EXECUTIVE SUMMARY

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Abbreviation	Description
µg/l	Microgram (s) perLiter
AACE	Advancement of Cost Engineering
AADF	Annual Average Daily Flow
AC	Asbestos Cement
ADF	Average Day Flow
AFW	Accounted for Water
AMCL	Alternative Maximum Contaminant Level
ARCY	Anaerobic Recycle
ASR	Aquifer Storage and recovery
ATAD	Autothermal Thermophilic Aerobic Digestion
AWS	Alternative Water Supply
AWT	Advanced Wastewater Treatment
BCHD	Broward County Health Department
BCPFM	Broward County Population Forecasting Model
BCTAZ	Broward County Traffic Analysis Zone
BEBR	Populations Bureau of Economic and Business Research
BNR	Biological Nitrogen Removal
CBOD5	Carbonaceous Biochemical Oxygen Demand
CCI	Construction Cost Index
CCL	Candidate Contaminant List
CFR	Code of Federal Regulations
CIP	Capital Improvements Planning
City	City of Sunrise
DAF	Dissolved Air Flotation
DBP	Disinfection by-product (s)
DIP	Ductile Iron Pipe
DIW	Deep Injection Wells
DO	Dissolved Oxygen
DRI	Development of Regional Impact
EBPR	Enhanced Bio Phosphorus Removal
ENR	Engineering News Report
EPA	Environmental Protection Agency
F.S	Florida Statutes
FAC	Florida Administrative Code
FACA	Federal Advisory Committee Act

Abbreviation	Description
FBR	Filter Backwash Rule
FDEP	Florida Department of Environmental Protection
fps	Feet per Second
ft	Feet
gal	Gallon (s)
GPAD	Gallons per Acre per Day
GPCD	Gallons Per Capita Per Day
gpd	Gallons per day
gpd/ft	Gallons per day per feet
gpm	Gallon (s) per minute
GWR	Groundwater Rule
HAAs	Haloacetic Acids
HDR	High Density Residential
Hp	Horsepower
hr	Hour (s)
HSP	High Service Pumps
IDSE	Initial Distribution System Evaluation
IESWTR	The Interim Enhanced Surface Water Treatment Rule
INS	Immigration and Naturalization Service
IRS	Internal Revenue Service
ISO	Insurance Services Office
IWA	International Water Association
LCR	Lead and Copper Rule
LDR	Low Density Residential
LEC	Lower east Coast Plan
LEC	Lower East Coast Plan
LEC WSP	Lower East Coast Water Supply Plan
LF	Linear Feet
LNU	Legitimate Night Use
LRAA	Locational Running Annual Average
mbr	Membrane Bio-reactor
MBRs	Membrane Bioreactors
MCL	Maximum Contaminant Level
MCLG	maximum contaminant Level Goal
MCLs	Maximum Contaminant Levels

Abbreviation	Description
MDF	Maximum Daily Flow
MDR	Medium Density Residential
MFL	MacVicar, Federico, and Lamb, Inc.
mg	Million gallons
MG	Million gallon
mg/L	Milligram (s) per liter
mgd	Million gallons per day
mgy	Milligram gallons per year
MNF	Minimum Night Flow
MRDLs	Maximum Residual Disinfectant Levels
MS	Membrane Softening
MWA	Montgomery Watson Americas
MWH	Montgomery Watson Harza
NF	Nanofiltration
NH3-N	Ammonia-Nitrogen
NMNF	Net Minimum Night Flow
NPDES	National Pollution Discharge Elimination System
NRCY	Nitrified Recycle
NRW	Non-revenue Water
NTU	Nephelometric Turbidity Unit (s)
O&M	Operation and Maintenance
pCi/l	PicoCurie (s) per liter
PHF	Peak Hourly Flow
PLC	Programmable Logic Controller
ppb	Parts per billion
ppm	Parts per million
psi	Pounds per square inch
psig	Pound (s) per square inch gage
PVC	Polyvinyl Chloride
PWS	Public Water System
RAS	Return Activated Sludge
RO	Reverse Osmosis
R/R	Renewal and Replacement
SDWA	Safe Drinking Water Act
SFWMD	South Florida Water Management District

Abbreviation	Description
sq ft	Square foot (feet)
Stage 1 D/ DBP Rule	Stage 1 Disinfectant and Disinfection Byproduct Rule
Stage 1 D/ DBP Rule	Stage 1 Disinfectant and Disinfection Byproduct Rule
SW	Southwest
SWTR	Surface Water Treatment Rule
SWWTP	South West Water Treatment Plant
SWWWTP	Southwest Waste Water Treatment Plant
TAC	Technical Advisory Committee
TAZ	Traffic Analysis Zone
TCR	Total Coliform Rule
TCRDSAC	Total Coliform Rule/Distribution System Advisory Committee
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
THMs	Trihalomethane (s)
TMADF	Three-Month Average Daily Flow
TN	Total Nitrogen
TP	Total Phosphorus
TRC	Total Coliform Rule
TWAS	Thickened Waste Activated Sludge
UCM	Unregulated Contaminants Monitoring
UFW	Unaccounted for Water
ug/L	Micrograms per Liter
UV	Ultraviolet
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound (s)
WAS	Waste Activated Sludge
WPO	Wellfield Protection Ordinance
WQBELs	Water Quality-Based Effluent Limits
WTP	Water Treatment Plant
WUP	Water Use Permit
WWTP	Waste Water Treatment Plant
yr	Year (s)

EXECUTIVE SUMMARY

Study Purpose

The City has historically prepared a five (5) year Capital Improvements Program (CIP) as part of the Master Planning process aimed at identifying those capital projects required to meet growth in the utility service area. The City had a comprehensive water and wastewater Master Plan prepared in 1995 with a subsequent update in 2000. The last CIP complied by the City's Utilities Department was in year 2000. With new regulations and stringent water resource allocations, a need for an alternative water supply evaluation arises. In addition there are growing demands from future growth and aging infrastructure. This all drives to a need for an updated Master Plan. In October 2007, the City authorized MWH to prepare an updated comprehensive water and wastewater Master Plan. MWH teamed with Hazen and Sawyer to assist with development of this Master Plan.

The comprehensive analysis undertaken in this study resulted in a greater portfolio of system deficiencies than had been previously documented. The resulting mix of projects, implementation timeline and cost to the utility customers will be a major focus of the utility for the foreseeable future.

This study looked at two time horizons, 2015 and 2030. The 2015 is considered near term and the majority of the projects identified fall within this first time horizon. The time frame of 2016 through 2030 are viewed as long range and provide a sense of the future population served and associated investment needed.

Study Area

The City of Sunrise's water and wastewater utility serves an area of nearly 70 square miles including the City of Sunrise, the City of Weston, the Town of Southwest Ranches and about 60 percent of the Town of Davie. **Figure ES-1** shows the existing and future service area of the City of Sunrise water and wastewater utility system.

Population Forecast

This Master Plan coordinated population forecasts with Broward County, South Florida Water Management District, City of Weston, the Town of SW Ranches and the Town of Davie. Since coordination of population forecasts is now a State requirement, the forecasts used in this study are in full agreement with the aforementioned. **Table ES-1** presents the population projections developed in this Master Plan.

