoxychlor	0.04	0.04
Oxamyl	0.2	0.2
Polychlorinated biphenyls (PCBs)	0.0005	Zero
Pentachlorophenol	0.001	Zero
Picloram	0.5	0.5
Simazine	0.004	0.004
Styrene	0.1	0.1
Tetrachloroethylene	0.005	Zero
Toluene	1.0	1.0
Toxaphene	0.003	Zero
2,4,5-TP (Silvex)	0.05	0.05
1,2,4-Trichlorobenzene	0.07	0.07
1,1,1-Trichloroethane	0.2	0.2
1,1,2-Trichloroethane	0.005	0.003
Trichloroethylene	0.005	Zero
Vinyl chloride	0.002	Zero
Xylenes	10.0	10.0
Microorganisms		
Total Coliforms	<5% samples in one month	Zero

The UCMR Monitoring List consists of all thirty-four (34) contaminants in the CCL Occurrence Priorities column and two radionuclides that emerged during regulation development. **Table A-4** presents the UCMR Monitoring List. The UCMR Monitoring List comprises three separate lists based on analytical methods readiness and current contaminant occurrence data. These are:

- **List 1:** Assessment Monitoring of Contaminants with Available Methods
- **List 2:** Screening Survey of Contaminants Projected to have Methods by Date of Program Implementation
- **List 3:** Pre-Screen Testing of Contaminants Needing Research on Methods

Beginning in 2001 all community and non-transient non-community water systems in Florida serving more than 10,000 persons began to monitor for the List 1 unregulated contaminants. USEPA also selected 32 small systems serving less than 10,000 randomly to monitor for the List 1 unregulated contaminants. Groundwater systems were required to monitor twice per year. The City monitored for List 1 UCMRs contaminants in July and December of 2003.

A.1.5 Radionuclides

The Radionuclides Rule was promulgated on December 7, 2000. The effective date of this rule is December 8, 2003. The purpose of this rule was to revise the requirements for radionuclides particularly combining radium-226/228 and lowering the MCL to 5 Pico Curies per liter (pCi/L) and including an MCL for previously unregulated uranium at 0.03 mg/L (30 μg/L). The new levels provided in **Table A-5** present the drinking water regulations for radionuclide contaminants.

FDEP has adopted the new standards issued by USEPA. FDEP stipulates that CWSs are not required to sample for combined radium or uranium if the gross alpha particle measurements are below 5 pCi/L and 15 pCi/L, respectively.

There are two (2) sources of radionuclide contamination in drinking water, naturally occurring or man-made. Naturally occurring radionuclides that are contained in the soil are imparted on the water as the water passes through. Phosphate rich soils and rock have been found to be sources of radioactive contamination in some areas of Florida. According to FDEP there is no known man-made radioactive contamination of drinking water in Florida.

TABLE A-4: UCMR Monitoring List

List 1	List 2	List 3
Assessment Monitoring of Contaminants with Available Methods	**Screening Surveys of Contaminant with Methods Just Developed**	**Pre-Screen Testing of Contaminants Needing Research on Methods (1)**
• 2,4-Dinitrotoluene • 2,6-Dinitrotoluene • Acetochlor • DCPA Di Acid degradate; DCPA Mono Acid degradate • 4,4'-DDE • EPTC • Molinate • MTBE • Nitrobenzene • Perchlorate • Terbacil	• 1,2-Diphenylhydrazine • 2-Methyl-1-Phenol • 2,4-Dichlorophenol • 2,4-Dinitrophenol • 2,4,6-Trichlorophenol • Aeromonas Hydrophila (2) • Alachlor ESA (1) • Diazinon • Disulfoton • Diuron • Fonofos • Linuron • Polonium-210 • RDX (1) • Prometon • Terbufos	• Algae and Toxins • Lead-210 • Echoviruses • Coxsackieviruses • Helicobacter pylori • Microsporidia • Caliciviruses • Adenoviruses

1. The monitoring period for Alachlor ESA, RDX and all List 3 contaminants will be performed only after future rulemaking specifies methods.
2. Monitoring will occur, pending promulgation of a UCMR Methods Update Federal Register Notice (MURFN).

TABLE A-5: Radionuclide Drinking Water Standards

Contaminant	MCL	Frequency/Location
Naturally occurring radionuclides		
Combined radium-226 and radium-228	5 pCi/L	3 years/Point of Entry (POE)
Gross alpha particle activity (including radium-226 but excluding radon and uranium)	15 pCi/L	3 Years/POE
Uranium	30 μg/L	3 Years/POE
Man-Made Radionuclides		
Beta particle and Photon radioactivity	4 mrem/year	Not Applicable

A.2.6 Organic and Inorganic Contaminants

Clarified compliance requirements for inorganic contaminants (IOC), synthetic organic contaminants (SOC), and volatile organic contaminants (VOC) are included in the Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring Rule issued on January 22, 2001.

These requirements state that compliance for IOC, SOC, and VOC will be based on the running annual average of any samples exceeding the MCL limitations and any other samples required by the State for verification. In addition, any system that does not collect the required number of samples will determine compliance by taking the sum of all the samples and dividing by the total number of samples. Systems are still required to meet all other requirements as set forth in previous rules.

A.2.7 Total Coliform Rule

The TCR was promulgated in December 1990 and included total coliforms such as fecal coliform and *Escherichia coli*. The MCLG for total coliform concentration is zero. Compliance with the rule is based on the presence/absence of total coliforms as opposed to an estimate of coliform density. Monitoring requirements for the TCR are as follows:

- A repeat sample must be collected and analyzed for each detected positive coliform sample.
- For any coliform-positive sample, fecal coliform analyses must also be performed.
- If it is determined that a sample analysis was not correctly performed or does not represent the water quality in the distribution system, then a positive coliform result could be invalidated.

Limited data were available relative to coliforms; however, the limited data indicates that coliforms have been absent in the samples collected. In evaluating potential treatment alternatives, it is important to consider how upgraded or newly installed processes may affect biological regrowth within the distribution system, which are often responsible for coliform detects during routine monitoring procedures.

USEPA announced on April 17, 2002 in the Federal Register its intention to begin the process for revising the TCR. USEPA plans to consider revisions to the TCR with new requirements addressing the integrity of the distribution system. Date for proposal has not been set.

A.2.8 Lead and Copper Rule

USEPA's national primary drinking water regulation known as the Lead and Copper Rule (LCR) requires all public water systems to demonstrate optimized corrosion control to minimize lead and copper contamination resulting from corrosion of plumbing materials. Public water systems that have lead concentrations below 0.015 mg/L (15 μg/L) and copper concentrations below 1.3 mg/L in more than 90 percent of tap water samples (the "action level") have optimized their corrosion control treatment. Systems that exceed the lead or copper action level must also monitor source water to determine whether treatment to remove lead or copper from the source water is needed. The LCR was promulgated in June 1991 and consists of the following five (5) main components:

- Lead and copper action levels of 0.015 mg/L and 1.3 mg/L, respectively.

- Increased monitoring requirements for lead and copper within the distribution system and at the consumer's tap with monitoring programs based on a water system's service population.
- Target sampling at locations that are suspect for higher lead and copper levels.
- Required corrosion control studies and treatment processes for systems serving more than 50,000 persons.
- Treatment techniques must be implemented if greater than 10 percent of measurements (90th percentile) exceed the regulatory action levels of 0.015 mg/L for lead or 1.3 mg/L for copper.

LCR monitoring within the City's PWSs shows that the 90th percentile reading for lead and copper was not exceeded.

A.2.9 Disinfectant/Disinfection By-Products Rule

In the 1970s USEPA discovered that chlorine could react with natural or man-made organic compounds in water to create disinfection by-products (DBPs). The most known and first group regulated of the by-products are trihalomethanes (THMs). In December 1999, the USEPA promulgated the Disinfectant/Disinfection By-Products Rule (D/DBPR). Under Florida regulations, CWSs that serve at least 10,000 customers were required to monitor for total THMs (TTHMs) quarterly until January 1, 2004. Currently, CWSs that serve at least 10,000 customers are required to monitor TTHMs and HAA5 quarterly.

To balance the risk associated with disinfection and DBPs, the D/DBPR consists of two (2) levels of regulatory standards, one for disinfectant residual effectiveness and the other for DBP formation. The D/DBPR consists of two stages of DBP reductions. Stage 1 standards of the D/DBPR required small groundwater utilities to comply with its regulations by January 2004. Consequently, this rule has a significant impact on the City. (Note: The total organic carbon (TOC) removal part of this rule applied only to surface water sources). The Ground Water Rule (GWR) will address disinfection for groundwater sources. The USEPA expects the GWR will be promulgated in August 2006.

Promulgate with the Stage 2 standards is not anticipated until January 2006. **Table A-6** presents the MCLs for DBPs the maximum residual disinfectant levels (MRDLs). The City has been complaint with the TTHM sampling since January 2002. The City has been compliant with the required TTHM and HAA5 sampling since 2004.

A.2.10 Stage 2 Disinfectant/Disinfection Byproducts Rule

The Stage 2 D/DBPR was promulgated in January 4, 2006. The impacts of this rule are for CWSs and NTNCWSs. The second stage MCLs and MCLGs are based upon the national database compiled during the Information Collection Rule (ICR). Currently, TTHMs, HAA5, Bromate and Chlorite are the only regulated DBPs. TTHM and HAA5 compliance is determined by averaging the most recent four quarterly samples collected in the distribution system.

USEPA uses the average of four quarterly samples because DBP formation has been shown to vary with seasonal water temperature changes. Bromate compliance is determined by averaging the most recent twelve monthly samples at plants that use ozone and chlorite compliance is determined from daily

TABLE A-6: MCLs and MRDLs for DBPs

STAGE 1: Promulgated December 1998 (Effective January 2004): [1]	
1. Maximum Contaminant Levels (MCLs) for DBPs	
• Total THMs (TTHMs)	80 μg/L RAA
• Five Haloacetic Acids (HAA5)	60 μg/L RAA
• Bromate Ion (plants that use ozone)	10 μg/L
• Chlorite Ion (plants that use chlorine dioxide)	1.0 mg/L
2. Maximum Residual Disinfectant Levels (MRDLs)	
• Chlorine	4.0 mg/L
• Chloramine	4.0 mg/L
• Chlorine dioxide	0.8 mg/L
STAGE 2: Promulgation anticipated Late 2004/Early 2005: [2]	
1. Maximum Contaminant Levels (MCLs) for DBPs	
• Total THMs	80 μg/L LRAA
• Five HAAs	60 μg/L LRAA

1. *USEPA Promulgated Stage 1 Disinfection By-Product Rule (December 1998).*
2. *USEPA Promulgated Stage 2 Disinfection By-Product Rule (January 2006)*

RAA = running annual average

LRAA = locational running annual average

samples at the entrance to the distribution system and monthly samples in the distribution system at plants that use chlorine dioxide.

The Stage 2 D/DBPR has maintained the running annual average (RAA) MCL from Stage 1 D/DBPR at 80 μg/L for TTHM and 60 μg/L for HAA5. However, it has changed the location in which the TTHM and HAA5 are sampled. With the Stage 2 D/DBPR, it requires a locational running annual average (LRAA) is used for compliance rather than the RAA. This new monitoring program insures that all the customers in the distribution system receive reduced DBPs levels by forcing compliance monitoring at the sites with highest DBP levels.

The compliance dates, number of locations sampled, and monitoring frequency depend on the population served. The compliance sample type will consist of at least one of the following (depending on population served):

- One near the entry point
- One at a representative average residence time
- One at the representative point with high HAA5 levels identified by the IDSE
- One at the representative point with high TTHM levels identified by the IDSE

The Stage 2 D/DBPR schedule for monitoring and compliance is shown below:

Population	Submit Plan	Complete Monitoring Study	Submit IDSE Report	Begin Compliance Monitoring
≥100,000	Oct. 1, 2006	Sept. 30, 2008	Jan. 1, 2009	April 1, 2012
50,000 – 99,999	April 1, 2007	March 31, 2009	July 1, 2009	Oct. 1, 2012
10,000 – 49,999	Oct. 1, 2007	Sept. 30, 2009	Jan. 1, 2010	Oct. 1, 2013
<10,000	April 1, 2008	March 31, 2010	July 10, 2010	Oct. 1, 2013

A.2.11 Ground Water Rule

The GWR was proposed in May of 2000 and is presently scheduled to be issued as a final rule in August 2006. Currently, for new systems, the FDEP requires a 30-minute free chlorine contact time at maximum daily flow for groundwater systems using chlorine for disinfection.

USEPA is proposing a rule that specifies the appropriate use of disinfection in groundwater and addresses other components of groundwater systems to assure public health protection. The GWR establishes multiple barriers to protect against bacteria and viruses in drinking water from groundwater sources and will establish a targeted strategy to identify groundwater systems at high risk for fecal contamination. More stringent disinfection requirements will have an impact on DBP formation within the water system. The draft rule requires monitoring and reporting of disinfectant residual levels and/or fecal indicators. Requirements proposed in the GWR include the following:

- System sanitary surveys conducted by the State to identify significant deficiencies. The State must:
  - Perform each system's sanitary survey and address the 8 elements from the joint USEPA and Association of State Drinking Water Administrators guidance.
  - Exercise authority to enforce corrective action requirements.
  - Provide a list of significant deficiencies (e.g., those that require corrective action) to the system within 30 days of identification of deficiencies.
- Hydrogeological sensitivity assessments for undisinfected systems. The State:
  - Must conduct a one-time assessment of all systems that do not provide 4-log virus inactivation/removal to identify those systems located in sensitive aquifers.
  - May waive source water monitoring for sensitive systems if there is a hydrogeological barrier to fecal contamination. USEPA considers karst, gravel, or fractured bedrock aquifers to be "sensitive" to microbial contamination.
- Source water microbial monitoring by systems that do not disinfect and draw from hydrogeological sensitive aquifers or have detected fecal indicators within the system's distribution system. Systems need to perform:
  - Routine Monitoring. For systems determined by the State to be hydrogeologically sensitive, the system must conduct monthly source water monitoring for fecal indicators. Sampling frequency may be reduced after twelve negative samples.
  - Triggered Monitoring. If a total coliform-positive sample is found in the distribution system, then the system must collect one source water sample and monitor for a fecal indicator.
- Corrective action by any system with significant deficiencies or positive microbial samples indicating fecal contamination. Keys to action include:
  - Significant Deficiency or Source Water Contamination. If a groundwater system is notified of significant deficiencies by the State, or notified of a source water sample positive, within 90 days it must correct the contamination problem by eliminating the contamination source, correct the significant deficiencies, provide an alternative source water or install a treatment process which reliably achieves 4-log removal or inactivation of viruses. A system may take longer than 90 days for corrective action with a State-approved plan. Systems must notify the State of completion of the corrective action or the State must confirm correction within 30 days after the 90-day period or scheduled correction date.
  - Treatment. Systems providing treatment must monitor treatment to ensure at least 4-log virus inactivation and/or removal.

Compliance monitoring required for systems, which disinfect to ensure that they reliably achieve 4-log (99.99%) virus inactivation/removal. If monitoring shows the disinfection concentration to be below the required level, the system must restore the disinfection concentration within 4 hours or notify the State.

Because of the significance of this rule for the City, water quality testing should be conducted for microbiological evaluations of the PWSs in addition to chlorine contact time (CT) tracer tests of each water treatment plant when primary disinfection is in place.

A.2.12 Contaminant Candidate List 2

The SDWA requires the USEPA to update and publish a new CCL every five (5) years after the first one, which was issued on March 2, 1998. The second CCL (CCL2)is expected to be similar to the first CCL. The draft CCL2 was published on April 2, 2004 and was promulgated February 24, 2005.

A.2.13 Security Issues

The "Public Security and Bioterrorism Preparedness and Response Act" (Public Law 107-188) amended the SDWA to include the need for Vulnerability Assessments (VA) of CWSs as defined in the SDWA for systems as follows:

- CWSs serving populations >100,000 must submit by March 31, 2003
- CWSs serving populations >50,000 but <100,000 must submit by December 31, 2003
- CWSs serving populations >3,300 but <50,000 must submit by June 30, 2004

The law also requires that a CWS serving a population greater than 3,300 shall prepare or revise, where necessary, an Emergency Response Plan that incorporates the results of the VA. A plan should include implementing the recommendation to improve facility security from the threats of terrorism. The studies and ultimate designs need to be in full compliance with the USEPA guidelines for a WTP security system that is both secure and functional. Threat reduction includes:

- Site perimeter and access control
- Surveillance
- Locking and alarm systems
- SCADA
- Fencing and Barriers
- Lighting
- Recommended operational procedures

These facility design features are ranked to help the utility to implement the most cost-effective security systems to protect its assets. Additional information required may include specific toxin monitoring at WTPs. In addition, laboratories tasked with evaluating environmental samples for chemical warfare agents may be further regulated in response to a report released by the Association of Public Health Laboratories. This report expresses concerns on whether laboratories are prepared to handle the events related to a chemical warfare attack.

