AECOM

Submitted to:
Collier County
Public Utilities Division
3339 Tamiami Trail East
Naples, FL 34112

Submitted by:
AECOM
4415 Metro Parkway
Suite 404
Fort Myers, FL 33916
Dated: August 18, 2015

Collier County Water-Sewer District

2014 Water, Wastewater, Irrigation, Quality Water and Bulk Potable Water Master Plan/CIP Plan*

Summary Report

Ronald R. Cavalieri, P.E., BCEE

*Consistent with the Capital Improvement Program (CIP) contained in the Water, Wastewater, Irrigation Quality Water, and Bulk Potable Water User Rate Study approved by the Board of County Commissioners (Board) on June 10, 2014, as Agenda Item 11C.

Table of Contents

List of Acronyms

Acronym	Definition
AADD	Annual Average Daily Demand
AADF	Annual Average Daily Flow
ASR	Aquifer Storage and Recovery
AUIR	Annual Update and Inventory Report
BEBR	Bureau of Economics and Business Research
BCC	Board of County Commissioners
CCWSD	Collier County Water-Sewer District
CCPUD	Collier County Public Utilities Department
CDES	Community Development & Environmental Services
CIP	Capital Improvement Plan
CMOM	Capacity, Management, Operation & Maintenance
CUP	Consumptive Use Permit
DIW	Deep Injection Wells
ERP	Environmental Resource Permit
FAC	Florida Administrative Code
FGUA	Florida Government Utility Authority
FDEP	Florida Department of Environmental Protection
FY	Fiscal Year
GIS	Geographic Information System
gpcd	Gallons per Capita per Day
GPD	Gallons per Day
Hp	Horsepower
HPRO	High Pressure Reverse Osmosis
HZ1	Hawthorn Zone 1
IE	Ion Exchange
I/I	Inflow and Infiltration
IQ	Irrigation Quality
LH	Lower Hawthorne
LOSS	Level of Service Standard
LPRO	Low Pressure Reverse Osmosis
LS	Lime Softening
LT	Lower Tamiami Aquifer
MMADD	Maximum Month Average Daily Demand
MMDD	Maximum Month Daily Demand(Equivalent to MMADD)
MDD	Maximum Daily Demand
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
MLE	Modified Ludzack-Ettinger
MMDF	Maximum Month Daily Flow (Equivalent to MMADF)
MMADF	Maximum Month Average Daily Flow
MS	Membrane Softening
M3DF	Maximum 3-Day Daily Flow
M3DD	Maximum 3-Day Demand
NCRWTP	North County Regional Water Treatment Plant
NCWRF	North County Reclamation Facility
NERWTP	Northeast Regional Water Treatment Plant
NEWRF	Northeast Water Reclamation Facility
NF	Nanofiltration
OTUC	Orange Tree Utility Company
OTWTP	Orange Tree Water Treatment Plant
O&M	Operations and Maintenance
PUMP	Public Utilities Master Plan
PUD	Planned Unit Development
RIDS	Regional Irrigation Distribution System
RO	Reverse Osmosis
SCADA	Supervisory Control and Data Acquisition
SCRWTP	South County Regional Water Treatment Plant
SCWRF	South County Water Reclamation Facility
SDP	Site Development Plan
SERWTP	Southeast Regional Water Treatment
SEWRF	Southeast Water Reclamation Facility
SFWMD	South Florida Water Management District
TAZ	Traffic Analysis Zone
TDS	Total Dissolved Solids
TM	Technical Memorandum
UIC	Underground Injection Control
USEPA	United States Environmental Protection Agency
VFD	Variable Frequency Drive

Acronym	Definition
WRF	Water Reclamation Facilities
WT	Water Table
WTP	Water Treatment Plant
WUP	Water Use Permit
WWTP	Wastewater Treatment Plant

Section 1

Developing the Plan

This Section provides an overview of the project goals and objectives including a brief description on the project background and a summary of project approach.

1 Introduction

The Collier County Water-Sewer District 2014 Water, Wastewater, Irrigation Quality Water, and Bulk Potable Water Master Plan (Master Plan) provides direction for near and long term infrastructure management strategies supported by technical evaluations and capital improvement programs that are focused on meeting the future customer demands with best value solutions and fully leveraged assets.

1.1 Background

The Collier County Water-Sewer District (CCWSD) owns and operates a potable water supply, treatment and distribution system; a wastewater collection, conveyance and treatment system; and an irrigation quality water supply and distribution system to provide potable water and wastewater services to a seasonally adjusted population of over 200,000 in unincorporated areas of Collier County. The Collier County Water and Wastewater Departments are responsible for operation and maintenance of the potable water, wastewater, and irrigation quality water systems. The Collier County Planning and Project Management Department (PPMD) is responsible for planning and management of capital improvements and replacement and rehabilitation (R&R) projects. The CCWSD has retained AECOM Technical Services, Inc. (AECOM) for development of a Master Plan.

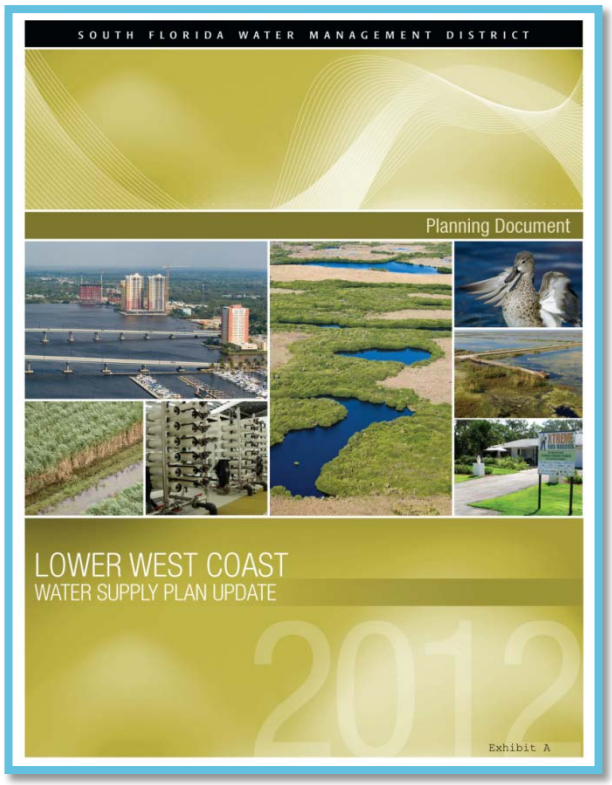
1.2 Previous Plans and Studies

The initial Water Master Plan for CCWSD was completed in 1980. Updates to the initial plan were completed in 1985, 1986, 1996, 2001, 2002, 2003, 2005, and 2008. Similarly, a “201 Facilities Plan” for the CCWSD’s wastewater system was completed in 1978. Updates to the initial facilities plan were completed as master plans for wastewater facilities in 1986, 1996, 1997, 2001, 2002, 2003, 2005, and 2008.

In the preparation of this Master Plan, the results and findings from several other past and ongoing reports have been considered and incorporated. A complete summary of previous plans and studies is included in the references section at the end of this report. The key studies and reports that provided an insight to this Master Plan include the following:

- CCWSD’s 2008 Water and Wastewater Master Plan Updates,

- 10-Year Water Supply Facilities Work Plan Update,
- CCWSD's 2013 and 2014 Annual Update Inventory Reports (AUIRs) for the potable water and wastewater systems,
- South Florida Water Management District (SFWMD) 2012 Lower West Coast Water Supply Plan (LWCWSP) Update.



Although these previous studies provided guidance on development of the CCWSD's water and wastewater systems, they were done independently of each other. A Master Plan is needed to address the multiple objectives of the CCWSD's water and sewer system management and to serve as a framework for planning.

1.3 Project Vision

The CCWSD's vision for this project is to "provide to the County Manager and Board of County Commissioners (BCC) a comprehensive Master Plan that provides direction for near and long term infrastructure management strategies supported by technical evaluations and capital improvement programs that are focused on meeting the future customer demands with best value solutions and fully leveraged assets." It is the intent of this Master Plan to meet the future demands of the CCWSD with enhanced supply and optimized capacity using advanced and proven best value technology. The CCWSD also wishes to develop and maintain a comprehensive Master Plan, including a Capital Improvement Program (CIP) with prioritized rehabilitation and restoration (R&R), using asset management, GIS-based hydraulic modeling, and advanced coordination efforts with inter-divisional staff and assets.

1.4 The Stakeholders

The Master Plan considers the viewpoints of multiple stakeholders. Each of the stakeholder groups involved in and/or impacted by the development of this Master Plan include:

Collier County BCC – The Collier County BCC, ex-officio the governing board of the CCWSD, is comprised of five elected officials who have final approval and legislative authority over the CCWSD management and operations.

Collier County Water-Sewer District Customers — The CCWSD mission is to deliver best value, high quality, sustainable services that meet CCWSD customers' expectations.

CCWSD Working Group — The CCWSD working group is comprised of key staff actively involved in regular progress meetings and review of project deliverables. The individuals assigned to the working group are identified in the Project Management Plan.

Project Team — The project team is comprised of AECOM staff members assigned to this project, identified in the Project Management Plan. The project team members are responsible for the preparation of project deliverables.

Regulatory Agencies — The regulatory agencies that impact the development of the Master Plan include:

- **Florida Department of Environmental Protection (FDEP)** — The FDEP is responsible for the regulation and administration of water and wastewater treatment facilities and related infrastructure and aquifer storage and recovery systems.

- **South Florida Water Management District (SFWMD)** — The SFWMD is responsible for the regulation and administration of water use permits, and establishment of minimum flows and levels to protect the State's waters.

Collier County Departments — The development of the Master Plan involved interaction with other Collier County departments outside of the Public Utilities Division, including Growth Management Division (GMD) Comprehensive Planning Section.

Adjacent Utilities — The implementation of a Master Plan could be impacted with potential changes in the adjacent utilities such as interconnect options and regionalization opportunities. However, during the development of the Master Plan such utilities were not contacted to discuss existing and potential opportunities. The following are potential utilities that could impact the implementation of the Master Plan:

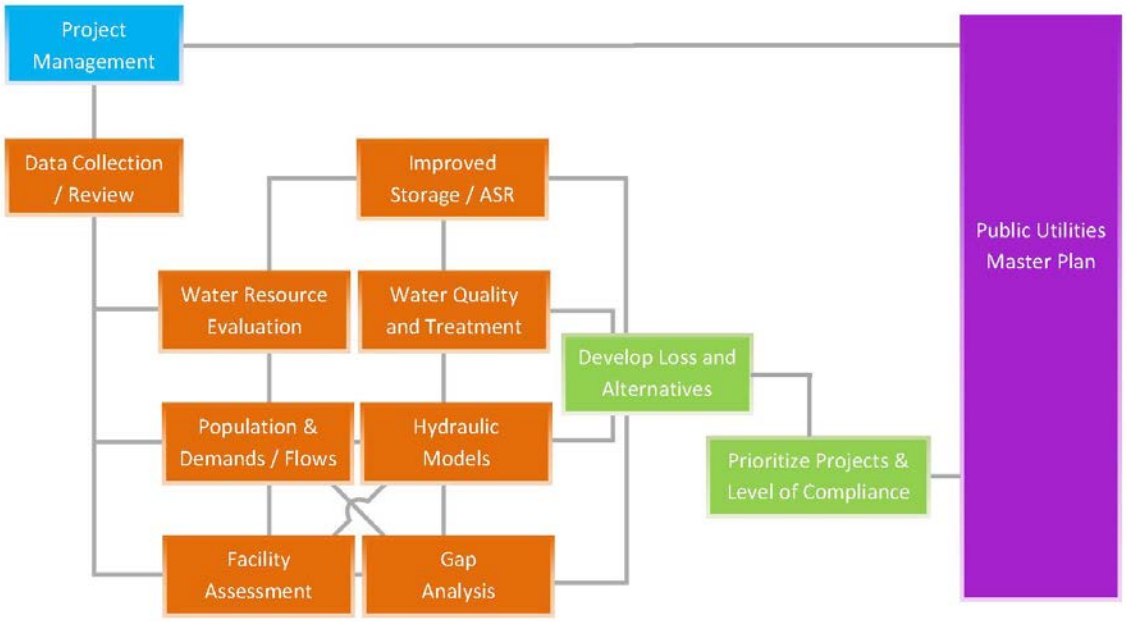
- City of Naples Public Utilities
- Florida Government Utility Authority, Golden Gate Utility System
- Bonita Springs Utilities, Inc.
- Marco Island Public Utilities

1.5 Project Tasks and Approach

The scope of services for the Master Plan is built on an objective-based approach and was completed under the following major tasks:

- Project management (Task 1)
- Data collection and review of existing background reports, studies, and operating data (Task 2)
- Development of water resources characterization (Task 3)
- Evaluation of population trends and demands and flow projections for potable water, wastewater, and irrigation quality water (Task 4)
- Evaluation of the existing treatment capacity for potable water, wastewater, and irrigation quality water (Task 5)
- Utilization of existing hydraulic models for potable water, wastewater, and irrigation quality water pipe networks (Task 6)
- Evaluation of water quality goals and treatment options to meet established goals (Task 7)
- Development of level of service standards and alternative water resource configurations (Task 8)
- Evaluation and prioritization of Capital Improvement Projects (Task 9)
- Development of recommended infrastructure improvements, Capital Improvement Plan and Final Master Plan Report (Task 10)

Exhibit 1-1: Master Plan Strategic Approach



1.6 Project Goals and Objectives

The goals and objectives that are critical to achieving the vision and mission for this project are identified as follows:

- **Business Oriented Plan:** The Master Plan is a business oriented plan, which provides guidance on the recommended capital improvement program.
- **Establish Adequate Budget for R&R Projects:** The Master Plan establishes a capital improvement program that is sustainable and keeps assets in good operating condition and extends their useful life. The development of the Master Plan actively involved management and operations staff to ensure that the CCWSD's needs are met.
- **Coordinate with County's Rate Consultant:** The Master Plan and recommended Capital Improvement Program has been coordinated and integrated with the CCWSD's rate consultant for development of appropriate customer user rates and impact fees. Future Master Plans and Rate/Impact Studies will continue to be coordinated and integrated.
- **Population Projections:** The Master Plan establishes not just future population, but also where growth will occur within the CCWSD in order to develop an appropriate capital improvement program.
- **Alternative Water Supplies (AWS):** According to the SFWMD, continued development of AWS is needed to meet the regions long term water supply needs. A Total Water Management (TWM) approach was considered, which integrates multiple water supply sources on meeting water demands and considers all parts of the water cycle.
- **Strategy for development of the Northeast Service Area:** The CCWSD owns approximately 216 acres within the Orange Tree PUD. Design documents have been prepared for a new NERWTP and a new NEWRF, as well as 85 raw water well sites. The Master Plan addresses these potential facilities as a function of future demands above and beyond the current private utilities. Infrastructure for the Northeast site has

been designed, zoned, and approved by the BCC. Construction drawings are complete and ready to permit for future demands, such as the Town of Big Cypress.

- **Strategy for Orange Tree Utility Company (OTUC):** It is anticipated that the OTUC will be integrated into the CCWSD pursuant to the 1991 agreement and subsequent court orders. The CCWSD intends to continue to operate the current utility facilities as long as needed and expand as needed within the current site boundaries. The Master Plan developed a corresponding capital improvement plan.

- **Extended Use of Irrigation Quality Water:** Currently, all treated effluent from the CCWSD's WRFs either goes to Irrigation Quality (IQ) water or to a deep injection well. During the rainy season not all of the effluent goes to the IQ water system. In addition, the CCWSD does not produce enough reclaimed water to meet IQ demand during the dry season. Consequently, the CCWSD augments IQ water supply during the dry season with fresh groundwater, and is currently developing a fresh groundwater Aquifer Storage and Recovery (ASR) system with storage below the underground source of drinking water (USDW). Recent Interpretation by the United States Environmental Protection Agency (USEPA) and FDEP on how Florida can apply the Underground Injection Control (UIC) program requirements to ASR wells, may allow storage zones within the USDW. Storage within the USDW could significantly reduce the capital and operation cost of ASR systems. This new interpretation may be an important factor in the CCWSD's long term plan for ASR. The Master Plan includes further augmenting the IQ water supply with alternative water supplies such as the Golden Gate Canal, Cocohatchee River, Henderson Creek, and stormwater, including but not limited to the Lower Tamiami aquifer. The goal is 100 percent beneficial reuse of wastewater treatment plant effluent that is not required for deep injection well testing.

- **Replacement of Antiquated/Sub-Standard Pipe:** The CCWSD currently has approximately 88 miles of asbestos cement pipe and 96 miles of iron pipe, which is being replaced at an approximate rate of 3 miles per year. In addition, vulnerability assessments indicate other areas in need of replacement. The Master Plan establishes an adequate capital improvement program for addressing these areas.

- **Sustainability and Reliability:** The sustainability and reliability of the CCWSD's future infrastructure is a major objective in development of the Master Plan and recommended improvements. Treatment plant reliability is determined differently for water and wastewater because each is governed by different regulatory bodies.

  Wastewater plants are required to meet Class 1 reliability in accordance with the Florida Department of Environmental Protection (FDEP) regulations. FDEP Class I wastewater reliability standards ensure that sufficient reliability is designed into the process such that the facility can be safely operated and maintained at the constructed capacity.

  Water plan reliability is not addressed by FDEP regulations; therefore, the CCWSD has chosen to follow the "2012 Recommended Standards for Water Works." This standard recommends reducing constructed capacity by the largest treatment process unit in order to allow for operational maintenance to occur during times of peak demand. The CCWSD refers to this reduced value as operational capacity.

  These methods are summarized in the CCWSD's Public Utilities Division Reliability Guidelines, February 2006.

- **Environmental Protection:** The Master Plan seeks sustainable water supply sources that are consistent with the LWCWSP and the BCC approved 10-Year Water Supply Plan.

- **Flexibility:** The Master Plan provides recommendations for facilities and resources that are capable of modification or adaption to reflect changing conditions to accommodate development and demand.

- **Water Supply Diversity:** The Master Plan includes the use of multiple sources of water so that the CCWSD is not reliant on a single water supply source or location for ground and fresh water. Over the next ten to twenty years, and through build out, the Master Plan provides a progressive, integrated approach that enables plants to treat water from a wide variety of ground and surface water sources for potable and irrigation uses.

- **Outlook beyond the CCWSD Service Area:** While the Master Plan provides recommendations for facilities and resources through build-out for all developable lands within the CCWSD service area; it also identifies potential expansion opportunities to increase the service area where development activities are feasible. These new areas could be served by: extending pipes of existing centralized treatment facilities; de-centralized satellite treatment facilities; or a hybrid of both.

Section 2

Existing System & Operation

This Section provides a brief summary of the CCWSD's existing potable water system, wastewater system, and irrigation quality water system facilities and their operation.

2 Existing System and Operation

The CCWSD is a public utility, which owns and operates a potable water supply, treatment and distribution system; a wastewater collection, conveyance and treatment system; and an irrigation quality water supply and distribution system.

The existing CCWSD is bounded on the north by Lee County, on the south by the Marco Island Public Utilities Service Area, on the east by the Urban Planning Boundary and on the west by the City of Naples Public Utilities Service Area and the Gulf of Mexico. Within the Water-Sewer District boundary the service area does not include those areas within Collier County currently served by the City of Naples, the Florida Government Utility Authority (Golden Gate City) and the Orange Tree Utility Company (OTUC). It is anticipated that the OTUC will be integrated into the CCWSD pursuant to the 1991 agreement and subsequent court orders. The CCWSD intends to continue to operate the current utility facilities as long as needed and expand as needed within the current site boundaries.

2.1 Potable Water System

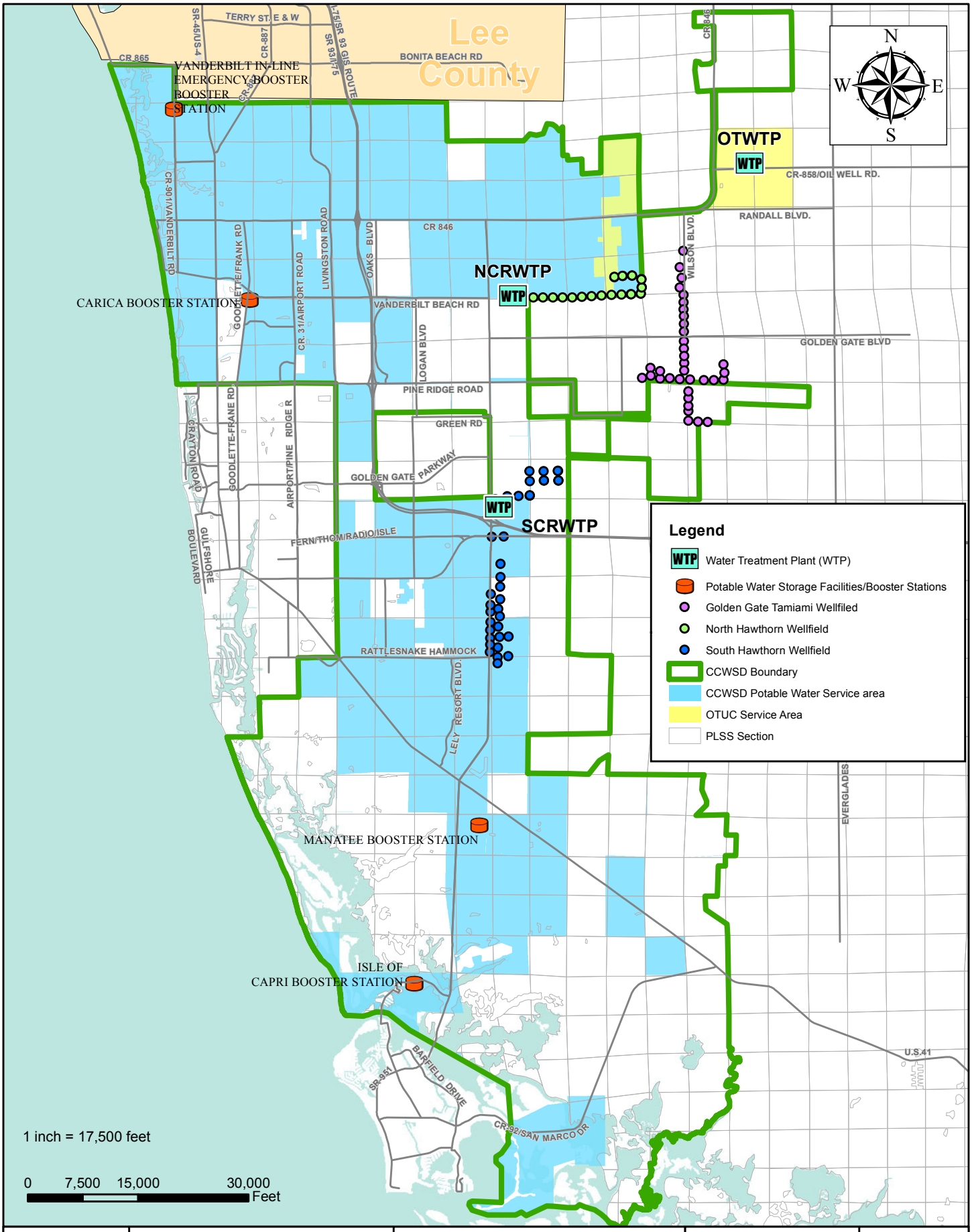
The CCWSD potable water (PW) system includes two WTPs, three water storage and re-pumping facilities, three wellfields, and one Aquifer Storage and Recovery (ASR System). There are over 56,000 service connections and water is distributed through nearly 1,000 miles of water mains. **Exhibit 2-1** presents the CCWSD potable water service area.

2.1.1 Potable Water System Existing Facilities

2.1.1.1 PW System Supply Sources

The CCWSD has historically obtained its potable water supply from groundwater resources. Groundwater is either fresh or brackish depending on its source aquifer. The potable water system utilizes three existing wellfields for raw water supply:

- The Golden Gate Tamiami Wellfield – draws water from the fresh water Lower Tamiami aquifer
- The North Hawthorn Wellfield – draws water from the brackish water Lower Hawthorn and Hawthorn Zone 1 (Mid Hawthorn) aquifers



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

Collier County

Collier County Public Utilities Master Plan

Potable Water System Service Area

AECOM

Exhibit

2-1

- The South Hawthorn Wellfield – draws water from brackish water Hawthorn Zone 1 and Lower Hawthorn aquifers

The South Florida Water Management District (SFWMD) regulates the raw water supply for the CCWSD through water use permit [Permit Number 11-00249-W] that was issued on September 22, 2014 and expires on September 22, 2036. **Table 2-1** presents a summary of CCWSD wellfield details.