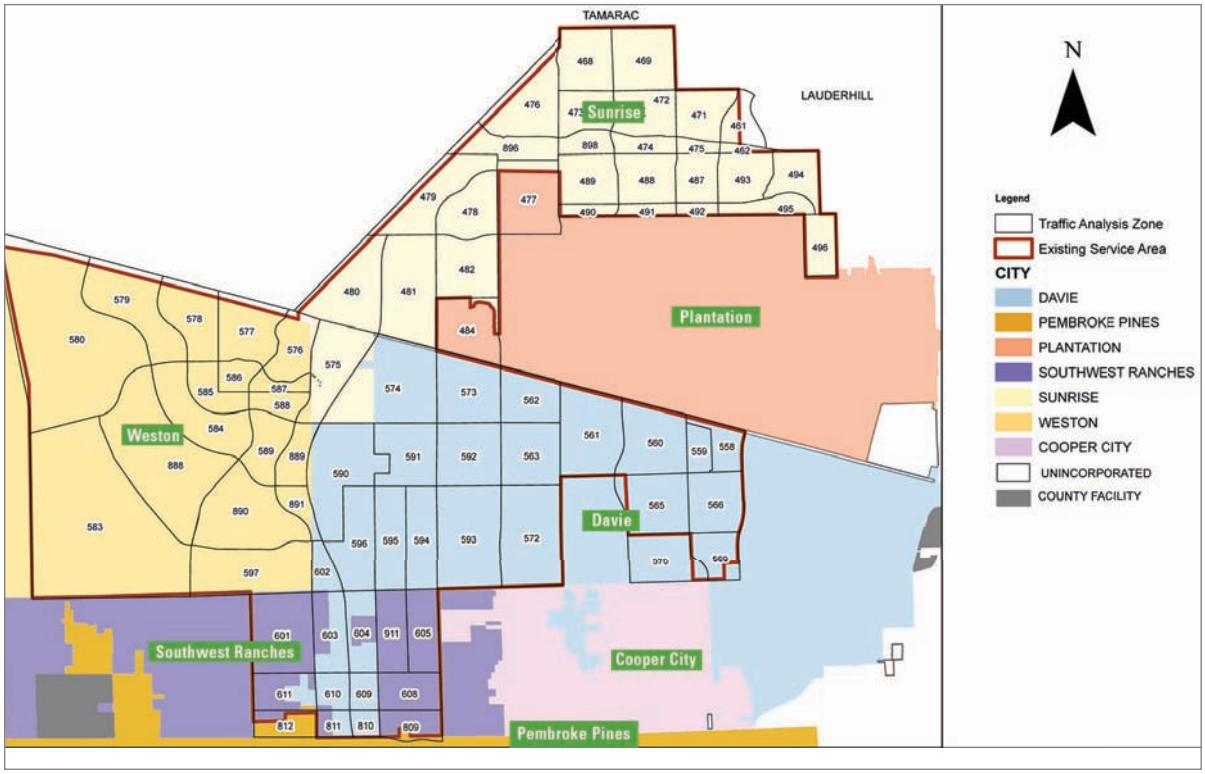


Figure ES-1
City of Sunrise Existing and Future Water and Wastewater Utilities Service Area

Table ES-1 Master Plan Population Projections

Service Area	Municipality	Existing Population	Future Population				
		2007	2010	2015	2020	2025	2030
Service Area	Municipality	2007	2010	2015	2020	2025	2030
Existing	Davie	54,900	57,200	61,500	63,500	64,600	65,200
	Sunrise	91,300	96,200	106,000	113,400	116,600	119,000
	Weston	62,500	64,200	66,100	67,400	68,000	68,500
	SW Ranches	4,800	5,000	5,700	6,200	6,300	6,300
SUBTOTAL		**213,500**	**222,800**	**239,600**	**250,500**	**255,500**	**259,000**
Future	SW Ranches		5,300	5,700	5,900	6,000	6,000
TOTAL		**213,500**	**228,100**	**245,300**	**256,400**	**261,500**	**265,000**

Water Demands

The City of Sunrise's population averages one of the lowest per capita water usage rates in Broward County, at 108 gpcd. The per capita water usage that includes the entire service population is 127 gpcd, still one of the lowest within the County. The following table illustrates that the future demands are not excessive and are manageable. **Table ES-2** presents the demand projections for the Sunrise Utilities developed within this Master Plan.

Figure ES-2 illustrates the variation in demand that must be met during a typical day.

Since water facilities are sized to provide adequate pressure across the entire range of demand, some of the recommended improvements identified in this report are driven by service requirements not growth.

Conservation savings are included in the alternative water supply analysis. Including conservation in this analysis lowered the average water usage. Although conservation defers expansion for growth, much of the water infrastructure is sized for peak flows such as seen when fire fighting flows occur.

This study found that approximately 25 percent of the future capital improvements are sensitive to implementation of successful conservation programs. The remaining 75 percent of the capital improvements is driven by new regulations and deteriorating or substandard equipment and pipelines.

Wastewater Flows & Loads

Historical wastewater flow and population data for the year 2007 were used to calculate the flow contributions to each WWTP on a per capita basis. The per capita wastewater flow accounts for residential, industrial and commercial, and includes both base flow and I/I.

Table ES-2 Customer Demand Projections

Service Area	Municipality	Existing Demand	Future Demand				
		2007 (mgd)	2010 (mgd)	2015 (mgd)	2020 (mgd)	2025 (mgd)	2030 (mgd)
Existing	Davie	6.09	6.33	6.68	6.94	7.08	7.17
	Sunrise	9.89	10.49	11.84	12.83	13.17	13.40
	Weston	1.08	11.13	11.42	11.64	11.81	11.92
	SW Ranches	0.32	0.34	0.36	0.39	0.39	0.40
SUBTOTAL		**27.12**	**28.29**	**30.30**	**31.81**	**32.45**	**32.88**
Future		0.66	0.67	0.72	0.75	0.76	0.76
	GRAND TOTAL	**27.78**	**28.97**	**31.02**	**32.56**	**33.21**	**33.65**