A.3 FDEP Regulations

This section contains a summary of the Florida drinking water standards and important regulations, as well as existing, proposed and anticipated SDWA regulations that are significant to the City's PWSs.

A.3.1 Updates to FDEP 62-555

The FDEP is in charge of regulatory programs and permitting for the State of Florida air, water and wastewater management. FDEP has enacted a set of rules governing activities statewide related to

drinking water programs. Chapter 62-555 is related to the permitting, construction, operation and maintenance of drinking water systems.

FDEP began making changes to this rule in October of 2000 in response to various special requests for changes to this rule. A Technical Advisory Committee (TAC) was formed in May 2002 to address these requests. The final rule became effective on August 28, 2003. The following sections describe the various changes to the rule.

A.3.2 Water Quality

Chapter 62-555.315 requires various construction, operation and maintenance items with respect to water quality constraints. Detailed water quality constraints are listed in FDEP Chapter 62-550: Drinking Water Standards, Monitoring, and Reporting (Chapter 62-550). The following requirements are included in Chapter 62-555.315(5) regarding water quality:

Control of Copper Pipe Corrosion and Black Water - The sulfide water quality levels in **Table A-7** are required treatment levels included in Chapter 62-555. The treatment techniques listed next to each water quality level are recommendations only and not requirements. However, other treatment techniques used must achieve the same or better removal. Sulfide concentrations above 0.3 mg/L will most likely involve an aeration technique, with forced draft aeration being likely at concentrations above 0.6 mg/L.

Sulfide data has not been routinely collected by the City. Boyle recommends monitoring for H_2S because PWS are required to comply with objectionable odors per FDEP Chapter 62-296.320(2).

For utilities with existing wells permitted and constructed prior to August 28, 2003, no treatment is required. For any future wells permitted after August 28, 2003, utilities will need to address treatment for sulfide removals per **Table A-7**.

A.2.3 Auxiliary Power

Chapter 62-555.320(14) requires a CWS serving 350 or more people or 150 or more connections to provide standby power for the CWS WTP by no later than December 31, 2005. Auxiliary power must be provided for source, treatment, and pumping facilities as required for delivery of drinking water at a rate equal to the average daily water demand at a minimum. FDEP defines a CWS as being a PWS that serves at least 15 connections used by year-round residents or serves at least 25 year-round residents.

Auxiliary power may be provided through either a separate power unit such a generator or through a second power line connection independent of the first one. If the second power line connection is preferred, power must be fed from different substations.

A.2.4 Operation and Maintenance

Chapter 62-555.350 requires the following operation and maintenance procedures:

- Piping at all WTPs shall be color coded in accordance with Section 2.14 of the Recommended Standard for Water Works and as required in this rule.

TABLE A-7: Sulfide Water Quality Level and Treatment

Source Water Sulfide Level	Recommended Treatment Technique
Total Sulfide (TS) < 0.3 mg/L; or Dissolved Iron (DI) < 0.1 mg/L[1]	Direct chlorination[2]
0.3 mg/L < TS < 0.6 mg/L @ pH < 7.2	Conventional aeration[3] (maximum removal efficiency ≈ 40% to 50%)
0.3 mg/L < TS < 0.6 mg/L @ pH > 7.2	Conventional aeration with pH adjustment (maximum removal efficiency ≈ 40% to 50%)
0.6 mg/L < TS < 3.0 mg/L @ pH < 7.2	Forced Draft Aeration[3] (maximum removal efficiency ≈ 90%)
0.6 mg/L < TS < 3.0 mg/L @ pH > 7.2	Forced Draft Aeration with pH adjustment [4, 5] (maximum removal efficiency ≈ 90%)
TS > 3.0 mg/L	Packed Tower Aeration with pH adjustment [4, 5] (maximum removal efficiency ≈ 90%)

1. High iron content raises concern if significant dissolved oxygen exists in the water and chlorination is the only disinfection method used. Filtration may be required to remove particulate iron.
2. Direct chlorination of sulfide in the pH range typically found in potable water sources can produce elemental sulfur and turbidity. Finished water turbidity should be no more than 2 NTU greater than raw water turbidity.
3. Corrosivity may be increased with entrained dissolved oxygen during aeration.
4. Corrosion control treatment may be required. Corrosion control treatment includes pH adjustment, alkalinity recovery, and corrosion inhibitor injection.
5. pH adjustment may be more expensive with a higher alkalinity. Other treatment techniques that can maintain the background alkalinity may be preferable.

- A PWS not requiring construction permits for operation and maintenance of their water main(s) shall place the water main back into service prior to FDEP approval provided the disinfection and bacteriological testing is complete and successful. The bacteriological tests have to be submitted to FDEP with the Monthly Operating Report (MOR) for that current month or within ten (10) days of the end of that month.

The following preventive maintenance measures shall be practiced by all PWSs:

- Finished water storage tanks, including hydropneumatic tanks (except bladder and diaphragm-type tanks) shall be rehabilitated and repaired as needed, cleaned every five (5) years, and structurally inspected every five (5) years by a Florida licensed professional engineer.
- Treatment facilities shall be kept free of biogrowth, films, algae, etc.
- Isolation valves, auxiliary equipment, and hydropneumatic tank air pressure relief valves shall be exercised in accordance with manufacturer's recommendations and the CWS written preventive maintenance plan.

Systems subject to the "new system" definition shall be required to update and submit to FDEP their financial/managerial operations plan. FDEP defines a "new system" as being:

- New CWS and non-transient non-community water systems (NTNCWS) constructed or beginning operation on or after October 1, 1999;
- Water systems not previously considered a CWS or a NTNCWS but have grown to become either a CWS or a NTNCWS through new facilities either constructed or first operated on or after October 1, 1999; and
- Water systems not previously considered a CWS or a NTNCWS but have added finished drinking water users without adding additional facilities.

A.3.5 Capacity

The capacity of a WTP shall conform to the requirements of Chapter 62-555.348. These requirements include the following:

- Maintaining water source and treatment facilities at a capacity of at least the water system's maximum day demand including design fire flows, if applicable.
- Capacity analysis reports (CAR) are required for CWSs serving 350 or more people or 150 or more connections. The requirements for these CAR include the following:
    - CWSs shall routinely monitor their total net quantity of finished drinking water per day versus the total maximum day permitted operating capacity of the CWS.
    - When the maximum finished drinking water produced by the CWS reaches 75 percent of the total maximum day permitted operating capacity, the CWS shall submit a CAR for the source, treatment and storage facilities. This initial CAR shall be submitted six months after the month in which the 75 percent point was reached, or by August 28, 2004, whichever is later.

- No additional report will be required if the initial or updated report shows that the total maximum day finished water demand at build-out will not exceed the treatment capacity of the plant and if the finished water storage needed at maximum day at build-out will not exceed the useful finished water storage capacity.
- If the initial report or the latest updated CAR shows that the total maximum day finished water demand and the finished water storage need will not exceed present plant capacity for at least ten years, the next report will be submitted within five (5) years of the previous report.
- If the initial report or the latest updated CAR shows that the total maximum day finished water demand and the finished water storage need will not exceed present plant capacity for at least five years but less than ten years, the next report will be submitted within two (2) years of the previous report.
- If the initial report or the latest updated CAR shows that the total maximum day finished water demand and the finished water storage need will exceed present plant capacity in less than five years, the next report will be submitted within one (1) year of the previous report. Documentation shall be provided with this report showing timely progress of design, permitting and construction of new facilities to accommodate the additional finished water demand.
- The items to be included in the CAR include:
  - The capacity of each water source and treatment facility,
  - Permitted maximum day and peak capacity of each plant,
  - Useful capacity of each finished water storage facility,
  - The maximum day and annual average daily quantities of finished water produced from each plant during each of the past ten years or during each of the years the plant has been in operation (whichever is less),
  - Projected total annual average and maximum daily water demand for at least the next ten years,
  - Total projected finished water storage for at least the next ten years,
  - An estimate of the time required for the maximum day water demand to exceed the permitted maximum day capacity for each plant,
  - An estimate of the time required for the total finished water storage need to exceed the available storage capacity, and
  - Any recommendations for additional source, treatment or storage capacity as necessary.

A.3.6 Disinfection

Chapter 62-555.320(12) requires changes in existing disinfection practices or procedures, as indicated in the following:

- Chlorine CT shall be calculated per the FDEP definition of contact time. FDEP's definition of contact time is "the product of 'residual disinfectant concentration' (C) in mg/L before or at taps

providing water for human consumption, and the corresponding 'disinfectant contact time' (T) in minutes.

- CWSs that have more than one plant with gas chlorination facilities, standby equipment shall be provided for each type and size of equipment instead of keeping standby equipment at each plant.
- The limit on hypochlorite use is being eliminated and hypochlorite system requirements similar to those for gas chlorination facilities are being added.

A.3.7 WTP Process

Chapter 62-555.320 includes several new process related requirements. These criteria are listed below as follows:

- New process equipment components in all PWSs that will be in contact with drinking water and drinking water chemicals shall be in compliance with NSF Standard 61 or other similar standard referenced in Chapter 62-555.320(3).
- An equipment failure alarm system shall be provided for any new or altered equipment that is designed to achieve primary standards for nitrate and nitrite removal, as referenced by 62-555.320(11).

A.3.8 Storage

Chapter 62-555.320(19) includes finished water storage requirements. These criteria are listed below as follows:

- Sufficient finished water storage shall be provided for 25 percent of the maximum day demand, excluding fire flows.
- Provide sufficient finished water storage for fire flows.
- A few exceptions to this requirement are allowed provided one of the following is accomplished:
  - Prove that the finished water storage provided is sufficient for operational equalization, or
  - Prove that the finished water storage provided is sufficient for peak water demands for four (4) hours.

A.3.9 WTP Process Equipment

Chapter 62-555.320 requires the following items regarding process equipment:

- 62-555.320(7): Raw surface water pumping stations constructed or altered after the effective date of this rule shall be equipped with a standby pump equal to the highest capacity installed operating pump in the station for a CWS serving 350 people or more or serving 150 connections or more. For CWSs that have more than one pump station, they may provide a standby pump equal to each size of all installed pumps instead of having a standby pump at each station.
- 62-555.320(15): High service or booster pump stations constructed or altered after the effective date of this rule shall be equipped with a standby pump equal to the highest capacity installed

operating pump in the station for a CWS serving 350 people or more or serving 150 connections or more. For CWSs that have more than one pump station, they may provide a standby pump equal to each size of all installed pumps instead of having a standby pump at each station.

- 62-555.320(16): All WTPs connected to a CWS or a non-community water system (NCWS) constructed or altered after the effective date for this rule shall be equipped with a totalizing flow meter. FDEP defines a NCWS as either a NTNCWS or a transient NCWS (TNCWS). A NTNCWS is a water system that regularly serves at least 25 of the same people over a six-month period in one year. A TNCWS is a water system that does not regularly serve at least 25 of the sample people over a six-month period over the course of one year.
- 62-555.320(20): Hydropneumatic tanks shall comply with Section 7.2 in the Recommended Standards for Water Works and shall not require housing. These tanks shall be bladder or diaphragm-type tanks that are not required to have access manholes, water sight glasses, or other manners of air addition besides recharging valves.

A.3.10 Separation Requirements

Chapter 62-555.314 requires the following horizontal and vertical separation distances for water mains:

- Minimum horizontal separation distances
  - Three (3) feet between water mains & vacuum sewer, storm sewer or reclaimed water pipes.
  - Six (6) feet between water mains & gravity or pressure sewers or force mains.
  - Ten (10) feet between water mains & onsite sewage treatment and disposal systems (OSTDS).
- Minimum vertical separation distances
  - Six (6) inches above or twelve (12) inches below water mains crossing gravity sewers, vacuum sewers, and storm sewers. FDEP prefers the water main being above the gravity sewers, vacuum sewers, and storm sewers.
  - Twelve (12) inches above or below water mains crossing pressure sewers, wastewater or storm force mains, and reclaimed water mains. FDEP prefers the water main being above the pressure sewers, wastewater or storm force mains, and reclaimed water mains.

A.3.11 WTP Siting Requirements

Each WTP shall be located in a manner that conforms to Chapter 62-555.320(5), including flood protection in 62-555.320(4). The CWS shall have adequate protection from the damage from a 100-year flood. The CWS facilities shall be accessible and operational during a 25-year flood.

A.3.12 Miscellaneous

- Owners who submit applications for a “Specific Permit to Construct PWS Components” may submit either a Preliminary Design Report (PDR) or drawings, specifications, and design data.
- Specific items not requiring a construction permit are specified in Chapter 62-555.520(1). Examples of these items include:

- Discontinuing the use of any existing drinking water treatment, pumping, or storage facility
- Temporarily adding a chemical to raw, partially treated, or finished water for the purposes of conducting a tracer test
- Replacement of any existing drinking water process equipment or mains provided they are of the same design and capacity

➢ Plant modifications or situations not requiring a permit modification are specified in Chapter 62-555.536. Examples of these situations include:

- Relocation of PWS components within the same right of way (ROW) or easement to maintain required separation distances
- Changes in water main construction method
- Changes in materials that will not come into contact with drinking water or drinking water treatment chemicals.

A.3.13 Summary

FDEP made changes to Chapter 62-555 that include, but are not limited to, water quality, process, process equipment, disinfection and auxiliary power. The changes specified above, unless indicated otherwise, are applicable as of the effective date of the rule, August 28, 2003. All permit applications submitted prior to the rule's effective date will still be reviewed under the old Chapter 62-555.

Therefore, any future expansions or new WTPs in the City will be subject to the new requirements under the new Chapter 62-555.

A.4 Summary of Florida Drinking Water Standard Water Quality Components

This section provides an overview of Florida drinking water standard MCLs and sampling frequencies relative to the Town's PWSs.

A.4.1 Inorganic Contaminants

Table A-8 presents the primary Florida drinking water standards for IOCs. To meet compliance, sampling activities for IOCs are conducted once every three years, with the exception of asbestos (every 9 years) and nitrate and nitrite (annually) at the POE to the distribution system. There are many sources of inorganic contamination. Some of it is man-made and some of it occurs naturally. The City has been compliant with the IOCs regulations.

A.4.2 Volatile Organic Contaminants

Table A-9 presents the Florida drinking water standards for VOCs. To meet compliance, sampling for VOCs are conducted quarterly for the first year then annually for the next three years and finally every three years on POE water. There are many sources of VOCs. VOCs are man-made and the presence of

TABLE A-8: FDEP Regulations for IOCs (1)

Contaminant	MCL	Frequency/Location
Antimony	0.006 mg/L	3 years/POE
Arsenic	0.05 mg/L (2)	3 years/POE
Asbestos	7 MFL	9 years/POE
Barium	2 mg/L	3 years/POE
Beryllium	0.004 mg/L	3 years/POE
Cadmium	0.005 mg/L	3 years/POE
Chromium	0.1 mg/L	3 years/POE
Cyanide	0.2 mg/L	3 years/POE
Fluoride	4.0 mg/L	3 years/POE
Lead	0.015 mg/L	3 years/POE
Mercury	0.002 mg/L	3 years/POE
Nickel	0.1 mg/L	3 years/POE
Nitrate	10 mg/L as N	Annually/POE
Nitrite	1 mg/L as N	Annually/POE
Total Nitrate and Nitrite	10 mg/L as N	Annually/POE
Selenium	0.05 mg/L	3 years/POE
Sodium	160 mg/L	3 years/POE
Thallium	0.002 mg/L	3 years/POE

1. FDEP 62-550 Florida Administrative Code (FAC) – August 2000.
2. Due to change to 0.01 mg/L in 2006.

TABLE A-9: FDEP Regulations for VOCs (1)

Contaminant	MCL	Frequency(2)/Location(3)
1,1-Dichloroethylene	0.007 mg/L	3 years/Raw
1,1,1-Trichloroethane	0.2 mg/L	3 years/Raw
1,1,2-Trichloroethane	0.005 mg/L	3 years/Raw
1,2-Dichloroethane	0.003 mg/L	3 years/Raw
1,2-Dichloropropane	0.005 mg/L	3 years/Raw
1,2,4-Trichlorobenezene	0.07 mg/L	3 years/Raw
Benzene	0.001 mg/L	3 years/Raw
Carbon tetrachloride	0.003 mg/L	3 years/Raw
Cis-1,2-Dichloroethylene	0.07 mg/L	3 years/Raw
Dichloromethane (Methylenechloride)	0.005 mg/L	3 years/Raw
Ethylbenzene	0.7 mg/L	3 years/Raw
Monochlorobenzene	0.1 mg/L	3 years/Raw
o-Dichlorobenzene	0.6 mg/L	3 years/Raw
Para-Dichlorobenzene	0.075 mg/L	3 years/Raw
Styrene	0.1 mg/L	3 years/Raw
Tetrachloroethylene	0.003 mg/L	3 years/Raw
Toluene	1 mg/L	3 years/Raw
Trans-1,2-Dichlorethylene	0.1 mg/L	3 years/Raw
Trichloroethylene	0.003 mg/L	3 years/Raw
Vinyl chloride	0.001 mg/L	3 years/Raw
Xylenes (total)	10 mg/L	3 years/Raw

1. FDEP 62-550 FAC – August 2000.
2. Sampled quarterly for the first year then annually for the next three years and after that every three years.
3. City has historically collected VOC water quality samples from the raw well water sources.