Table 2-1: Potable Water System Wellfields Summary

Wellfield / Aquifer	Water source	# of Wells[1]	SFWMD CUP Allocation (AADF MGD)	Wellfield Firm Capacity (SFWMD Permit) (MGD)	Wellfield Firm Capacity (CCWSD Inventory) (MGD)
Golden Gate Tamiami Wellfield	Fresh ground water	37[2]	26.50[4]	44.93	37.09
Hawthorn Zone 1 Aquifer	Brackish ground water	46	16.00[4]	96.91	60.59
Lower Hawthorn Aquifer	Brackish ground water	42[3]	13.03[4]		
Total		125	55.53[4]	141.8	97.7

1. Number of wells taken from SFWMD CUP (Permit Number 11-00249-W)
2. Existing production well 8 has been capped and is out of service.
3. Includes 17 proposed future wells as included in the SFWMD CUP.
4. Limiting condition 5 of the SFWMD CUP provides for a total annual allocation of 55.53 MGD, and limits annual withdrawals from specified sources as identified above. However, the allocation for the Lower Hawthorn Aquifer with overlap is 19.52 MGD.

The OTUC also maintains a SFWMD consumptive use permit (CUP) for its potable water supply to the Orange Tree Water Treatment Plant (OTWTP). The permit expiration date is August 26, 2018. **Table 2-2** summarizes the wells permitted for the OTUC.

Exhibit 2-1 shows the location of the CCWSD raw water wellfields. The Technical Memorandums on Task 3 – Water Resource Evaluation and Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provide greater detail on the potable water system raw water supply sources.

Table 2-2: OTUC Wellfield Summary

Wellfield	Water Resource	Number of Wells	SFWMD CUP Allocation (AADF MGD)
Lower Tamiami Wellfield	Fresh Groundwater	6[1]	0.91

1. Four wells are existing and two wells are proposed for future use

2.1.1.2 PW System Treatment Facilities

The CCWSD operates two water treatment plants that have the ability to process both fresh groundwater and brackish groundwater resources. The WTPs include:

- North County Regional Water Treatment Plant (NCRWTP)
- South County Regional Water Treatment Plant (SCRWTP)

Exhibit 2-2: NCRWTP LPRO Treatment Skids

The NCRWTP has a constructed capacity of 20.0 Million Gallons per Day (MGD) including a 12.0 MGD nanofiltration (NF) process and an 8.0 MGD low pressure reverse osmosis (LPRO) process. The Golden Gate Tamiami Wellfield supplies raw fresh groundwater to the plant's NF process system while the North Hawthorn Wellfield supplies raw brackish groundwater to the plant's LPRO process system. The recovery efficiencies of the NCRWTP NF and LPRO treatment processes are 85 percent and 75 percent, respectively.

Exhibit 2-3: SCRWTP LS Treatment Reactor Tank

The SCRWTP has a permitted capacity of 32.0 MGD including a 12.0 MGD lime softening (LS) process and a 20.0 MGD LPRO process. The Golden Gate Tamiami Wellfield supplies raw fresh groundwater to the plant's LS process system while the South Hawthorn Wellfield supplies raw brackish groundwater to the plant's LPRO process system. The recovery efficiencies of the SCRWTP LS and LPRO treatment processes are 97 percent and 75 percent, respectively.

OTUC operates the OTWTP, located east of SR-846 and north of CR-858. The OTWTP has a constructed capacity of 0.75 MGD using membrane softening (MS). The plant is supplied by the Lower Tamiami fresh ground water wellfield and the MS treatment process has a recovery efficiency of approximately 80 percent.

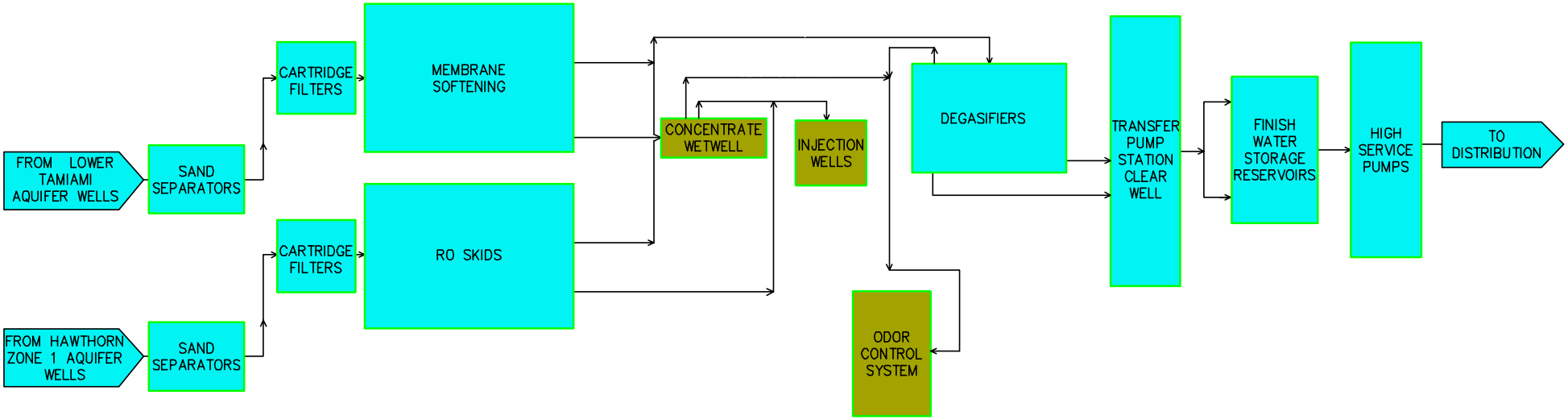
Exhibits 2-4 and **2-5** present treatment process block diagrams for the NCRWTP and SCRWTP, respectively. A summary of potable water system treatment facilities is provided in **Table 2-3**. **Exhibit 2-1** shows the location of the CCWSD potable water system treatment facilities. The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the potable water system treatment facilities.

2.1.1.3 PW System Storage & Pumping Facilities

The CCWSD potable water system pumping facilities are comprised of high service pumps located at both water treatment plants, three water booster pumping stations and an in-line emergency booster pump station. Ground storage tanks at the water treatment plants and at the booster pumping station sites provide system storage and reserve capacity to help meet peak hourly demands of the system. A summary of these facilities is provided in **Table 2-4**. **Exhibit 2-1** shows the location of the CCWSD potable water system storage facilities. The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the potable water system storage facilities.

2.1.2 PW System Historical Water Production

The CCWSD potable water system currently provides drinking water service to over 160,000 permanent residents and over 200,000 residents in peak season. The potable water production data for 2001 through 2013 was analyzed to establish historical trends in the potable water plant production and to characterize the maintenance and management of the existing system. **Exhibit 2-6** presents the historical trends of potable water plant production data on an annual average daily demand (AADD), maximum month daily demand (MMDD), maximum daily demand (MDD), and maximum 3-day daily demand (M3DD) basis. The historical potable water production chart indicates that since 2001, potable water production peaked in 2007 (26.3 MGD AADD) and decreased thereafter until 2010. This could be attributed partly to the economic recession in the Country after 2007, implementation of water conservation measures, and significant drought conditions during 2007 and associated water restrictions. Since 2010 potable water production has been gradually increasing.



User: Thomson
Date: January 2015
County, Collier

Collier County

Not To Scale

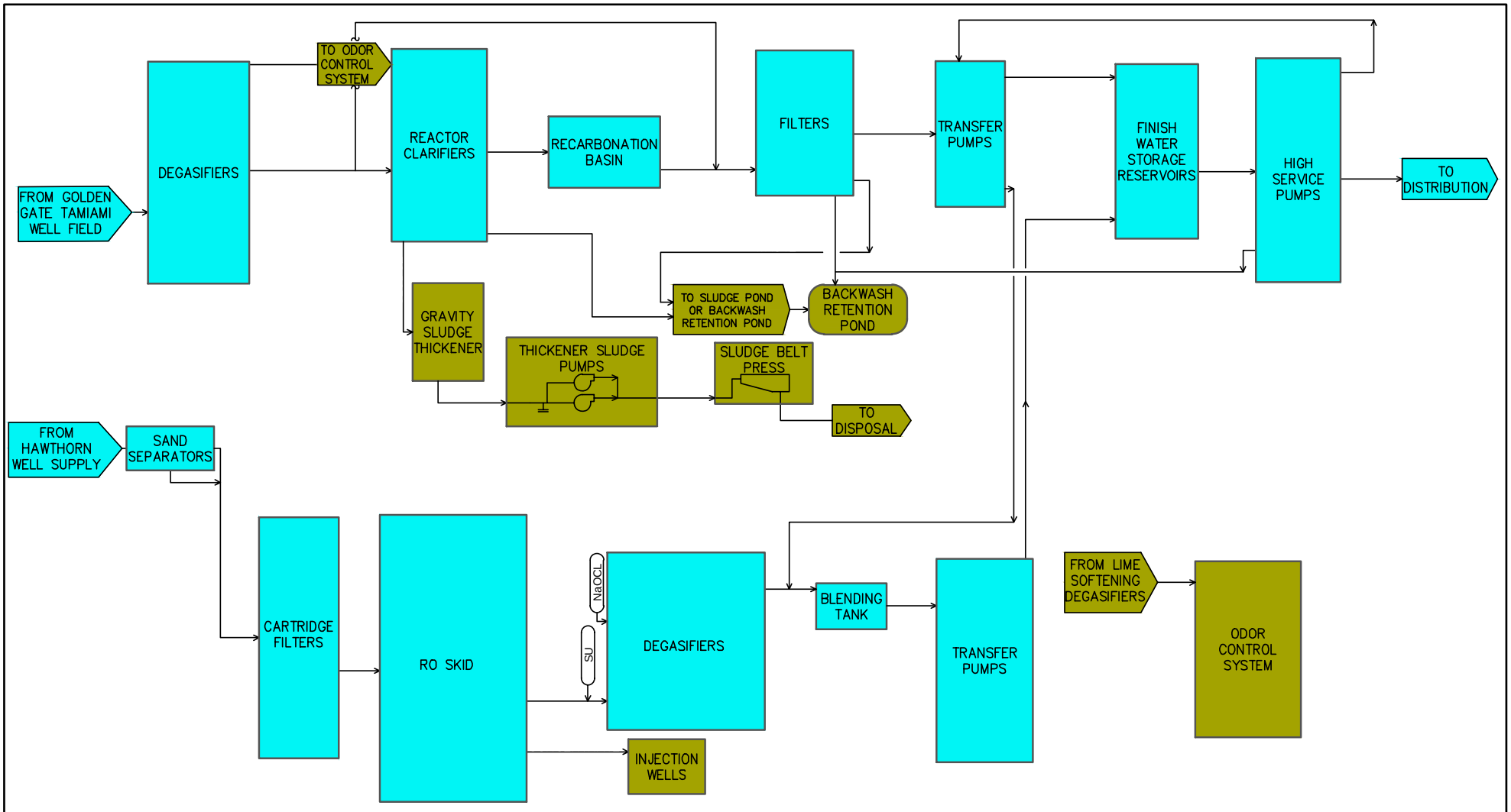
Collier County
Public Utilities Master Plan

NCRWTP Treatment Process

AECOM
4415 Metro Parkway
Suite 404
Fort Myers, Florida 33916
T 239-278-7996 F 239-278-0913

Exhibit

2 - 4



User: A Thomson
Date: January 2015
County, Collier

Collier County

Not To Scale

Collier County
Public Utilities Master Plan

SCRWTP Treatment Process

AECOM
4415 Metro Parkway
Suite 404
Fort Myers, Florida 33916
T 239-278-7996 F 239-278-0913

Exhibit

2 - 5

Table 2-3: Potable Water System Treatment Facilities Summary

WTP	Treatment Process	Ground Water Resource	Constructed Capacity	Recovery Efficiency
NCRWTP	Nanofiltration (NF)	Fresh Ground Water	6 X 2 MGD = 12 MGD	85%
	Low Pressure Reverse Osmosis (LPRO)	Brackish Ground Water	4 X 2 MGD = 8 MGD	75%
SCRWTP	Lime Softening (LS)	Fresh Ground Water	3 X 4 MGD = 12 MGD	97%
	Low Pressure Reverse Osmosis (LPRO)	Brackish Ground Water	10 X 2 MGD = 20 MGD	75%
Total Constructed Capacity			52 MGD	NA
Operational Capacity[1]			48 MGD	NA

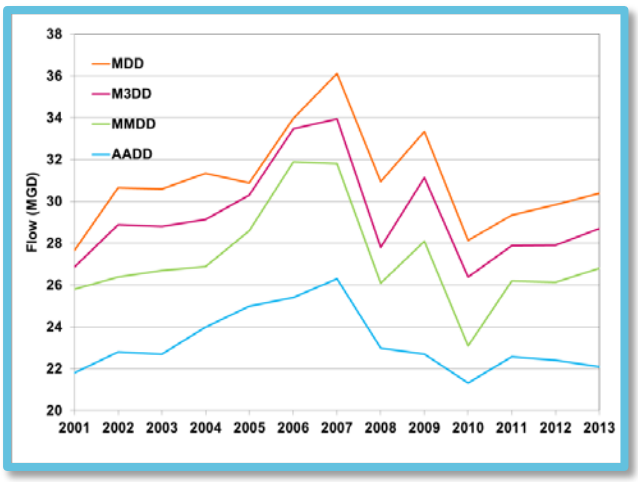
1. In order to account for the operational need to maintain plant equipment, the constructed capacity (52 MGD) is reduced by the largest treatment process unit (4 MGD lime softening reactor/clarifier). The resulting operational capacity (48 MGD) is used to determine when expansion is required. This is based on the CCWSD's Public Utilities Division Reliability Guidelines, February 2006, consistent with the "2012 Recommended Standards for Water Works."

Table 2-4: PW System Storage Facilities Summary [1,2]

Storage Facility Location	Usable Storage Volume (MG)
NCRWTP	11.1
SCRWTP	12.4
Isle of Capri Pumping Station	0.2
Manatee Road Pumping Station	1.8
Carica Road Pumping Station	9.3
Total Capacity	34.8

1. Manatee Road ASR is not currently in use and therefore is not included.
2. Goodland Booster Pump Station and ground storage tank serves Goodland and Key Marco. Therefore, the storage volume is not considered herein.

Exhibit 2-6: Historical PW Production



2.1.2.1 Non-Revenue Water

Non-Revenue water (NRW) including water main losses, fire flow, and water usage for water main flushing and other types of unbilled water use, averaged approximately 7 percent of the total potable water distributed during the time period 2001 through 2012. The NRW showed a decreasing trend in recent

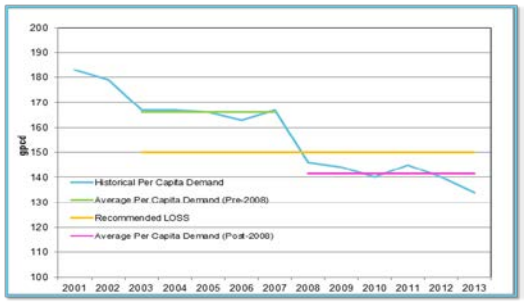
years, with only 3 percent NRW in the year 2012. This percentage reflects good system maintenance and management of leaks and other water main losses.

2.1.2.2 Per-Capita Demand

An analysis of historical per-capita water demand data indicated a decreasing trend for the time period 2001 through 2013. This could be attributed in part to conservation measures implemented in the CCWSD's service area, such as the installation of lower flow fixtures; the recent economic recession; and reduced irrigation as a result of drought conditions.

The average per capita demand during the period 2001 to 2013 was 157 gpcd. As shown in **Exhibit 2-7**, the per capita demands for the years 2001 and 2002 were much higher than the per capita demands during the following years from 2003 to 2013. During the period from 2003 through 2007 the per capita demand remained relatively constant at an average per capita demand of 166 gpcd. Similarly, during the period of 2008 through 2013, the per capita demand varied slightly with an averge over the period being 142 gpcd. Between the years 2007 and 2008 a notable change occurs where the per capita demand decreases. From 2008 through 2013 the per capita demand remains lower and ranges between 146 to 134 gpcd, which may be a result of behavioral changes, improved water efficiencies and water conservation efforts. It is anticipated the lower per capita demand will continue, given the reasons stated above, but also considering that the CCWSD has an IQ water program with an overall objective of reducing the potable water used for irrigation and expanding the use of reclaimed water.

Exhibit 2-7: Historical Per-Capita Water



It is therefore recommended that a per capita water demand of 150 gpcd be used as the Level of Service Standard (LOSS) for the Master Plan. This is a conservative value when considering the last five years, and it is representative of the recent downward trend in per capita demand.

LOSS Per-Capita Potable Water Demand = 150 gpcd

2.1.2.3 Water Demand Peaking Factors

The total operational capacity of water treatment facilities must be able to meet the projected peak demands. Since the CCWSD has potable water storage capacity in excess of the recommended storage requirements identified in the "2012 Recommended Standards for Water Works", the Maximum 3 Day Demand is utilized in this Master Plan for determining the operational water treatment capacity. The peaking factor that is used to determine plant capacity is therefore based on the ratio of the M3DD to AADD. The SFWMD allocates ground water supply for utilities based on MMDD. The peaking factor that is used to determine raw water supply allocation is based on the ratio of the MMDD to AADD. A similar peaking factor (MDD to AADD) is used when evaluating projected MDDs.

The ratio of M3DD to AADD, MMDD to AADD, and MDD to AADD for the time period of 2001 through 2013 was evaluated. The M3DD peaking factor ranged from 1.21 to 1.37 during the period 2001 through 2013, with an average peaking factor of 1.26. The ratio of MMDD to AADD ranged from 1.08 to 1.26 during the period 2001 through 2013, with an average peaking factor of 1.17. Similarly, the ratio of MDD to AADD ranged from 1.24 to 1.47 during the period 2001 through 2013, with an average peaking factor of 1.33. Based on an evaluation of these trends a MMDD peaking factor of 1.20, a M3DD peaking factor of 1.30, and a MDD peaking factor of 1.35 is recommended to be used for the Master Plan to establish future potable water demand projections.

The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides greater detail on the potable water system historical water production data and analysis.

M3DD Peaking Factor = 1.30

MMDD Peaking Factor = 1.20

MDD Peaking Factor = 1.35

2.2 Wastewater System

The CCWSD wastewater (WW) system includes two water reclamation facilities (WRFs), and an extensive wastewater collection and conveyance system consisting of gravity sewers, pumping stations, and a manifolded force main network. The wastewater service area is divided into the following:

- North Service Area
- South Service Area

The North Sewer Service Area is approximately 78 square miles and the South Service Area is approximately 58 square miles. **Exhibit 2-8** presents the CCWSD wastewater service area. The CCWSD wastewater service area is not the same as the potable water service area and includes some areas where the City of Naples provides potable water service.

2.2.1 Wastewater System Existing Facilities

2.2.1.1 Wastewater Reclamation Facilities

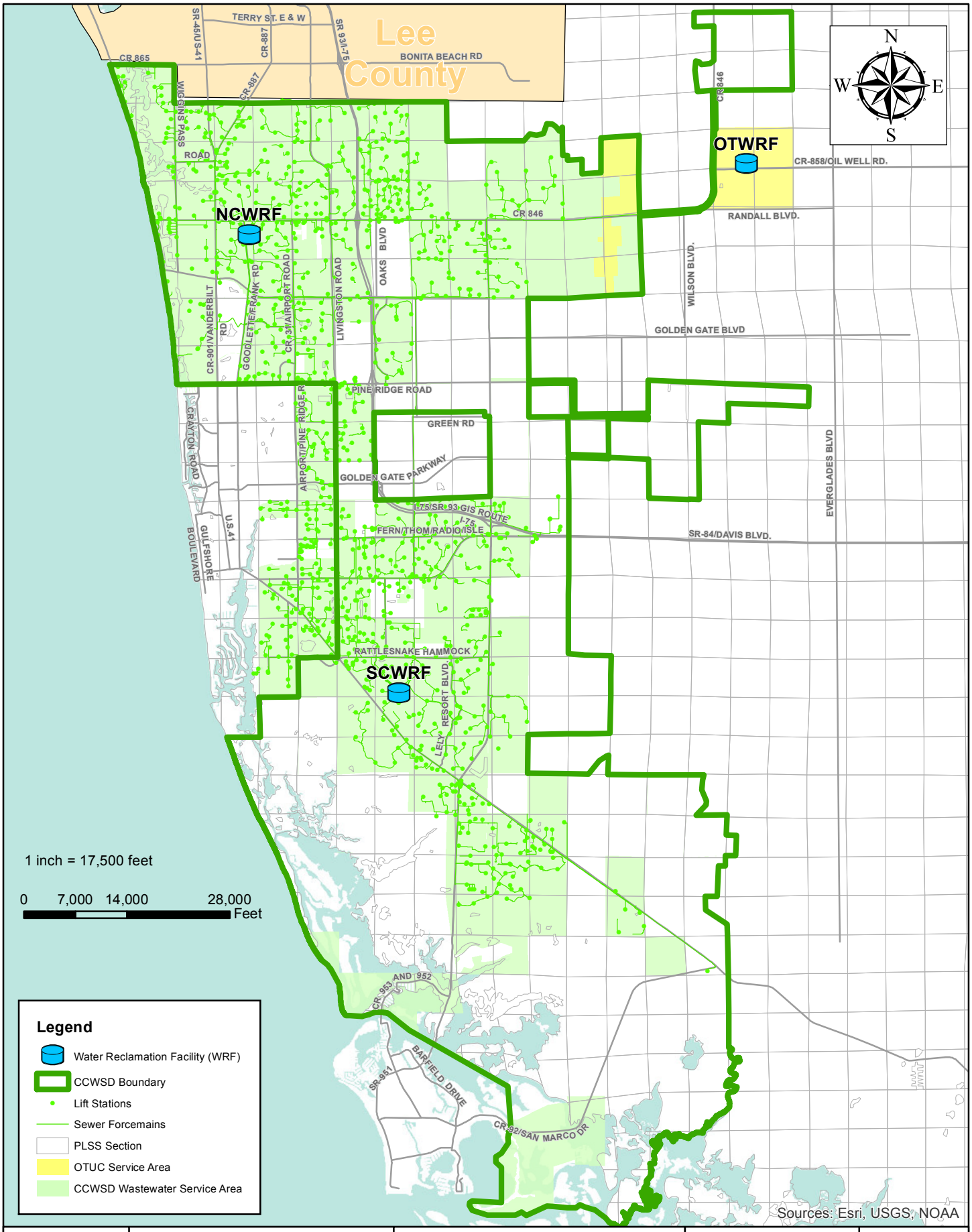
The CCWSD operates two WRFs that are required to meet Class 1 reliability in accordance with the CCWSD's Public Utilities Division Reliability Guidelines, February 2006, and Florida Department of Environmental Protection (FDEP) Regulations for wastewater. The classes of reliability, Class I, II and III (highest to lowest) have been established for wastewater facilities. The classifications are based upon the consequences of failure of these facilities. Class I reliability standards are applied to facilities or vital components where failure would result in permanent or unacceptable damage to receiving waters or other vital components of the system, and will result in a permit violation.

The WRFs include:

- North County Water Reclamation Facility (NCWRF)
- South County Water Reclamation Facility (SCWRF)

The NCWRF provides wastewater treatment in the North County Service Area. The facility currently operates under FDEP permit number FL0141399 and has a 24.1 MGD maximum month average daily flow (MMDF) capacity with two 1.5 million gallon (MG) storage tanks for influent flow equalization prior to treatment. The northern portion of the plant includes oxidation ditches and extended aeration that is currently rated for 9.6 MGD of treatment capacity. The southern portion of the plant includes conventional aeration basins each with a two-stage Modified Ludzack-Ettinger (MLE) process that is currently rated for 14.5 MGD of treatment capacity. The NCWRF has consistently met the effluent requirements of the operating permit.