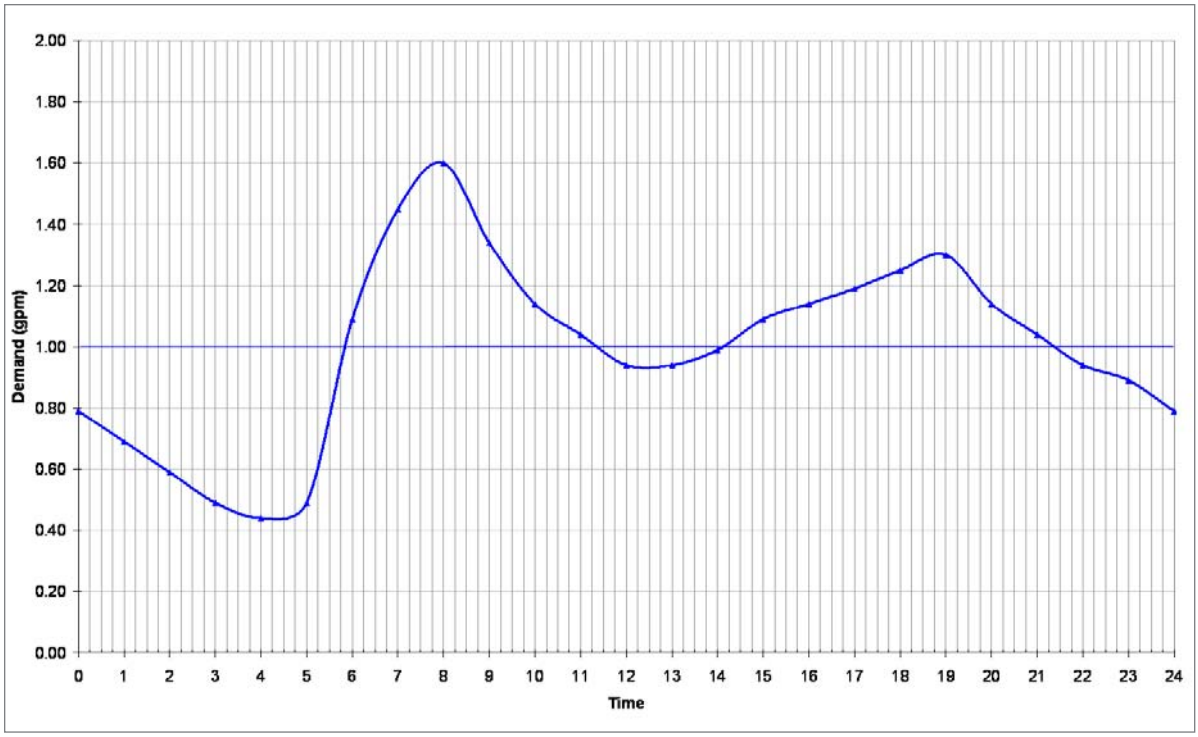


Figure ES-2
Future Diurnal Demand Pattern

The total per capita wastewater flow for the each wastewater facilities were calculated for year 2007 and are presented in **Table ES-3**. Based on the projected flows, the Sawgrass WWTP and Springtree WWTP will not reach the permitted capacity by the year 2030. The Southwest WWTP is scheduled for rehabilitation by 2013 and will be designed to handle projected flows.

Wet weather flows generate approximately 10mgd at the Sawgrass WWTP and approximately 8mgd at the Springtree WWTP. The wet weather flows in the Springtree service area are entering the excessive range based on the Capacity, Maintenance, Operation and Management (CMOM) criteria. This may be indicative of the age of the sewerage system and the construction materials used. The Total Suspended Solids (TSS) in the Springtree sewerage system is considered high. The high TSS combined with excessive per capita flows are markers for system deterioration.

Alternative Water Supply Evaluation

Historically, all potable water in Broward County came from the Biscayne aquifer. This aquifer is a highly productive zone located approximately 100 feet below land surface. This aquifer is water table driven meaning that the canals that crisscross the County constantly recharge the aquifer. These canals serve primarily as a drainage system for the populated areas of the County as well as for the Everglades agricultural area (EAA). When the Comprehensive Everglades Restoration Program began in 2000, the Federal government mandated that water currently drained from the EAA must be proportioned so that water needed for the restoration of the Everglades was reserved from consumptive allocation.

That requirement promulgated the Regional Water Availability rule adopted in 2007 that severely limited the future water allocation from the Biscayne. In the case of Sunrise, this rule meant that its historic Biscayne use of 32mgd would be cut back to 29.09 mgd over a five year period. Additionally all future water supplies would come from sources alternative to the Biscayne aquifer. The practical result of this rule means future water demands must be met by either brackish water treated with reverse osmosis technology, or reclaimed wastewater that is highly treated to either offset irrigation demands or artificially recharge the Biscayne aquifer.

Facilities	Total per Capita Wastewater Flow (gpcd)
Sawgrass	112
Springtree	121
Southwest	149

Table ES-3
City of Sunrise Wastewater Facilities per Capita Flows for Year 2007

Table ES-4 Additional Treated Water AWS Source Projections by 2030

	Additional Treated Water AWS Source Projections(MGD) by 2030						
AWS Source	Base Condition	A	B	C	D	E	F
Biscayne Aquifer	11.20						0.75
Floridan Aquifer		11.20		6.81	5.92	3.45	8.80
Reuse Water							
Irrigation						3.36	
Recharge			11.20		0.89	0.89	1.60
Concentrate Recovery				1.50	1.50	1.50	
ASR (1 mgd)				0.89	0.89		
Demand Management				2.00	2.00	2.00	
Subtotal	**11.20**	**11.20**	**11.20**	**11.20**	**11.20**	**11.20**	**11.20**

This study examined six (6) alternative water supply strategies and compared them against the base condition of continued use of the Biscayne aquifer for future supply. **Table ES-4** highlights the alternative strategies.

Each strategy was then priced relative to the base condition. The pricing of the options was developed using a Class 5 capital estimate combined with estimates of annual operating costs resulting in a Net Present Value for each strategy. These were comparative cost to the base condition and did not represent absolute project cost.

Development of Alternative Water Supply strategies is more complex than a simple present value analysis. Each of the elements within the options matrix represents a level of uncertainty and risk to the City. Many of the options involve potential competition for an untested aquifer. Some involve development of indirect potable reuse that will be heavily scrutinized by the regulatory community and the citizens.

Some options call upon conservation by customers outside the code jurisdiction of the City which likely can be impacted only through an aggressively tiered rate structure and educational programs. In an effort to weigh the impact of these risks, a feasibility score was developed for each option. The weighted score provided a normalization of risk and feasibility that provided a final ranking as shown on **Table ES-5**.

Based on this analysis, Option D was selected as the preferred strategy for supplying the City's future water supply needs. The remainder of the Master Plan develops infrastructure improvements based on this option.

Water Supply System

The City as part of compliance with newly enacted legislation prepared and adopted a 10-year supply facilities work plan (August 2008). This Plan was filed with the South Florida Water Management District and the Department of Community Affairs, (DCA). This Master Plan used the 10-year work plan as a guide for phasing expansion of it water supply system. Another key to the water supply system expansion is the recently approved 20-year Water Use Permit. The schedule for the required infrastructure improvements defined both in the Water Use Permit and the 10-year work plan were tightly coordinated and provides the base schedule for implementation of many projects identified within this Master Plan.

The Water Use Permit schedule is shown in **Figure ES-3**. The 10-year Water Supply Facilities Plan capital investment schedule was required for acceptance by DCA, and is captured in the summary CIP schedule shown in **Chapter 13-Capital Improvements Plan**.

Figure ES-6 was adopted by the City as part of its compliance with DCA requirements. This figure

Table ES-5 Rank of Option

Options	A	B	C	D	E	F
Total Feasibility Scores	460.0	605.0	357.2	302.2	331.2	407.5
Normalized Score Factor	1.5	2.0	1.2	1.0	1.1	1.3
Cost Factor	245	308	199	227	243	271
Final scores	373.5	615.8	235.2	227.0	266.8	365.4
Rank	5	6	2	1	3	4