VOCs are typically a result of improper waste disposal. The City maintains compliance with the SDWA relative to VOCs MCLs.

A.4.3 Synthetic Organic Contaminants

Table A-10 presents the Florida drinking water standards for SOCs. This group of contaminants includes pesticides, herbicides, PCB and dioxin. To meet compliance, sampling for SOCs are conducted once every three years on POE water. There are many sources of SOCs. SOCs are man-made and the presence of SOCs are typically a result of leaching into the groundwater or improper waste disposal. The City maintains compliance with the SDWA relative to SOC MCLs.

A.4.4 Radionuclide Contaminants

Table A-11 presents the Florida drinking water regulations for radionuclide contaminants. There are two sources of radionuclide contamination in drinking water, naturally occurring or man-made. Naturally occurring radionuclides that are contained in the soil are imparted on the water as the water passes through it. Phosphate rich soils and rock have been found to be sources of radioactive contamination in some areas of Florida, including the City. According to FDEP, there is no known man-made radioactive contamination of drinking water in Florida.

The regulations and rules governing radionuclides have been revised by the USEPA to include uranium. Florida will adopt the new standards and rules issued by the USEPA. The new standard for uranium was promulgated in December 2000 and became effective in December 2003. The status of standards and rules governing radon is still under review. To meet compliance, sampling for radionuclides are conducted once every three years on POE water for naturally occurring radionuclides. The City screens for radionuclides by measuring the gross alpha particle activity. If the gross alpha particle activity exceeds 5 pCi/L then the WTP is sampled for radium. The City should prepare to begin sampling for uranium, if not already doing so.

A.4.5 Microbiological Contaminants

Table A-12 presents the Florida drinking water standards for microbiological contaminants. The following are the three MCLs for microbiological contaminants:

- Presence or absence of coliform bacteria – The presence of coliform bacteria is used as an indicator that the water system must pay closer attention to its disinfection process. Violation of this MCL is not an emergency situation.
- Presence of fecal coliform or *Escherichia coli* (*E. coli*) – Violation of this MCL is an emergency situation, and the State requires water systems to promptly notify the public.
- Bacteria, viruses and protozoa such as Giardia lamblia and Cryptosporidium (protozoa applicable only to public water systems that use surface water or groundwater under the influence of surface water). These systems typically use conventional or direct filtration. Turbidity standards are used as surrogates to assess the microbiological removal efficiency. This MCL does not apply to the City as the source waters are groundwater, not surface water.

TABLE A-10: FDEP Regulations for SOCs (1)

Contaminant	MCL	Frequency/Location
2,3,7,8-TCDD (Dioxin)	$3(10)^{-8}$ mg/L	3 years/POE
2,4-D	0.07 mg/L	3 years/POE
2,4,5-TP (Silvex)	0.05 mg/L	3 years/POE
Alachlor	0.002 mg/L	3 years/POE
Atrazine	0.003 mg/L	3 years/POE
Benzo(a)pyrene	0.0002 mg/L	3 years/POE
Carbofuran	0.04 mg/L	3 years/POE
Chlordane	0.002 mg/L	3 years/POE
Dalapon	0.2 mg/L	3 years/POE
Di(2-ethylhexyl)adipate	0.4 mg/L	3 years/POE
Di(2-ethylhexyl)phthalate	0.006 mg/L	3 years/POE
Dibromochloropropane (DBCP)	0.0002 mg/L	3 years/POE
Dinoseb	0.007 mg/L	3 years/POE
Diquat	0.02 mg/l	3 years/POE
Endothall	0.1 mg/L	3 years/POE
Endrin	0.002 mg/L	3 years/POE
Ethylene dibromide (EDB)	0.00002 mg/L	3 years/POE
Glyphosate	0.7 mg/L	3 years/POE
Heptachlor	0.0004 mg/L	3 years/POE
Heptachlor epoxide	0.0002 mg/L	3 years/POE
Hexachlorobenzene	0.001 mg/L	3 years/POE
Hexachlorocyclopentadiene	0.05 mg/L	3 years/POE
Lindane	0.0002 mg/L	3 years/POE
Methoxychlor	0.04 mg/L	3 years/POE
Oxamyl (vydate)	0.2 mg/L	3 years/POE
Pentachlorophenol	0.001 mg/L	3 years/POE
Picloram	0.5 mg/L	3 years/POE
Polychlorinated byphenyl (PCB)	0.0005 mg/L	3 years/POE
Simazine	0.004 mg/L	3 years/POE
Toxaphene	0.003 mg/L	3 years/POE

1. FDEP 62-550 FAC – August 2000.

TABLE A-11: FDEP Regulations for Radionuclide Contaminants (1)

Contaminant	MCL	Frequency/Location
Naturally occurring radionuclides		
Combined radium-226 and radium-228	5 pCi/L	3 years/POE
Gross alpha particle activity (including radium-226 but excluding radon and uranium)	15 pCi/L	3 Years/POE
Uranium	30 μg/L	3 Years/POE
Man-Made Radionuclides		
Beta particle and Photon radioactivity	4 mrem/year	Not Applicable

1. FDEP 62-550 FAC – August 2000.

TABLE A-12: FDEP Regulations for Microbiological Contaminants (1)

Contaminant	MCL	Frequency/Location
Coliform	Presence or absence Treatment technique(2)	Monthly/Distribution
Fecal coliform	Presence or absence Treatment technique(3)	Monthly/Distribution
Escherichia coli (*E. coli*)	Presence or absence Treatment technique(3)	Monthly/Distribution
Giardia lamblia	Treatment technique(4)	Not Applicable
Cryptosporidium	Treatment technique(4)	Not Applicable

1. FDEP 62-550 FAC – August 2000.
2. The presence of coliform bacteria is used as an indicator that the water system must pay closer attention to its disinfection process. Violation of this MCL is not an emergency situation.
3. Violation of this MCL is an emergency, and the State requires water systems to promptly notify the public and resample.
4. Applies to surface water or groundwater under the influence of surface water.

Public water systems must determine compliance with the MCL for microbiological contaminants each month. The City has been compliant with sampling for total coliform and fecal coliform in the PWSs.

A.4.6 Secondary Contaminants

Table A-13 presents the Florida secondary drinking water contaminants. Generally, no adverse health effects are associated with secondary drinking water contaminants. Secondary contaminants pertain to aesthetics. However, at considerably higher concentrations than those listed, health implications could exist by reducing public confidence in the PWS; hence, the secondary standards are important and FDEP enforces these equally with primary regulations. To maintain compliance, sampling for secondary contaminants are conducted once every three years on POE water. The City has been compliant for sampling secondary drinking water contaminants.

A.5 Proposed Regulatory Issues

Proposed and anticipated SDWA regulations are provided for review and are based on current available information and may be subject to change.

A.5.1 Water Quality

A.5.1.1 Radon

The proposed radon rule was published on November 2, 1999 in the Federal Register. It is anticipated that this rule will only apply to CWSs that regularly serve 25 or more people. It is anticipated that this rule will apply to those systems that use groundwater.

USEPA is offering two options to states and CWSs in this rule for the treatment of radon. The first option allows a state to choose to abate the risk of indoor radon while the CWS reduces water levels to the alternative higher MCL of 4,000 pCi/L. If a state chooses not to go with the first option, the CWS would either have to reduce radon in drinking water to 300 pCi/L or develop an indoor radon program and reduce radon in drinking water to 4,000 pCi/L. It is has yet to be determined when this rule will become final.

A.5.1.2 Aldicarb

A notice of postponement for certain provisions of the final rule related to the MCLs for aldicarb, aldicarb sulfoxide, and aldicarb sulfone was issued in May 1992. The MCLs that were set aside would have limited aldicarb, aldicarb sulfoxide, and aldicarb sulfone concentrations to 0.003 mg/L, 0.003 mg/L, and 0.004 mg/L, respectively. The USEPA has discussed proposing revised MCLs of 0.007 mg/L for each compound, along with a 0.009 mg/L not-to-exceed total for all three compounds.

TABLE A-13: FDEP Regulations for Secondary Contaminants (1)

Contaminant	SMCL	Frequency/Location
Aluminum	0.2 mg/L	3 years/POE
Chloride	250 mg/L	3 years/POE
Copper	1 mg/L	3 years/POE
Fluoride	2.0 mg/L	3 years/POE
Iron	0.3 mg/L	3 years/POE
Manganese	0.05 mg/L	3 years/POE
Silver	0.1 mg/L	3 years/POE
Sulfate	250 mg/L	3 years/POE
Zinc	5 mg/L	3 years/POE
Color	15 CPU	3 years/POE
Odor	3 TON	3 years/POE
pH	6.5 – 8.5 std. units	3 years/POE
Total Dissolved Solids	500 mg/L	3 years/POE
Foaming Agents (Surfactants)	0.5 mg/L	3 years/POE

1. FDEP 62-550 FAC – August 2000.

A.5.1.3 Contaminant Candidate List 2

The SDWA requires the USEPA to update and publish a new CCL every five (5) years after the first one, which was issued on March 2, 1998. The second CCL is expected to be similar to the first CCL. The draft CCL2 was published on April 2, 2004. The promulgation date for the CCL2 was February 24, 2005.

A.5.1.4 Periodic Review of NPDWR

The USEPA shall, not less often than every 6 years, review and revise, as appropriate, each NPDWR promulgated under the SDWA. Any revision of a NPDWR shall be promulgated in accordance with periodic reviews of NPDWR, except that each revision shall maintain, or provide for greater, protection of the health of the public. Any revision will be based upon the information available to the USEPA regarding those contaminants.

A.5.1.5 Ground Water Rule

The USEPA expects to promulgate the final GWR August 2006. The purpose of this rule is to establish minimal disinfection requirements for all water systems using a groundwater source unless they are able to demonstrate their supplies are not vulnerable to fecal viral and bacterial contamination. Under this rule, PWSs using groundwater will have to disinfect the source water unless the system:

- Meets “natural disinfection” criteria
- Qualifies for a variance

The rule also establishes distribution system disinfection requirements, calls for qualified operators and establishes treatment technique requirements in lieu of MCLs for viruses, heterotrophic plate count (HPC) and Legionella. The issue of whether or not to include coverage for Legionella in this anticipated rule has yet to be resolved, as data concerning the presence of Legionella in groundwater are limited. Florida has had mandatory disinfection for many years but will define disinfection according to CT (see Chapter 62-555). The draft rule has proposed criteria and conditions, which may be subject to change, and include:

- Pre-qualifying Conditions – In order for a well to avoid source water disinfection, the wellfield must not have been identified as a source of a water borne disease outbreak, the well (wellfield) must meet State-approved well construction codes, and the system must not have violated the TCR unless the cause of the violation had been identified and corrected (Note: Florida mandates disinfection).
- The vulnerability of supply wells for each system to “Natural Disinfection” conditions will be determined, based upon the location of fecal contamination sources (sewage line, force mains, septic tanks, etc.) with respect to each well, and hydrogeological features.
- Additional components of the proposed GWR include:
- Periodic sanitary surveys conducted by the State and identification of significant deficiencies;

- Assessment of hydrogeological sensitivity to fecal contamination for undisinfected systems;
- Source water microbial monitoring for systems that do not disinfect and draw from hydrogeological sensitive aquifers or have detected fecal indicators within the system's distribution system;
- Corrective action by any system with significant deficiencies or positive microbial samples indicating fecal contamination; and
- Compliance monitoring for systems, which disinfect to ensure 4.0-log (99.99 percent) inactivation or removal of viruses.

In the proposed rule, we anticipate USEPA will include some methods for PWSs to show that disinfection is meeting treatment technique performance standards. The most likely method USEPA is planning to propose is the CT method used previously in the Surface Water Treatment Rule (SWTR), and CT values will be key parameters in determining adequacy of the treatment technique for viruses, in lieu of an MCL.

A.5.2 Emerging Issues

This section involves emerging issues in drinking water that have not yet been regulated by the USEPA or the FDEP.

A.5.2.1 Endocrine Disrupters

Under the 1996 SDWA amendments the USEPA was required to establish a program to screen endocrine disrupters. These contaminants are those substances, which disrupt the function of the endocrine system and were originally considered during the development of the first draft CCL.

USEPA issued an interim assessment in February 1997, pending a more extensive review expected to be issued by the National Academy of Sciences, determining that, while effects have been found in laboratory animal studies, a causal relationship between exposure to a specific environmental agent and an adverse health effect in humans operating via endocrine disruption has not been established, with a few exceptions. Further research is needed before such effects can be demonstrated. At this time, USEPA has not included contaminants for inclusion on the first CCL based solely on the possibility of endocrine disruption (although several contaminants implicated as endocrine disrupters were considered for other reasons). However, the USEPA will continue to follow this issue closely and reconsider this category of potential contaminants in the development of future CCLs.

A.5.2.2 N-nitrosodimethylamine (NDMA)

The USEPA classifies NDMA as a probable human carcinogen. The California Office of Environmental Health Hazard Assessment has set a cancer risk for NDMA in drinking water and the California Department of Health Services has set an action level for NDMA. This action level is not an enforceable standard, but it is required to notify the authorities when that action level is exceeded. It is likely that NDMA will be regulated in the future.

NDMA is formed during manufacturing processes involving rocket fuel, and is used as a solvent, inhibitor, and an additive. Traces of NDMA have been found in cosmetics, detergents, cured meats, smoked fish, cooked ham, tobacco smoke, cheeses, soybean oil, canned fruit, and alcohol.

NDMA is also believed to be a byproduct of chloramination (Wilczak 2003). NDMA is typically formed when ammonia is added ahead of chlorine in the disinfection process. The City currently uses free chlorine, therefore NDMA is not anticipated to be an issue.

A.5.2.3 Pesticides

The SDWA requires the USEPA to consider substances registered as pesticides under FIFRA for inclusion in the CCL. During the preparation of the CCL, the USEPA sought guidance from the EPA Office of Pesticide Programs (OPP) on which pesticides would exhibit the greatest risk to drinking water. The OPP used the Groundwater Risk Score (GWRS) to determine a pesticide's risk based on physical and chemical properties, occurrence, and extent of use. Pesticides with a GWRS greater than two were recommended for consideration by the USEPA.

Those pesticides without additional information were not added to the CCL. The USEPA is in the process of developing a tool to better estimate pesticide concentrations in ground and surface water based on physical and chemical properties and use volumes. The USEPA would then get a peer review conducted on the tool before applying it towards regulatory issues. Therefore, the potential exists for additional pesticides being added to the CCL and for future regulatory action.