Exhibit 2-9: NCWRF Sludge Processing Facility



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

Collier County

Collier County Public Utilities Master Plan

Wastewater System Service Area

AECOM

Exhibit

2-8

The primary means of effluent disposal is returning highly treated reclaimed water to the community for beneficial reuse as irrigation water. The balance is disposed of through either of two on-site deep injection wells (DIWs). Reuse quality effluent is pumped by the Reuse Pump Station to the irrigation quality (IQ) Water System. Any water not meeting the reuse standards is stored in reject ponds and/or disposed of through the DIWs. Bio-solids are dewatered using belt filter presses, which discharge into a truck loading facility and hauled to an out of county landfill. The Solid and Hazardous Waste Management Department is in the planning stages of adding a bio-solids treatment facility at the Collier County Landfill.

The SCWRF treats wastewater from customers south of Golden Gate parkway to Auto Ranch Road and has a permitted capacity of 16 MGD. The facility operates under FDEP permit number FL0141356-013, and has a MLE process and two 1.25 MG tanks for influent flow equalization prior to treatment. The facility consists of preliminary treatment, biological treatment, clarification, filtration, disinfection, solids processing and an effluent disposal system.

Exhibit 2-10: SCWRF Effluent Filters

The SCWRF has consistently met the effluent requirements of the operating permit. The primary means of effluent disposal is returning highly treated reclaimed water to the community for beneficial reuse as irrigation water. The balance is disposed of through a deep injection well. Any effluent not meeting reuse standards can also be stored in reject ponds for reintroduction to the facility as a side stream flow for treatment.

Exhibits 2-11 and **2-12** present treatment process block diagrams for the NCWRF and SCWRF, respectively.

The OTUC operates the Orange Tree Wastewater Treatment Plant (OTWWTP). The OTWWTP operates under an FDEP permit and has a permitted capacity of 0.60 MGD. The OTWWTP has met the effluent requirements of the permit with the exception of effluent total nitrogen, which has been exceeded three times in the past three years. Effluent disposal at OTWWTP is achieved through three on-site percolation ponds. Residuals generated by the facility are lime stabilized and then hauled off-site for landfill disposal.

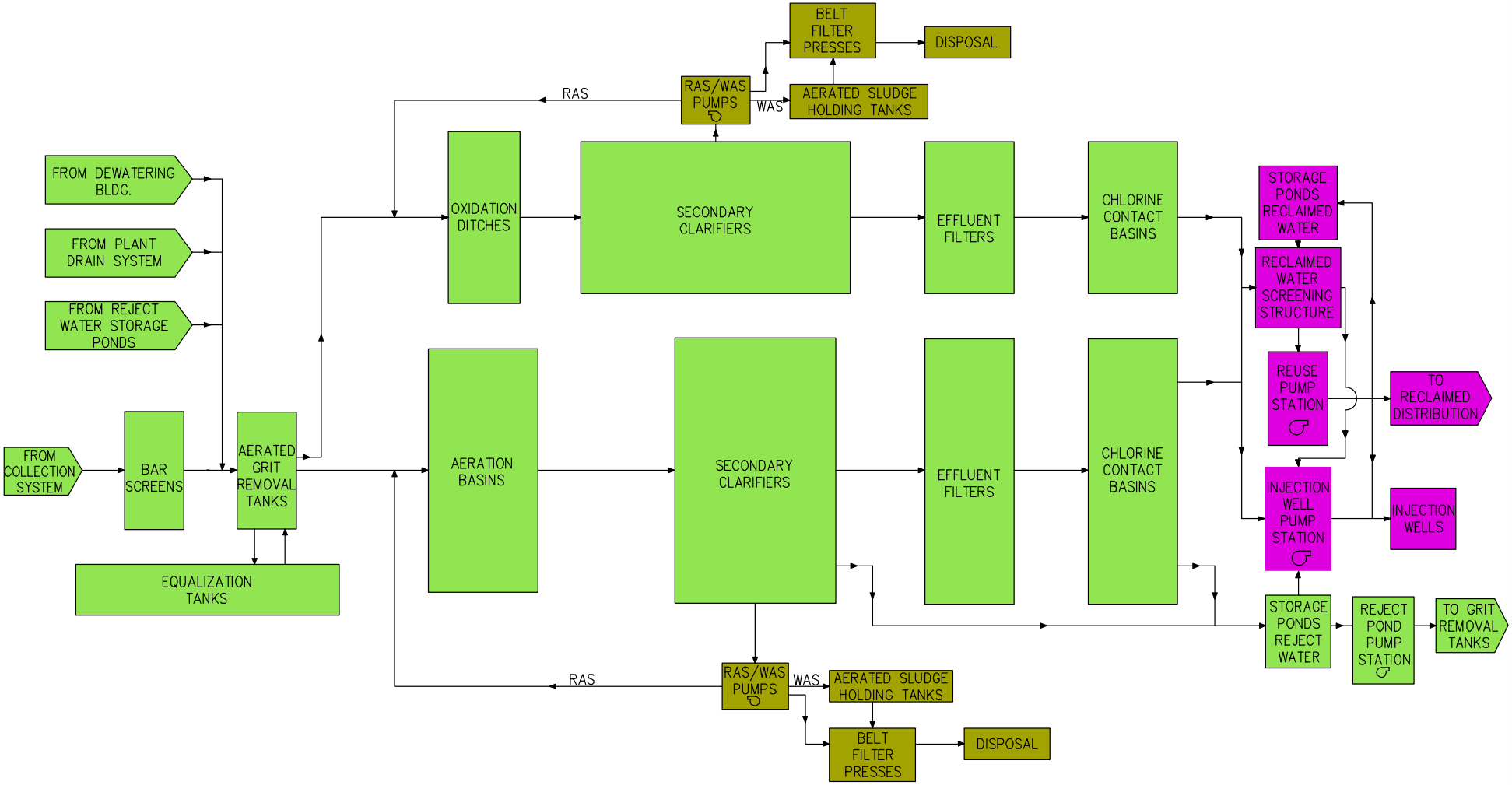
Exhibit 2-8 shows the location of the CCWSD WRFs. The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the wastewater system WRFs. A summary of wastewater reclamation facilities is provided in **Table 2-5.**

Table 2-5: Water Reclamation Facilities Summary

Water Reclamation Facility	Permitted Capacity (MGD)
NCWRF	24.1
SCWRF	16.0
Total	40.1

2.2.1.2 Wastewater Collection System

The CCWSD wastewater collection and conveyance system consists of gravity sewers, about 1,110 pumping stations, and a manifolded force main network.



User: A Thomson
Date: January 2015
County, Collier

Collier County

Not To Scale

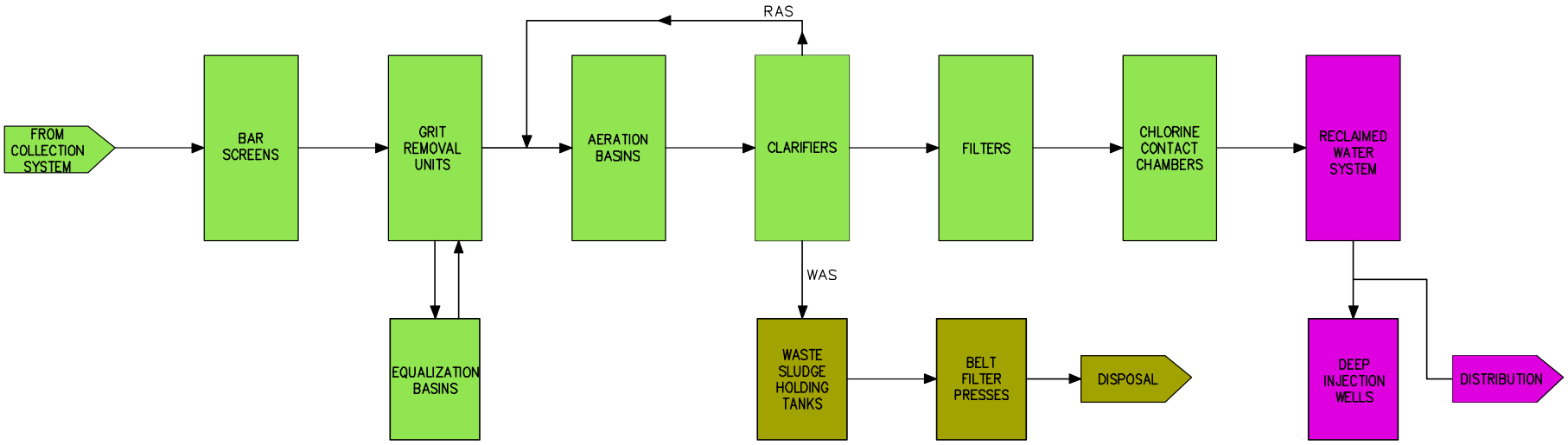
Collier County
Public Utilities Master Plan

NCWRF Treatment Process

AECOM
4415 Metro Parkway
Suite 404
Fort Myers, Florida 33916
T 239-278-7996 F 239-278-0913

Exhibit

2 - 11



User: A Thomson
Date: January 2015
County, Collier

Collier County

Not To Scale

Collier County
Public Utilities Master Plan

SCWRF Treatment Process

AECOM
4415 Metro Parkway
Suite 404
Fort Myers, Florida 33916
T 239-278-7996 F 239-278-0913

Exhibit

2 - 12

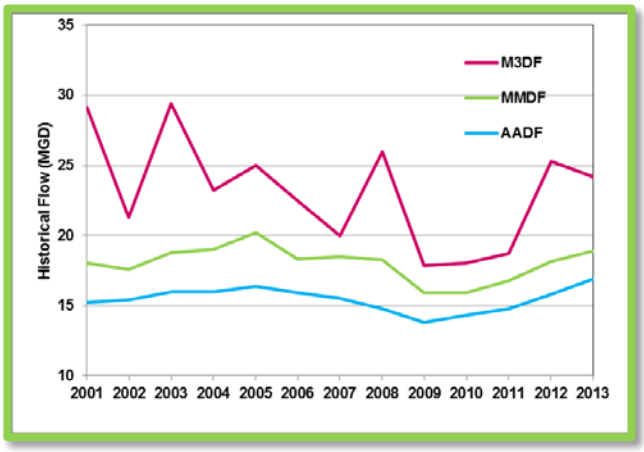
Out of the 1,110 pump stations, 768 pump stations are owned and operated by the CCWSD and the remaining 342 pump stations are private. There are 410 CCWSD -owned pump stations in the North Service Area and 358 pump stations in the South Service Area. Twenty one of the CCWSD-owned pump stations are considered Master Pumping Stations (MPSs).

Exhibit 2-8 shows the CCWSD wastewater collection system. The Technical Memorandums on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the wastewater system collection system.

2.2.2 Historical Wastewater Flows

The CCWSD wastewater system currently provides wastewater service to over 180,000 permanent residents. The historical wastewater flow data for 2001 through 2013 was analyzed to establish historical trends in the wastewater flow. Each WRF handles a similar amount of flow on an average daily basis, with the NCWRF receiving just slightly more flow (54.1 percent) than the SCWRF on an average daily basis between 2001 and 2013. **Exhibit 2-13** presents the historical wastewater flow data on an annual average daily flow (AADF), maximum month daily flow (MMDF), and maximum 3-day daily flow (M3DF) basis.

Exhibit 2-13: Historical Wastewater Flows



The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides greater detail on the wastewater system historical flow data and analysis.

2.2.2.1 Wastewater Flow Per-Capita

The CCWSD has in the past evaluated per-capita wastewater flow rates for both the North and South WRFs separately because the northern portion of the CCWSD tended to have a slightly higher per-capita day usage and each plant had its own service area. However, improvements to the collection system have been implemented and future improvements are planned to increase reliability and improve flexibility in operations. These improvements facilitate conveying wastewater flows to either plant, therefore, allowing one per-capita flow rate to be utilized for both plants.

In order to establish a recommended system-wide per-capita wastewater flow rate for the Master Plan, a historical analysis of wastewater flows and permanent population was completed. This analysis included evaluating the per-capita usage during the period (2001 to 2013) for the north and south service areas separately, and then as a combined system.

The average per-capita demand (based on permanent population) during the period 2001 through 2013 for the north wastewater service area is 97 gpcd and for the south wastewater service area is 86 gpcd. The average per-capita demand during the period 2001 through 2013 for the CCWSD combined wastewater system is 91 gpcd. Based on an evaluation of these trends a per-capita wastewater flow of 100 gpcd is recommended to be used as the LOSS for the Master Plan in establishing future wastewater flow projections. This per capita wastewater flow rate is consistent with FDEP permit requirements, which identify a per capita average daily flow of 100 gallons per capita, unless water use data or other justification is provided.

LOSS Per-Capita Wastewater Flow = 100 gpcd

2.2.2.2 Wastewater Flow Peaking Factors

The total operational capacity of wastewater treatment facilities must be able to meet the projected peak wastewater flows. Although FDEP recommends that the wastewater treatment capacity be based on treating MMDF, it is recommended in this Master Plan that the wastewater treatment plants be able to treat the M3DFs. This will provide greater reliability for treatment of peak flow periods. The peaking factor that is used to determine plant capacity is based on the ratio of the M3DF to AADF. A similar peaking factor (MMDF to AADF) is used to evaluate projected MMDFs.

The ratio of MMDF to AADF and M3DF to AADF for the time period of 2001 through 2013 was evaluated. The ratio of MMDF to AADF ranged from 1.11 to 1.24 during the period 2001 through 2013, with an average peaking factor of 1.17. Similarly, the M3DF peaking factor ranged from 1.26 to 1.91 during the period 2001 through 2013, with an average peaking factor of 1.49. Based on an evaluation of these trends a MMDF peaking factor of 1.2 and M3DF peaking factor of 1.5 is recommended to be used for the Master Plan to establish future wastewater flow projections.

MMDF Peaking Factor = 1.2

M3DF Peaking Factor = 1.5

The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides greater detail on the wastewater system historical flows and analysis.

2.3 IQ Water System

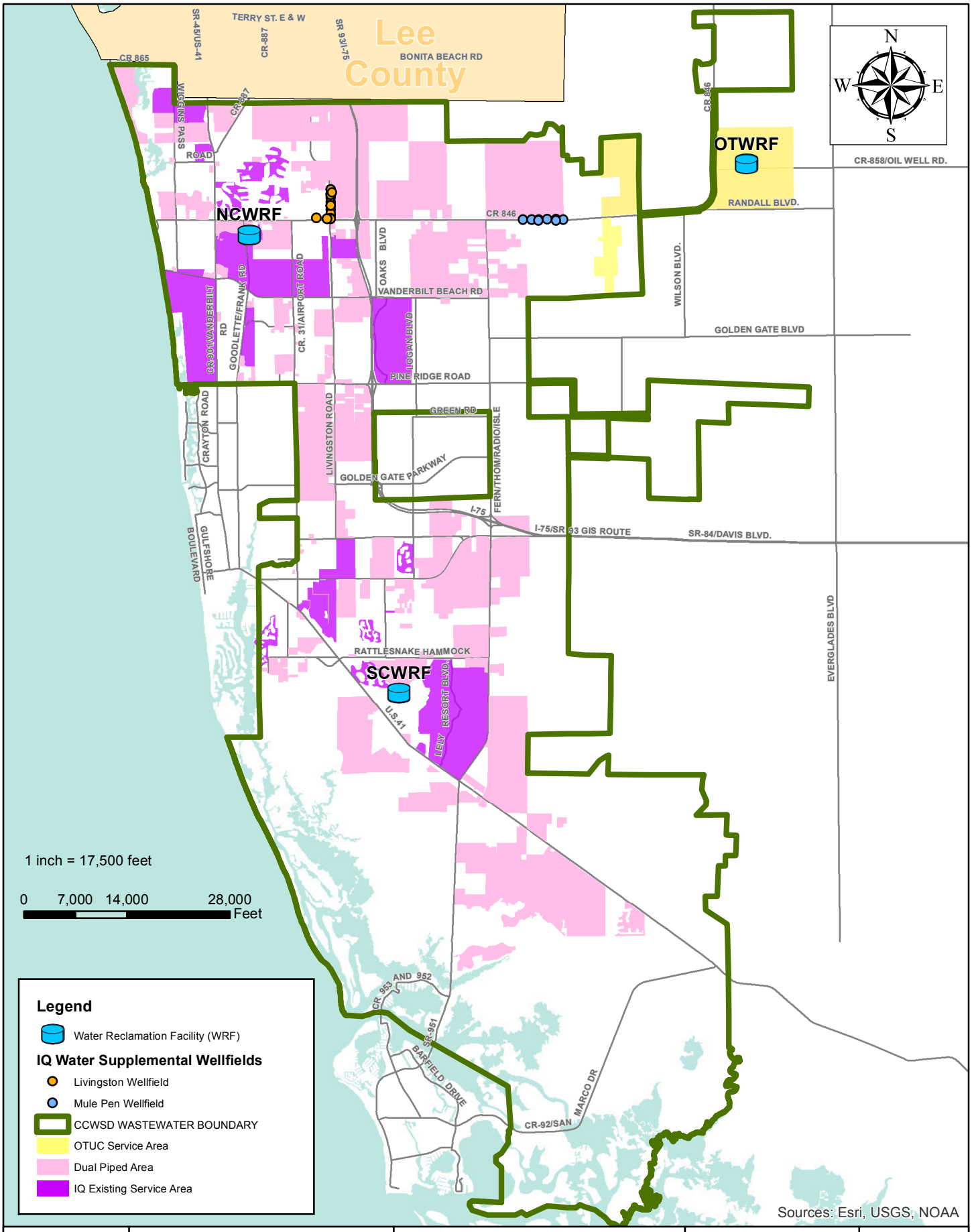
The CCWSD has an established Irrigation Quality (IQ) Water Service Area boundary. The IQ service area does not include those areas within Collier County currently served by the City of Naples, the Florida Government Utility Authority (Golden Gate City), Marco Island, or Orange Tree. IQ water is primarily treated effluent from the CCWSD's water reclamation facilities, although the IQ supply is currently supplemented with fresh groundwater. CCWSD's IQ water customers are primarily golf courses, roadway medians, and residential customers. **Exhibit 2-14** presents the CCWSD IQ water service area and facilities.

2.3.1 IQ Water System Facilities

The CCWSD provides IQ water using treated effluent from the NCWRF and SCWRF, supplemented by fresh groundwater wellfields including:

- The Livingston Road Wellfield
- The Mule Pen Wellfield
- Foxfire Wellfield
- SCWRF Wellfield

The fresh groundwater wellfields supplement IQ water, with no additional treatment required. **Table 2-6** provides a summary of these wellfields. The revised total allocation is 9.23 MGD. In addition, an ASR well located on Livingston Road is permitted to provide up to 5.0 MGD (average annual allocation) of IQ water.



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

Collier County

Collier County Public Utilities Master Plan

IQ Water System Service Area

AECOM

Exhibit

2-14

The CCWSD IQ water system consists of over 130 miles of distribution piping, seven storage tanks, 29 storage ponds, 1,600 meters, four wellfields, and six large pumping stations located throughout the CCWSD.

Table 2-6: IQ Water Wellfields Summary

Wellfield	Number of Wells	SFWMD CUP Allocation (AADF MGD)
Livingston Wellfield	7	3.73
Mule Pen Wellfield	6	3.50
Foxfire Wellfield	1	1.00
SCWRF Wellfield	1	1.00
Total	15	9.23*

*The SFWMD CUP permit was revised on April 14, 2014.

Water reclamation is accomplished via an activated sludge treatment process that includes filtration and high level disinfection. The treated effluent is compliant with FDEP permit requirements and is of quality suitable for public and/or open access irrigation. The CCWSD has also invested significant capital in over 130 miles of pipe network to deliver IQ water to existing and planned unit developments.

The Technical Memorandums Task 3 – Water Resource Evaluation and Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provide greater detail on the IQ water system facilities.

2.3.2 Existing IQ Water Demand

The CCWSD's existing IQ water customers include 21 golf courses, 6 County parks and schools, 64 miles of roadway medians, residential communities, and environmental mitigation areas.

Current agreements allocate 22.9 MGD of IQ water to existing customers based on an IQ demand of 1-inch per irrigable acre per week. Average monthly IQ system distribution for the period 2001 through 2013 was 15.5 MGD and the average for the period of 2009 through 2013 is 16.8 MGD.

The IQ water availability from the CCWSD's WRFs is estimated as 95 percent of the minimum month average daily flows (MMADF). The peaking factor that is used to determine minimum month average daily flow is based on the ratio of the MMADF to AADF of the wastewater effluent. The ratio of MMADF to AADF for the time period of 2001 through 2013 was evaluated. The ratio of MMADF to AADF ranged from 0.76 to 0.89 during the period 2001 through 2013, with an average peaking factor of 0.84. Based on an evaluation of these trends a conservative MMADF peaking factor of 0.80 is recommended to be used for the Master Plan to establish future IQ water availability.

MMADF Peaking Factor = 0.8

Although meeting customer demands is currently an issue, CCWSD may expand the IQ water system as the wastewater system expands and additional effluent is available for IQ water. Dual piped distribution systems are the key to the expansion of the IQ water system, which have separate distribution systems for potable water and irrigation. Since 2002, new planned unit developments are required to install dual distribution systems through Collier County ordinances. For developments prior to 2002, a separate IQ water system would need to be constructed to connect them to the IQ water service area.

Future IQ water availability based upon 95 percent of the minimum monthly ADF at the WRFs plus supplemental fresh water from groundwater production wells and ASR wells is expected to increase to 35.75 MGD by the year 2034.

The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides greater detail on the IQ water system historical flows and analysis.

Section 3

Projected Demands/Flows & Gap Analysis

This Section establishes the future capacity needs for CCWSD's raw water, potable water treatment and storage, wastewater treatment, and IQ water.

3 Projected Demands/Flows & Gap Analysis

- 20 Year Planning Period (2034)
- Build-out
- Beyond Current Boundaries

The CCWSD projected potable water system demands will increase by 57.4 percent and the projected wastewater system flows will increase by 53.2 percent at the end of the 20 year planning period (2034). Build-out for water and wastewater occurs in 2034 and 2039, respectfully.

In order to adequately assess the future needs of the CCWSD system, population projections were used to determine potable water demands and wastewater flows through the planning horizon of this Master Plan, which includes a 20 year planning period through the year 2034, build-out, and potential boundary expansions.

The U.S. Census estimated that approximately 332,427 people resided in Collier County in 2010. The County's Growth Management Division Comprehensive Planning Section provided population estimates for the years 2010 through 2011, population projections for the years 2012 through 2034, and projected build-out population for the CCWSD water and sewer service areas. These projections were used as the basis to project future potable water demands and wastewater flows for the Master Plan.

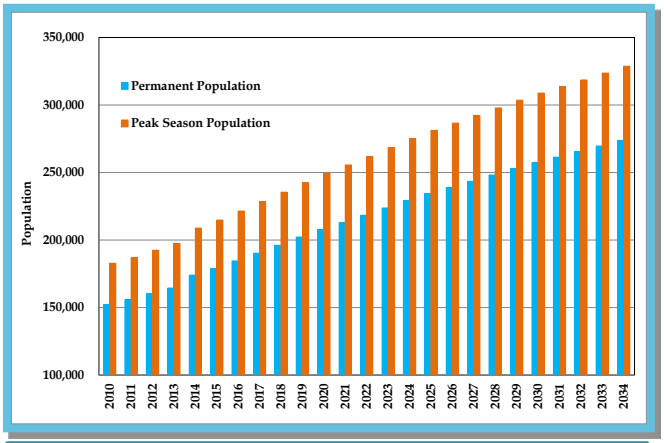
Due to the seasonal variation in population, the CCWSD's permanent population is different than the CCWSD's seasonal peak population, which accounts for the influx of tourists and part-time residents. The seasonal population is greater than the permanent population and is calculated by multiplying the permanent population by 1.2. The Master Plan was developed based on the CCWSD's permanent population. However, the demands and flows using "permanent" or "seasonal" populations render similar results, since the per-capita rates and peaking factors vary proportionally with population. The higher the population, the lower the per-capita rate.

3.1 Potable Water System

3.1.1 Population Projections

For the potable water system projections, the population included both the CCWSD and the OTUC service areas. The CCWSD provided water service to approximately 46 percent of Collier County's population in 2010 (based on permanent population). According to the population projections, the potable water service area permanent population is projected to increase from 152,326 to 273,873, while the peak seasonal population is projected to increase from 182,791 to 328,648 from 2010 to 2034. The 2034 water service area projection provided by the Comprehensive Planning Section was used as the build-out population since the population was not projected to increase beyond 2034. **Exhibit 3-1** presents the potable water service area projected population through the year 2034.