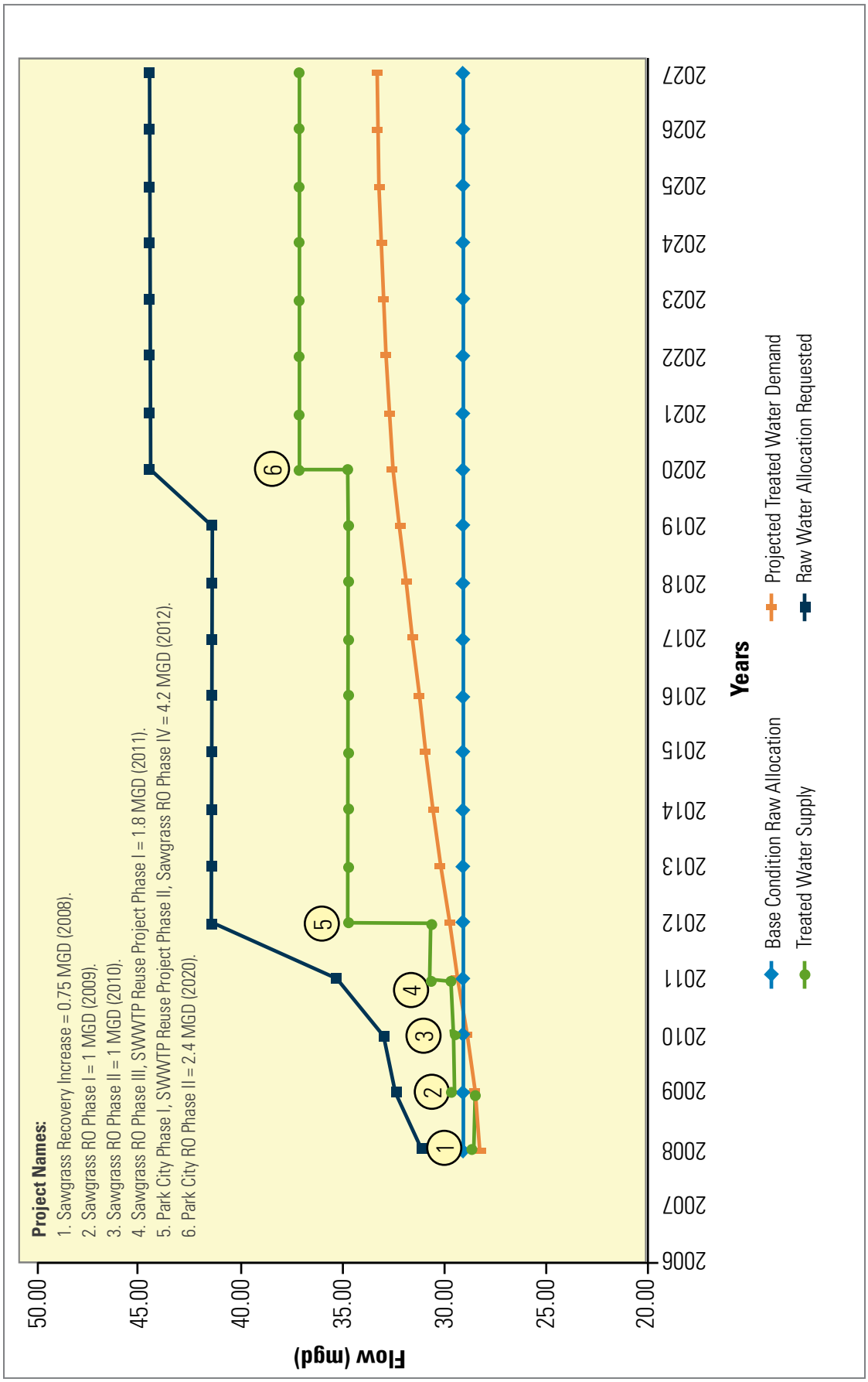
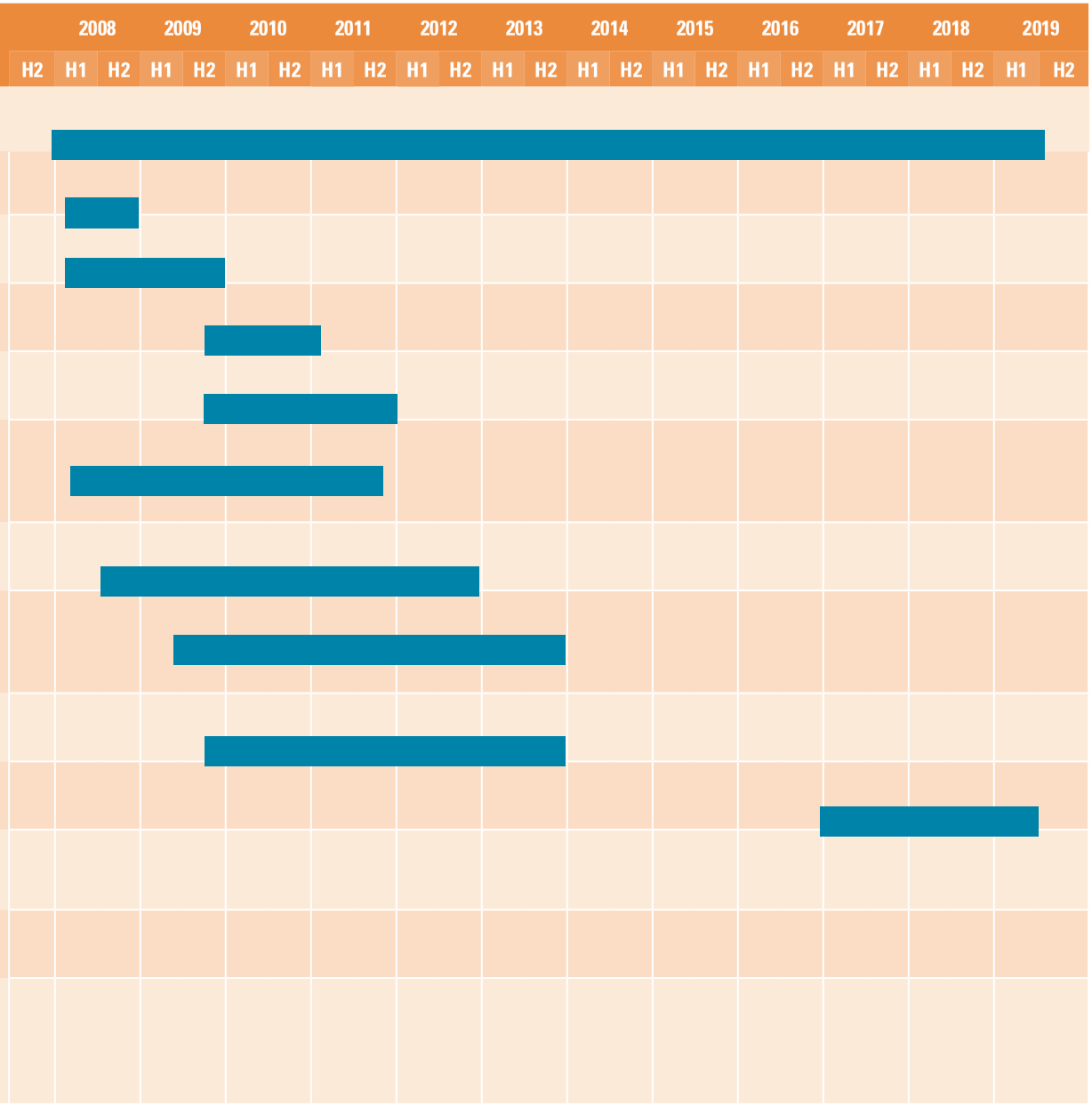


Figure ES-3
System-wide Demand versus Supply Plan Presented in WUP

Table ES-6 *10-Year Water Supply Facilities Work Plan (2008) Implementation Schedule (2008 Dollars)* [1]

Task Name	Estimated Capital Cost ($ M)	Additional Flow (mgd)
Sunrise 10 year Facilities Plan	$0.00	
Increase in Sawgrass Recovery (0.75 mgd)	$0.56	0.75
Sawgrass RO Phase I (1mgd)	$13.61	1.0
Sawgrass RO Phase II (1mgd)	$4.08	1.0
Sawgrass RO Phase III (1mgd)	$4.08	1.0
Southwest Groundwater Recharge Phase 1 (0.8 mgd)	$24.69	0.8
Park City RO - Phase 1 (2.4 mgd)	$36.82	2.4
Southwest Groundwater Recharge - Phase II (0.8 mgd)	$15.55	0.8
Sawgrass RO Phase IV (1mgd)	$4.70	1.0
Park City RO - Phase II (2.4 mgd)	$12.63	2.4
New Transmission Mains and Base Improvements	$21.49	
Total 5 Year Capital Cost Associated With AWS	$125.59	8.8
Total AWS project capacity as part of the water supply plan (including 8.8 mgd from first five years)[2]		11.2



[1] *February 2008 (ENR CCI = 8094)*

[2] *Reference 10 Year Water Supply Plan (August 2008) for additional table details.*

graphically depicts the addition of new water sources and treatment facilities over time. Although some of the future water sources may be delayed due to the current economic downturn, the immediate water sources must be developed because of the borrowed Biscayne water that will be phased out by 2013.