Appendix B - Potable Water Regulations Tables – Jupiter Compliance

TABLE B-1: Applicability of Current Drinking Water Regulations*

Contaminant or Rule	Community Water Systems	Nontransient-Noncommunity Water Systems	Transient-Noncommunity Water Systems
Organic contaminants	All	All	Some (only epichlorohydrin and acrylamide)
Disinfection by-products	All TTHMs and HAA5; some chlorite if system uses chlorine dioxide); some (bromate if system uses ozone); enhanced coagulation (surface water systems using conventional treatment)	All (TTHMs, HAA5); some (chlorite if system uses chlorine dioxide); some (bromate if system uses ozone)	None
Maximum disinfectant residual levels	All	All	Some (only those using chlorine dioxide)
Inorganic contaminants	All	Some (all except fluoride)	None
Nitrate and nitrite	All	All	All
Radionuclides	All	None	None
Total Coliform Rule	All	All	All
SWTR	Some (only PWSs using surface water or groundwater sources under the direct influence of surface water)	Some (only PWSs using surface water or groundwater sources under the direct influence of surface water)	Some (only PWSs using surface water or groundwater sources under the direct influence of surface water)
Interim Enhanced SWTR	Some (serving ≥10,000 people)	Some (serving ≥10,000 people)	Some (serving ≥10,000 people)
Lead and Copper Rule	All	All	None
Consumer Confidence Report Rule	All	None	None
Unregulated Contaminant Monitoring Rule	All serving >10,000 people	All serving >10,000 people	None
Filter Backwash Recycling Rule	Some	Some	Some
Long-term 1 Enhanced SWTR	Some (serving <10,000 people)	Some (serving <10,000 people)	Some (serving <10,000 people)

*SWTR – Surface Water Treatment Rule, TTHMs – total trihalomethanes, HAA5 - sum of five haloacetic acids, PWSs – public water systems

TABLE B-2: USEPA Drinking Water Standards and BAT for Regulated Contaminants*

Contaminant	Regulation	Status	MCLG† mg/L	MCL mg/L‡	BAT	Reference	Future Compliance Probability
Organic substances							
Acrylamide	Phase II	Final	Zero	TT§	PAP**	USEPA, 1991b	High
Alachlor	Phase II	Final	Zero	0.002	GAC	USEPA, 1991b	High
Aldicarb	Phase II	Delayed	0.001	0.003	GAC	USEPA, 1992b	High
Aldicarb sulfone	Phase II	Delayed	0.001	0.002	GAC	USEPA, 1992b	High
Aldicarb sulfoxide	Phase II	Delayed	0.001	0.004	GAC	USEPA, 1992b	High
Atrazine	Phase II	Remanded	0.003	0.003	GAC	USEPA, 1991b; BNA, 1995	High
Benzene	Phase I	Final	Zero	0.005	GAC, PTA	USEPA, 1987	High
Benzo(a)pyrene	Phase V	Final	Zero	0.0002	GAC	USEPA, 1992a	High
Bromodichloromethane	D/DBP††	Final	Zero	NA††	EC	USEPA, 1998b	Medium
Bromoform	D/DBP	Final	Zero	NA	EC	USEPA, 1998b	Medium
Carbofuran	Phase II	Final	0.04	0.04	GAC	USEPA, 1991b	High
Carbon tetrachloride	Phase I	Final	Zero	0.005	GAC, PTA	USEPA, 1987	High
Chlordane	Phase II	Final	Zero	0.002	GAC	USEPA, 1991b	High
Chloroform	D/DBP	Final	§§	NA	EC	USEPA, 1998b	Medium
2, 4-D	Phase II	Final	0.07	0.07	GAC	USEPA, 1991b	High
Dalapon	Phase V	Final	0.2	0.2	GAC	USEPA, 1992a	High
De(2-ethylhexyl) adipate	Phase V	Final	0.4	0.4	GAC, PTA	USEPA, 1992a	High
De(2-ethylhexyl) phthalate	Phase V	Final	Zero	0.006	GAC	USEPA, 1992a	High
Dibromochloromethane	D/DBP	Final	0.06	NA	EC	USEPA, 1998b	Medium
Dibromochloropropane	Phase II	Final	Zero	0.0002	GAC, PTA	USEPA, 1991b	High
Dichloroacetic acid	D/DBP	Final	Zero	NA	EC	USEPA, 1998b	Medium
p-dichlorobenzene	Phase I	Final	0.075	0.075	GAC, PTA	USEPA, 1987	High
o-dichlorobenzene	Phase II	Final	0.6	0.6	GAC, PTA	USEPA, 1991b	High
1,2-dichloroethane	Phase I	Final	Zero	0.005	GAC, PTA	USEPA, 1987	High
1,1-dichloroethylene	Phase I	Final	0.007	0.007	GAC, PTA	USEPA, 1987	High
cis-1,2-dichloroethylene	Phase II	Final	0.07	0.07	GAC, PTA	USEPA, 1991b	High
trans-1,2-dichloroethylene	Phase II	Final	0.1	0.1	GAC, PTA	USEPA, 1991b	High
Dichloromethane (methylene chloride)	Phase V	Final	Zero	0.005	PTA	USEPA, 1992a	High
1,2-dichloropropane	Phase II	Final	Zero	0.005	GAC, PTA	USEPA, 1991b	High
Dinoseb	Phase V	Final	0.007	0.007	GAC	USEPA, 1992a	High
Diquat	Phase V	Final	0.02	0.02	GAC	USEPA, 1992a	High
Endothall	Phase V	Final	0.1	0.1	GAC	USEPA, 1992a	High
Endrin	Phase V	Final	0.002	0.002	GAC	USEPA, 1992a	High
Epichlorohydrin	Phase II	Final	Zero	TT	PAP	USEPA, 1991b	High
Ethylbenzene	Phase II	Final	0.7	0.7	GAC, PTA	USEPA, 1991b	High
Ethylene dibromide	Phase II	Final	Zero	0.00005	GAC, PTA	USEPA, 1991b	High
Glyphosate	Phase V	Final	0.7	0.7	OX	USEPA, 1992a	High
HAA5***	D/DBP	Final		0.06	EC	USEPA, 1998b	Medium
Heptachlor	Phase II	Final	Zero	0.0004	GAC	USEPA, 1991b	High
Heptachlor epoxide	Phase II	Final	Zero	0.0002	GAC	USEPA, 1991b	High
Hexachlorobenzene	Phase V	Final	Zero	0.001	GAC	USEPA, 1992a	High
Hexachlorocyclopentadiene	Phase V	Final	0.05	0.05	GAC, PTA	USEPA, 1992a	High
Lindane	Phase II	Final	0.0002	0.0002	GAC	USEPA, 1991b	High
Methoxychlor	Phase II	Final	0.04	0.04	GAC	USEPA, 1991b	High
Monochlorobenzene	Phase II	Final	0.1	0.1	GAC, PTA	USEPA, 1991b	High
Oxamyl (vydate)	Phase V	Final	0.2	0.2	GAC	USEPA, 1992a	High
Pentachlorophenol	Phase II	Final	Zero	0.001	GAC	USEPA, 1992b	High

*USEPA – US Environmental Protection Agency, BAT – best available technology
**AA – activated alumina, AD – alternative disinfectants, AR – aeration, CC – corrosion control, C-F – coagulation and filtration, CL – chlorination, D – disinfection, DC – disinfection system control, DEF – diatomaceous earth filtration, DF – direct filtration, EC – enhanced coagulation, ED – electrodialysis reversal, GAC – granular activated carbon, IX – ion exchange, LS – lime softening, LSLR – lead service line replacement, OX – oxidation, PAP – polymer addition practices, PE – public education, PR – precursor removal, PTA – packed tower aeration, RO – reverse osmosis, SPC – stop prechlorination, SSF – slow sand filtration, SWT – source water treatment

***Sum of five haloacetic acids – sum of the concentrations of mono-, di-, and trichloroacetic acids and mono- and dibromoacetic acids †MCLG – Maximum contaminant level goal
‡MCL – Maximum contaminant level
§TT – Treatment Technique
††D/DBP – Disinfectants/disinfection by-products
‡‡NA – Not Applicable
§§Chloroform MCLG was withdrawn

TABLE B-2: USEPA Drinking Water Standards and BAT for Regulated Contaminants* - cont'd

Contaminant	Regulation	Status	MCLG† mg/L	MCL mg/L‡	BAT	Reference	Future Compliance Probability
Organic substances - continued							
Picloram	Phase V	Final	0.5	0.5	GAC	USEPA, 1992a	High
Polychlorinated byphenyls	Phase II	Final	Zero	0.0005	GAC	USEPA, 1991b	High
Simazine	Phase V	Final	0.004	0.004	GAC	USEPA, 1992a	High
Styrene	Phase II	Final	0.1	0.1	GAC, PTA	USEPA, 1991b	High
2,3,7,8-TCDD (dioxin)	Phase V	Final	Zero	$5x10^{-8}$	GAC	USEPA, 1992a	High
Tetrachloroethylene	Phase II	Final	Zero	0.005	GAC, PTA	USEPA, 1991b	High
Toluene	Phase II	Final	1	1	GAC, PTA	USEPA, 1991b	High
Toxaphene	Phase II	Final	Zero	0.005	GAC	USEPA, 1991b	High
2,4,5-TP (silvex)	Phase II	Final	0.05	0.05	GAC	USEPA, 1991b	High
Trichloroacetic acid	D/DBP	Final	0.3	NA	EC	USEPA, 1998b	Medium
1,2,4-trichlorobenzene	Phase V	Final	0.07	0.07	GAC, PTA	USEPA, 1992a	High
1,1,1-trichloroethane	Phase I	Final	0.2	0.2	GAC, PTA	USEPA, 1987	High
1,1,2-trichloroethane	Phase V	Final	0.003	0.005	GAC, PTA	USEPA, 1992a	High
Trichloroethylene	Phase I	Final	Zero	0.005	GAC, PTA§	USEPA, 1987	High
Trihalomethanes (sum of 4; TTHMs) ‡‡	D/DBP**	Final	NA††	0.08	AD, PR, SPC, EC	USEPA, 1998b	Medium
Vinyl chloride	Phase I	Final	Zero	0.0002	PTA	USEPA, 1987	High
Xylenes (total)	Phase II	Final	10	10	GAC, PTA	USEPA, 1991b	High
Inorganic substances							
Antimony	Phase V	Final	0.006	0.006	C-F, §§ RO	USEPA, 1992a	High
Arsenic	Arsenic	Final	Zero	0.01	AA; C-F; EDR, IX; LS; RO	USEPA, 2001b	High
Asbestos (fibers/L>10µm)	Phase II	Final	7 MFL***	7 MFL	CC, C-F, §§ DEF, DF, IX, RO	USEPA, 1991b	High
Barium	Phase II	Final	2	2	IX, LS, §§ RO	USEPA, 1992b	High
Beryllium	Phase V	Final	0.004	0.004	AA, IX, RO, LS§§	USEPA, 1992a	High
Bromate	D/DBP	Final	Zero	0.01	DC	USEPA, 1998b	Medium
Cadmium	Phase II	Final	0.005	0.005	C-F, §§ IX, LS, §§ RO	USEPA, 1991b	High
Chlorite	D/DBP	Final	0.8	1	DC	USEPA, 1998b	Medium
Chromium (total)	Phase II	Final	0.1	0.1	C-F, §§ IX, LS (Cr III) §§, RO	USEPA, 1991b	High
Copper	LCR†††	Final	1.3	T‡‡‡	CC, SWT	USEPA, 1991a	Medium
Cyanide	Phase V	Final	0.2	0.2	CL, IX, RO	USEPA, 1992a	High
Fluoride	F§§§	Final	4	4	AA, RO	USEPA, 1986	High
Lead	LCR	Final	Zero	TT	CC, LSLR, PE, SWT	USEPA, 1991a	Medium
Mercury	Phase II	Final	0.002	0.002	C-F (influent ≤10 µg/L) §§ ; GAC, LS (influent ≤10 µg/L), §§, RO	USEPA, 1991b	High
Nickel	Phase V	Final	0.1	0.1	IX, LS, §§ RO	USEPA, 1992a	High
Nitrate (as N)	Phase II	Final	10	10	ED, IX, RO	USEPA, 1991b	High
Nitrite (as N)	Phase II	Final	1	1	IX, RO	USEPA, 1991b	High

*USEPA – US Environmental Protection Agency, BAT – best available technology
†MCLG – Maximum contaminant level goal
‡MCL – Maximum contaminant level
§AA – activated alumina, AD – alternative disinfectants, AR – aeration, CC – corrosion control, C-F – coagulation and filtration, CL – chlorination, D – disinfection, DC – disinfection system control, DEF – diatomaceous earth filtration, DF – direct filtration, EC – enhanced coagulation, ED – electrodialysis reversal, GAC – granular activated carbon, IX – ion exchange, LS – lime softening, LSLR – lead service line replacement, OX – oxidation, PAP – polymer addition practices, PE – public education, PR – precursor removal, PTA – packed tower aeration, RO – reverse osmosis, SPC – stop prechlorination, SSF – slow sand filtration, SWT – source water treatment
**D/DBP – Disinfectants/disinfection by-products
††NA – Not Applicable
‡‡Sum of the concentrations of bromodichloromethane, dibromochloromethane, bromoform, and chloroform
§§Coagulation – filtration and lime softening are not BAT for small systems for variances unless treatment is already installed.
***MFL – Million fibers per liter
†††LCR – Lead and Copper Rule
‡‡‡TT – Treatment technique
§§§F – Fluoride Rule
****S – Sulfate Rule
††††R – Radionuclides Rule
‡‡‡‡ESWTR – Enhanced Surface Water Treatment Rule
§§§§TCR – Total Coliform Rule
*****Final for systems using surface water; also being considered for groundwater systems
†††††No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples per month, no more than 1 sample per month may be positive.
‡‡‡‡‡PS – Performance standard

TABLE B-2: USEPA Drinking Water Standards and BAT for Regulated Contaminants* - cont'd

Contaminant	Regulation	Status	MCLG† mg/L	MCL mg/L‡	BAT	Reference	Future Compliance Probability
Inorganic substances - continued							
Nitrate + nitrite (both as N)	Phase II	Final	10	10	IX, RO	USEPA, 1991b	High
Selenium	Phase II	Final	0.05	0.05	AA, C-F (Se IV), §§ ED, LS, §§ RO	USEPA, 1991b	High
Thallium	Phase V	Final	0.0005	0.002	AA, IX	USEPA, 1992a	High
Radionuclides							
Beta-particle and photon emitters	R††††	Final	Zero	4 mrem	IX, RO	USEPA, 2000c	High
Alpha emitters	R	Final	Zero	15 pCi/L	RO	USEPA, 2000c	High
Radium 226 + 228	R	Final	Zero	5 pCi/L	LS, IX, RO	USEPA, 2000c	High
Radon	Radon	Proposed	Zero	300 pCi/L; alt. MCL: 4,000 pCi/L	AR	USEPA, 1999	High
Uranium	R	Final	Zero	30 µg/L	LS, RO, EC, IX	USEPA, 2000c	High
Microorganisms							
Cryptosporidium	ESWTR‡‡‡‡	Final	Zero	TT	C-F, SSF, DEF, DF, D	USEPA, 1998c	High
Escherichia coli	TCR§§§§	Final	Zero	TT	D	USEPA, 1989b	High
Fecal coliforms	TCR	Final	Zero	TT	D	USEPA, 1989b	High
Giardia lamblia	SWTR	Final	Zero	TT	C-F, SSF, DEF, DF, D	USEPA, 1989a	High
Heterotrophic bacteria	SWTR	Final*****	NA	TT	C-F, SSF, DEF, DF, D	USEPA, 1989a	High
Legionella	SWTR	Final*****	Zero	TT	C-F, SSF, DEF, DF, D	USEPA, 1989a	High
Total coliforms	TCR	Final	Zero	†††††	D	USEPA, 1989b	See note No.1
Turbidity	SWTR	Final	NA	PS‡‡‡‡‡	C-F, SSF, DEF, DF, D	USEPA, 1998c	High
Viruses	SWTR	Final*****	Zero	TT	C-F, SSF, DEF, DF, D	USEPA, 1989a	High

Note No. 1: Probability of compliance is medium for coliform if chloramines is used for secondary disinfection, and the probability of compliance is high if free chlorine is used for secondary disinfection.

*USEPA – US Environmental Protection Agency, BAT – best available technology

†MCLG – Maximum contaminant level goal

‡MCL – Maximum contaminant level

§AA – activated alumina, AD – alternative disinfectants, AR – aeration, CC – corrosion control, C-F – coagulation and filtration, CL – chlorination, D – disinfection, DC – disinfection system control, DEF – diatomaceous earth filtration, DF – direct filtration, EC – enhanced coagulation, ED – electrodialysis reversal, GAC – granular activated carbon, IX – ion exchange, LS – lime softening, LSLR – lead service line replacement, OX – oxidation, PAP – polymer addition practices, PE – public education, PR – precursor removal, PTA – packed tower aeration, RO – reverse osmosis, SPC – stop prechlorination, SSF – slow sand filtration, SWT – source water treatment

**D/DBP – Disinfectants/disinfection by-products

††NA – Not Applicable

‡‡Sum of the concentrations of bromodichloromethane, dibromochloromethane, bromoform, and chloroform

§§Coagulation – filtration and lime softening are not BAT for small systems for variances unless treatment is already installed.