Exhibit 3-1: Potable Water System Population Projections



Permanent Population (2010) = 152,326

Permanent Population (2034/BO) = 273,873

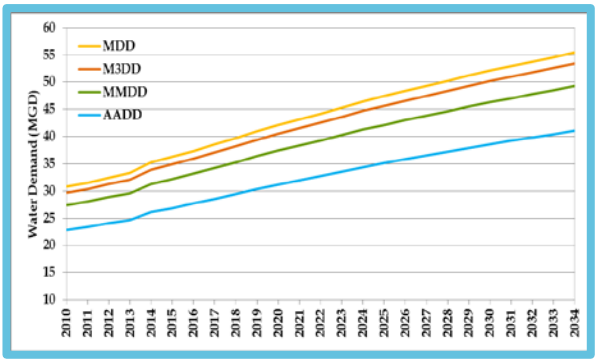
3.1.2 Projected Demands

The potable water system annual average demand projections are estimated using population projections and a recommended per-capita water demand that was established based on an analysis of historical water usage. A per-capita water demand of 150 gpcd is used as the LOSS for this Master Plan (refer to Section 2.1.2).

AADD = Population X Per-Capita

The potable water system maximum month demand (MMDD) projections, maximum 3 day demand (M3DD) projections, and maximum day demand (MDD) projections are estimated based on AADD increased by peaking factors of 1.2, 1.3, and 1.35, respectively (refer to Section 2.1.2). **Exhibit 3-2** presents a graphical representation of the projected AADD, MMDD, M3DD, and MDD water demands through the year 2034.

Exhibit 3-2: Potable Water System Demand Projections



MMDD = AADD x 1.20

M3DD = AADD x 1.30

MDD = AADD x 1.35

Year	AADD (MGD)	MMDD (MGD)	M3DD (MGD)	MDD (MGD)
2014	26.10	31.32	33.93	35.24
2034	41.08	49.30	53.41	55.46

Based on these projections, the potential potable water system demands will increase by 57.4 percent from the year 2014 through 2034 (based on AADD). The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides more details on the potable water system population and demand projections.

3.1.3 Gap Analysis

The potable water system gap analysis identifies the differential, whether a surplus or deficit, between the CCWSD's existing potable water system facilities and the projected potable water demands. The potable water system facilities that were evaluated under this gap analysis include the following:

- Water Treatment Plant Capacity
- Raw Water Supply Capacity (wellfield capacity and raw water allocation)
- Storage Capacity

The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides more details on the potable water system gap analysis.

3.1.3.1 Water Treatment Plant Capacity

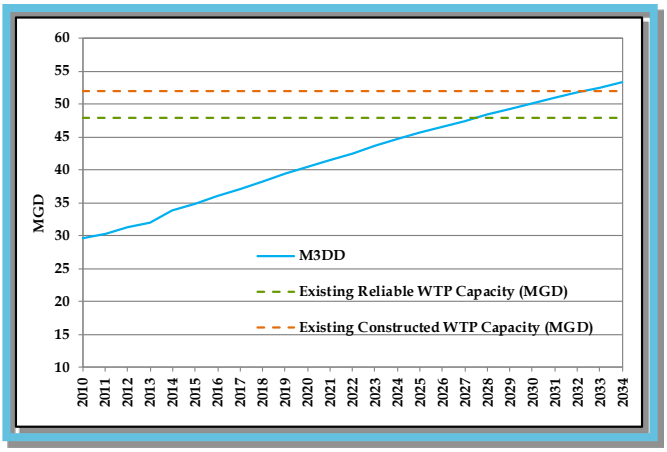
As indicated in Section 2 of this report, the permitted treatment capacity of the CCWSD WTPs is 52.0 MGD including 20.0 MGD at the NCRWTP and 32.0 MGD at the SCRWTP. The total operational treatment capacity of the CCWSD's potable water system is 48.0 MGD assuming that a 4.0 MGD lime softening reactor/clarifier is out of service.

The total combined operational capacity of the water treatment facilities must be able to meet the M3DD. Therefore, comparing the CCWSD potable water system total operational treatment capacity of 48.0 MGD to the potable water system projected M3DDs shows that the estimated M3DD will exceed the existing WTP total operational capacity by the year 2028. **Exhibit 3-3** presents a chart showing the projected potable water M3DDs against the total operational capacity and total constructed capacity.

Approximately 5.4 MGD of additional treatment capacity is required to meet the projected potable water system demands through the year 2034. Additional treatment capacity will start to be needed in 2028 according to **Exhibit 3-3**. The OTWTP capacity is not included in analyzing the surplus or deficit.

WTP components at each facility such as degasifiers, chemical feed systems, piping, pumping, etc. need to be evaluated for reliability during design phases of proposed expansions. Any upgrades or replacement/expansions that may be necessary to maintain existing rated plant capacity must also be considered and scheduled at appropriate times through the planning period.

Exhibit 3-3: WTP Capacity Gap Analysis



Additional WTP Capacity Requirement by 2034 = 5.4 MGD (Starting in 2028)

The M3DD is used in lieu of MDD when evaluating operational treatment plant capacity, because the CCWSD water system has sufficient potable water storage available to offset peak hour demands.

If the CCWSD continues to adhere to the Ten States Standards requirement for potable water storage, it will always have at least one day of average demand available to offset peak demands. Given this additional storage, peak demands can be handled in lieu of expanding treatment capacity to meet MDD. If the CCWSD does not expand storage in 2026, then the standard for potable water treatment capacity should be changed back to MDD.

3.1.3.2 Raw Water Supply Capacity

3.1.3.2.1 Raw Water Allocation

The total annual average raw water allocation per the SFWMD CUP is 55.53 MGD. The permit limits the use of fresh groundwater resources to 26.5 MGD and brackish water to 29.03 MGD (35.52 MGD with overlap). Limiting condition 5 of the SFWMD CUP allows for an allocation up to 26.5 MGD from fresh groundwater resources through September 29, 2036.

An analysis was completed to evaluate the necessary raw fresh groundwater and brackish groundwater required to produce potable water to meet projected demands. This analysis considered the various water treatment processes at the NCRWTP and SCRWTP and their respective recovery efficiencies. The required raw water (fresh or brackish) to produce potable water to meet projected potable water demands was then compared to the SFWMD CUP raw water allocation. The results of this comparison are summarized below:

- The CCWSD fresh groundwater and brackish groundwater permitted allocation from SFWMD provides sufficient quantities of raw water to meet the year 2034 annual average projected demands of 41.08 MGD provided the following conditions are met.
  - Fresh raw water treatment processes at both WTPs to produce 24.0 MGD of potable water (requiring 26.5 MGD of fresh groundwater) are fully utilized prior to brackish raw water treatment processes.
  - Brackish raw water treatment processes at both WTPs to produce 17.08 MGD of potable water (requiring 22.77 MGD of the brackish groundwater allocation) are utilized.
- An expansion of 6.0 MGD treatment capacity (required to meet the projected M3DD through the year 2034) using a fresh groundwater treatment process would require 6.18 MGD of additional fresh groundwater allocation. Assuming the fresh raw water treatment processes would be fully utilized prior to brackish raw water treatment processes would result in a need to increase the fresh groundwater allocation to 32.68 MGD.
- An expansion of 6.0 MGD treatment capacity (required to meet the projected M3DD through the year 2034) using a brackish groundwater treatment process would not require any increase in fresh groundwater or brackish groundwater allocation.

3.1.3.2.2 Wellfield Capacity

Based on the Public Utilities Division Reliability Guidelines, February 2006, the operational capacity of a wellfield must include additional capacity equal to 20 percent of the raw water requirement for the Tamiami wellfield (fresh groundwater resource) and 33 percent of the raw water requirement for the Hawthorn wellfields (brackish groundwater resource).

Approximately 31.79 MGD (26.5 MGD fresh raw groundwater requirement X 1.20) of fresh groundwater well capacity is required to provide 24.0 MGD of potable water. Similarly, 49.65 MGD (37.33 MGD brackish raw groundwater requirement X 1.33) of brackish groundwater well capacity is required to provide 28.0 MGD of potable water. The existing wellfields total permitted capacity are 44.93 MGD and 96.91 MGD for the fresh groundwater and brackish groundwater wellfields, respectively. The existing wellfields total constructed capacity based on the CCWSD's inventory, which does not include proposed wells or inactive wells, is 37.09 MGD and 60.59 MGD for fresh groundwater and brackish groundwater wellfields, respectively. Expansion of the wellfield capacity by 6 MGD would be required using one of the following two alternatives:

- An expansion of 6.0 MGD treatment capacity (required to meet the projected M3DD through the year 2034) using a fresh groundwater treatment process would require an additional 2.12 MGD of fresh groundwater wellfield constructed capacity

based on the CCWSD's inventory. (No additional groundwater wellfield permitting is required).

- Alternatively, an expansion of 6.0 MGD treatment capacity (required to meet the projected M3DD through the year 2034) using a brackish groundwater treatment process would not require any additional well construction or permitting.

- A hybrid expansion of 6.0 MGD treatment capacity using 4.0 MGD of fresh groundwater treatment process (one lime softening reactor/clarifier) and 2.0 MGD of brackish groundwater treatment process (one RO skid) could be accomplished without additional well construction or permitting.

Summary of Raw Water Supply and Permit Allocations Needed for Future 6 MGD Treatment Plant Expansion

Treatment Process Source Water	Additional Raw Water Allocation Requirement	Additional* Wellfield Constructed Capacity
Fresh Groundwater	6.18 MGD	2.12 MGD
Brackish Groundwater	0.0 MGD	0.0 MGD

*Requirements for wellfield constructed capacity are based on the County's inventory. No additional groundwater wellfield constructed capacity is needed based on SFWMD permit.

3.1.3.3 Storage Capacity

Various reference standards outline criterion for water system storage facilities. The "Recommended Standards for Water Works 2012" (referred to as Ten States Standards) recommends that finished water storage facilities be sized for AADD plus fire flow requirements. FDEP Rule 62-555, "Drinking Water Standards, Monitoring and Reporting" states that finished water storage capacity (excluding storage capacity for fire protection) should be at least 25 percent of the systems maximum day demand. The 2008 Master Plan for Collier County recommended that finished water storage volume be based upon 100 percent of the MMDD.

Any recommendations for increasing finished water storage to meet operational standards must also consider the impacts on water age in the distribution system and overall water quality. It is therefore recommended that the criterion identified in the Ten States Standards be used where finished water storage volume should equal AADD plus fire flow requirements. This criterion exceeds the FDEP Rule 62-555 criterion, and will provide storage to meet an average day demand and fire demand for one hour should unexpected outages of treatment capacity occur. Existing constructed usable storage in the CCWSD's potable water system is 34.80 MG (as noted in **Table 2-4**). With the projected increase in annual average daily demands from 2013 (24.67 MGD) to 2034 (41.08 MGD), it is estimated that an additional constructed storage capacity of approximately 7 MG is needed in order to meet the recommended storage requirement. Additional storage will start to be needed in 2024.

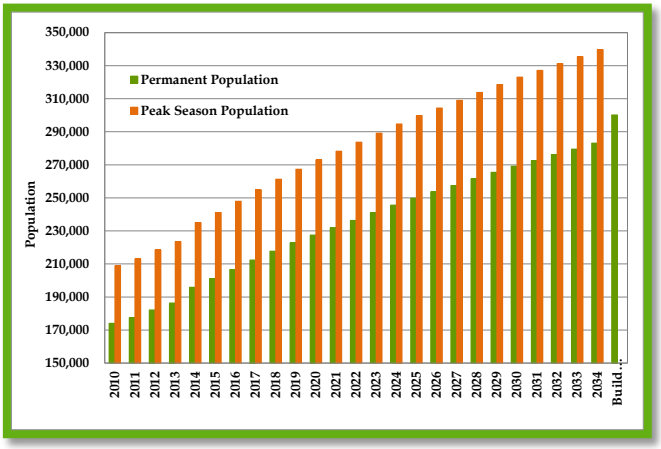
Additional Potable Water Storage Required by 2034 = 7 MG (Starting in 2024)

3.2 Wastewater System

3.2.1 Population Projections

For the wastewater system projections, the population included both the CCWSD and the OTCU service areas. The CCWSD provided wastewater service to around 54 percent of Collier County's population in 2010 (based on permanent population). According to the population projections, the wastewater service area permanent population increased from 174,054 to 283,102, while the peak seasonal population increased from 208,864 to 339,723 from 2010 to 2034. The build-out (BO) permanent population estimate for the wastewater service area is 300,213. **Exhibit 3-4** presents the wastewater service area projected population for the 20 year planning period of this Master Plan, and build-out.

Exhibit 3-4: Wastewater System Population Projections



Permanent Population (2010) = 174,054

Permanent Population (2034) = 283,102

Permanent Population (BO) = 300,213

3.2.2 Projected Flows

The wastewater system annual average flow projections are estimated using population projections

AADF = Population X Per-Capita Demand

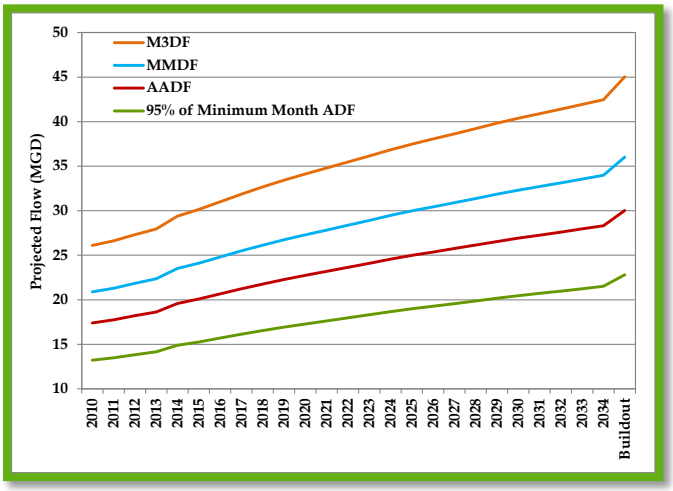
and a recommended per-capita wastewater flow,

which was established after an analysis of historical wastewater flows. A per-capita wastewater flow of 100 gpcd is used as the LOSS for this Master Plan (refer Section 2).

The wastewater system maximum month flow projections and M3DF projections are estimated based on AADF increased by peaking factors of 1.2 and 1.5, respectively (refer to Section 2.2.2). **Exhibit 3-5** presents the graphical representation of the projected AADF, MMDF, and M3DF for the CCWSD wastewater system through the year 2034 and build-out.

Based on these projections, the projected wastewater system flows will increase by 44.5 percent from the year 2014 through 2034 and by 53.2 percent from the year 2014 through build-out (based on AADF).

Exhibit 3-5: Wastewater System Flow Projections



MMDF = AADF X 1.2

M3DF = AADF X 1.5

Year	AADF (MGD)	MMDF (MGD)	M3DF (MGD)
2014	19.59	23.51	29.39
2034	28.31	33.97	42.47
BO	30.02	36.03	45.03

The Technical Memorandum on Task 4 – Population and Demand/Flow Projections provides greater detail on the wastewater system population and flow projections.

3.2.3 Gap Analysis

The wastewater system gap analysis identifies the differential, whether a surplus or deficit, between the CCWSD's existing wastewater system facilities and the projected wastewater flows. The OTWWTP capacity is not included in analyzing the surplus or deficit.

The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the wastewater system gap analysis.

3.2.3.1 Wastewater Treatment Plant Capacity

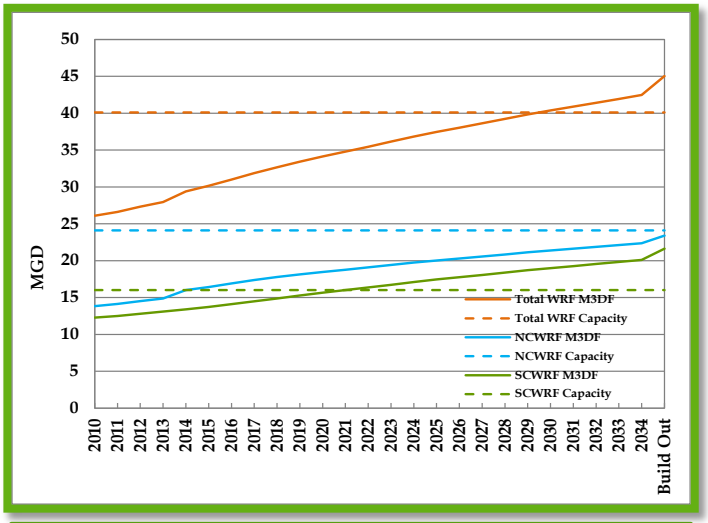
As indicated in Section 2 of this report, the permitted treatment capacity of the CCWSD WWTPs is 40.1 MGD including 24.1 MGD at the NCWRF and 16.0 MGD at the SCWRF. The constructed capacity and the operational capacity for the WWTPs is 40.1 MGD.

The total capacity of the wastewater treatment plants must be able to meet M3DFs based upon operational peak flow experience and data. The CCWSD uses the M3DF, in lieu of the MMDF, to determine wastewater treatment plant capacity requirements so that the plants can more reliably handle peak wastewater flows and loads. Since the CCWSD has plans to increase the conveyance capacity of the interconnection between north county and south county service areas, the evaluation of the treatment plant capacity required was completed on a system-wide basis. Therefore, comparing the CCWSD wastewater system total treatment capacity of 40.1 MGD to the wastewater system projected M3DFs shows that on a system wide basis an additional 4.9 MGD of treatment capacity is required to meet the projected wastewater system flows through the year 2034 and build-out. Additional treatment capacity will start to be needed in 2030 according to **Exhibit 3-6**. **Exhibit 3-6** presents a chart showing the projected wastewater M3DF against the total treatment capacity.

If the additional conveyance capacity of the interconnection between the north and south service areas is not provided, then NCWRF has enough capacity to meet the projected wastewater system demands through the year 2034 and build-out. However, the SCWRF would require an additional capacity of about 5.6 MGD to meet the projected wastewater system demands through the year 2034 and build-out because the CCWSD has agreed that no further expansion of this facility will occur, this scenario is informational only.

In lieu of expanding the SCWRF, 5.6 MGD of additional collection system conveyance capacity will be required by build-out to move flows from the South to the North Service Area. This additional conveyance is needed starting in 2021 when the SCWRF begins to exceed its treatment capacity.

Exhibit 3-6: WWTP Capacity Gap Analysis



Additional WWTP Capacity Requirement by BO = 4.9 MGD* (Starting in 2030)

Total Collections Conveyance Capacity (South to North) Requirement by BO-5.6 MGD (Starting in 2021)

3.3 IQ WATER SYSTEM

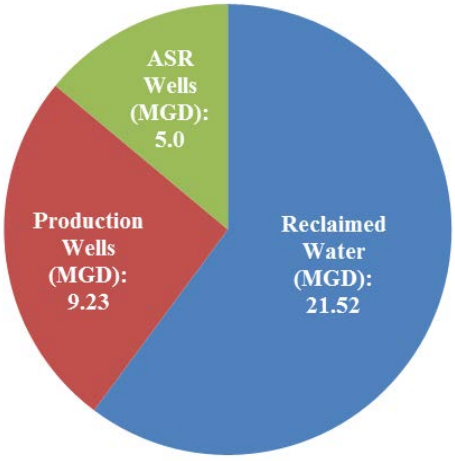
The CCWSD's existing IQ water availability is primarily determined based on the quantity of treated effluent from its WRFs. Due to the seasonal fluctuation of WRF effluent flows, the availability of IQ water is based upon 95 percent of the minimum monthly effluent flow. Since IQ water demand is currently greater than the available effluent, the CCWSD currently supplements their IQ water supply from fresh groundwater wellfields. These wells currently can provide up to 3.8 MGD of additional water that is added to the IQ water distribution system. The total allocation included in the April 2014 SFWMD CUP is 9.23 MGD.

Although meeting customer demands is currently an issue, CCWSD plans to expand their IQ system as the wastewater system expands and additional effluent is available for IQ water. Dual piped distribution systems are the key to the expansion of the IQ water system, which have separate distribution systems for potable water and irrigation. Since 2002, new planned unit developments are required to install dual distribution systems through Collier County's ordinances. For developments prior to 2002, a separate IQ water system would need to be constructed to connect them to the IQ service area.

3.3.1 Future IQ Water Availability

The future IQ water availability is estimated as the sum of 95 percent of the minimum monthly ADF at the WRFs and supplemental fresh water from groundwater production wells and ASR wells. The minimum month average daily flow is based on AADF reduced by a peaking factor 0.8, which was established based on CCWSD's historical wastewater flows from 2001 through 2013. **Exhibit 3-7** presents the future IQ water availability by the year 2034.

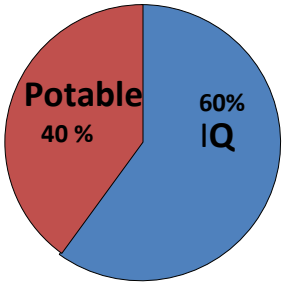
Exhibit 3-7: Future IQ Water Availability by year 2034



Total 35.75 MGD

The CCWSD has opportunities to increase its IQ water supply through utilization of ASR systems. Increased IQ water supply would help reduce utilization of potable water for irrigation (non-potable) applications, and potentially reduce the CCWSD's total potable water demand. It would also result in progress towards attaining a target 60:40 ratio of IQ water demand to potable water demand, which is the ultimate objective. **Exhibit 3-8** shows a graphic illustrating the twenty year target ratio.

Exhibit 3-8: 20 Year Target Ratio for IQ Water Total Usage and Potable Water Total Usage



The Technical Memorandum on Task 5 – Existing Treatment Capacity Evaluation and Gap Analysis provides greater detail on the future IQ water availability.

3.4 Potential CCWSD Boundary Expansion

The Public Utilities Master Plan is based on permanent population projections for the period 2013 through 2034, and build-out. The population projections are also based on the potable water and wastewater service areas for customers within the existing CCWSD boundary. The population projections and projected potable water demands and wastewater flows could be impacted by the potential expansion of the CCWSD service area.

The CCWSD can only provide service within the Water-Sewer District boundary and does not include the following adjacent utilities:

- City of Naples Public Utilities
- Florida Government Utility Authority (FGUA), Golden Gate Utility System
- Bonita Springs Utilities, Inc.
- Marco Island Public Utilities

The development of the Master Plan did not consider expansion of the CCWSD boundary to include service for these utilities. However, there potentially could be an opportunity to provide service to some of these utilities through regionalization and/or expansion. The FGUA was formed in 1999 as a legal and public body pursuant to Chapters 125, 163, 166 of the Florida Statutes. The FGUA's mission focuses on providing critical water and wastewater services and infrastructure to customers in various Florida counties. The systems currently serviced by FGUA include the Golden Gate Utility System in Collier County. The FGUA was established to provide ownership and operation of distressed utilities until such time as a local government/utility is able to take it over. The CCWSD could at some time annex the Golden Gate Utility System.

Currently, the CCWSD provides potable water service to Goodland by purchasing bulk potable water from Marco Island Utilities. Goodland is located on the eastern portion of Marco Island. Conversely, Marco Island Utilities provides potable water service to Marco Shores by purchasing bulk potable water from the CCWSD. Marco Shores, also known as Hammock Bay, is located on the mainland, near Isles of Capri. It is possible that at some time in the future the CCWSD could serve Marco Shores directly, and the Marco Island Utilities could serve Goodland.

Another possibility for CCWSD boundary expansion is growth. The future Town of Big Cypress, which is proposed to be located east of Golden Gate Estates in Collier County, has the potential to add 9,000 customers, with corresponding commercial development to support the community. Although development of the Town is still in the initial planning phases, it is recommended the CCWSD monitor the progress and evaluate the potential for expanding of the water and wastewater service area boundary to include the Town.

The CCWSD currently does not provide water and wastewater service to the Golden Gate Estates. The homeowners in the Estates are responsible for their own potable water supply wells and on-site treatment systems, and septic tanks for wastewater disposal. Since the Estates are comprised of large parcels (typically 5, 2.5, and 1.25 acre lots) it may not be economically feasible to serve this area. However, as the Estates become more fully developed the CCWSD may consider expansion to include this area.

It is recommended that the CCWSD regularly update the Public Utilities Master Plan. In addition to reviewing and updating the LOSS for potable water demand and wastewater flows, the Plan should consider potential expansion of the CCWSD boundary.