The new alternative water supply projects are scheduled to be in compliance with the City's 20-year consumptive use permit. The Consumptive Use Permit provides for borrowing of 2.3 mgd from the Biscayne aquifer provided the use of that water is phased out before 2013.

Replacing the out dated Park City water treatment plant with a new Floridan reverse osmosis plant, reestablishes storage and high service pumping in the far eastern portion of the utility system especially in the Park City area where pressure and flow are deficient. Refurbishment of the Southwest water treatment plant will provide improved fire fighting capability for the commercial properties at Griffin Rd and East I-75 and Sheridan Rd and East I-75 and service to the southern portions of Weston.

Water Treatment Plant Expansion

New sources of water require new treatment technologies and strategies. **Table ES-7** illustrates the five (5) "best value", strategies employed to achieve the City's future water needs.

The expansion and improvements to the Water Treatment Plants is driven by regulation, service, or growth.

- Regulation requires either new water sources or improvements to protect public health and safety.
- Service requirements involve equipment failure or equipment that is no longer capable of meeting system needs. Service problems are not due to a lack of maintenance, rather worn out equipment that can no longer be serviced.
- The growth component was derived from the 10-year Water Supply Facilities Plan and the Water Use Permit. Both of these documents rely on Broward County population projections that predate the current housing crisis. The housing crisis may impact the rate of growth but since the City is behind in its permitted supply development; this economic slowdown has minimal impact on current deficiencies.

Water Storage, Transmission and Distribution

The City's 750 mile piping network, including storage and high-service pumps was modeled for current conditions

Table ES-7 *Selected Alternative (Option D) AWS Sources and Flows*

AWS Source	2015 Finished Water		2030 Finished Water		Facility
	Avg Day Flow (mgd)	Max Day Flow (mgd)	Avg Day Flow (mgd)	Max Day Flow (mgd)	
Floridan Aquifer	1.50	1.50	3.00	3.00	Sawgrass WTP
Concentrate Recovery	1.50	1.50	1.50	1.50	Sawgrass WTP
Floridan Aquifer	2.00	4.00	2.90	6.00	Park City WTP
ASR (1 mgd)	0.89	2.00	0.89	2.00	Springtree WTP
Groundwater Recharge of Reuse Water	0.89	1.60	0.89	1.60	Southwest WWTP/WTP
Demand Management	2.00	0.00	2.00	0.00	System wide
Subtotal	**8.78**	**10.60**	**11.20**	**14.10**	

Table ES-8 *Treated Water System Requirements*

Planning Period	ADF (mgd)	MDF (mgd)	PHF (mgd)
2015	34.72	48.61	77.77
2030	37.12	51.97	83.15

as well as 2015 and 2030. The demands for these periods are shown in the **Table ES-8**.

The target service level set by the City is 55 psi which provides pressure to operate automatic fire sprinkler system located on upper level floors. In Weston a chronic problem persists because the distribution system is comprised of numerous small lines and dead ends. The solution involves construction of new water transmission mains to new northwestern and southern connection points. **Figure ES-4** illustrates these chronic low pressure problems that need to be addressed.

Fire flow is a critical service provided by the water utility system. A few areas were identified as problematic and resolvable by looping of distribution lines and interconnecting with the City of Plantation. The more problematic area is the Park City subdivision. This subdivision is old and has a substandard distribution system. The City has commenced further analysis and design of the required improvements as a separate study.

Thirty (30) projects are recommended in this study to improve deficiencies in the water system distribution, transmission and storage. The City's water system storage was also evaluated against regulatory requirements and best practices and was found to be sufficient. The one recommended near term storage improvement is identified and that is for the addition of a ground storage reservoir at the Park City utility complex. Although not required by regulation, the distribution system performance is significantly improved with the addition of storage in the eastern portion of the service area. **Figure ES-5** summarizes the system-wide storage tank capacity.

Wastewater Collection and Transmission System

The City's wastewater system is comprised of 211 lift stations, 90 miles of force main and 600 miles of collection piping. The wastewater system was modeled to determine the adequacy of the lift station and force mains to meet future flow projections. Failure in the system's ability to handle peak flows can result in sanitary sewer overflows (SSO) which present a public health problem and may result in regulatory compliance actions. In the Springtree service area, five lift stations were determined to be in need of rehabilitation along with approximately 7,500 feet of area force mains.

In the Sawgrass wastewater service area nine (9) lift stations were identified as needing rehabilitation as well as approximately 4,000 feet of force main.

Table ES-9 *Model Results for Existing Springtree Network Under Different Modeling Scenarios*

Lift Station ID	Lift Station Assessment			
	Current Average Daily Flow	Current Maximum Daily Flow	2015 Maximum Daily Flow	2030 Maximum Daily Flow
101	Surcharge	Overflow	Overflow	Overflow
102	Overflow	Overflow	Overflow	Overflow
109	ok	Surcharge	Surcharge	Surcharge
110	ok	Overflow	Overflow	Overflow
114	ok	ok	ok	Surcharge

Table ES-10 *Model Results for Existing Sawgrass Network Under Different Modeling Scenarios*

Lift Station ID	Lift Station Assessment			
	Current Average Daily Flow	Current Maximum Daily Flow	2015 Maximum Daily Flow	2030 Maximum Daily Flow
174	ok	ok	Overflow	Overflow
319	ok	ok	ok	Surcharge
324	ok	Surcharge	Overflow	Overflow
346	ok	ok	Surcharge	Overflow
348	ok	ok	Surcharge	Overflow
350	ok	Overflow	Overflow	Overflow
352	ok	Overflow	Overflow	Overflow
353	ok	Overflow	Overflow	Overflow
355	ok	Surcharge	Overflow	Overflow