***MFL – Million fibers per liter

†††LCR – Lead and Copper Rule

‡‡‡TT – Treatment technique

§§§F – Fluoride Rule

****S – Sulfate Rule

††††R – Radionuclides Rule

‡‡‡‡ESWTR – Enhanced Surface Water Treatment Rule

§§§§TCR – Total Coliform Rule

*****Final for systems using surface water; also being considered for groundwater systems

†††††No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples per month, no more than 1 sample per month may be positive.

‡‡‡‡‡PS – Performance standard

TABLE B-3: USEPA* Standards for Disinfectants†

Disinfectant	Regulation	MRDLG‡ *mg/L*	MRDL§ *mg/L*	Best Available Technology
Chlorine**	D/DBPs††	4 (as Cl_2)	4.0 (as Cl_2)	DC‡‡
Chloramines§§	D/DBPs	4 (as Cl_2)	4.0 (as Cl_2)	DC
Chlorine dioxide	D/DBPs	0.3 (as ClO_2)	0.8 (as ClO_2)	DC

*USEPA – US Environmental Protection Agency
†Disinfectants and Disinfection By-products. Final Rule. *Fed. Reg.*, 63:241:69390 (Dec. 16, 1998).
‡MRDLG – maximum residual disinfectant level goal
§MRDL – maximum residual disinfectant level; MRDL for chlorine and chloramine may be exceeded on a short-term basis to address water quality problems. Compliance is based on an annual average of monthly averages.
**Measured as free chlorine
††DBPs – disinfection by-products
‡‡DC – disinfection system control
§§Measured as total chlorine

TABLE B-4: USEPA* National Secondary Drinking Water Contaminant Standards

Contaminant†	Effects	SMCL‡ mg/L	Reference	Future Compliance Probability
Aluminum	Colored water	0.05 – 0.2	USEPA, 1991b	High
Chloride	Salty taste	250	USEPA, 1979	High
Color	Visible tint	15 color units	USEPA, 1979	High
Copper	Metallic taste, blue-green stain	1	USEPA, 1979	Medium
Corrosivity	Metallic taste, corrosion, fixture staining	Noncorrosive	USEPA, 1979	Medium
Fluoride	Tooth discoloration	2	USEPA, 1986	High
Foaming agents	Frothy, cloudy, bitter taste, odor	0.5	USEPA, 1979	High
Iron	Rusty color, sediment, metallic taste, reddish or orange staining	0.3	USEPA, 1979	High
Manganese	Black to brown color, black staining, bitter metallic taste	0.05	USEPA, 1979	High
Odor§	“Rotten egg”, musty, or chemical smell	3 TON**	USEPA, 1979	High
pH	Low pH – bitter metallic taste, corrosion; high pH – slippery feel, soda taste, deposits	6.5 – 8.5	USEPA, 1979	High
Silver	Skin discoloration, graying of the white of the eye	0.1	USEPA, 1991b	High
Sulfate	Salty taste	250	USEPA, 1979	High
Total dissolved solids	Hardness, deposits, colored water, staining, salty taste	500	USEPA, 1979	High
Zinc	Metallic taste	5	USEPA, 1979	High

*USEPA – US Environmental Protection Agency

†In the proposed Phase II rule published May 22, 1989, USEPA considered setting SMCLs for seven organic chemicals. They were not included in the final rule because of scientific limitations. The existing odor SMCL (3 threshold odor number) was retained. However, utilities should be aware that tastes and odors may be caused by the following organic chemicals at the levels indicated: *o*-dichlorobenzene: 0.01 mg/L, *p*-dichlorobenzene: 0.005 mg/L, ethylbenzene: 0.03 mg/L, pentachlorophenol: 0.03 mg/L, styrene: 0.01 mg/L, toluene: 0.04 mg/L, and xylene: 0.02 mg/L. These levels are below the MCLs for these contaminants, meaning that consumers may taste or smell them even though the MCLs are met.

‡SMCL – secondary maximum contaminant level

§For more information on the identification and control of taste and odors, refer to the following publications from the AWWA Research Foundation, AWWA, and Lyonnaise des Eaux: *Identification and Treatment of Tastes and Odors in Drinking Water* (90518), edited by J. Mallevialle and I.H. Suffet (1987), and *Advances in Taste-and-Odor Treatment and Control* (90610), edited by I.H. Suffet, J. Mallevialle, and E. Kawczynski (1995). To order, call the AWWA Bookstore at 1-800-926-7337.

**TON – threshold odor number

TABLE B-5: USEPA* Drinking Water Advisories†

Chemical	Status	Health-Based Level	Taste Threshold	Odor Threshold
Ammonia	Draft 1992	NA‡	30 mg/L	20 µg/L
Methyl tertiary butyl ether	Final 1998	NA	40 µg/L	
Sodium	Draft 2002	20 mg/L (for individuals on a 500-mg/d restricted sodium diet)	30 – 60 mg/L	
Sulfate	Draft 2002	500 mg/L	250 mg/L	

*USEPA – US Environmental Protection Agency
†USEPA, 2002g
‡NA – not available

TABLE B-6: Regulatory Requirements Affecting Community Water Systems

	Surface Water Systems and Groundwater Under Direct Influence Systems				Groundwater Systems
Population Served*	**25 - 500**	**501 - 3,300**	**3,301 - 10,000**	**>10,000**	**All**
Inorganic contaminants (includes arsenic)					
o Compliance with MCLs	●	●	●	●	●
o Compliance monitoring	●	●	●	●	●
Organic contaminants					
o Compliance with MCLs	●	●	●	●	●
o Compliance monitoring	●	●	●	●	●
Total Coliform Rule					
o Compliance with MCLs	●	●	●	●	●
o Compliance monitoring	●	●	●	●	●
SWTR	●	●	●	●	●
o Turbidity performance criteria	●	●	●	●	
o *Giardia* and virus log removals	●	●	●	●	
o Disinfection level	●	●	●	●	
o Disinfectant residual at distribution system entry	●	●	●	●	
o Contact time (unfiltered systems)	●	●	●	●	
o Watershed protection (unfiltered systems)	●	●	●	●	
Interim ESWTR					
o Turbidity performance criteria				●†	
o *Cryptosporidium* log removals				●†	
o Individual filter monitoring				●†	
Long-term 1 ESWTR					
o Turbidity performance criteria	●	●	●		
o *Cryptosporidium* log removals	●	●	●		
o Individual filter monitoring					
o Disinfection benchmarking	●	●	●		
Filter Backwash Recycling Rule					
o Recycle requirements	●	●	●	●	
o Reporting requirements	●	●	●	●	
Stage 1 D/DBPR					
o DBP MCLs	●	●	●	●	●
o MRDLs	●	●	●	●	●
o Enhanced coagulation‡	●	●	●	●	
Lead and Copper Rule					
o Compliance monitoring	●	●	●	●	●
o Optimal corrosion control	●	●	●	●	●
o Lead service line replacement§	●	●	●	●	●
o Public education§	●	●	●	●	●
Radionuclides					
o Compliance with MCLs	●	●	●	●	●
o Compliance monitoring	●	●	●	●	●
Unregulated Contaminants Monitoring Rule					
o Monitoring and reporting**					●††
CCR Rule					
o Issue annual CCR	●	●	●	●	●
Security vulnerability assessments					
o Prepare and submit vulnerability assessment			●	●	●††
o Develop emergency response plan			●	●	●††

TABLE B-6: Regulatory Requirements Affecting Community Water Systems – cont'd

	Surface Water Systems and Groundwater Under Direct Influence Systems				Groundwater Systems
Population Served*	**25 - 500**	**501 - 3,300**	**3,301 - 10,000**	**>10,000**	**All**
Stage 2 DBPR (future, anticipated)					
o Revised DBP MCLs	●	●	●	●	●
o Initial distribution system evaluation	●	●	●	●	●
Long-term 2 ESWTR (future, anticipated)					
o Monitoring for bin classification	●	●	●	●	
o Application of microbial toolbox measures	●	●	●	●	
o *Giardia* and virus benchmarking	●	●	●	●	
o Monitoring for rebinning	●	●	●	●	
Radon (future, proposed)					
o MCL compliance§§	●	●	●	●	●
o AMCL/MMM program					●
Ground Water Rule (future, proposed)					
o Source monitoring, correction of deficiencies, sanitary survey					●

*MCLs – Maximum contaminant levels, SWTR – Surface Water Treatment Rule, ESWTR – Enhanced Surface Water Treatment Rule, D/DBPR – Disinfectants/Disinfection By-products Rule, DBPs – disinfection by-products, MRDLs – maximum residual disinfectant levels, CCR – Consumer Confidence Report, AMCL – alternative maximum contaminant level, MMM – multimedia mitigation

†Applies to systems serving 10,000 or more people

‡Systems using conventional treatment

§If lead action level is exceeded following implementation of optimal corrosion control

** USEPA – US Environmental Protection Agency

††Only those serving >10,000 people

‡‡Systems serving >3,300 people

§§Radon is typically not found in surface waters, but the rule will apply to surface water systems.

Appendix G

Nanofiltration Plant Exhibits

40516-112B001.CDR

HAZEN AND SAWYER
Environmental Engineers & Scientists

Site Data

Total Site Area	9.09 Acres: 395,904 s.f.
Existing Zoning	I–2

Building Data

Existing Total	39,640 s.f. 100,343 s.f. (Including Tanks and other Structures)
Proposed	
Building 'A' – Nanofiltration	20,600 s.f.
Building 'B' – Warehouse	6,700 s.f.
1st Floor	4,700 s.f.
2nd Floor	2,000 s.f.
Building 'C' – Pretreatment	2,600 s.f.
Total Building Area	29,900 s.f.

Parking Data

Total Parking Required	36 Spaces
5850 s.f. Office Use	24 Spaces (1/250 s.f.)
9500 s.f. Warehouse	10 Spaces (1/1000 s.f.)
RO– NF Plant Operations	2 Spaces
Total Parking Provided	36 Spaces
Handicap Required	2 Spaces
Handicap Provided	2 Spaces
Pervious Area	128,026 s.f.; 32.3%
Impervious Area	267,878 s.f.; 67.7%
Open Space	122,026 s.f.; 32.3%

Building Setback Data

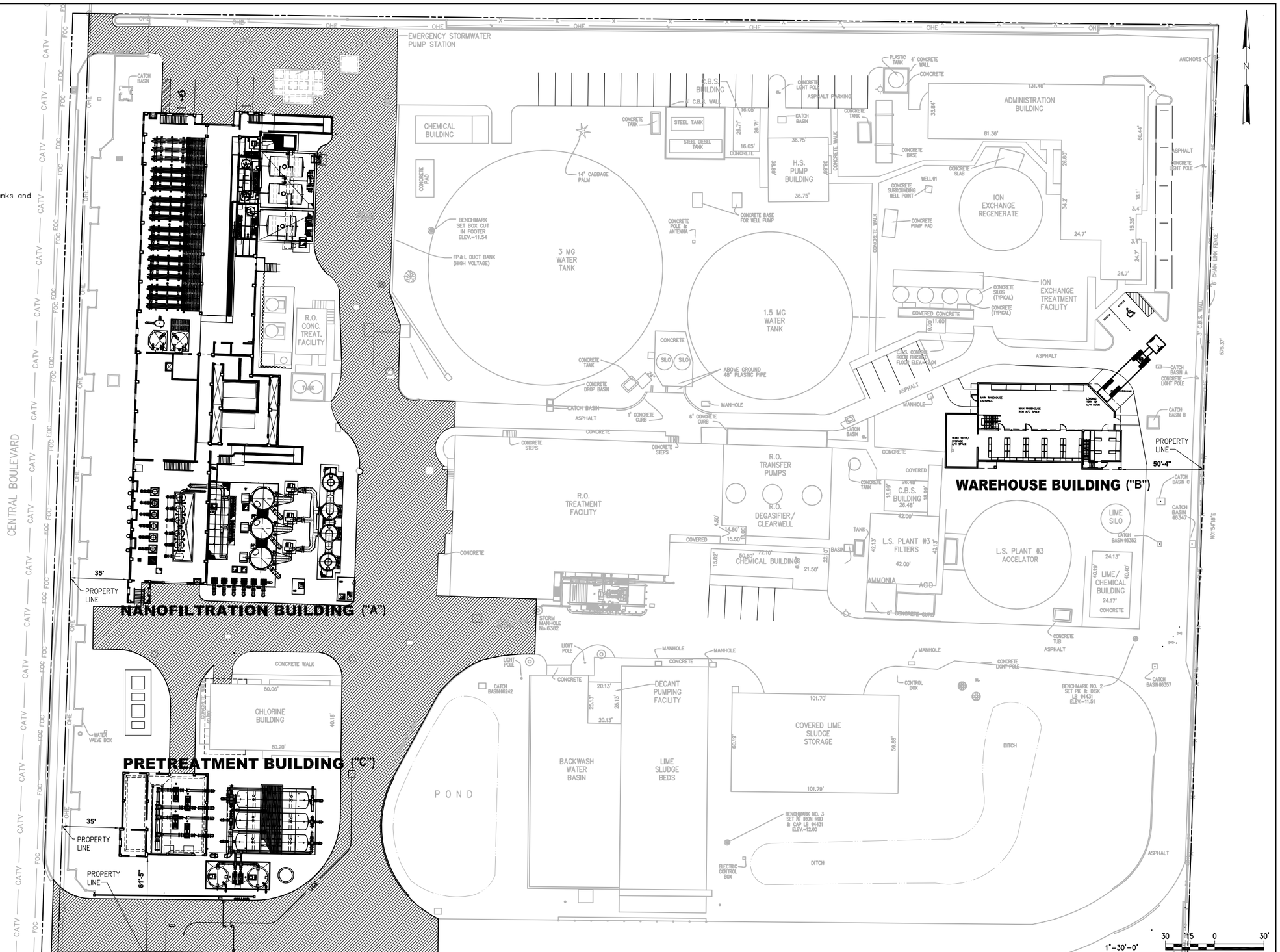
	REQ'D	BLDG. 'A'	BLDG. 'B'	BLDG. 'C'
FRONT	35'	35'	–	35'
REAR	25'	–	50'	–
SIDE (NORTH)	20'	60'	–	–
SIDE (SOUTH) (ABUTTING RESIDENTIAL)	35'	–	–	61'

Building Lot Coverage

Required	50% Max.
Provided	17%; 67,540 s.f. 32.4%; 128,243 s.f. (Including Tanks and other Structures)

LEGEND

= PROPOSED / RECONSTRUCTED PAVEMENT



NO.	DATE	ISSUED FOR	BY

DESIGNED E.B.S.
DRAWN ORGO
CHECKED E.B.S.
PROJ. ENGR. R.B.T.