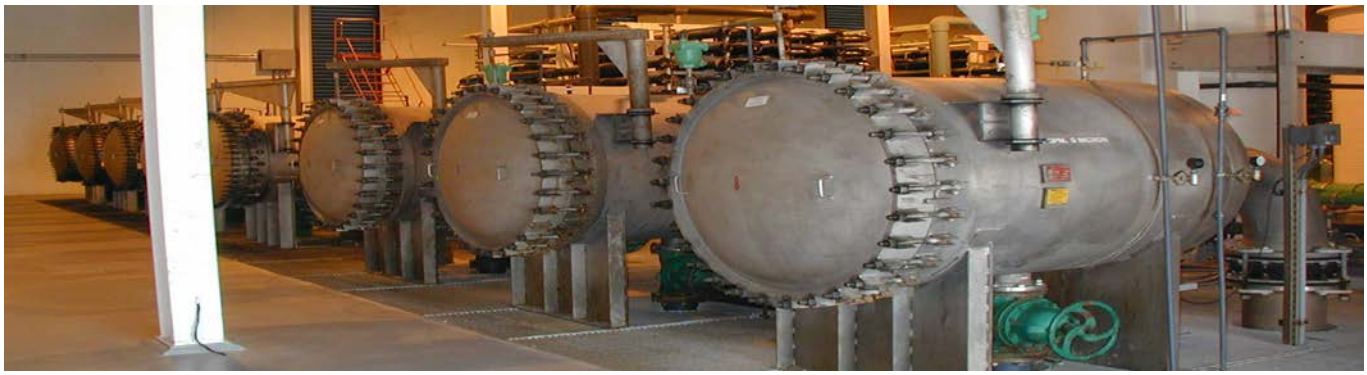
Section 4

Identifying Recommended Capital Improvements

This Section analyzes the impact of increased future demands/flows on the CCWSD's potable water, wastewater, and IQ water systems; identifies system deficiencies; and recommends improvements to achieve the CCWSD's level of service standards.

4 Identifying Recommended Capital Improvements

- 10 Year Planning Period (CIP)
- 20 Year Planning Period



Recommended capital improvements support the CCWSD's mission to achieve compliance with facility operating permits, applicable laws, rules, and regulations. The Capital Improvement Program includes recommended infrastructure upgrades to address consistency with the water program policy, continued system optimization, conservation of potable water, beneficial WRF effluent reuse, and environmental sustainability through good water treatment, distribution, waste collection, reuse, and disposal practices.

4.1 Level of Service Standards (LOSS)

Level of Service Standards (LOSS) identify planned per-capita demand/flow and operational standards and goals. These standards are established to provide a basis for determining demand/flow generated by a planned development, the availability of facility capacity, and a basis to measure the overall performance of the utility service provided.

The Master Plan includes a baseline assessment of the CCWSD's LOSS for per-capita demand/flow; a review of LOSS and goals from other utilities; recommendations for LOSS and goals, a service gap analysis; and a risk analysis of current practices and levels of service. The results of the LOSS analysis in conjunction with water quality goals, treatment requirements and available water resources were utilized to develop a prioritized list of capital improvements.

Tables 4-1, **4-2**, and **4-3** present recommended LOSS and goals for CCWSD's potable water system, wastewater system, and IQ water system, respectively. The Technical Memorandum on Task 8 – Level of Service Standards provides greater detail on the development of LOSS.

4.2 Guiding Principles

The CCWSD Utilities Standards Manual was prepared to guide the design and construction of potable water, IQ water and wastewater system improvements to Collier County Public Utility Infrastructure. The Utilities Standards Manual is continuously reviewed for best engineering practices, and the last update was Board

Table 4-1: Potable Water – Level of Service Standards and Goals

Per-Capita Demand[1]	150 gpcd for Annual Average Day Demand
Treatment Plant [2, 3, 6]	
Process Design Basis [9]	Maximum 3 Day Demand when sufficient potable water storage is available to offset peak demands
Distribution System	
Fire Flow Demand - Residential[4]	1,000 gpm for duration of 1 hour
Fire Flow Demand - Commercial[5]	1,500 gpm for duration of 1 hour
Annual Average, Max Day and Peak Hour Demand Operating Pressure[4]	50 psi (minimum), 90 psi (maximum)
Max Day plus Fire Demand Operating Pressure[4]	40 psi
Annual Average, Max Day and Maximum Velocity in Pipe[4]	7 fps
Peak Hour Maximum Velocity in Pipe [4]	8 fps
Reliable Distribution System	Greater than one transmission main to serve areas
Water Quality [7, 8]	Comply with Federal and State of Florida Safe Drinking Water Act Standards
Reliability Goals	
Operational Treatment Plant Capacity[2, 3, 6]	Capacity with one of the largest units out of service
Operational Capacity from Fresh Groundwater Source - Tamiami Wellfield [1, 2, 6]	Additional 20 percent of supply requirement[10]
Operational Capacity from Brackish Groundwater Source - Hawthorne Wellfields[1, 2, 6]	Additional 33 percent of supply requirement[10]
Operational Storage Capacity	Minimum operational storage capacity is equal to AADD plus fire requirements , plus meeting water quality standards[9]
Reliability Requirements for mechanical and electrical equipment[4, 5]	Varies

References

1. Technical Memorandum on Task 4, Population and Demand / Flow Projections (2014); and CCWSD input
2. Collier County Government Public Utilities Division Reliability Guidelines (February 2006)
3. EPA - 430-99-47-001 Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability
4. Collier County Water Model Standard Protocol, Draft, February 2013, p.27-28
5. 2008 Collier County Public Utility Master Plan
6. Technical Memorandum on Task 5, Existing Treatment Capacity Evaluation and Gap Analysis (2014)
7. FDEP Rule Chapter 62-555 Drinking Water Standards, Monitoring, and Reporting
8. Technical Memorandum on Task 7, Water Quality and Treatment Evaluation (2014)
9. CCWSD requirement when sufficient potable water storage is available.
10. The supply requirement is based upon the design capacity of the water treatment plants and the amount of raw water required to produce finished water.

Table 4-2: Wastewater Level of Service Standards and Goals

Per Capita Demand [1]	100 gpcd for Annual Average Day
Treatment Plant [2, 3, 5]	
Process Design Basis [7]	Maximum 3 Day Flow
Conveyance System	
Minimum Scour Velocity [2]	2 fps
Maximum Velocity [3]	6 fps
Effluent Quality [6]	Comply with FDEP Permit Requirements
Reliability Goals	
Operational Treatment Plant Capacity [4, 5]	Capacity with the largest treatment unit or tank out of service
Operational Treatment Plant Hydraulic Capacity [3]	Maximum 3-Day Flow with flow equalization.
Operational conveyance [3]	Multiple conveyance opportunities (flexibility for rerouting flows)
Operational Capacity for Deep Injection Well for Effluent Disposal	Maximum 3-Day Flow
Reliability Requirements for mechanical & electrical equipment [4, 5]	Varies

References

1. Technical Memorandum on Task 4, Population and Demand/Flow Projections; and CCWSD input
2. FDEP and 10 States Standards
3. CCWSD Staff input
4. EPA - 430-99-47-001 Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability.
5. Collier County Government Public Utilities Division Reliability Guidelines (February 2006)
6. FDEP Rule Chapter 62-600 Domestic Wastewater Facilities
7. CCWSD requirement exceeds FDEP guidelines (treatment process design based on Maximum Month Daily Flow) in order to treat peak flows and loads more reliably.

Table 4-3: IQ Water Level of Service Standards and Goals

IQ Water Demand [2]	1-inch/acre/week for irrigable areas
Targeted percent of Beneficial Reuse [3]	100 percent of WRF Effluent
Targeted percent of Potable Water and IQ Water with Respect to Total Demand (Potable + IQ) [3]	Potable Water = 40 percent of Total Demand IQ Water = 60 percent of Total Demand
IQ Plan for Future Customers [4]	Control future demands to match available reliable supply
IQ Water Distribution System	
Minimum Pressure [5]	45 psi downstream of customer meter
Annual Average, Max Day, Maximum Velocity in Pipe [5]	7 fps
Peak Hour Maximum Velocity in Pipe [5]	8 fps
Water Quality[7]	Comply with Regulatory and Permitting Requirements
Reliability Goals	
Operational Capacity from Fresh Groundwater Source [1, 6]	Additional 20 percent of supply requirement
Operational Capacity from ASR	TBD; standards vary
Operational Capacity from WRF effluent (for IQ water supply)	95 percent of (0.80 x AADF)
Operational Capacity for Process Treatment [1, 6]	Capacity with the largest treatment unit out of service
Reliability Requirements for mechanical & electrical equipment [4, 5]	Varies

References:

1. Collier County Government Public Utilities Division Reliability Guidelines (February 2006)
2. Per Collier County IQ Water Dept. Noted in TM 4 – Population and Demand/Flow Projections
3. Per Collier County IQ Water Dept. Noted in TM 3 – Water Resources Evaluation
4. Per Collier County IQ Water Department
5. IQ Water Model Standard Protocol report submitted with IQ water model
6. EPA – 430-99-47-001 Design for mechanical, electric, and fluid system and component reliability
7. FDEP Rules Chapter 62-610 Reuse of Reclaimed Water and Land Application

approved in December 2013. In addition, the CCWSD's Public Utilities Division Reliability Guidelines, February 2006, establishes requirements for the CCWSD to be consistent with EPA 430-99-47-001. The identification of capital improvements for this Master Plan was completed in accordance with the guiding principles described in the CCWSD Utilities Standards Manual and the Reliability Guidelines.

4.3 Water Quality and Treatment

The Master Plan included an evaluation of existing water and wastewater treatment facilities, establishment of water quality goals for potable and non-potable water use and the development of a treatment technologies matrix to be utilized when recommending the development of additional water resources as a part of the CCWSD's capital improvements program.

Water quality goals for the potable water system were recommended to establish a level of quality necessary for each potential water resource. Regulatory standards and consumer expectations for aesthetic water quality were key considerations on the establishment of these water quality goals.

Historical water quality for the CCWSD's potable water system was reviewed and no significant water quality treatment issues were observed at any of the CCWSD's water treatment facilities. The CCWSD produces high quality potable water at each of its WTPs. The historical Monthly Operating Reports (MORs) and consumer confidence reports (CCRs) indicated that the treatment plants met the water quality goals and Maximum Contamination Levels (MCLs) for compliance with the State and Federal Safe Drinking Water Act (SDWA).

The water quality standards established for wastewater effluent depends on the specific discharge use such as land application, deep well injection, surface water discharge, or reuse.

Historical effluent water quality for the CCWSD's wastewater system was reviewed and no water quality treatment issues were observed at any of the CCWSD's wastewater treatment facilities. The historical Daily Monitoring Reports (DMRs) indicated that the WRFs meet or exceed the treatment permit requirements for its current end-uses.

The Technical Memorandum on Task 7 – Water Quality and Treatment provides greater detail on the water quality goals, wastewater effluent water quality goals and treatment options for each potential water resource and its end use. Based on these goals and treatment options, recommendations were made to optimize the CCWSD water supply while effectively meeting future demands at build-out.

The following are recommended strategies to expand water supply in order to meet future demands. These strategies support the CCWSD's mission to achieve compliance with facility operating permits, and applicable laws, rules, and regulations.

Potable Water System:

- Continue brackish groundwater utilization as an alternative water supply
- Secure additional fresh groundwater allocations, if possible
- Implement uniform finished water quality goals

Wastewater System:

- Maximize reclaimed water production suitable for public access reuse
- Minimize effluent disposal via deep well injection by 100% beneficial reuse

IQ Water System:

- Meet existing IQ water contractual commitments.

- Achieve 60:40 target ratio [where IQ water is 60 percent of the total demand (IQ water + potable water demand) and potable water is 40 percent of the total demand] to off-set potable demand and conserve fresh groundwater supply.
- Maximize use of installed IQ water distribution capacity.
- Utilize ASR systems for IQ water storage to meet peak dry season flows, including the following:
  - Expand existing fresh groundwater ASR system
  - Develop surface water supply ASR system
  - Develop reclaimed water ASR system

4.4 Hydraulic Modeling Tools

Hydraulic modeling was performed to evaluate the impact of projected growth on the CCWSD's potable water, wastewater, and IQ water systems. The CCWSD's existing calibrated hydraulic models were used to identify recommended improvements for meeting the projected demands/flows through the year 2034 and build-out. The hydraulic modeling tools included the following:

- Potable Water System Hydraulic Model – built in Bentley's WaterGEMS Version V8i (Series 3)
- Wastewater System Hydraulic Model – built in Bentley's SewerGEMS Sanitary Version V8i (Series 3)
- IQ Water System Hydraulic Model – built in Bentley's WaterGEMS Version V8i (Series 3)

4.4.1 Potable Water System Hydraulic Modeling

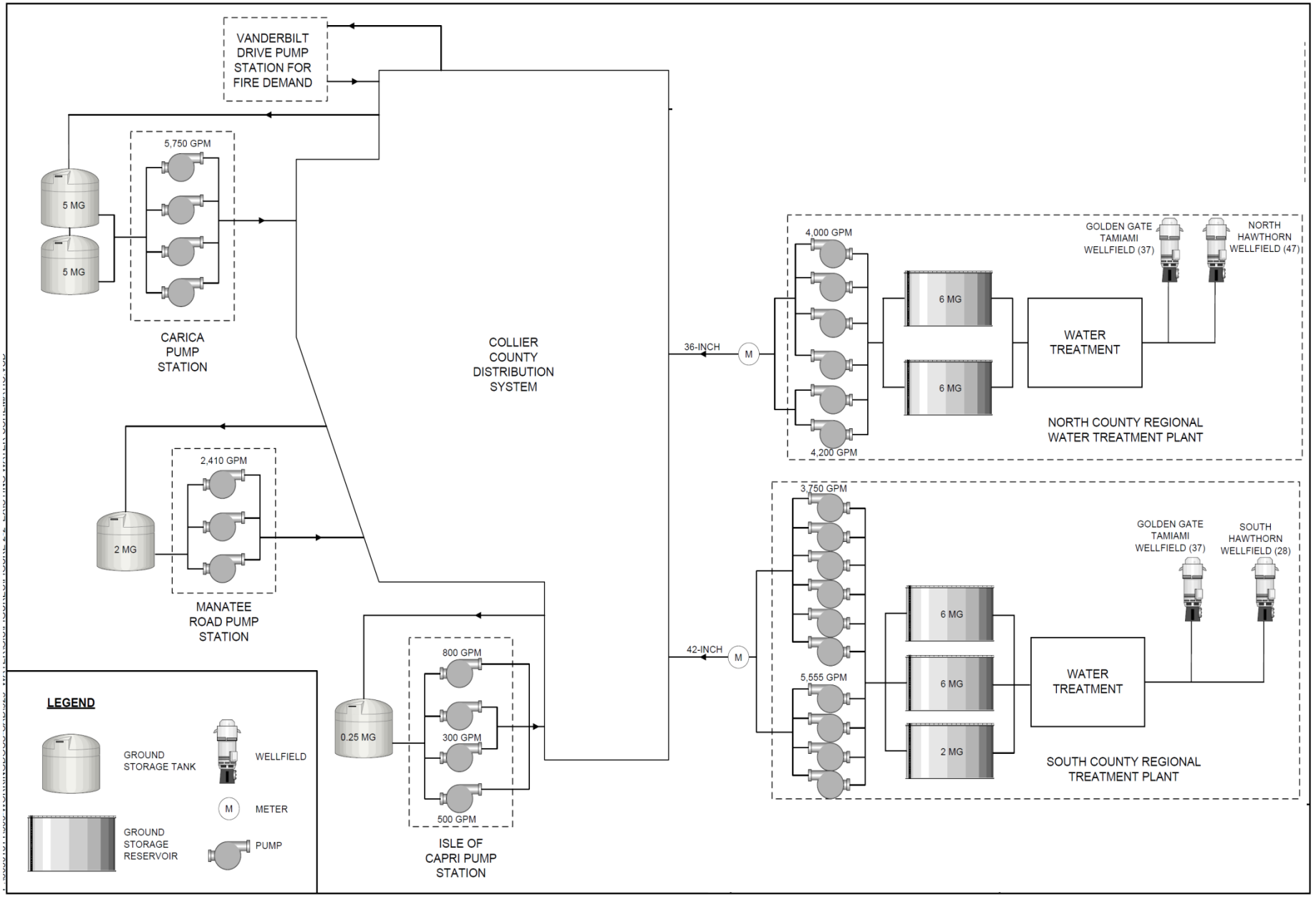
The existing potable water system hydraulic model included scenarios for current conditions simulating the year 2012 demands. The model was updated for future planning conditions based on available population data from Traffic Analysis Zones (TAZ) and potable water demand projections provided as part of this Master Plan. The hydraulic model was used to analyze future demands for the years 2019, 2024, and 2034/build-out conditions using the demand scenarios identified in **Table 4-4**. Design criteria used to identify potable water system deficiencies included fire flow demands, operating pressures, pipe velocities and storage capacity as noted in **Table 4-1** Level of Service Standards and goals. A schematic of the existing potable water system is shown in **Exhibit 4-1**.

Table 4-4: Demand Scenarios for Potable Water System Hydraulic Modeling

Demand Scenario 1	Annual Average Day Demand
Demand Scenario 2	Max Day Demand (Extended Period Simulation)
Demand Scenario 3	Max Day plus Fire Flow
Demand Scenario 4	Peak Hour

The potable water system hydraulic model analysis included an evaluation of high service pumping capacity, availability of system storage and distribution system available pressure and flow capacity. The results of the analysis are outlined below:

- Evaluation of the high service pumping capacity in the CCWSD's potable water system indicated that adequate capacity is available to meet year 2034/build-out demand for peak hour conditions.
- Evaluation of the available storage in the CCWSD's potable water system indicated that additional storage of approximately 6 MG is needed by the year 2034.
- Evaluation of the CCWSD's potable water distribution system piping for flow and pressure requirements identified a series of piping infrastructure improvements needed during fire flow conditions.



Collier County Public Utilities Master Plan

Existing Potable Water System Schematic

Exhibit 4-1

4.4.1.1 Alternatives for Potable Water Treatment Capacity Expansion

Section 3 of this Master Plan identified that 6.0 MGD of additional treatment capacity is required to accommodate potable water system future growth through the year 2034 and build-out. The following are recommended alternatives for potable water system treatment capacity expansion:

- Alternative 1: Installation of a new 4.0 MGD LS reactor at SCRWTP and installation of a new 2.0 MGD treatment unit at the NCRWTP
- Alternative 2: Construction of a new 6.0 MGD LPRO treatment system at SCRWTP
- Alternative 3: Construction of a new 6.0 MGD NERWTP using LPRO treatment process

Several factors make construction of a new water treatment plant located at the Northeast Facility the preferred alternative to meet the year 2034 condition. It is anticipated that any treatment process expansion would utilize brackish groundwater, since it is considered unlikely that the CCWSD would be granted an increase in their fresh groundwater allocation. In addition, there is limited space at the existing WTPs for expansion of 6.0 MGD treatment capacity using a brackish groundwater treatment process. A new brackish groundwater wellfield has already been planned to provide raw water to the NERWTP. The CCWSD also currently has the design complete for the new NERWTP that could meet the year 2034 and build-out condition demands.

4.4.2 Wastewater System Hydraulic Modeling

The CCWSD's wastewater system hydraulic model was constructed in the year 2012 and was validated in the year 2013 to represent current conditions based on observed operating data.

The wastewater system hydraulic model analysis was performed for the following future planning years:

- 2019
- 2024
- Build-Out

Design criteria utilized in the hydraulic analysis of the wastewater system included velocity criteria as noted previously in **Table 4-2**, as well as the criterion to maintain existing system operating pressures.

When completing the analysis, system flows were estimated to be 60 percent of the peak hour flows because 100 percent of the pump stations do not typically operate simultaneously. Also, the Hazen and Williams friction loss coefficient for the existing system piping was established to be 80 (as identified in the validated hydraulic model) and set equal to 130 for new piping.

The CCWSD's wastewater system was analyzed using the hydraulic model to evaluate the following conditions:

- Improvements required to accommodate northeast wastewater service area (NEWWSA) future developments
- Improvements required for diverting wastewater flows, which exceed the SCWRF plant capacity of 16 MGD, from the South County wastewater service area to the North County wastewater service area

4.4.2.1 Analysis to Accommodate NEWWSA Future Developments

The CCWSD has the following planned developments in the northeast part of its wastewater service area:

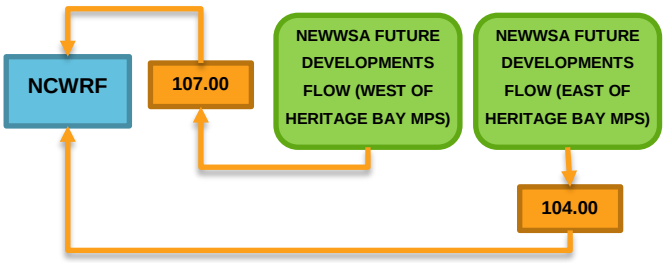
- The Heritage Bay planned unit development and other proposed developments north of Immokalee Road, which will require the construction of a new Heritage Bay Master Pump Station (MPS).

- Potential addition of OTUC customers to the CCWSD including 1) the existing Twin Eagles development located north of Immokalee Road, 2) the proposed Twin Eagles development located south of Immokalee Road, 3) the Orange Blossom Ranch development located north and south of Oil Well Road and 4) the existing Orange Tree Utilities customers.

As part of the hydraulic modeling analysis, the projected wastewater flows from future development in the NEWWSA, west of Heritage Bay MPS are assumed to be conveyed to the CCWSD's MPS 107.00 and then re-pumped to the NCWRF. Projected wastewater flows from future developments located east of Heritage Bay MPS are assumed to be conveyed to the CCWSD's MPS 104.00 via a new force main that would extend along Immokalee Road, Logan Boulevard, and Vanderbilt Beach Road. Flows from MPS 104.00 would then be re-pumped to the NCWRF.

Exhibit 4-2 presents a flow schematic for diverting projected wastewater flows from NEWWSA to the NCWRF as described above.

Exhibit 4-2: NEWWSA Projected Flows Schematic



The projected wastewater flows for the proposed developments in the NEWWSA were determined based on population projections provided with the CCWSD's Northeast Service Area Hydraulic Modeling Master Plan (2013).

The CCWSD's wastewater hydraulic system model was also used to identify the piping infrastructure improvements and capacity expansion improvements that are required to transfer projected wastewater flows from the NEWWSA to the NCWRF.

4.4.2.2 Analysis for Diverting Flows from South County to North County Wastewater Service Area

Based upon the wastewater flow projections and gap analysis for each water reclamation facility, it was determined that the NCWRF has sufficient capacity to meet build-out conditions. However, in the year 2021 the SCWRF will reach its operational capacity, and by build out the SCWRF operational capacity will be exceeded by 5.6 MGD. The wastewater flow projections that were developed as a part of this Master Plan show, that diverting flows up to a maximum of 2.7 MGD (on a M3DF basis) from the South County Wastewater Service Area to the North County Wastewater Service Area, starting in the year 2021 could delay the need for a treatment plant upgrade at the South WRF. However by the year 2028, there is a need for a system-wide plant expansion. **Table 4-5** lists the MPSs and tributary wastewater flows in the South County wastewater service area that are recommended to be diverted to the North County wastewater service area.

Table 4-5: MPSs in South County Service Area to be Diverted to North County Service Area

MPS	Flow (gpm *
305.00	517
309.00	416
310.00	245
313.00	491
312.00	924
Total Flow	2,593

* Flows represent AADF to be conveyed from South to North

Wastewater flows from MPSs 305.00, 309.00, and 310.00 are proposed to be diverted to the North County wastewater service area via a new force main

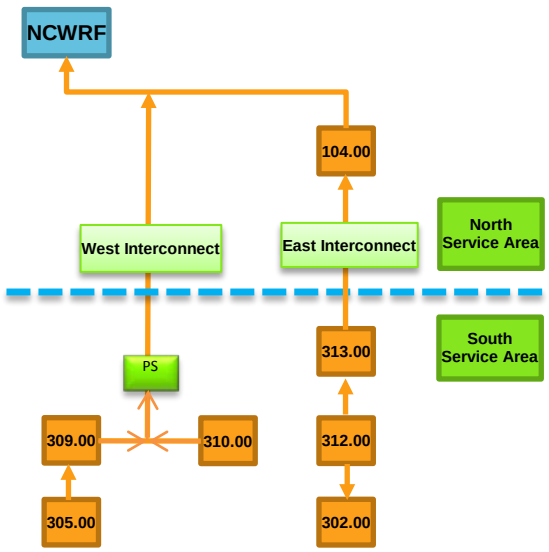
(West Interconnect) along Livingston Road from Radio Road to Vanderbilt Beach Road. The proposed west interconnect would discharge flows to the existing 24-inch main along Vanderbilt Beach Road, which transmits flow to the NCWRF. An in-line booster pump station is recommended at the intersection of the Radio Road and Livingston Road to pump wastewater flows along the proposed west interconnect.