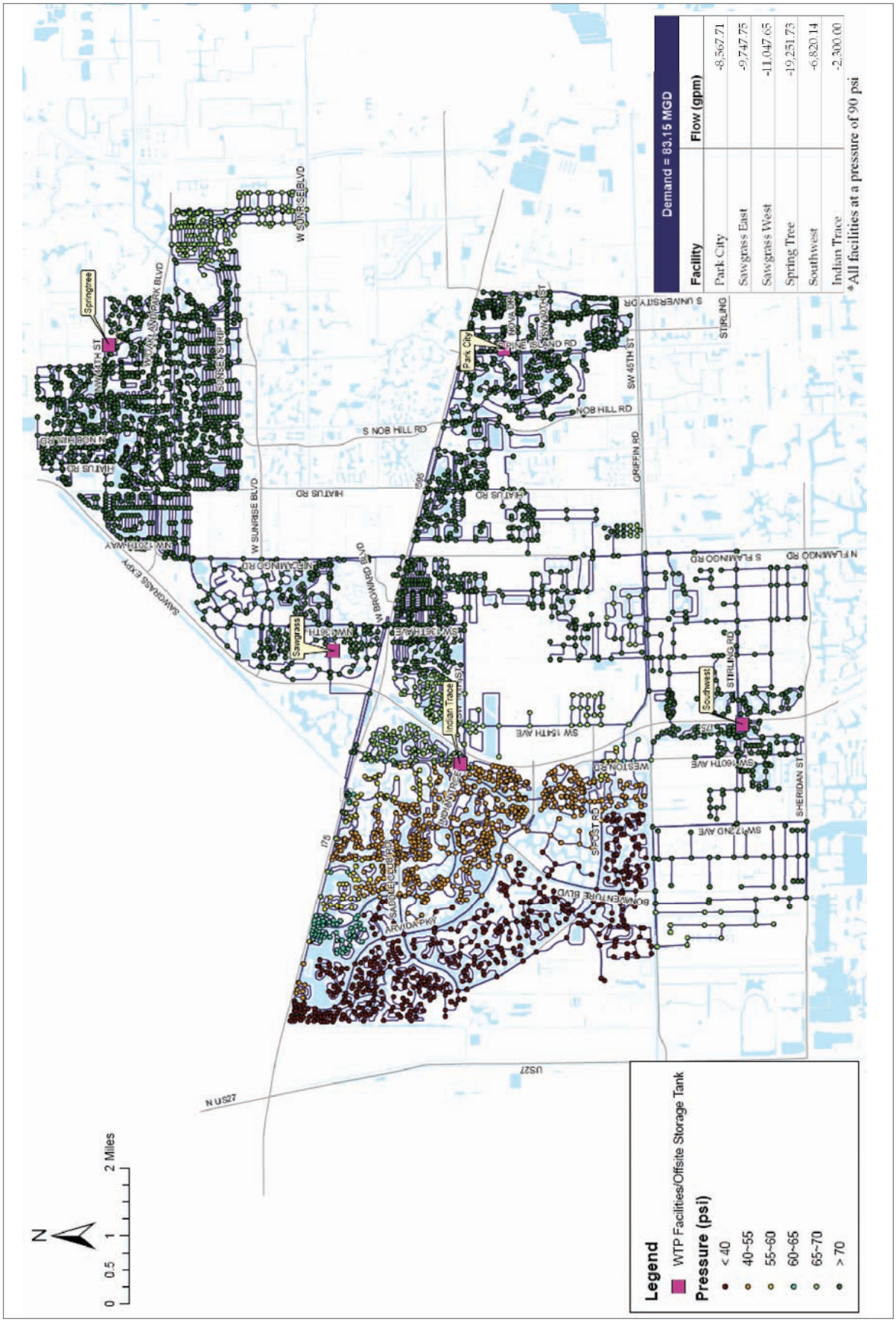
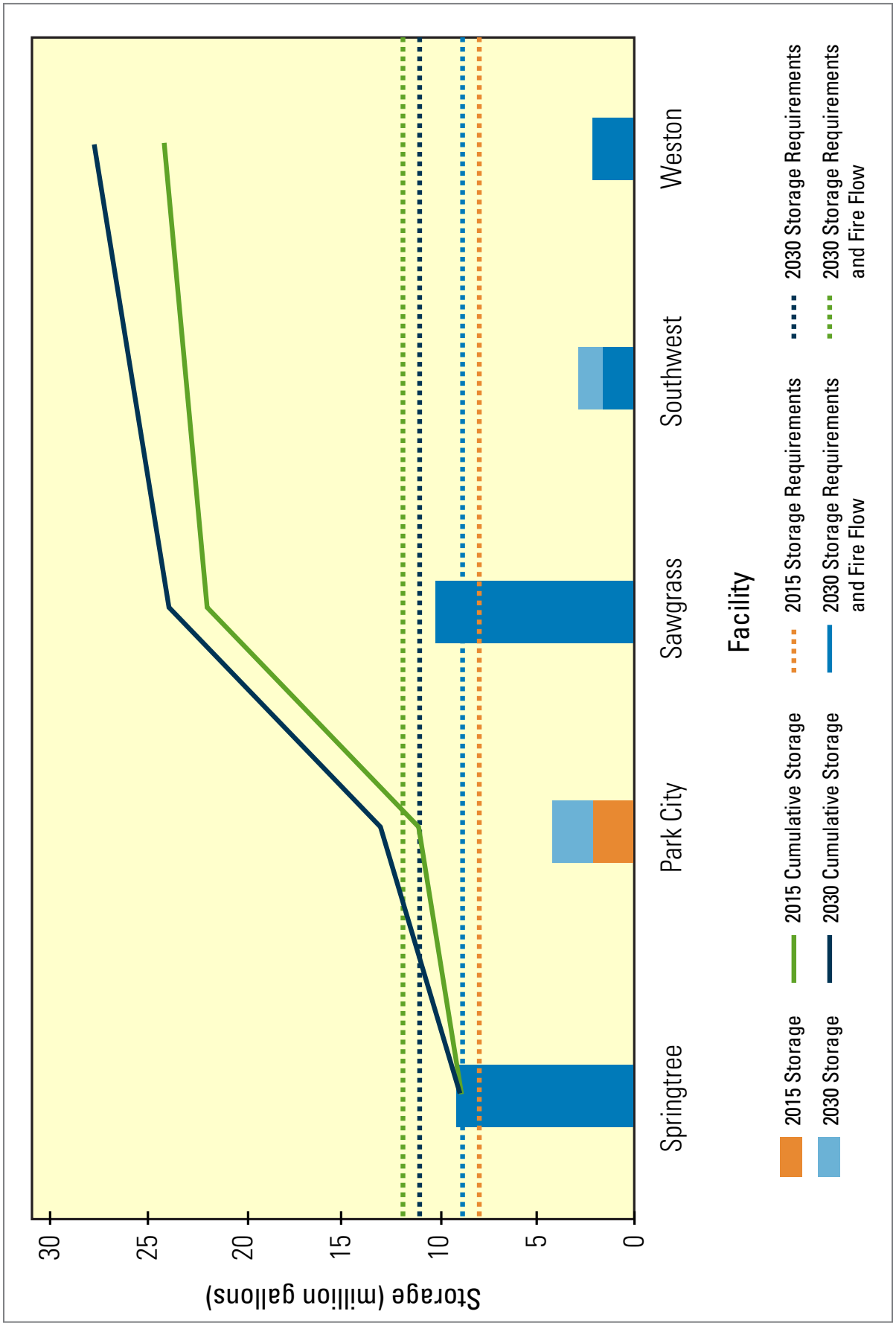


Figure ES-4
2030 Peak Hour Flow Evaluation Results

Figure ES-5
Storage Tank Capacity



Wastewater Treatment

Based on the projected flows, neither the Sawgrass nor Springtree wastewater treatment plants will require expansion. The major improvements recommended for the Sawgrass facility are at the headworks and blowers, and for the Springtree facility are at the blowers. Seventeen other projects are identified for the Sawgrass plant and twenty projects are identified for the Springtree facility.

The SW wastewater treatment plant is a concern to the FDEP because the effluent is discharged through percolation ponds and the City's discharge permit from FDEP requires certain upgrades be made to the plant by 2011.

The cost of abandoning the plant including the transfer of wastewater flows and lost capacity at Sawgrass wastewater treatment plant represents an estimated capital outlay of $23M. The capital cost to convert the existing plant to water reclamation facility (WRF) is about $20M which can additionally generate Biscayne allocations. Abandoning the plant is more costly than upgrading the wastewater treatment plant thus, it is recommended the plant be upgraded to WRF qualifying for reuse credits.