EDWIN B. SPRINGTHORPE P.E.
No. 51152

HAZEN AND SAWYER
Environmental Engineers & Scientists
2101 Corporate Boulevard, Suite 301
Boca Raton, Florida 33431
Certificate of Authorization Number: 2771

SCALE 1"=30'-0"

CONTRACT: –
CLIENTS PROJECT: JW 02–08
ENGINEERS PROJECT: 41041–011
CAD REFERENCE: SITE PLAN APPROVAL

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

SITE PLAN

DATE: JULY 2006
SHEET: – OF –
DRAWING: X–1

PLOT DATE: 11/16/2006 11:10 AM BY: FBENNETT

XREFs= HS_SP–TP–XB,HS_SP–TP–PB,HS_SP–RD–PB,41041.011TB,HS_MB–P2–PB,HS_MB–P1–S,HS_MB–PO–PB

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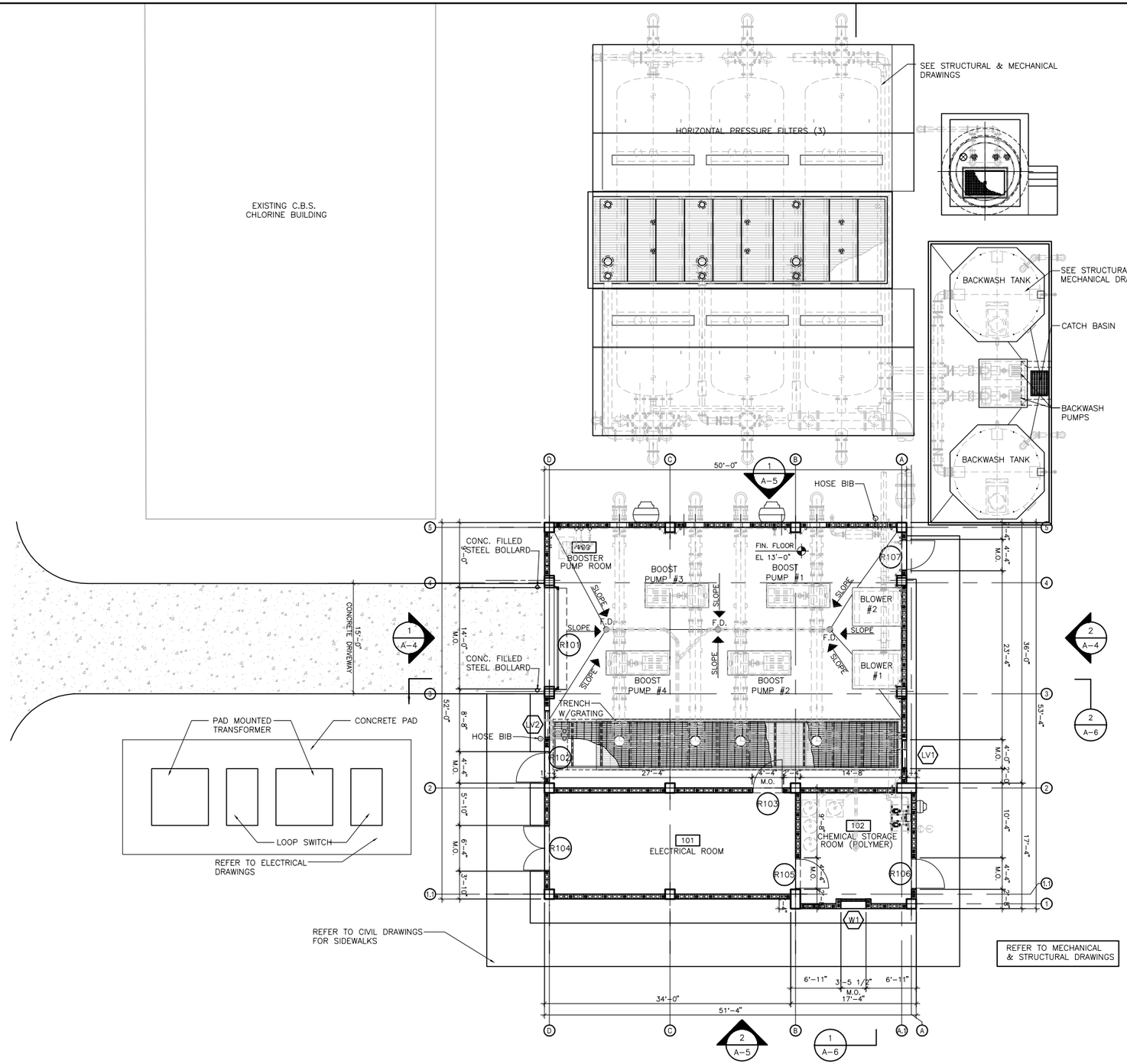

1 A–2 OVERALL BUILDING FLOOR PLAN

1/8" = 1'-0"

LEGEND

101 DOORS – RE: A–8

W1 WINDOWS – RE: A–8

FINISHES – RE: A–8

GENERAL NOTES

1. THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO STARTING CONSTRUCTION. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES OR ANY INCONSISTENCIES.
2. ALL DIMENSIONS FOR NEW WORK ARE TO CENTERLINE OF STUDS, FACE OF CMU OR CONC. AND CENTERLINES OF COLUMNS, UNLESS OTHERWISE INDICATED.
3. ALL WOOD IN DIRECT CONTACT WITH MASONRY OR CONCRETE SHALL BE PRESSURE TREATED. PROVIDE ALL REQUIRED BLOCKING AS NEEDED FOR BUILT IN CASEWORK, EQUIPMENT SUPPORTS, TOILET ACCESSORIES, ETC. COORDINATE WITH ALL TRADES AS REQUIRED. PROVIDE G–185 COATING FOR PT WOOD ANCHORS.
4. VERIFY SIZES OF ALL EQUIPMENT (N.I.C.) AND COORDINATE ALL OPENINGS, CLEARANCES, ELECTRICAL AND MECHANICAL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION.
5. UPON COMPLETION OF THE WORK, PROPERTY AND ADJACENT AREAS SHALL BE LEFT CLEAN AND SATISFACTORY TO THE OWNER AND THE ARCHITECT.

1/8"=1'-0" 8 6 4 2 0 6'

NO.	DATE	ISSUED FOR	BY
2	11/06	99% SUBMITTAL	R.B.T.
1	7/06	95% SUBMITTAL	R.B.T.

DESIGNED
DRAWN DS
CHECKED PG
PROJ. ENGR.

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ARCHITECT: PETER GILSTAD
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Certificate of Authorization Number: 2771

SCALE 1/8"=1'-0"

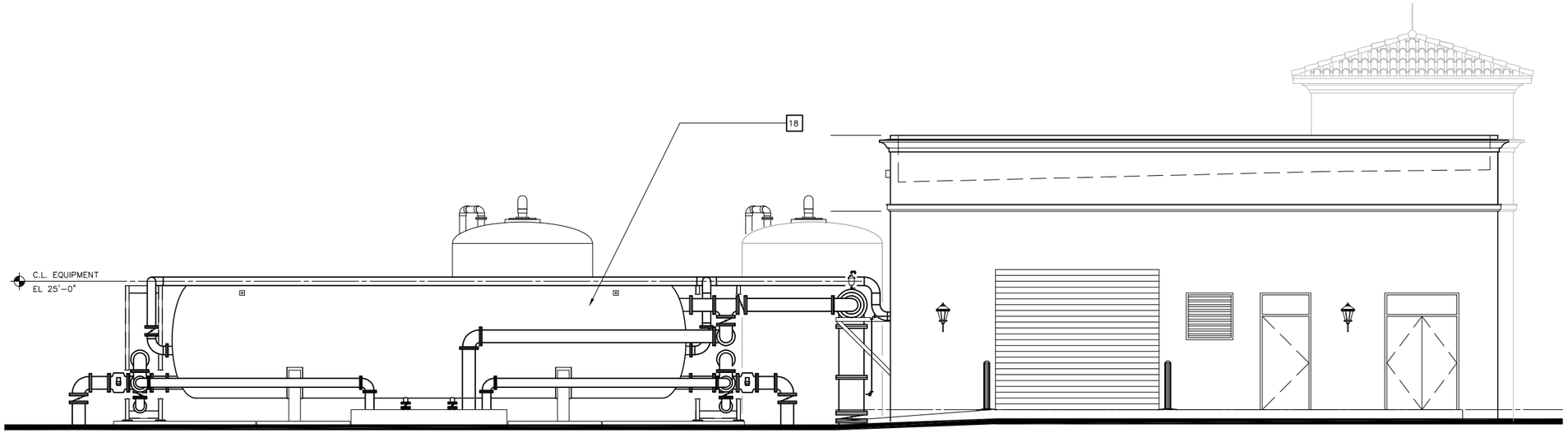
CONTRACT: –
CLIENTS PROJECT: JW 02–08
ENGINEERS PROJECT: 41041–011
CAD REFERENCE: 41041–011–A02

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

PRETREATMENT BUILDING FLOOR PLAN

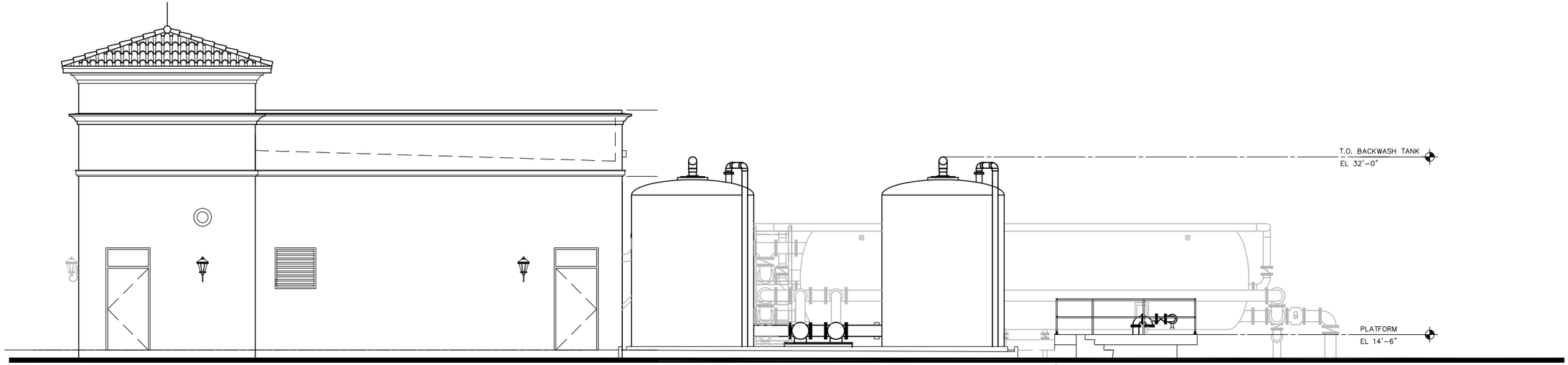
DATE: NOVEMBER 2006
SHEET: 2 OF –
DRAWING: A–2



1	NORTH ELEVATION
A-4	3/16" = 1'-0"

ELEVATION KEY NOTES

1. GLASS BLOCK WINDOWS, IMPACT RATED SYSTEM.
2. LOUVERS, IMPACT RATED SYSTEM.
3. DOOR, IMPACT RATED SYSTEM. SEE SCHEDULE SHEET A-8.
4. GALVANIZED STEEL ROLL-UP DOOR.
5. ARCHITECTURAL FOAM SHAPE, TYPICAL.
6. CONCRETE ROOF TILE SYSTEM.
7. OVERFLOW SCUPPER, TYPICAL.
8. LIGHT FIXTURE, TYPICAL.
9. PAINTED STUCCO FINISH, TYPICAL.
10. CONTROL JOINT, TYPICAL.
11. ALUMINUM FINIAL, TYPICAL.
12. TEXTURED STUCCO, TYPICAL.
13. LINE OF ROOF BEYOND.
14. CENTRIFUGAL EXHAUST FAN, SEE HVAC DRAWINGS.
15. PIPE OPENINGS, SEE MECHANICAL DRAWINGS.
16. STEEL BOLLARD.
17. PRE-FINISHED METAL COPING.
18. DEGASIFIERS (3).



2	SOUTH ELEVATION
A-4	3/16" = 1'-0"

NO.	DATE	ISSUED FOR	BY
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1	7/06	95% SUBMITTAL	R.B.T.

DESIGNED
DRAWN DS
CHECKED PG
PROJ. ENGR.

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LICENSE #: AR-0014949

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Certificate of Authorization Number: 2771

SCALE 3/16" = 1'-0"

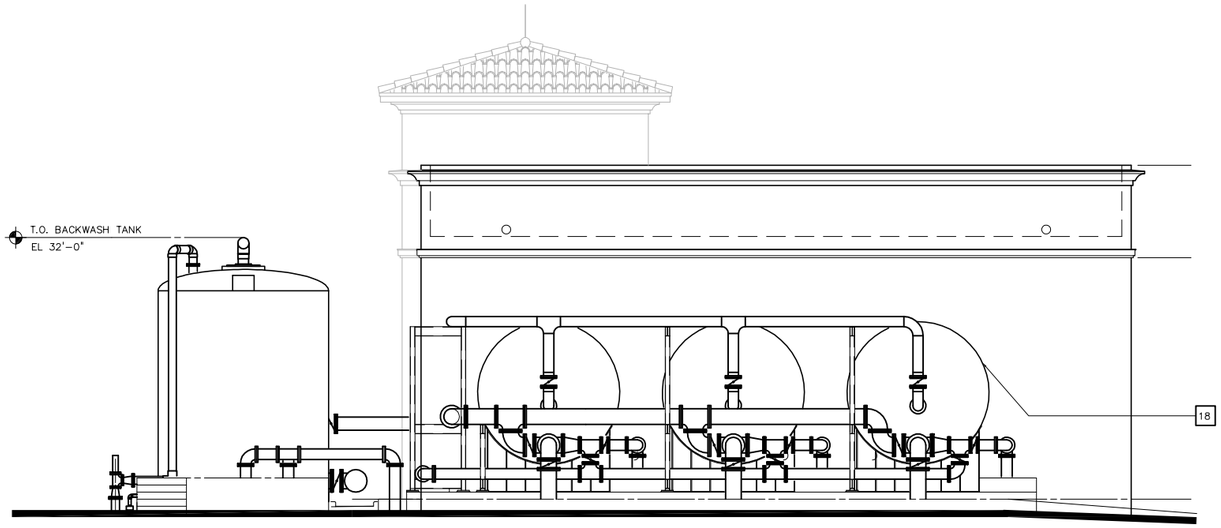
CONTRACT: –
CLIENTS PROJECT: JW 02-08
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A04

TOWN OF JUPITER, FLORIDA

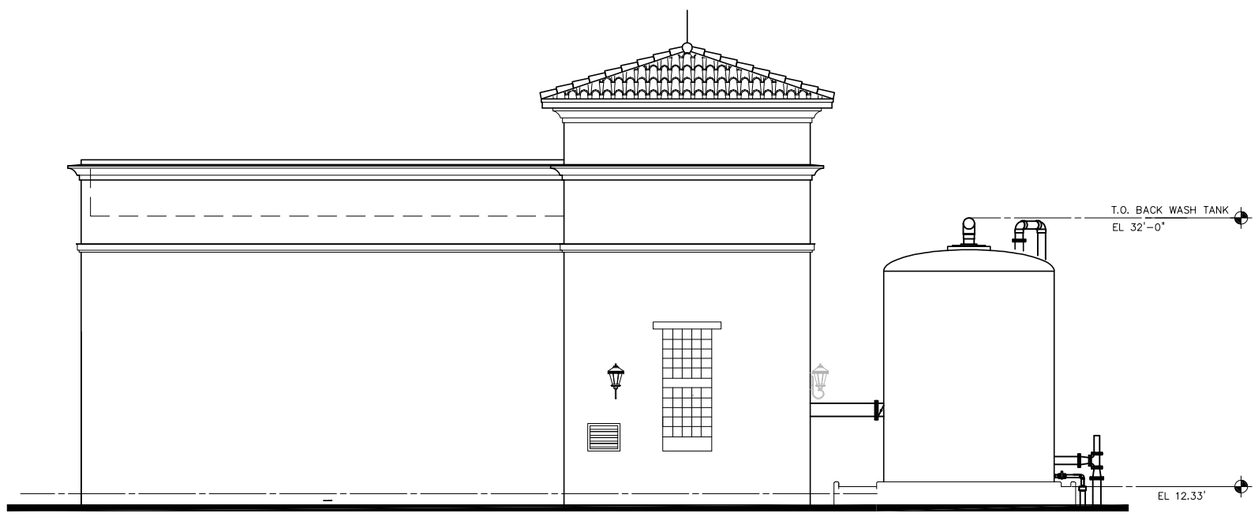
NANOFILTRATION PLANT

PRETREATMENT BUILDING NORTH & SOUTH ELEVATIONS

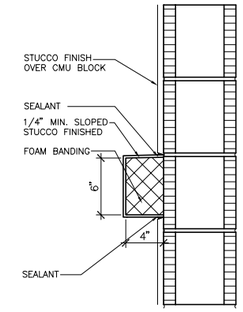
DATE: NOVEMBER 2006
SHEET: 4 OF –
DRAWING: A-4



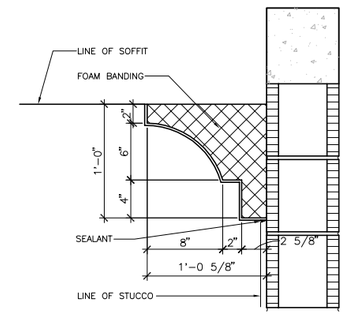
1	EAST ELEVATION
A-5	3/16" = 1'-0"