Wastewater flows from MPSs 312.00 and 313.00 are proposed to be diverted to the North County wastewater service area via an existing 24-inch pipe (east interconnect) along Santa Barbara Boulevard from MPS 313.00 to MPS 104.00 on Vanderbilt Beach Road.

Exhibit 4-3 presents a flow schematic for diverting flows from the South County wastewater service area to the North County wastewater service area.

The CCWSD's wastewater hydraulic model was used to identify the piping infrastructure improvements and capacity expansion improvements that are required to divert South County wastewater service area flows to North County wastewater service area.

Exhibit 4-3: Schematic – Diverting Flows from South to North County Service Area



4.4.2.3 Alternatives for Treatment Capacity Expansion

The wastewater gap analysis indicated that on a system wide basis 4.9 MGD of additional treatment capacity is required to accommodate wastewater system future growth through build-out. However, as noted in the proceeding paragraphs, wastewater flows could be diverted from the south service area to the NCWRF so that the additional treatment plant capacity is not needed until the year 2028.

Three alternatives for wastewater treatment expansion are identified, which would require some degree of flow diversion from the south service area as follows:

- Alternative 1: Expansion of NCWRF to 30.6 MGD
- Alternative 2: Construction of the NEWRF (Site and design exist).
- Alternative 3: Reactivate the CCWSD's Pelican Bay Utility Site. (Requires 5 MGD of wastewater membrane bioreactor (MBR) treatment capacity)

It's recommended that a final decision be made on the wastewater treatment expansion after 2-4 years, when the direction and intensity of growth is better known.

As part of the Master Plan, other alternatives in lieu of flow diversion were identified that could address the SCWRF shortfall in treatment plant capacity. These alternatives are listed as follows:

- Alternative 4: Re-rating of existing SCWRF to accommodate future flows through build-out. (Would likely require changing treatment technology from MLE to MBR).
- Alternative 5: Construction of a new 5.6 MGD SEWRF. (Would require land acquisition, permitting and design)

It is also recommended that the CCWSD complete a feasibility study for a scalping plant (MBR facility) that could provide operational flexibility, along with the proposed alternatives for treatment capacity expansion. The potential locations for the scalping plant are 1) Pelican Bay Utility site [MPS 109.00] and 2) OTUC WWTP site

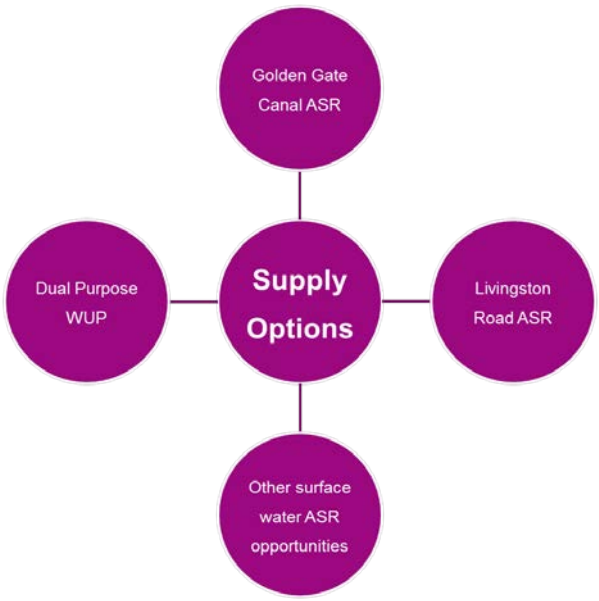
4.4.3 IQ Water System Hydraulic Modeling

The IQ water system hydraulic model uses current demand allocations (year 2012). The availability of IQ water is primarily dependent on treated effluent from the CCWSD's WRFs and available infrastructure for distribution. It is recommended that the CCWSD expand the IQ water customer base as IQ water availability increases. Therefore, no updates were made to the existing IQ water system hydraulic model to represent future demand conditions. A schematic of the existing IQ water system is presented in **Exhibit 4-4.**

The IQ water system hydraulic model was used to identify areas within the CCWSD IQ water distribution network that were not maintaining a minimum of 45 psi during the maximum day – peak hour – conditions. These analyses identified areas with operating pressures lower than the proposed criteria. The proposed infrastructure improvements and upgrades that are recommended to improve the operating pressure include increasing the size distribution mains in the northwest and southeast service area, and increasing the operating head of the IQ water pumps at the Pelican Bay pump station.

In order to expand the use of IQ water and achieve a target ratio of 60% for IQ water total usage and 40% potable water total usage, the alternative water supply options shown in **Exhibit 4-5** are recommended. Consistent with these recommendations, the CUP was revised to reflect a total allocation of 9.23 MGD, which includes fresh groundwater wells at Foxfire and the SCWRF. The recommended alternatives can augment the WRFs effluent available for reuse and therefore expand the IQ water customer base for the CCWSD.

Exhibit 4-5: Schematic – Alternative Water Supply Options for IQ Water



4.5 Recommended Improvements for Growth

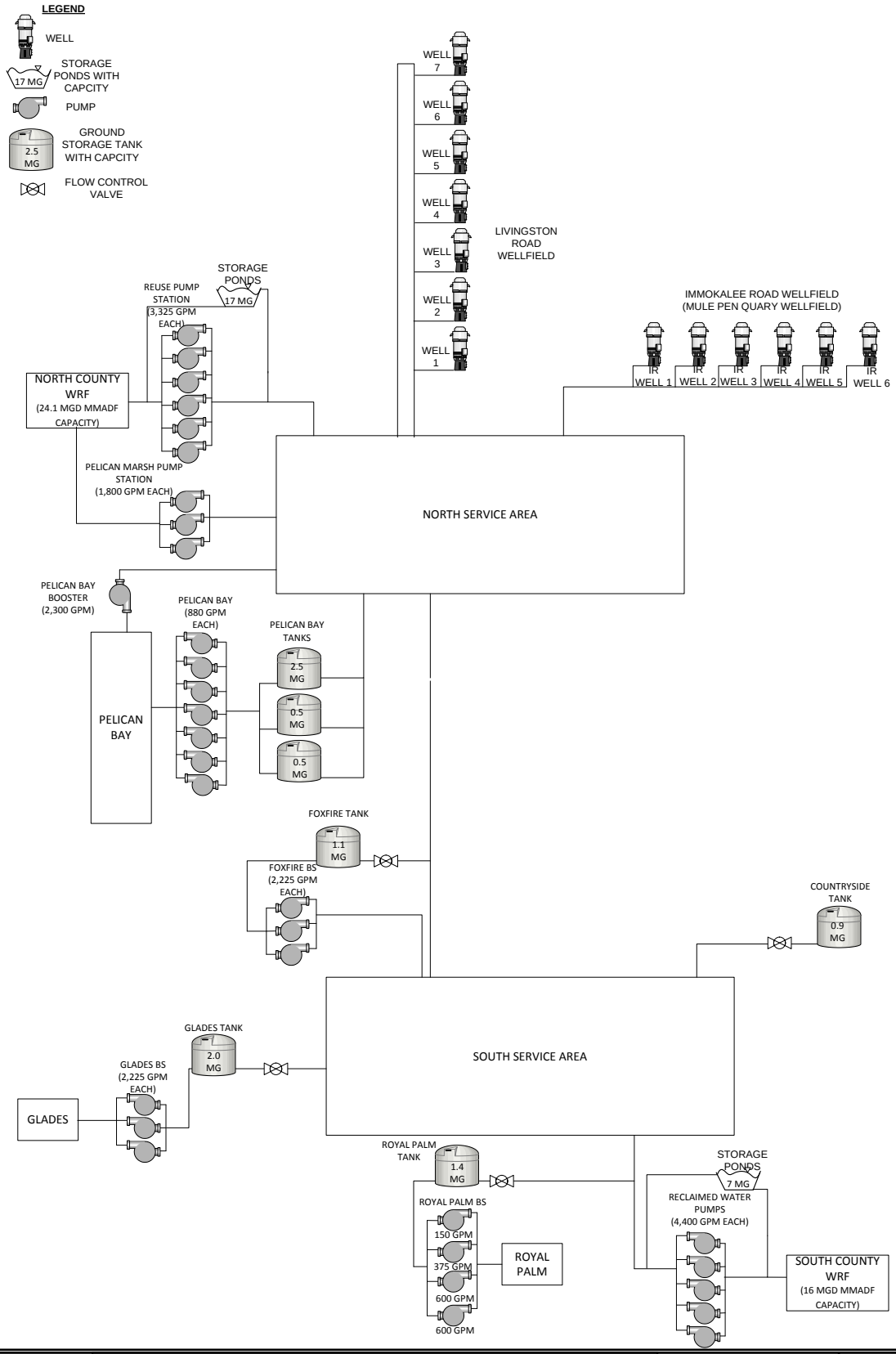
A series of recommended improvements were identified based upon the results of the hydraulic modeling to handle projected growth in the CCWSD.

4.5.1 Potable Water System

Table 4-6 summarizes the potable water system recommended improvements. These improvements are recommended to handle the CCWSD's potable water system projected demands through 2034. **Exhibit 4-6** shows the location of the recommended potable water system pipe improvements.

4.5.2 Wastewater System

Table 4-7 summarizes the wastewater recommended improvements. These improvements are required to handle the CCWSD's wastewater system projected flows through build-out. **Exhibit 4-7** shows the location of these improvements.



Collier County Public Utilities Master Plan
Existing Irrigation Quality Water System Schematic

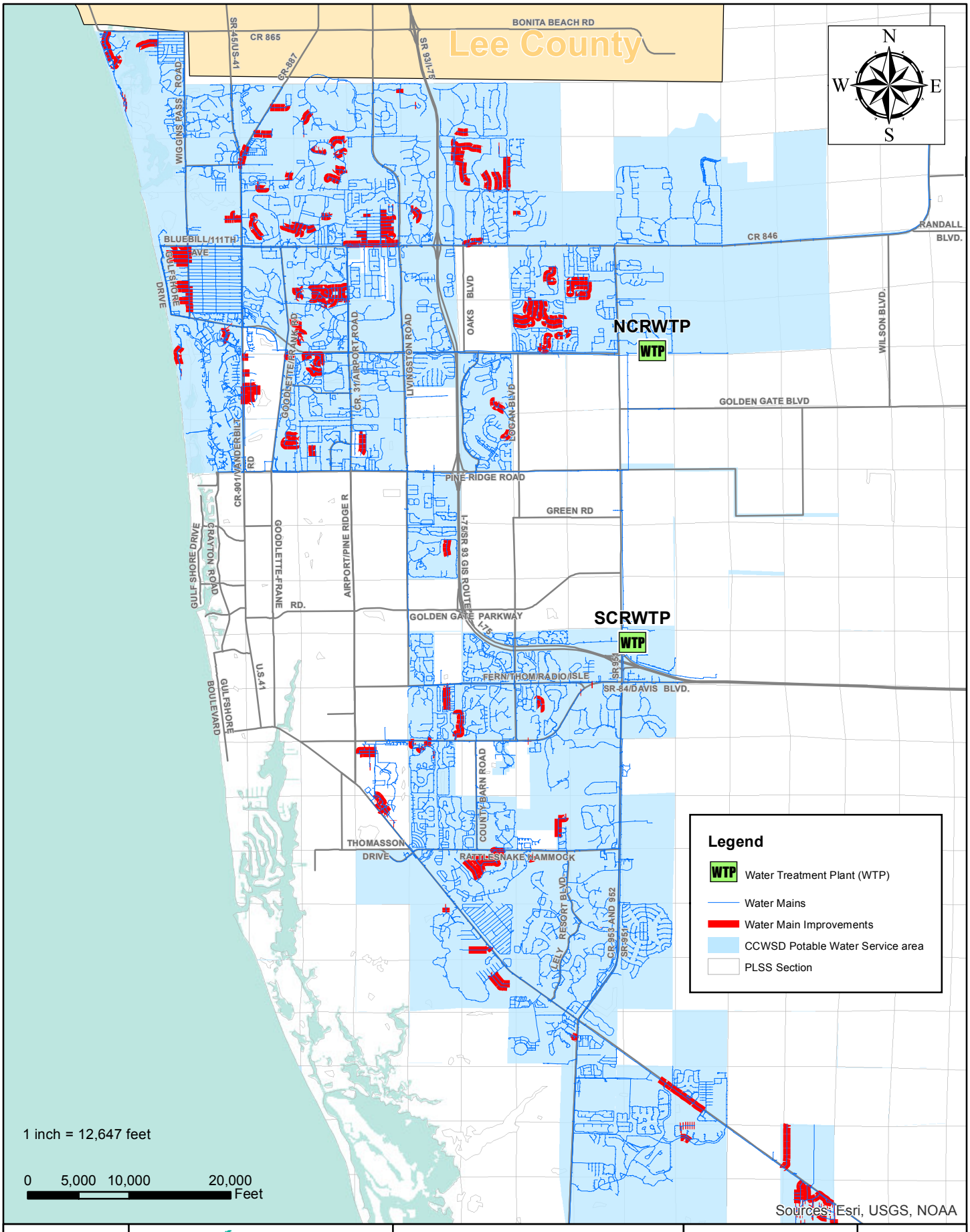
Exhibit 4-4

Table 4-6: Potable Water System Recommended Improvements Required by 2034

Item	Description	Unit	Quantity
1	3.5 Million Gallon Storage Tanks	EA	2
2	New NERWTP	MGD	6
3	8-inch diameter pipe	LF	170,000
4	10-inch diameter pipe	LF	18,250
5	12-inch diameter pipe	LF	6,650
6	16-inch diameter DI pipe	LF	16,500
7	20-inch diameter DIP pipe	LF	4,400

Table 4-7: Wastewater System Recommended Improvements Required by Build-Out

Item	Description	Unit	Quantity	Details
Recommended Improvements to meet Future Flow from NEWWSA Developments				
1	New Orange Tree MPS	gpm	2,500	Construction of new pump station with a capacity of 2,500 gpm to pump wastewater flow from OTUC customers and new developments to NCWRF
2	Twin Eagles MPS (additional capacity)	gpm	500	Expansion of existing Twin Eagles MPS by 500 gpm to pump wastewater flow to NCWRF
3	New Heritage Bay MPS	gpm	900	Construction of new pump station with a capacity of 900 gpm to pump WW flow from Heritage Bay development to NCWRF
4	12 inch diameter PVC pipe (Orange Tree MPS to existing sewer collection system)	LF	5,000	Pipe to connect new Orange Tree MPS to existing 16 inch force main on Immokalee Road
5	8 inch diameter PVC pipe (Twin Eagles MPS to existing sewer collection system)	LF	5,000	Pipe to connect Twin Eagles MPS to existing 16 inch force main on Immokalee Road
6	12 inch diameter PVC pipe (Heritage Bay MPS to existing sewer collection system)	LF	110	Pipe to connect Heritage Bay MPS to existing 16 inch force main on Immokalee Road
7	12 inch diameter PVC pipe (SR 846 Development to existing sewer collection system)	LF	6,500	Pipe to connect SR 846 development to existing 16 inch force main on Immokalee Road
8	24 inch diameter PVC pipe (Heritage Bay MPS to MPS 104.00)	LF	22,000	New pipe from Heritage Bay MPS to MPS 104.00 along Immokalee to Logan Boulevard and along Logan Boulevard to Vanderbilt Beach Road to MPS 104.00 (to tranfer NEWWSA flow to MPS 104.00)
Recommended Improvements to Divert South County Wastewater Service Area Flows to North County Wastewater Service Area				
1	24 inch diameter PVC pipe (West Interconnect)	LF	33,000	Diverting South County flows - Proposed West Interconnect to divert flows from MPS 305.00, 308.00, 309.00, & 310.00 to North County service area
2	12 inch diameter PVC pipe (MPS 310.00 to proposed West Interconnect)	LF	3,000	Diverting South County flows - Pipe to connect MPS 310.00 to proposed West Interconnect
3	16 inch diameter PVC pipe (MPS 305.00 to MPS 309.00)	LF	5,000	Diverting South County flows - Pipe to connect MPS 305.00 to MPS 309.00
4	16 inch diameter PVC pipe (MPS 104.00 to West Interconnect)	LF	12,500	Pipe parallel to existing 24" pipe on Vanderbilt Beach Road from MPS 104.00 to proposed West Interconnect
5	24 inch diameter PVC pipe (West Interconnect) to Immokalee	LF	10,500	Diverting South County flows - Extension to proposed West Interconnect to divert flows from MPS 305.00, 308.00, 309.00, & 310.00 to North County service area (extension of the proposed interconnect from Vanderbilt Beach Road to Immokalee Road will provide for operational flexibility)
6	30 inch diameter PVC pipe (West Interconnect to NCWRF)	LF	19,000	Pipe parallel to existing 24" pipe on Vanderbilt Beach Road from Livingston Road to NCWRF



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

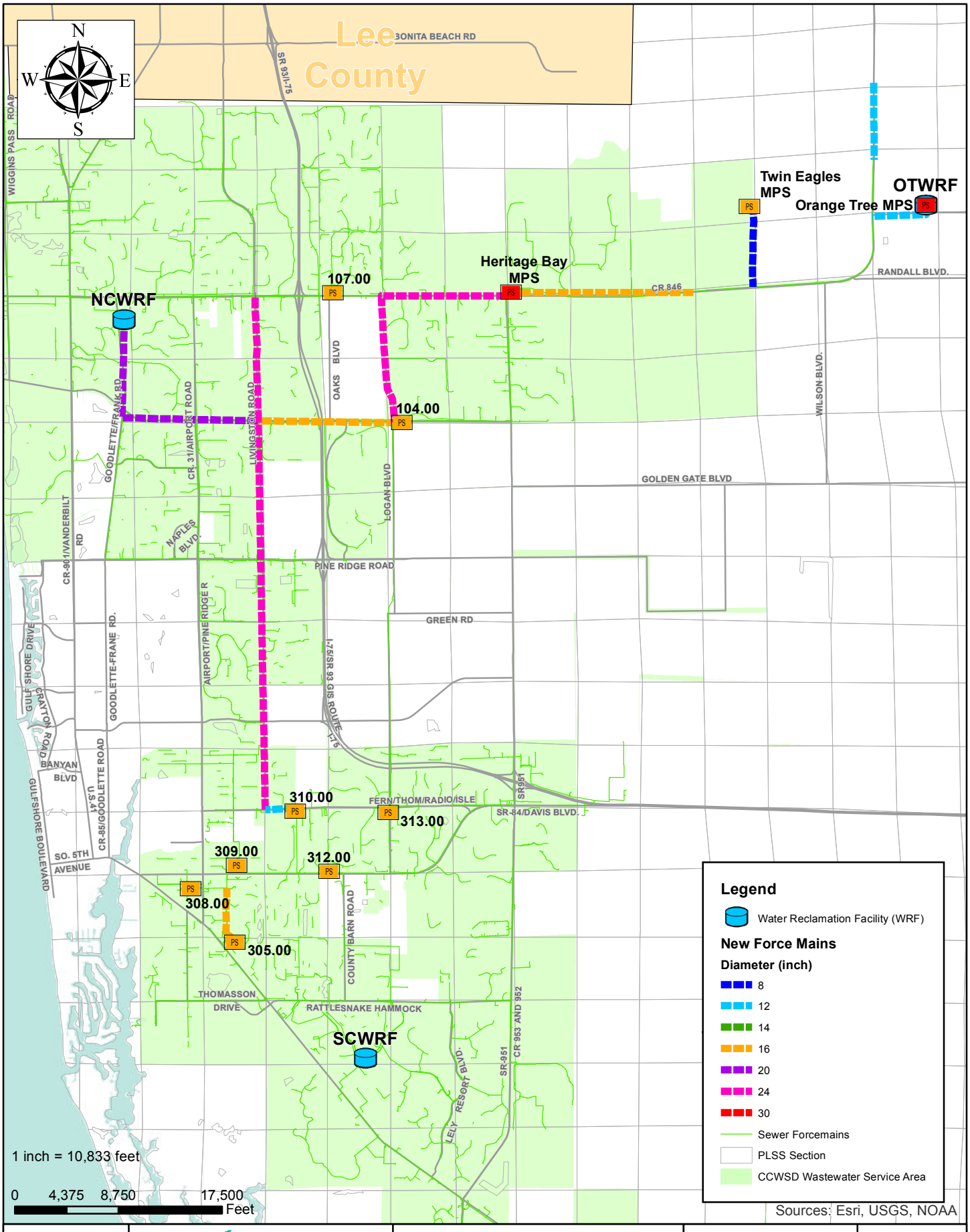
Collier County

Collier County Public Utilities Master Plan

Potable Water System Pipe Improvements Required by 2034

AECOM

Exhibit **4-6**



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

Collier County

Collier County Public Utilities Master Plan
Wastewater System Pipe Improvements Required by Buildout

AECOM

Exhibit
4-7

4.5.3 IQ Water System

There are no growth related improvements proposed for the CCWSD's IQ water system. The CCWSD will expand the customer base as the IQ water availability increases. **Exhibit 4-8** shows the location of the recommended pipe improvements.

4.6 Recommended Repair and/or Rehabilitation (R&R) Improvements

4.6.1 Public Utilities Planning and Project Management R&R Improvements

The CCWSD's Planning and Project Management Department staff and Operations staff developed a list of potential capital improvement projects for consideration in the CIP. The prioritization of projects and recommended CIP is presented in Section 5.

Hydraulic modeling analysis of the CCWSD's potable water system and wastewater system did not identify any R&R improvements.

4.6.2 IQ Water System

The following are the R&R improvements that were identified as part of hydraulic modeling analysis for the CCWSD's IQ water system to increase IQ water flow and operating pressure.

- The installation of 18-inch pipe in the northwest part of the network to replace the existing 12-inch and 16-inch pipes.
- The installation of a 16-inch pipe in the southeast part of the network to replace an existing 12-inch pipe. This project crosses an area of environmental sensitivity and may require some additional investigations to evaluate its feasibility.
- Improvements in the Pelican Bay pump station service area.

Table 4-8 summarizes the recommended R&R improvements for the IQ water system. **Exhibit 4-8** shows the location of these improvements.