Effluent Disposal and Reuse

The treated effluent from Sawgrass and Springtree are injected into one of three (3) deep wells for disposal. Provided, infiltration and inflow do not increase, the current wells should provide service through 2030.

Currently Sunrise is not required to achieve high level disinfection treatment at either Springtree or Sawgrass WWTP. However if construction of a new deep injection well is needed in the future, the treatment process of both Sawgrass and Springtree may require upgrading.

Although the deep wells provide sufficient disposal capacity for the future, the deep well pumps, do not. The capacity of the existing pumping system is deficient. The City is undertaking an immediate expansion to increase the capacity to 43.5 mgd and is designing a second project to increase the pumping capacity to 52.11 mgd by 2011.

The City has one reuse project that could provide a return on investment. The SW WRF project mentioned previously provides the City with an opportunity to reuse highly treated effluent to recharge the Biscayne aquifer and receive potable water credits from the SFWMD.

Biosolids

Biosolids generated by the City are becoming difficult disposal problem. Historically, Class B sludge was land applied to agricultural lands in neighboring counties (i.e. sod farms).

Proposed revisions to Chapter 62-640, F.A.C. will severely limit this practice. Additionally, restrictions by some counties and phosphorous limitations imposed as part of the Everglades restoration have increased hauling costs.

This study recommends an immediate first step of dewatering sludge to reduce hauling costs. This recommendation has a 4 year return on investment as indicated in **Table ES-11**.

The second step provides a longer term solution and involves thermal drying of the sludge to achieve class A/AA residual that is a marketable product. This report analyzed two alternatives and presents associated costs as shown in **Table ES-12** where alternative 2 is recommended. The preliminary project schedule for this second step is recommended for completion by 2015.

Year	Total Difference[1] in Projected Cost Liquid Hauling vs Dewatered Cake Annual Cost[2]
2009	$2,643,000
2010	$5,279,000
2011	$7,959,000
2012	$10,658,000

[1]Annual cost based on difference of liquid land application disposal fee of $575 per 6000 gallons and dewatered cake land application disposal fee of $34 per wet ton.

[2]Projected annual cost is not a NPC but an annual cost in 2008 dollars.

Table ES-11 *City of Sunrise Payback Period for Dewatering Equipment*

Project Name	Capital Cost	Lifecycle Cost (thru 2030)	Net Present Cost
Alternative 1: Thermal Oxidation	$53,110,000	$47,320,000	$100,430,000
Alternative 2: Thermal Drying	$48,320,000	$27,520,000	$ 75,840,000

[1]Pricing based on ENR Construction Cost Index = 8293 (July 2008).

[2]Estimates of probable costs are order-of-magnitude estimates as defined by the Association for the Advancement of Cost Engineering. These costs estimates are defined to be accurate within a range of -50% to +100% of actual costs.

[3]These cost opinions include a 30% factor for estimating the costs for engineering, permitting and administration services during design, permitting and construction. Additionally, a 30% contingency is included.

Table ES-12 *City of Sunrise Summary of Probable Alternative Costs (2008 Dollars)[1, 2, 3]*

Capital Improvements Plan

The recommended capital improvements identified as part of this plan, are identified by project in **Chapter 13 - Capital Improvements Plan**. In summary, the recommended improvements were developed for two time horizons, 2015 and 2030 and are shown in **Table ES-13**.

The more immediate time horizon of 2015 was further subdivided to provide more detail on the make-up and risk associated with the recommended improvements. The chart in **Figure ES-6** illustrates the categories of projects that compile the CIP.

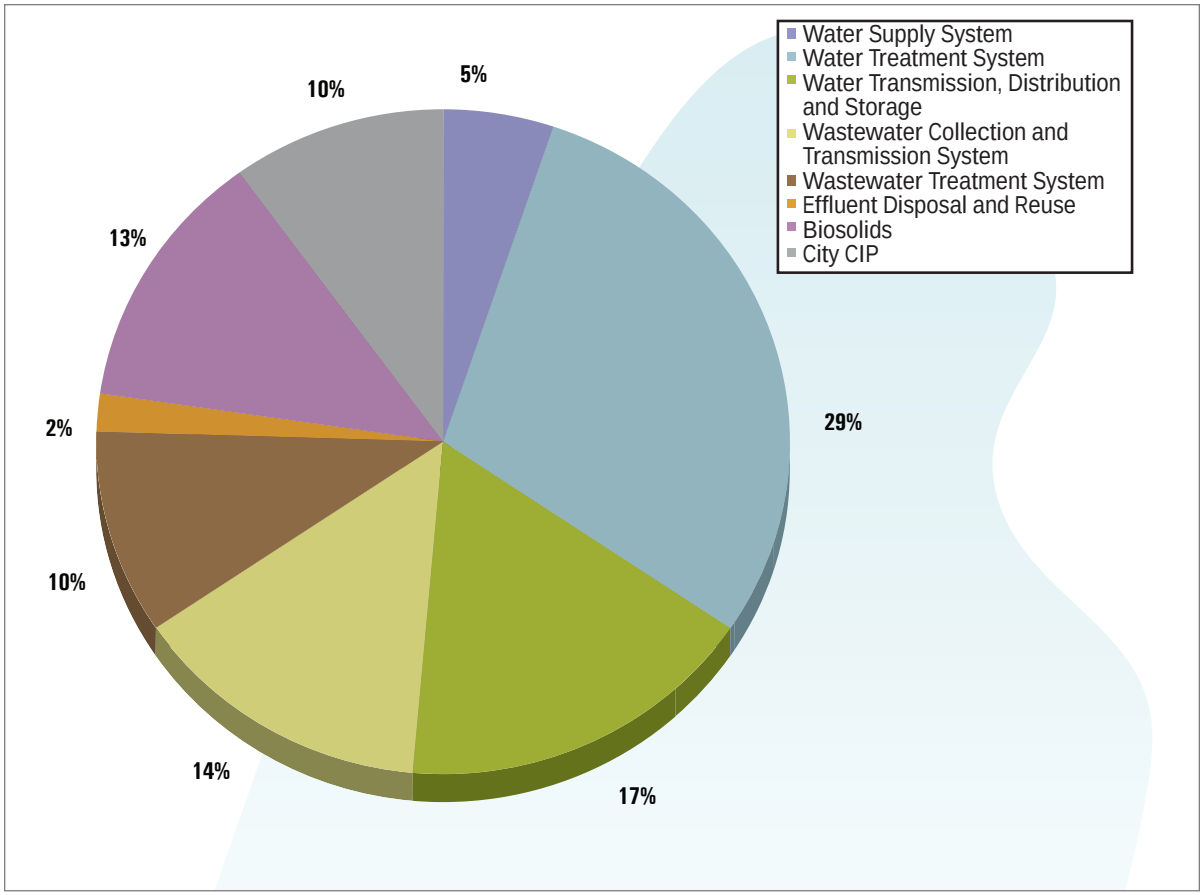
The implementation schedule for the projects identified in the 2015 time horizon is show on **Figure ES-7**.

The investment dollars identified for the 2015 time horizon approximate the dollars approved by the City in their five year, 2013 CIP. The recommended implementation schedule is based on the City's current permits, consent orders, system operation and growth projections. This recommended plan defers approximately $100M in investment of the City's budget (2013).