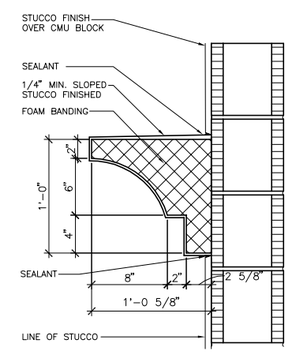
2	WEST ELEVATION
A-5	3/16" = 1'-0"



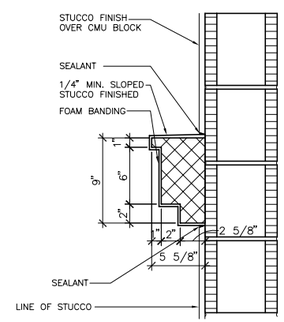
7	FOAM DETAIL
A-5	1 1/2" = 1'-0"



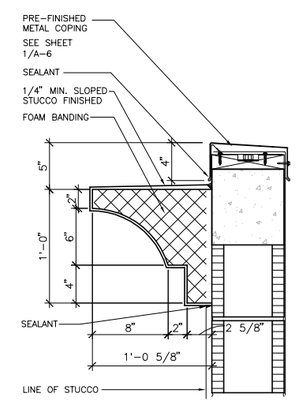
6	FOAM DETAIL
A-5	1 1/2" = 1'-0"



3	FOAM DETAIL
A-5	1 1/2" = 1'-0"



4	FOAM DETAIL
A-5	1 1/2" = 1'-0"



5	FOAM DETAIL
A-5	1 1/2" = 1'-0"

ELEVATION KEY NOTES

1. GLASS BLOCK WINDOWS, IMPACT RATED SYSTEM.
2. LOUVERS, IMPACT RATED SYSTEM.
3. DOOR, IMPACT RATED SYSTEM. SEE SCHEDULE SHEET A-8.
4. GALVANIZED STEEL ROLL-UP DOOR.
5. ARCHITECTURAL FOAM SHAPE, TYPICAL.
6. CONCRETE ROOF TILE SYSTEM.
7. OVERFLOW SCUPPER, TYPICAL.
8. LIGHT FIXTURE, TYPICAL.
9. PAINTED STUCCO FINISH, TYPICAL.
10. CONTROL JOINT, TYPICAL.
11. ALUMINUM FINIAL, TYPICAL.
12. TEXTURED STUCCO, TYPICAL.
13. LINE OF ROOF BEYOND.
14. CENTRIFUGAL EXHAUST FAN, SEE HVAC DRAWINGS.
15. PIPE OPENINGS, SEE MECHANICAL DRAWINGS.
16. STEEL BOLLARD.
17. PRE-FINISHED METAL COPING.
18. DEGASIFIERS (3).

NO.	DATE	ISSUED FOR	BY
2	11/06	99% SUBMITTAL	R.B.T.
1	7/06	95% SUBMITTAL	R.B.T.

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2101 Corporate Boulevard, Suite 301
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Certificate of Authorization Number: 2771

SCALE: AS NOTED

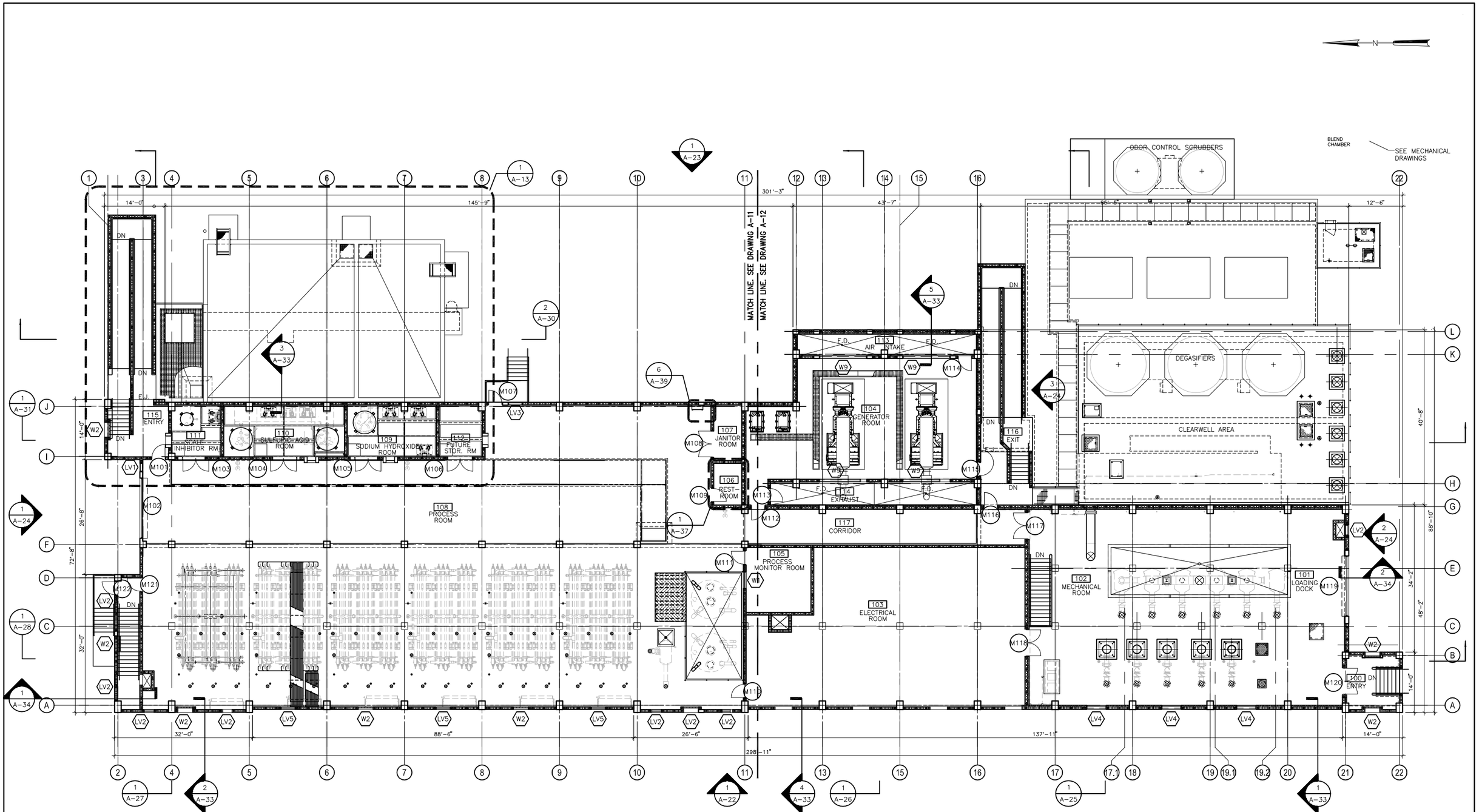
CONTRACT: –
CLIENTS PROJECT: JW 02-08
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A05

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

PRETREATMENT BUILDING EAST & WEST ELEVATIONS

DATE: NOVEMBER 2006
SHEET: 5 OF –
DRAWING: A-5



1 / A-10 OVERALL BUILDING FLOOR PLAN

3/32" = 1'-0"

3/32"=1'-0" 10 8 6 4 2 0 11'

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1	7/06	95% SUBMITTAL	R.B.T.

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Certificate of Authorization Number: 2771

SCALE 3/32"=1'-0"

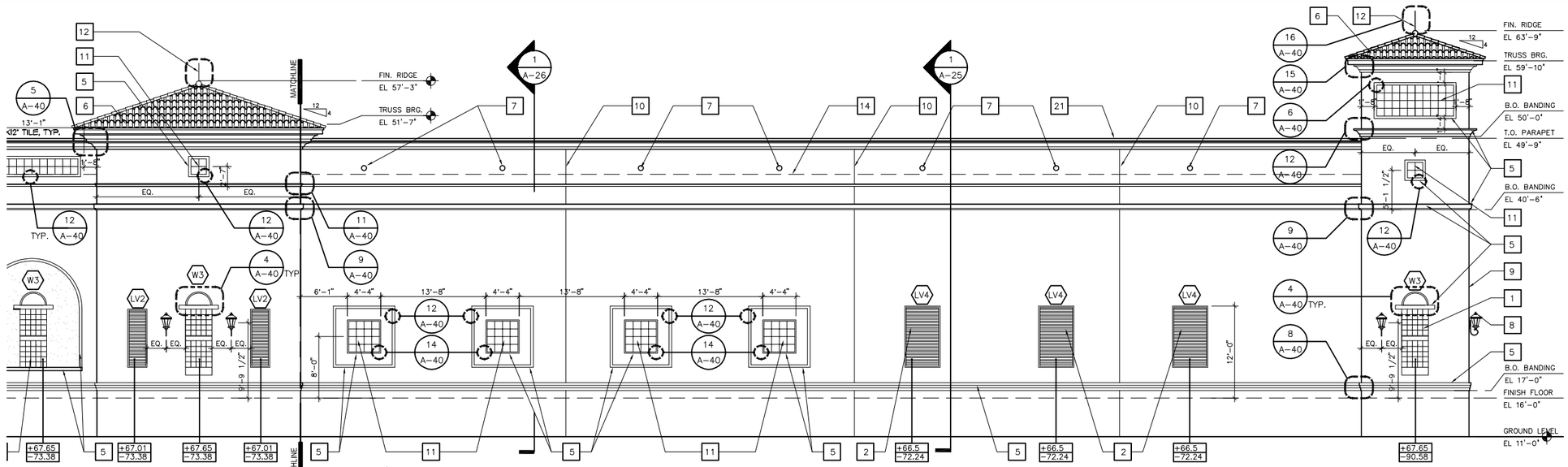
CONTRACT: –
CLIENTS PROJECT: JW 02-08
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A10

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

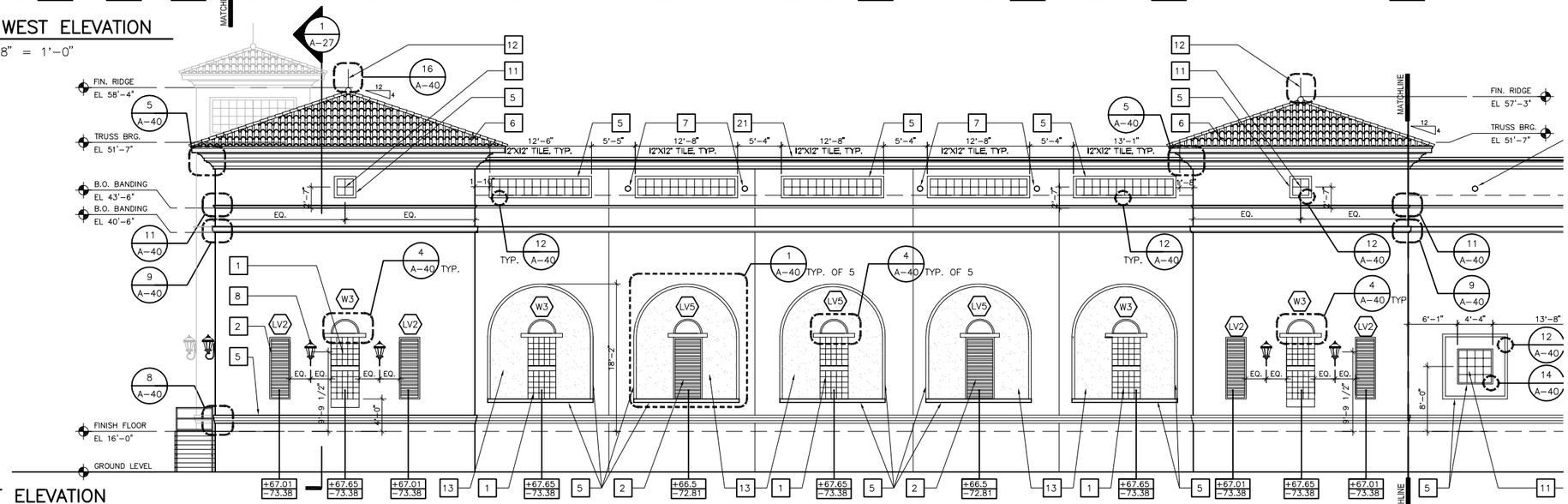
MEMBRANE BUILDING
OVERALL FLOOR PLAN

DATE: NOVEMBER 2006
SHEET: 10 OF –
DRAWING: A-10



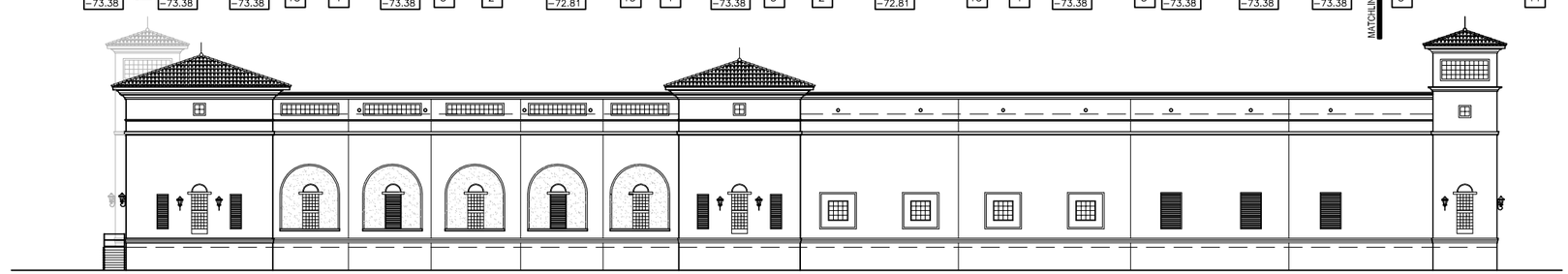
3 A-22 PARTIAL WEST ELEVATION

1/8" = 1'-0"



2 A-22 WEST ELEVATION

1/8" = 1'-0"



1 A-22 OVERALL WEST ELEVATION

1/16" = 1'-0"

ELEVATION KEY NOTES

1. GLASS BLOCK WINDOWS, IMPACT RATED SYSTEM.
2. LOUVERS, IMPACT RATED SYSTEM.
3. DOOR, IMPACT RATED SYSTEM. SEE SCHEDULE SHEET A-36.
4. GALVANIZED STEEL ROLL-UP DOOR.
5. ARCHITECTURAL FOAM SHAPE, TYPICAL.
6. CONCRETE ROOF TILE SYSTEM.
7. OVERFLOW SCUPPER, TYPICAL.
8. LIGHT FIXTURE, TYPICAL.
9. PAINTED STUCCO FINISH, TYPICAL.
10. CONTROL JOINT, TYPICAL.
11. 12"x12" TILE, TYPICAL.
12. ALUMINUM FINIAL, TYPICAL.
13. TEXTURED STUCCO, TYPICAL.
14. LINE OF ROOF BEYOND.
15. SINAGE.
16. ARCHED OPENING.
17. TEXTURED STUCCO WITH 1'-0" DIAMOND SHAPED SCORE LINES.
18. (3) CENTRIFUGAL EXHAUST FANS, SEE HVAC DRAWINGS.
19. (3) DEGASIFIERS, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
20. CHEMICAL BULK STORAGE, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
21. PRE-FINISHED METAL COPING.