Table 4-8: Proposed R&R Improvements for IQ Water Facility

Item	Description	Quantity (feet)
1	18 inch pipe	11,385
2	16-inch pipe	881

4.7 Strategy for Northeast Service Area

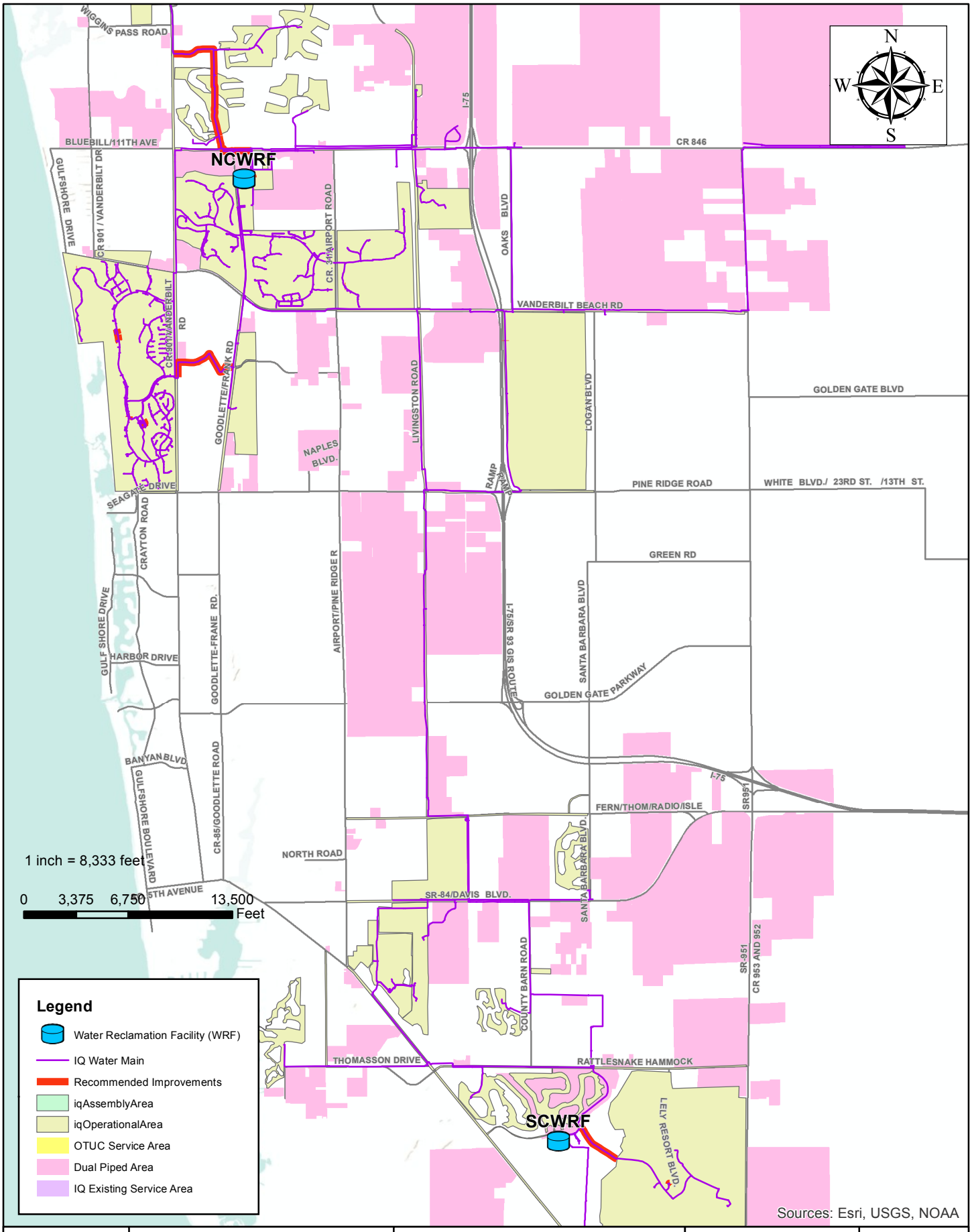
The water treatment plant capacity assessment presented in Section 3 of this Master Plan indicated that additional water treatment plant capacity is not required until the year 2026 and that at build-out conditions approximately 6.0 MGD is required. Section 3 of this Master Plan discussed the options of expanding treatment capacity and the difficulties with expanding the existing WTPs. The construction of a new NERWTP is recommended based upon the availability of brackish groundwater supplies, continued growth in the northeast service, available property, and current engineering design for a NERWTP.

The wastewater treatment capacity assessment presented in Section 3 shows that on a system-wide basis an additional 4.9 MGD of treatment capacity is required to meet the projected wastewater system flows through the year 2034 and build-out. Although the NCWRF has sufficient capacity to meet the projected flows for the North Service Area at build-out, the SCWRF will reach its operational capacity by the year 2021 and the operational capacity will be exceeded by 5.6 MGD at build-out.

The Master Plan considers diverting up to a maximum of 2.7 MGD (on a M3DF basis) from the South County Wastewater Service Area to the North County Wastewater Service Area starting in the year 2021, which would delay the need for a treatment plant

upgrade at the SCWRF. However, by the year 2028 there is need for a system-wide plant expansion.

Several alternatives were identified in Section 4.4.2.3 for treatment capacity expansion, including construction of the NEWRF. However, expansion of the NCWRF to 30.6 MGD would likely be more cost-effective than construction of a new WRF at the Northeast Facility. Construction of the NEWRF would only be needed if the service area boundary expanded, resulting in increased wastewater flow projections above the build-out flow projections identified in this Master Plan.



Source: Collier County, FDOT, BLM, and ESRI
User: jhelkowski
Date: August 2013
County: Collier

Collier County

Collier County Public Utilities Master Plan

IQ Water System Pipe Improvements

AECOM

Exhibit

4-8

Section 5

Prioritization of Projects & Recommended Capital Improvement Program (CIP)

This Section provides the recommended CIP and summarizes the process of prioritization of projects that involved identifying various parameters on condition, performance, and risk indices for infrastructure related to water, wastewater, and IQ water systems.

5 Prioritization of Projects & Recommended CIP

Priorities across the water, wastewater, and IQ water system assets are reconciled to develop a CIP that meets available budgets. This Master Plan is consistent with the CIP contained in the Water, Wastewater, Irrigation Quality Water, and Bulk Potable Water User Rate Study approved by the Board on June 10, 2014, as Agenda Item 11C. This process establishes an objective approach for the allocation of available budgets to the highest priority assets.

5.1 Level of Compliance Rating System

The CCWSD has assigned levels of compliance ratings to their assets based on a red, yellow, and green system, as outlined in **Exhibit 5-1**. The rating system is used to establish a prioritized list of recommended repairs and upgrades to the CCWSD infrastructure.

The CCWSD's level of compliance rating system categorizes capital projects based upon the risk of potential non-compliance with regulatory standards into three categories (red, yellow and green). The CCWSD's Planning and Project Management staff and Operations staff meet to discuss the condition and performance of vertical assets and assign an overall risk associated with not meeting regulatory compliance should a particular asset fail. A level of compliance score is then identified for each asset/capital project, which is then used to prioritize projects during the capital budgeting process.

Exhibit 5-1 Level of Compliance Rating Categories

GREEN **Level 1 Sustained Compliance**	There is little risk of non-compliance. Maintenance is routine and planned. The CCWSD provides reliable and full service that is sustained quality-compliant water and wastewater with no consent orders, back-ups, SSOs (spills), off-site odor emissions, and off-site noise emissions.
YELLOW **Level 2 Managed Compliance**	There is a risk of potential non-compliance with enforcement letters being issued. The level of service is sustained through deferred planned maintenance, asset management, and mitigation measures based on the resources available.
RED **Level 3 Risked Compliance**	There is a high risk of non-compliance with consent orders being issued. The reliability of the utility system and the level of service are in danger of being compromised with full-scale migration towards costly break-down maintenance, resulting in customer service outages, service interruptions, SSOs (spills), back-ups, and property damage.

Based upon site visits conducted at the water and wastewater treatment plants, meetings and discussions with Planning and Project Management staff and Operations staff, the compliance ratings identified by the CCWSD appear to be reasonable. This rating system was utilized to prioritize vertical infrastructure needs for development of the Capital Improvement Plan.

5.2 Capital Asset Prioritization System (CAPS)

A Capital Asset Prioritization System (CAPS) involves identification of various parameters for each infrastructure class related to water, wastewater, and IQ water systems and establishing a score and weighting system for those parameters in order to prioritize infrastructure needs. The CAPS is a tool that can be used to support the Level of Compliance Rating System currently being utilized by the CCWSD.

As part of the master planning effort, a Capital Asset Prioritization System for linear assets was developed along with a computer algorithm, which was utilized by the CCWSD to develop their Capital Improvement Program.

5.2.1 Linear Assets

The CAPS application generates a Priority Action Number (PAN) for each water, wastewater, and IQ water linear asset. The PAN is a number that rates assets in relative priority based on their condition, performance, and risk associated with failure. An asset is rated on a number of parameters (X), given a score (Y) and weighted (Z). The product of YZ is the score for each parameter. The sum of all parameters represents the overall PAN for each asset. The PAN is calculated as follows:

$$PAN = \sum_{i}^{X} YZ$$

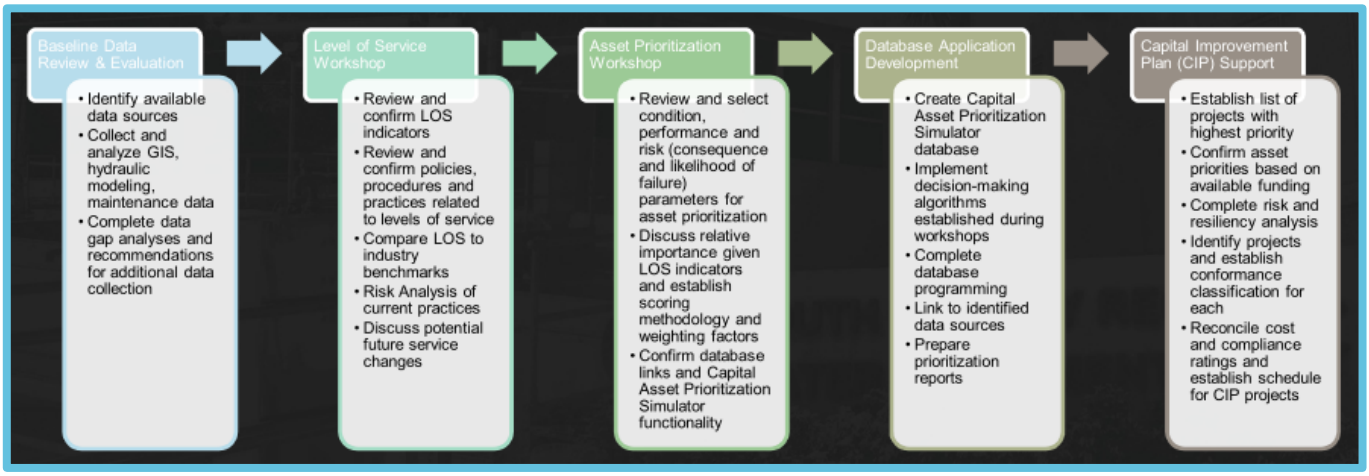
The total PAN score, or the overall PAN score for an asset or network of assets, will assist in prioritizing the assets so that critical assets are addressed first and levels of service are maintained or improved in a financially sustainable manner. Higher numbers represent a higher priority.

Linear water, wastewater, and IQ water assets were evaluated with the following parameters:

- Condition – The current physical condition of the pipe
- Performance – A measure of a pipe's ability to operate/perform as required to meet customer needs
- Risk – Impact (or consequence) associated with loss of service and the likelihood of that loss of service occurring

After scoring for each asset class, priorities across the water, wastewater, and IQ water asset classes are reviewed and adjusted as needed to develop a CIP that meets available budgets. This process establishes an objective approach for the allocation of available budgets to the highest priority assets. **Exhibit 5-2** presents a schematic of the CAPS analysis approach used to develop this Master Plan.

Exhibit 5-2: CAPS Analysis Approach - Schematic



5.2.1.1 Prioritization of Repair and Rehabilitation (R&R) Projects

The CAPS – PAN approach was used for prioritizing rehabilitation/replacement needs for water mains, sanitary sewer gravity mains, sanitary force mains, and water reuse mains (linear assets).

PAN Calculation –Water Mains

The Condition of the water mains was based upon the following criteria:

- Remaining service life
- Breaks / total system breaks
- Service connection breaks

The Performance of water mains was based on the following criteria:

- Material
- Level of compliance (based upon CCWSD rating system)
- Velocity

The Risk associated with water mains was based on the following criteria:

- Impact of failure: Reliability and road class
- Probability of failure: Remaining service life

The overall PAN score for a linear water main was calculated by adding the parameter scores for Condition, Performance and Risk. The maximum possible PAN for a given linear water asset is 450. Within the spectrum of 66 to 450 each water main is compared relative to other PAN scores and its priority is determined. The higher the PAN score, the higher the priority in terms of conducting R&R activities on the asset.

PAN Calculation – Gravity and Force Main Sanitary Sewers

The Condition of sanitary sewers was based upon the following criteria:

- Remaining service life (gravity mains and force mains)

- Level of compliance (based upon CCWSD rating system-gravity mains)
- Material (gravity mains and force mains)
- Depth (gravity mains)
- Location (gravity mains)
- Number of main breaks (force mains)

The Performance of sanitary sewers was based on the following criteria:

- Sanitary sewer overflows / basin (gravity mains)
- Inflow and infiltration (gravity mains)
- Conformance to standards (gravity mains)
- Maintenance costs (gravity mains)
- Customer complaints (gravity mains)
- Level of compliance (based upon the CCWSD rating system – force mains)
- Material (force mains)
- Velocity (force mains)

The Risk associated with sanitary sewers was based on the following criteria:

- Impact of failure [based upon location (outstanding Florida waters or coastal/non-coastal), complaints, diameter, and depth for gravity mains and based on reliability and road class for force mains]
- Probability of failure (based on level of compliance, material type, and location for gravity mains and remaining service life for force mains)

The PAN score for a linear gravity sanitary sewer main was calculated by adding the parameter scores for Condition, Performance and Risk. The PAN scores for a given linear sanitary sewer asset can range between 160 to 1,125. Again, the higher the PAN score, the higher the priority in terms of conducting R&R activities on the gravity sanitary sewer main.

Similarly, the PAN score for a sanitary sewer force main is calculated by adding the parameter scores for Condition, Performance and Risk. The PAN score for a given sanitary sewer force main can range from 66 to 450, and the force main given a maximum 450 score will receive the highest priority in terms of conducting R&R activities.

PAN Calculation – IQ Water Mains

The Condition of IQ water mains was based on the following criteria:

- Remaining service life
- Number of main breaks

The performance of IQ water mains was based on the following criteria:

- Material
- Level of compliance (based upon CCWSD rating system)
- Velocity

The Risk associated with IQ water mains was based on the following criteria:

- Impact of failure (reliability and road class)
- Probability of failure (remaining service life)

The PAN score for an IQ water main was calculated by adding the parameter scores for Condition, Performance and Risk. The possible PAN scores for a given IQ water main will range from 66 to 450, and the IQ water main with a maximum PAN score of 450 will be given the highest priority when identifying R&R work relative to IQ water mains.

The detailed CAPS analysis and results are provided in Technical Memorandum for Task 9 – Prioritization of Projects and Levels of Compliance.

Results of CAPS Analysis

The results of CAPS analysis showed that PAN scores increase in coastal areas, differ with material type, and increase with age. However, these scores were derived based upon data that is currently available, and that where data is unavailable, a default score is assigned assuming the asset is in good condition. As the CCWSD updates and adds to their data, the confidence in the results generated through the CAPS will increase. The following is a brief summary of the findings from the CAPS analysis:

- Water mains constructed with plastic pipe have lower PAN scores than other materials. Most of the CCWSD's water main assets have a low consequence and a low probability of failure. There are no pipes that are in the highest risk category.

- Gravity sewer pipes constructed with plastic pipe have, on average, lower PAN scores than pipes made of other materials. Also, those gravity sewer pipes located in coastal areas have higher average PAN scores. There are no sanitary gravity sewer pipes that have the higher consequence of failure scores.

- Sanitary force mains made of plastic pipe have, on average, lower PAN scores than pipes made of other materials. Also, those force mains located in coastal areas have higher average PAN scores. The sanitary force mains have a low probability and low consequence of failure – and thus a low risk. There are some force mains that are found to have a higher consequence and probability of failure. These are older mains, located along Collier County roads that have a relatively large diameter.

- IQ water mains made of plastic pipe have, on average, lower PAN scores than pipes made of ductile iron. Also, those IQ water mains located in coastal areas have higher average PAN scores. Most of the IQ water mains have a low consequence of failure.

5.2.2 Vertical Assets

Similar to the algorithm developed for linear assets, a system to prioritize improvements on the CCWSD's vertical assets (treatment, storage and conveyance facilities, and equipment for potable water, wastewater and IQ water systems) is recommended. Information regarding asset condition, performance and the risk associated with failure is needed to establish an objective approach for ranking/prioritization of vertical assets. However, there is presently limited information within the CCWSD's GIS data base to support the vertical asset ranking/prioritization system.

SCRWTP High Service Pumps

5.2.3 Enterprise Asset Management

The CCWSD is currently moving forward with Phase III of the Asset Management project. The final objective of this project is to have a GIS-based asset and work management system to guide predictive and preventative maintenance and consistent sustainable work practices. Until this Asset Management system is developed and operational, it is recommended that the current compliance rating system developed by the

CCWSD continue to be utilized for the prioritization of the vertical assets.

5.3 Recommended CIP

Based upon results and findings from hydraulic modeling analysis, CAPS analysis, level of compliance analysis and discussion and meeting with CCWSD staff, a list of potential Capital Improvement Projects (CIP) for CCWSD's potable water, wastewater, and IQ water systems are recommended. The CIP for each system is subdivided by growth related projects and R&R projects. The CIP is also grouped by CCWSD's funding sources as indicated below:

- Potable water system growth related projects – Fund 411
- Potable water system R&R projects – Fund 412
- Wastewater and IQ water systems growth related projects – Fund 413
- Wastewater and IQ water systems R&R projects – Fund 414

Planning level cost estimates for the proposed capital projects are included with the CIP. The Preliminary Opinion of Probable Construction Cost is provided for the general guidance of the CCWSD. The accuracy of such opinions, as compared to contractor bids or actual cost to the CCWSD, is not guaranteed. Estimates were compiled using available 2013/2014 cost data.

The recommended CIP lists the potable water system, wastewater system, and IQ water system proposed projects and adopted budget for each fiscal year starting from the year 2015 through the year 2024. The associated level of compliance for each proposed project is also provided.

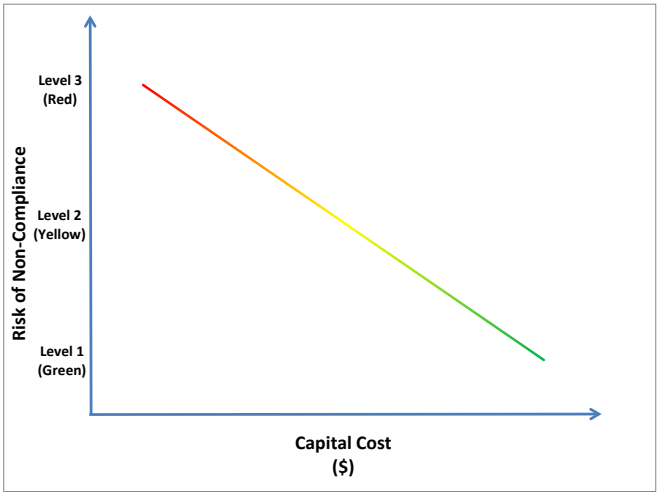
The recommended CIP for CCWSD's potable water, wastewater, and IQ water systems is provided in **Appendix A** of this Master Plan.

5.4 Costs for Various Levels of Compliance

The Capital Improvement Program includes recommended upgrades to address consistency with the water program policy, continued system optimization, conservation of potable water, beneficial WRF effluent reuse, and environmental sustainability through good water treatment, distribution, waste collection, reuse, and disposal practices. The preliminary opinion of probable cost for the recommended projects in the CIP is provided to allow the CCWSD to develop budgets for funding the CIP.

Since the CCWSD must be fiscally responsible when developing the Capital Improvement Program, the CIP was analyzed using the Level of Compliance Rating System in order to establish a relationship between cost and risk of non-compliance.

Exhibit 5-3 Risk of Non-Compliance vs Capital Cost



The costs associated with the CIP will be greatest if the CCWSD is unwilling to accept the risk of non-compliance, and would include Level 1 (green) projects. Conversely, if the CCWSD is willing to take on higher level of risk, the CIP cost will be less and would only include Level 3 (red) and possibly some Level 2 (yellow) projects. Ultimately, a final recommended Capital Improvement Program is provided that balances the risk of non-compliance with the costs for the program.

5.5 Impact of Rate Structure

The CCWSD has hired a Rate Consultant to review the adequacy of the current rates for service. The objective of the studies are to ensure adequate funding for utility operations, debt service, and the Capital Improvement Program, in order to provide a safe and reliable service to the CCWSD's water and wastewater customers. The CCWSD is working closely with the Rate Consultant to determine a final rate structure that achieves this purpose.

Appendix A. Fiscal Year 2015-2034 Capital Improvement Program

TABLE 8-1

COLLIER COUNTY GOVERNMENT
PUBLIC UTILITIES PLANNING AND PROJECT MANAGEMENT DEPARTMENT
2014 WATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS FY 2015-2024
PROJECT DESCRIPTIONS
WATER TREATMENT, TRANSMISSION AND DISTRIBUTION

Row No.	Project No.	Project Name	Description
Existing Water 412 Projects			
1	50105	Integrated Asset Management Program	Implement an Enterprise-wide Integrated Asset Management Program within the Public Utilities Division (PUD) that will more cost-effectively manage PUD assets. This multiyear program has three phases. Phase One (PUD pilot) and Phase Two (RFP solicitation and vendor selection) are complete. Phase Three is focused on procurement, implementation and integration of the selected software application with existing Agency wide systems of GIS, SAP, SCADA and many interdivisional processes including procurement and finance, including five full scale demonstrations projects. Phase Three is anticipated to be approximately 27 months of actual implementation.
2	70010	Meter Renewal & Replacement	This multi-year program consists of replacing water meters that have reached the end of their useful life and have decreased accuracy. There are approximately 55,800 meters in the system that record water usage, and are thus the source of revenue for the utility. All meters three inch and larger are tested and calibrated annually with replacements scheduled on a rotating basis. Scheduled replacement will be modified as needed to remain consistent with the results of the meter audit currently being conducted. In general, this project replaces water meters that have reached the end of their useful life, and meters that have been identified by the proactive ten year meter audit program as being non-compliant.
3	70014	Real Prop/Infrastructure Audit	Ensure that all Collier County Water-Sewer District assets are located within County Utility Easements. Where this is not the case, the County does not have the legal right to construct projects or perform maintenance required to remain in compliance and to serve the District's customers.
4	70015	General Legal Services	Obtain expert legal counsel for water, wastewater, and reuse issues. Provide appropriate legal representation for various complex or specialized water and wastewater related matters to stay in compliance.
5	70019	Cross Connection Projects	To maintain compliance with Rule 62-555 of the Florida Administrative Code and the Collier County Cross Connection Control Ordinance. The rule requires all community water systems to establish and implement a routine cross-connection control program to detect and control cross-connections and prevent backflow of contaminants into the water system. An additional component of the program is to install backflow devices on existing multi-family fire lines.
6	70021	Energy Efficiency Studies	Develop and implement a program of energy efficiency enhancements to reduce energy usage in water and wastewater facilities.
7	70023	Fire Hydrants Replacement	This on-going program replaces fire hydrants that have reached the end of their useful life. There are approximately 5,300 fire hydrants in the distribution system; 30 to 50 hydrants are planned to be replaced each year beyond those replaced with water main rehabilitation projects.
8	70031	Utility Master Plan	Utilize consultants to assist with updates to the Utilities Master Plan, including coordination with the rate study program, and the annual CIP update aimed at responsible system growth, maintenance and preservation.
9	70034	WTP Structure Rehab	Rehabilitate concrete structures at the Regional Water Treatment Plants (WTPs). Portions of the plants are over 30 years old and their concrete structures have started to exhibit failure. Projects include safety or compliance related issues and the following areas at each of the plants: north plant--generator enclosure, concentrate wetwell, transfer pump building, process flooring, clearwell, wetwell and concrete structural supports; south plant--chemical containment, ground storage tanks, process flooring, generator building, lime plant building, blending tank, and clearwell.