Table ES-13
City of Sunrise Summary of Capital Improvement Plan

	2015	2030	Total
Water Facilities	$ 245,262,000	$ 34,611,000	$ 279,873,000
Wastewater Facilities	$ 194,927,000	$ 151,211,000	$ 346,138,000
Total	**$ 440,189,000**	**$ 185,822,000**	**$ 626,011,000**

Figure ES-6
City of Sunrise Components of CIP



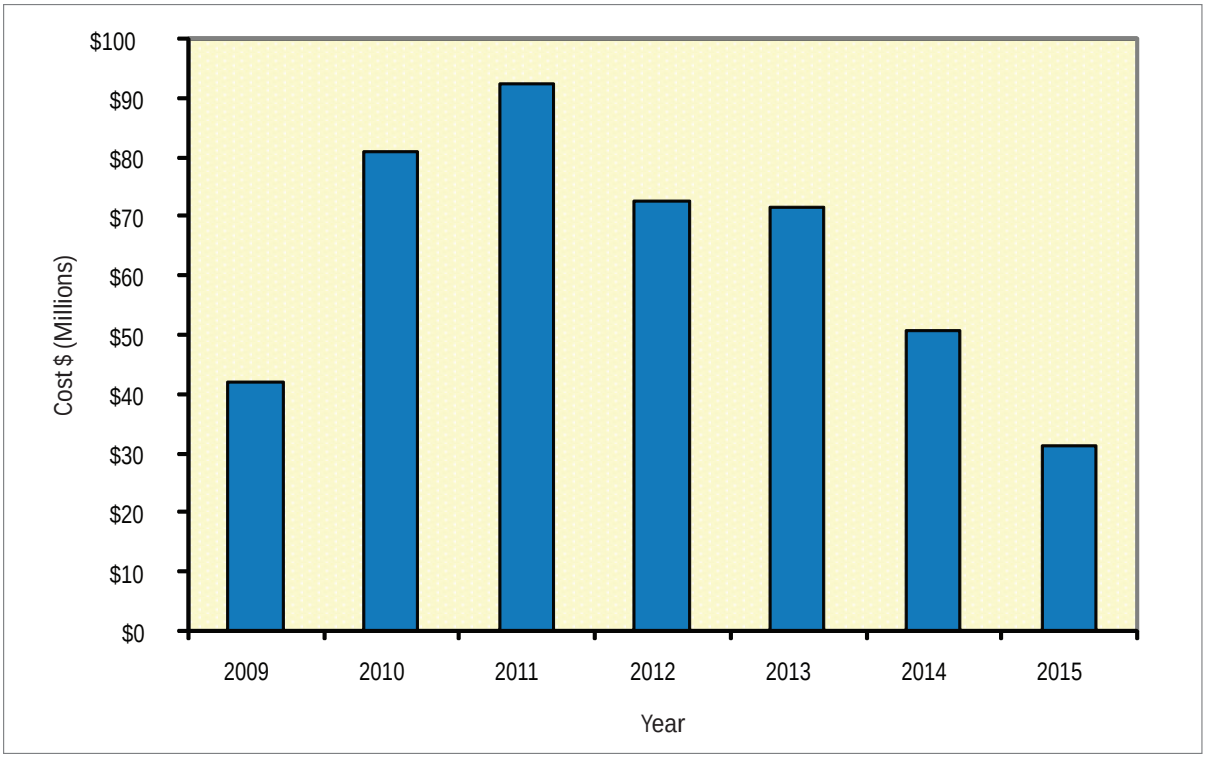


Figure ES-7
City of Sunrise CIP Implementation Schedule

Further refinement in the implementation schedule is reasonable due to the recent collapse in the housing market. **Figure ES-8** shows the percentage of the components of CIP as drivers. Approximately 29 percent of the 2015 CIP is driven by anticipated growth. Deferring growth driven projects until the housing market returns should be considered. Approximately 12 percent of the 2015 CIP is driven by regulatory requirements. These regulatory driven projects are not growth related and ref ective of pending permit conditions or consent orders with schedules controlled by regulation. The remaining 59 percent of the CIP is for renewal and replacement projects. The City has numerous facilities that have outlived their usefulness or no longer operate as needed. These renewal and replacement projects if deferred increase risk to the City of failures that could result in a wide variety of outcomes ranging from public health and safety issues to increased operating and maintenance costs or facility nuisance factors. In light of the current economic conditions, additional evaluation could refine the investment schedule based on risk of failure. This would aid the City target its investment dollars to those projects providing the greatest value to the customers.

It is recommended that the City evaluate its outstanding capacity commitments making certain those are fulfilled, and then reevaluate its policy on connection fees recognizing the cost of new service will be considerably more than historic costs.

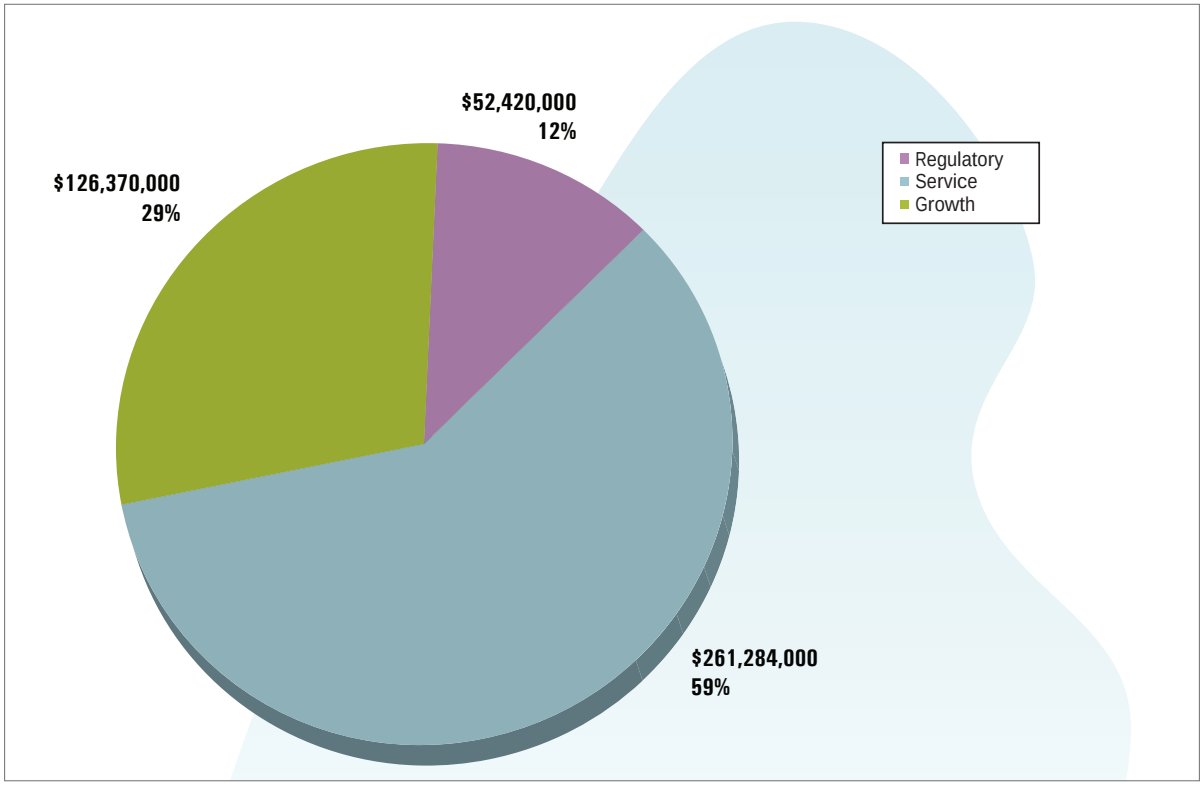


Figure ES-8
City of Sunrise
CIP Drivers