NO.	DATE	ISSUED FOR	BY
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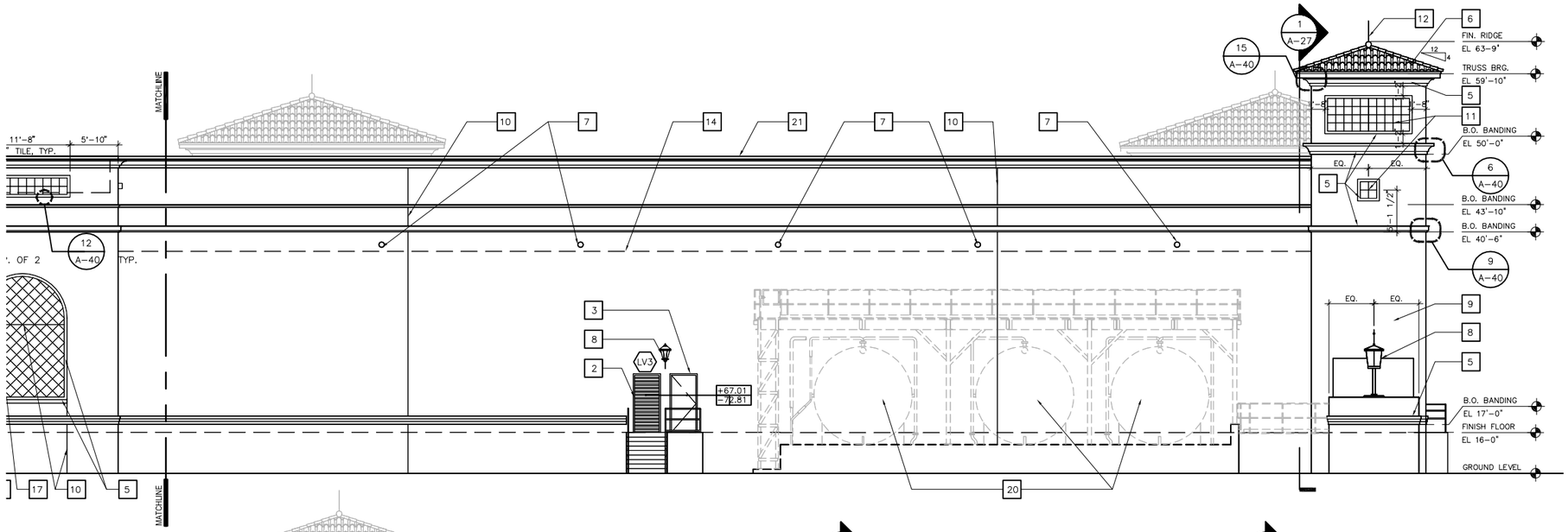
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A22

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

MEMBRANE BUILDING WEST ELEVATIONS

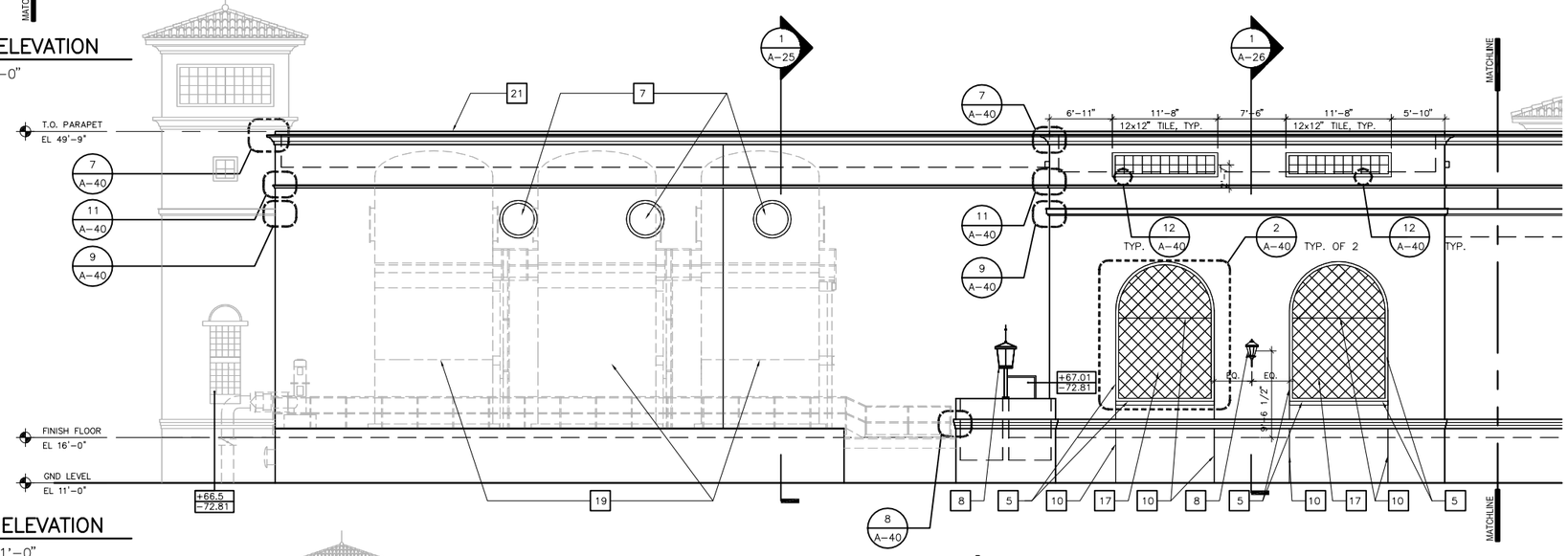
DATE: NOVEMBER 2006
SHEET: 22 OF -
DRAWING: A-22



3 PARTIAL EAST ELEVATION

A-23

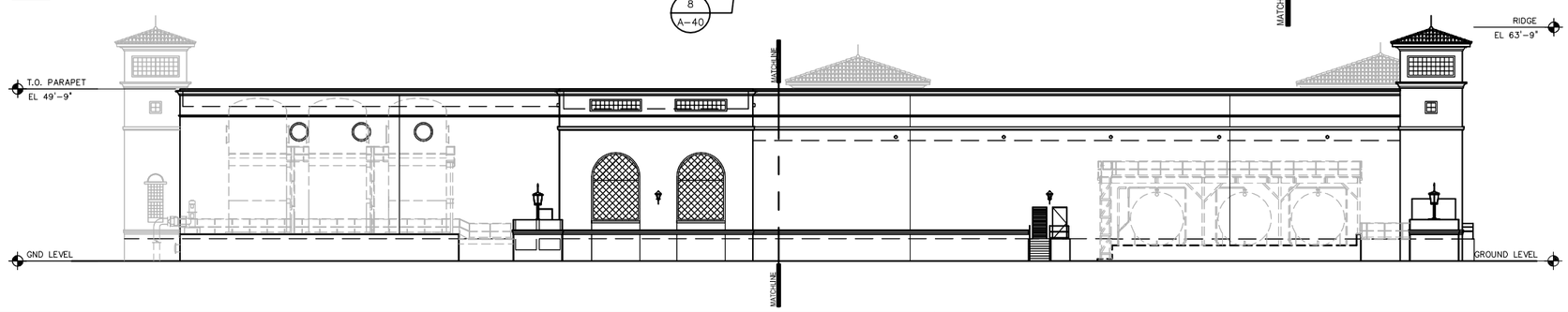
1/8" = 1'-0"



2 PARTIAL EAST ELEVATION

A-23

1/8" = 1'-0"



1 EAST ELEVATION

A-23

1/16" = 1'-0"

ELEVATION KEY NOTES

1. GLASS BLOCK WINDOWS, IMPACT RATED SYSTEM.
2. LOUVERS, IMPACT RATED SYSTEM.
3. DOOR, IMPACT RATED SYSTEM. SEE SCHEDULE SHEET A-36.
4. GALVANIZED STEEL ROLL-UP DOOR.
5. ARCHITECTURAL FOAM SHAPE, TYPICAL.
6. CONCRETE ROOF TILE SYSTEM.
7. OVERFLOW SCUPPER, TYPICAL.
8. LIGHT FIXTURE, TYPICAL.
9. PAINTED STUCCO FINISH, TYPICAL.
10. CONTROL JOINT, TYPICAL.
11. 12"x12" TILE, TYPICAL.
12. ALUMINUM FINIAL, TYPICAL.
13. TEXTURED STUCCO, TYPICAL.
14. LINE OF ROOF BEYOND.
15. SINAGE.
16. ARCHED OPENING.
17. TEXTURED STUCCO WITH 1'-0" DIAMOND SHAPED SCORE LINES.
18. (3) CENTRIFUGAL EXHAUST FANS, SEE HVAC DRAWINGS.
19. (3) DEGASIFIERS, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
20. CHEMICAL BULK STORAGE, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
21. PRE-FINISHED METAL COPING.

NO.	DATE	ISSUED FOR	BY
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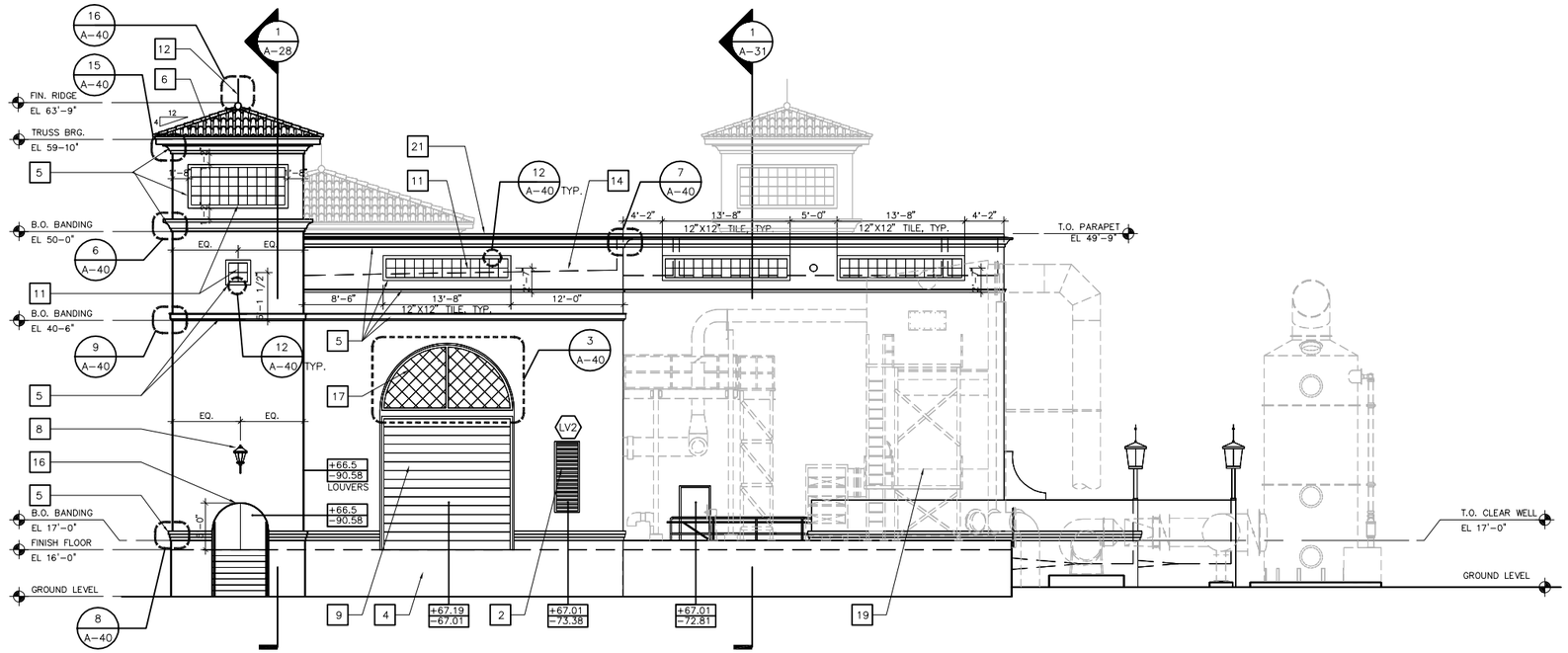
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A23

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

MEMBRANE BUILDING EAST ELEVATIONS

DATE: NOVEMBER 2006
SHEET: 23 OF –
DRAWING: A-23

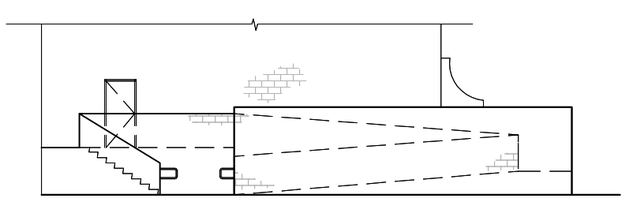


2 A-24 SOUTH ELEVATION

1/8" = 1'-0"

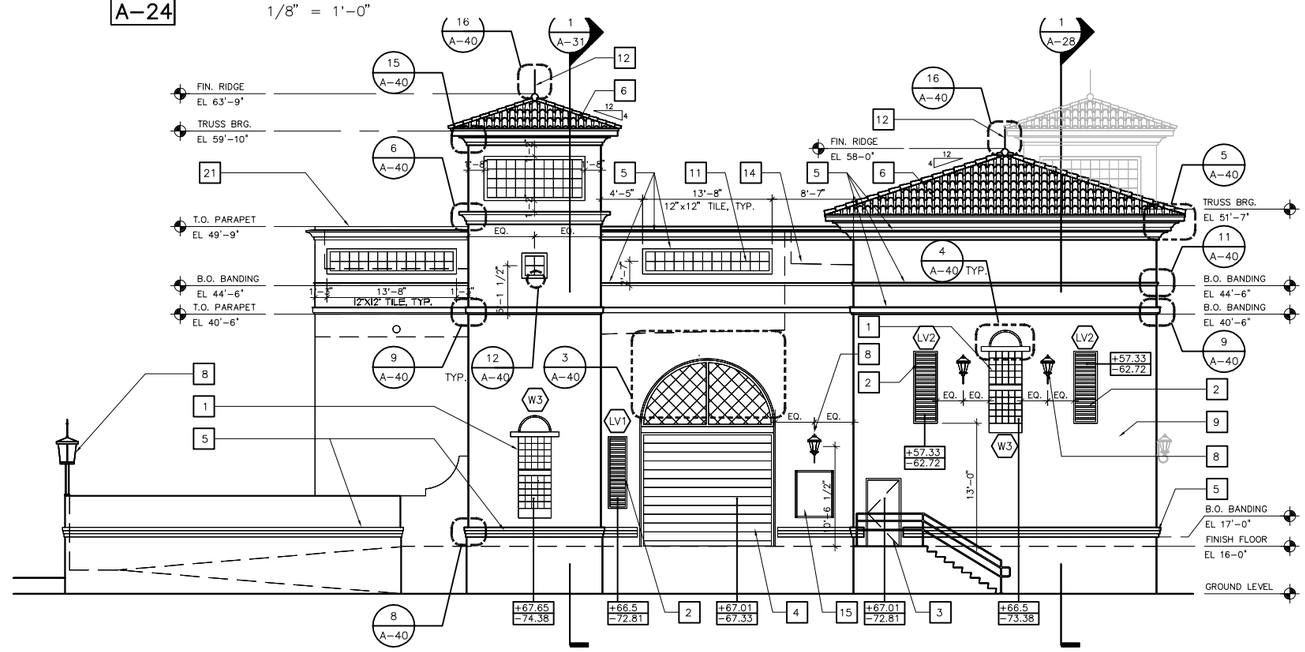
ELEVATION KEY NOTES

1. GLASS BLOCK WINDOWS, IMPACT RATED SYSTEM.
2. LOUVERS, IMPACT RATED SYSTEM.
3. DOOR, IMPACT RATED SYSTEM. SEE SCHEDULE SHEET A-36.
4. GALVANIZED STEEL ROLL-UP DOOR.
5. ARCHITECTURAL FOAM SHAPE, TYPICAL.
6. CONCRETE ROOF TILE SYSTEM.
7. OVERFLOW SCUPPER, TYPICAL.
8. LIGHT FIXTURE, TYPICAL.
9. PAINTED STUCCO FINISH, TYPICAL.
10. CONTROL JOINT, TYPICAL.
11. 12"x12" TILE, TYPICAL.
12. ALUMINUM FINIAL, TYPICAL.
13. TEXTURED STUCCO, TYPICAL.
14. LINE OF ROOF BEYOND.
15. SINAGE.
16. ARCHED OPENING.
17. TEXTURED STUCCO WITH 1'-0" DIAMOND SHAPED SCORE LINES.
18. (3) CENTRIFUGAL EXHAUST FANS, SEE HVAC DRAWINGS.
19. (3) DEGASIFIERS, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
20. CHEMICAL BULK STORAGE, SEE MECHANICAL AND STRUCTURAL DRAWINGS.
21. PRE-FINISHED METAL COPING.



3 A-10 RAMP ELEVATION

1/8" = 1'-0"



1 A-24 NORTH ELEVATION

1/8" = 1'-0"

1/8"=1'-0" 8 6 4 2 0 6'

NO.	DATE	ISSUED FOR	BY
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1	7/06	95% SUBMITTAL	R.B.T.

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SCALE 1/8"=1'-0"

CONTRACT: –
CLIENTS PROJECT: JW 02-08
ENGINEERS PROJECT: 41041-011
CAD REFERENCE: 41041-011-A24

TOWN OF JUPITER, FLORIDA

NANOFILTRATION PLANT

MEMBRANE BUILDING
NORTH & SOUTH ELEVATIONS

DATE: NOVEMBER 2006
SHEET: 24 OF –
DRAWING: A-24