Row No.	Project No.	Project Name	Description
10	70045	FDOT Utility Projects	Plan, design, and construct Collier County Water-Sewer District infrastructure driven by Florida Department of Transportation (FDOT) construction projects. Costs were based on the use of the standard Memorandum of Agreement (MOA). Upcoming FDOT projects requiring utility relocations include: US41 from CR951 to Greenway Road, US41 from Greenway Road to Six L's Farm Road, I-75 at CR951 Ultimate Interchange Build Out, various intersection improvements, lighting improvements, traffic signal upgrades and installations.
11	70071	CW Utility Projects	Plan, design, and construct Collier County Water-Sewer District infrastructure driven by inter-county divisions. Upcoming projects include utility relocations by the LASIP Stormwater project, Collier Boulevard from Green Boulevard to Golden Gate Boulevard, and improvements to intersections and stormwater systems.
12	70084	Wellfield SCADA TSP	Rehabilitate the supervisory control and data acquisition systems (SCADA) for the well fields that supply raw water to the north and south treatment plants through a multi-year Technical Support Program (TSP) to increase reliability and operational efficiency. This program is needed to eliminate obsolescence of existing programmable logic controllers (PLCs), and various instrumentation used to constantly monitor the process and communicate with the water plants. There are 101 well sites with 72 PLCs and communication networks throughout the wellfield. This program will upgrade communication methods to more consistent and reliable standards.
13	70085	Well/Raw Water Booster	Provide annual Technical Support Program (TSP) funding for repairs and modifications needed to meet demand and to remain in compliance. Projects include ongoing restoration and rehabilitation to maintain water production capabilities at 101 individual production wells (well pump replacement, casing and tubing replacement, metering, electrical and mechanical rehabilitation); within the 41 miles of raw water piping system (valve and main rehabilitation, air release valve installation); and at both raw water booster pump stations (pump and control rehabilitation, building maintenance). This is a multi-year program that addresses ongoing prioritized needs.
14	70086	PUD Ops Ctr TSP	Provide annual Technical Support Program (TSP) funding for repairs and modifications needed to maintain functional usage of the operations center office areas (18,000 square feet) and warehousing/vehicle storage (67,000 square feet) facility. Perform repairs to existing building components and systems to maintain the safety of employees and utilize the space efficiently. This is a multi-year project that will address safety and ongoing maintenance at the operations center site.
15	70088	SCRWTP Deep Injection Wells	Restore the failing casing pipe for the South County Regional Water Treatment Plant Deep Injection Well #1. This well allows the disposal of components removed from the treatment of raw water, and is one of two wells at the plant for this purpose. The wells are constantly used in tandem to ensure a reliable system as required by the Florida Department of Environmental Protection-approved contingency planning.
16	70102	SCRWTP SCADA TSP	Restore and rehabilitate the supervisory control and data acquisition (SCADA) systems for the South County Regional Water Treatment Plant through a multi-year Technical Support Program. This program is needed to eliminate obsolescence of existing programmable logic controllers (PLCs) and various instrumentation used to constantly monitor and control the many processes and communicate throughout the water treatment plant. There are 28 PLCs at this facility with 8 PLCs and associated instrumentation planned to be replaced per year focusing on management of the core communication networks and completing RO skid PLC migration.
17	70104	Wtr Plant Compliance Assurance (CAP)	This Compliance Assurance Project (CAP) provides needed process improvements at both the SCRWTP and the NCRWTP required to remain in compliance with local, state or federal regulations. Will continue to monitor the performance of pilot process changes constructed in FY13 intended to allow odor control industrial waste to be disposed of via deep injection well (DIW). Plan, design, permit, and move toward construction of DIWs to receive industrial waste discharge at the water plants. Subsequent changes may include replacing odor control systems with one that produces a more process-friendly waste stream. This is a program executed over multiple years to provide modifications to the odor control disposal process to that result in sustained compliance.
18	70202	Collier County Standards	Utilize design consultants to provide independent peer review of specific Collier County Water-Sewer District infrastructure detail drawings based on input and feedback from County staff and specific advisory committees. The Board of County Commissioners annually approves the Utility Standards Manual update.
19	70882	Customer Services/Billing	Provide a mobile work order system for utility technicians to electronically receive, create, and update work orders in the field. This will eliminate multiple manual data entries and enable real-time status of work performed. The project provides incremental functionality to the existing billing application, enabling entry of work order codes to customer calls used in conjunction with the utility GIS to enhance reporting, ensuring all meters are accounted for and billed appropriately.

Row No.	Project No.	Project Name	Description
20	71009	Security Upgrades	Multi-year program to provide both physical and virtual protection of assets that are imbedded in critical compliance-driven operations, including physical access points such as gates, fences, card access and recording devices, as well as cyber threats such as network intrusion and cyber hacking that could directly impact operations and billing systems. Evaluate and prioritize mitigation to resolve risk and exposure to maintain compliance with Department of Homeland Security requirements for public water supply systems and sustainability of existing levels of service.
21	71010	Distribution System TSP	A multi-year Technical Support Program (TSP) that provides replacement of water distribution system assets that have reached the end of their useful life and the installation of fire hydrants and water mains that improve fire protection and water quality. There are 880 miles of water piping, with plans to rehabilitate or replace 3-6 miles per year, on a prioritized basis, focused on asbestos-concrete pipe and ancillary water appurtenances, iron water mains identified as having excessive corrosion, and PVC piping with excessive breaks.
22	71047	10 Year Water Supply Plan	Update the 10-year Water Supply Plan to be consistent with the Lower West Coast Water Supply Plan provided by the South Florida Water Management District.
23	71055	NCRWTP SCADA TSP	Restore and rehabilitate the supervisory control and data acquisition (SCADA) systems for the North County Regional Water Treatment Plant (NCRWTP) through a multi-year Technical Support Program (TSP). This program eliminates obsolescence of existing programmable logic controllers (PLCs), and various instrumentation used to monitor and control plant processes and communicate throughout the plant. Projects include, but are not limited to, the replacement of 4 of 13 PLCs and remote input/output units at this facility along with associated instrumentation, communication network and hardware rehabilitation. Focus will be on the electrical service room and external control stations outside the main facility.
24	71056	SCADA Compliance Water	Multi-year program to acquire, manage and maintain 7 software applications, 4 licenses and 2 support agreements for Supervisory Control and Data Acquisition (SCADA) systems used throughout the Water Department.
25	71057	Membrane Treatment TSP	Increase the efficiency and the recovery rate of the Water Treatment Plant Reverse Osmosis (RO) and Nanofiltration (Nano) treatment units, replace membranes that are beyond their useful life, and maintain existing piping components. The project includes a coordinated design of membrane filters that are optimized with piping and pump redesign as needed to remain in regulatory compliance and improve the recovery rate of the treatment process.
26	71065	SCRWTP TSP	Provide annual Technical Support Program (TSP) funding for safety related projects, repairs and modifications needed to meet demand and to remain in compliance at the South County Regional Water Treatment Plant (SCRWTP). This facility produced approximately 5 billion gallons of treated water in 2013. The major pieces of equipment needed to be kept operational are: 8 cartridge filters, 5 transfer/blend pumps, 10 high service pumps, 10 treatment skids, 8 degasification towers, 4 odor control trains, 6 generator sets, 3 lime reactors, 6 media filters, a sludge thickener and a belt press. This is a multi-year program that addresses ongoing prioritized needs.
27	71066	NCRWTP TSP	Provide annual Technical Support Program (TSP) funding for safety related projects, repairs and modifications needed to meet demand and to remain in compliance at the North County Regional Water Treatment Plant (NCRWTP). This facility produced approximately 3.2 billion gallons of treated water in 2013. The major pieces of equipment needed to be kept operational are: 8 cartridge filters, 6 transfer pumps, 6 high service pumps, 10 treatment skids, 3 concentrate wet well pumps, 4 degasification and odor control trains, and 4 generator sets. Projects include the replacement of various piping elements, valves, meters, pumps and other components; chemical process replacement; weatherproofing, rustproofing, corrosion control and coatings; and safety-driven projects. This is a multi-year program that addresses ongoing prioritized needs.
28	71067	Repumping Stations TSP	Provide annual Technical Support Program (TSP) funding for repairs and modifications to the secondary water distribution stations to meet demand and to remain in compliance. These stations include the following booster stations and storage tanks: Carica, Manatee, Isles of Capri, Goodland and Vanderbilt. Projects include ground storage tank mixer installation and repair, Florida Department of Environmental Protection-required process modifications, emergency generator refurbishment, tank/structure weatherproofing, process building roofing, chemical process rehabilitation, and pump appurtenance rehabilitation, among others. This is a multi-year program that addresses ongoing prioritized needs.

Row No.	Project No.	Project Name	Description
29	74310	State Revolving Fund	Administer the loan contracts with Florida Department of Environmental Protection (FDEP) for the lowest cost source of external funding - State Revolving Fund (SRF) loans.
30	75005	Wellfield Program Management	Provide consultant engineering support to assist in the monitoring of the aquifer conditions in the existing wellfields (the Tamiami, the North Reverse Osmosis, and the South Reverse Osmosis, with a total of 101 production wells and 24 monitoring wells in the system), and planning for future wellfields. This program provides assistance with review of regulatory changes to water withdrawal permits, regulatory reporting, permit modification and renewal, and hydrogeological expertise and support. The Wellfield Management Program also provides engineering design for necessary repairs and rehabilitation projects to maintain a reliable and sustainable raw water supply. This is a multi-year project that will be needed throughout the life of the wells.
31	75017	PUD Hydraulic Analysis	Provide hydraulic evaluation and analysis of all water, wastewater and irrigation quality water infrastructure. Hydraulic models are used to verify availability for Planned Unit Developments, concurrency, and master planning. Models are also used by operations to predict pressures, flow rates, and water quality under varying conditions; they are essential for determining the appropriate emergency response in the event of pipe breakage. Flows can be modeled and redirected with minimum disruption to the community. Hydraulic analysis will identify opportunities for cost-savings resulting from pump station operations, diurnal curve management, pressure management, and pipe sizing.
32	75018	Financial Services	Utilize outside consultants to prepare feasibility reports, perform rate studies, asset valuations, and acquisitions.
33	75019	Growth Management Plan TSP	Utilize consultants to assist in addressing changes to key documents and data used to prepare the following: the Utilities portion of the Annual Update and Inventory Report (AUIR), updates to the Growth Management Plan (GMP), Evaluation and Appraisal Report (EAR) of the Growth Management Plan, and updates to the Land Development Code (LDC) to ensure sustained compliance within the CCWSD.
New Water 412 Projects			
34	TBD	Lime Treatment TSP	Design and construct improvements to the lime softening treatment process at the SCRWTP utilizing technology improvements that have occurred since the initial plant design in the early 1980's. Work to include recarbonation process rehabilitation, reactor tank replacement and/or repair, filter reconstruction and piping and appurtenance replacements. This project will permit an increase in the flexibility in the operation of the plant to avoid single failure points in permitted capacity.
35	TBD	VFD TSP	Systematically replace obsolete variable frequency drives (VFDs) at the Water Plants and secondary stations.
36	TBD	Generators 1 &4 R/R	R/R Projects at NCRWTP for the replacement of generators 1 & 4
37	TBD	Retrofit RO Skids to High TDS Skids	R/R Projects at NCRWTP for retrofitting RO skids to high TDS skids
38	TBD	NCRWTP Facilities Projects	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacements, and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the North County Regional Water Treatment Plant Facility. This will enhance the utilization and life cycle expectancy of the North County Regional Water Treatment Plant Facility by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
39	TBD	SCRWTP Facilities Projects	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacements, and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the South County Regional Water Treatment Plant Facility. This will enhance the utilization and life cycle expectancy of the South County Regional Water Treatment Plant Facility by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
40	TBD	PU Operation Center Facilities Project	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacements, and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the Public Utilities Operation Center. This will enhance the utilization and life cycle expectancy of the Public Utilities Operation Center by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
41	TBD	Potable Water Storage (3 MG)	Storage tank to accommodate future storage capacity and fire flow.
42	TBD	Fac Infrastructure Maint Water	Preventive Maintenance and O&M Program - Contractors to do regular preventive maintenance for water facilities to include inspection of roofs, gates, garage doors, fences, HVAC, site, fire sprinklers, cameras, card access. Cost based on Facilities Assessment completed in February 2014.

TABLE 8-2

COLLIER COUNTY GOVERNMENT
PUBLIC UTILITIES PLANNING AND PROJECT MANAGEMENT DEPARTMENT
2014 WATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS FY 2015-2019
WATER TREATMENT, TRANSMISSION AND DISTRIBUTION

Row No.	Project No.	Project Name	FY 2015 Proposed Budget	FY 2016	FY 2017	FY 2018	FY 2019	Summary FY 2015-2019
Existing Water 412 Projects								
1	50105	Integrated Asset Management Program	$1,000,000	$700,000	$430,000	$500,000	$560,000	$3,190,000
2	70010	Meter Renewal & Replacement	$2,300,000	$2,300,000	$2,300,000	$2,300,000	$300,000	$9,500,000
3	70014	Real Prop/Infrastructure Audit	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
4	70015	General Legal Services	$0	$0	$0	$0	$0	$0
5	70019	Cross Connection Projects	$750,000	$800,000	$1,000,000	$1,000,000	$1,000,000	$4,550,000
6	70021	Energy Efficiency Studies	$0	$0	$0	$0	$0	$0
7	70023	Fire Hydrants Replacement	$0	$0	$0	$0	$0	$0
8	70031	Utility Master Plan	$5,000	$35,000	$5,000	$5,000	$200,000	$250,000
9	70034	WTP Structure Rehab	$400,000	$250,000	$275,000	$250,000	$350,000	$1,525,000
10	70045	FDOT Utility Projects	$0	$0	$0	$0	$150,000	$150,000
11	70071	CW Utility Projects	$100,000	$800,000	$175,000	$150,000	$150,000	$1,375,000
12	70084	Wellfield SCADA TSP	$300,000	$150,000	$200,000	$150,000	$150,000	$950,000
13	70085	Well/Raw Water Booster	$1,300,000	$1,000,000	$1,000,000	$2,000,000	$2,000,000	$7,300,000
14	71063	NCRWTP VFD Replace	$150,000	$0	$0	$0	$0	$150,000
15	70088	SCRWTP Deep Injection Wells	$0	$0	$100,000	$0	$0	$100,000
16	70102	SCRWTP SCADA TSP	$200,000	$150,000	$200,000	$150,000	$150,000	$850,000
17	70104	Wtr Plant Compliance Assurance (CAP)	$0	$0	$0	$0	$0	$0
18	70202	Collier County Standards	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
19	70882	Customer Services/Billing	$0	$0	$0	$0	$0	$0
20	71009	Security Upgrades	$200,000	$100,000	$75,000	$75,000	$70,000	$520,000
21	71010	Distribution System TSP	$8,000,000	$4,000,000	$4,000,000	$5,000,000	$5,000,000	$26,000,000
22	71047	10 Year Water Supply Plan	$0	$0	$0	$0	$0	$0
23	71055	NCRWTP SCADA TSP	$200,000	$150,000	$200,000	$200,000	$200,000	$950,000
24	71056	SCADA Compliance Water	$60,000	$65,000	$70,000	$70,000	$70,000	$335,000
25	71057	Membrane Treatment TSP	$0	$750,000	$0	$0	$0	$750,000
26	71065	SCRWTP TSP	$650,000	$450,000	$550,000	$450,000	$700,000	$2,800,000
27	71066	NCRWTP TSP	$635,000	$550,000	$550,000	$600,000	$700,000	$3,035,000
28	71067	Repumping Stations TSP	$800,000	$400,000	$500,000	$400,000	$400,000	$2,500,000
29	74310	State Revolving Fund	$0	$0	$0	$0	$0	$0
30	75005	Wellfield Program Management	$150,000	$150,000	$170,000	$150,000	$150,000	$770,000
31	75017	PUD Hydraulic Analysis	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
32	75018	Financial Services	$30,000	$30,000	$30,000	$30,000	$30,000	$150,000
33	75019	Growth Management Plan TSP	$0	$0	$0	$0	$0	$0

Row No.	Project No.	Project Name	FY 2015 Proposed Budget	FY 2016	FY 2017	FY 2018	FY 2019	Summary FY 2015-2019
New Water 412 Projects								
34	TBD	Lime Treatment TSP	$400,000	$850,000	$1,750,000	$350,000	$1,400,000	$4,750,000
35	TBD	VFD TSP	$0	$150,000	$250,000	$150,000	$250,000	$800,000
36	TBD	Generators 1 &4 R/R	$0	$0	$0	$0	$0	$0
37	TBD	Retrofit RO Skids to High TDS Skids	$0	$0	$0	$0	$0	$0
38	TBD	NCRWTP Facilities Projects	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
39	TBD	SCRWTP Facilities Projects	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
40	TBD	PU Operation Center Facilities Project	$250,000	$250,000	$250,000	$250,000	$250,000	$1,250,000
41	TBD	Potable Water Storage (3 MG)	$0	$0	$0	$0	$0	$0
42	TBD	Fac Infrastructure Main Water	$350,000					$350,000
TOTAL WATER 412 Projects			**$18,550,000**	**$14,400,000**	**$14,400,000**	**$14,550,000**	**$14,550,000**	**$76,450,000**

TOTAL WATER PROJECTS (412)	**$ 18,550,000**	**$ 14,400,000**	**$ 14,400,000**	**$ 14,550,000**	**$ 14,550,000**	**$ 76,450,000**

* Note: budget has been developed using 2013 dollars

TABLE 8-3

COLLIER COUNTY GOVERNMENT
PUBLIC UTILITIES PLANNING AND PROJECT MANAGEMENT DEPARTMENT
2014 WATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS FY 2015-2024
WATER TREATMENT, TRANSMISSION AND DISTRIBUTION

Row No.	Project No.	Project Name	FY 2015-2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2020-2024	Summary FY 2015-2024
Existing Water 412 Projects										
1	50105	Integrated Asset Management Program	$3,190,000	$710,000	$777,000	$841,000	$907,000	$964,000	$4,199,000	$7,389,000
2	70010	Meter Renewal & Replacement	$9,500,000	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000	$11,000,000
3	70014	Real Prop/Infrastructure Audit	$250,000	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000	$500,000
4	70015	General Legal Services	$0	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000	$250,000
5	70019	Cross Connection Projects	$4,550,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$7,500,000	$12,050,000
6	70021	Energy Efficiency Studies	$0	$75,000	$0	$0	$0		$75,000	$75,000
7	70023	Fire Hydrants Replacement	$0	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000	$1,500,000
8	70031	Utility Master Plan	$250,000	$5,000	$5,000	$50,000	$5,000	$5,000	$70,000	$320,000
9	70034	WTP Structure Rehab	$1,525,000	$250,000	$200,000	$225,000	$250,000	$250,000	$1,175,000	$2,700,000
10	70045	FDOT Utility Projects	$150,000	$0	$1,500,000	$0	$1,500,000	$0	$3,000,000	$3,150,000
11	70071	CW Utility Projects	$1,375,000	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000	$2,125,000
12	70084	Wellfield SCADA TSP	$950,000	$250,000	$300,000	$300,000	$300,000	$300,000	$1,450,000	$2,400,000
13	70085	Well/Raw Water Booster	$7,300,000	$1,000,000	$1,000,000	$3,000,000	$1,000,000	$1,000,000	$7,000,000	$14,300,000
14	71063	NCRWTP VFD Replace	$150,000	$0	$0	$0	$0	$0	$0	$150,000
15	70088	SCRWTP Deep Injection Wells	$100,000	$0	$0	$100,000	$0	$0	$100,000	$200,000
16	70102	SCRWTP SCADA TSP	$850,000	$300,000	$250,000	$300,000	$300,000	$300,000	$1,450,000	$2,300,000
17	70104	Wtr Plant Compliance Assurance (CAP)	$0	$0	$0	$0	$0		$0	$0
18	70202	Collier County Standards	$100,000	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000	$200,000
19	70882	Customer Services/Billing	$0	$0	$0	$0	$0	$0	$0	$0
20	71009	Security Upgrades	$520,000	$75,000	$75,000	$75,000	$75,000	$75,000	$375,000	$895,000
21	71010	Distribution System TSP	$26,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$25,000,000	$51,000,000
22	71047	10 Year Water Supply Plan	$0	$100,000	$0	$0	$0		$100,000	$100,000
23	71055	NCRWTP SCADA TSP	$950,000	$300,000	$300,000	$315,000	$315,000	$315,000	$1,545,000	$2,495,000
24	71056	SCADA Compliance Water	$335,000	$85,000	$90,000	$95,000	$100,000	$105,000	$475,000	$810,000
25	71057	Membrane Treatment TSP	$750,000	$0	$0	$1,000,000	$0		$1,000,000	$1,750,000
26	71065	SCRWTP TSP	$2,800,000	$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000	$5,300,000
27	71066	NCRWTP TSP	$3,035,000	$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000	$5,535,000
28	71067	Repumping Stations TSP	$2,500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000	$5,000,000
29	74310	State Revolving Fund	$0	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000	$50,000
30	75005	Wellfield Program Management	$770,000	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000	$1,520,000
31	75017	PUD Hydraulic Analysis	$250,000	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000	$750,000
32	75018	Financial Services	$150,000	$30,000	$30,000	$30,000	$30,000	$30,000	$150,000	$300,000
33	75019	Growth Management Plan TSP	$0	$25,000	$25,000	$25,000	$25,000	$25,000	$125,000	$125,000

Row No.	Project No.	Project Name	FY 2015-2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2020-2024	Summary FY 2015-2024
New Water 412 Projects										
34	TBD	Lime Treatment TSP	$4,750,000	$2,000,000	$200,000	$2,000,000	$2,000,000	200,000	$6,400,000	$11,150,000
35	TBD	VFD TSP	$800,000	$250,000	$500,000	$250,000	$500,000	250,000	$1,750,000	$2,550,000
36	TBD	Generators 1 &4 R/R	$0	$0	$0	$0	$1,500,000	-	$1,500,000	$1,500,000
37	TBD	Retrofit RO Skids to High TDS Skids	$0	$0	$0	$0	$3,000,000	-	$3,000,000	$3,000,000
38	TBD	NCRWTP Facilities Projects	$500,000	100,000	100,000	100,000	100,000	100,000	$500,000	$1,000,000
39	TBD	SCRWTP Facilities Projects	$500,000	100,000	100,000	100,000	100,000	100,000	$500,000	$1,000,000
40	TBD	PU Operation Center Facilities Projects	$1,250,000	100,000	100,000	100,000	100,000	100,000	$500,000	$1,750,000
41	TBD	Potable Water Storage (3 MG)	$0	$0	$0	$0	$0	$5,520,000	$5,520,000	$5,520,000
42	TBD	Fac Infrastructure Main Water	$350,000							$350,000
TOTAL WATER 412 Projects			**$76,450,000**	**$14,885,000**	**$14,682,000**	**$18,036,000**	**$21,237,000**	**$18,769,000**	**$87,609,000**	**$164,059,000**

TOTAL WATER PROJECTS (412)	**$ 76,450,000**	**$ 14,885,000**	**$ 14,682,000**	**$ 18,036,000**	**$ 21,237,000**	**$ 18,769,000**	**$ 87,609,000**	**$ 164,059,000**

* Note: budget has been developed using 2013 dollars

TABLE 8-1

COLLIER COUNTY GOVERNMENT
PUBLIC UTILITIES PLANNING AND PROJECT MANAGEMENT DEPARTMENT
2014 WASTEWATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS FY 2015-2024
PROJECT DESCRIPTIONS
WASTEWATER AND IRRIGATION QUALITY WATER

Row No.	Project No.	Project Name	Description
Existing Wastewater 414 (Renewal/Replacement) Projects			
1	50105	Integrated Asset Management	Implement an Enterprise-wide Integrated Asset Management Program within the Public Utilities Division (PUD) that will more cost-effectively manage PUD assets. This multiyear program has three phases. Phase One (PUD Pilot) and Phase Two (RFP solicitation and vendor selection) are complete. Phase Three is focused on procurement, implementation and integration of the selected software application with existing Agency wide systems of GIS, SAP, SCADA and many interdivisional processes including procurement and finance, including five full scale demonstrations projects. Phase Three is anticipated to be approximately 27 months of actual implementation.
2	70014	Real Property/Infrastructure Audit	Ensure that all Collier County Water-Sewer District assets are located within County Utility Easements. Where this is not the case, the County does not have the legal right to construct projects or perform maintenance required to remain in compliance and to serve the District's customers. Confirm all assets reside within appropriate easements, and obtain additional easements where needed.
3	70031	Utilities Master Plan	Utilize consultants to assist with updates to the Utilities Master Plan, including coordination with the rate study program, and the annual CIP update aimed at responsible system growth, maintenance and preservation.
4	70043	Gravity Transmission System TSP	Restore, rehabilitate and replace aging wastewater gravity sewers within the Collier County Water-Sewer District network of 685 miles of pipe and 16,408 manholes through a Technical Support Program (TSP) to maintain compliance and to meet operational needs. Program goals include the minimization of infiltration and inflow of storm and ground water into the wastewater collections system by restoring or replacing manholes, and lining or replacing underground pipes and service laterals. This is a multi-year program that anticipates the renewal of 5 miles of piping and 100 manholes per year on a prioritized basis. Wastewater Basin Analyses are performed to evaluate existing conditions, assess condition of wastewater assets, identify system deficiencies, and recommend collection system improvements on a bundled basis. Projects include but are not limited to Basins 101, 305 and 306 as part of the Basin Program. Specifically, the wastewater collection system along Vanderbilt Drive between Vanderbilt Beach Road and 111th Street and the finger streets to the west are scheduled to be replaced in conjunction with the water main replacement program and the planned MSTU community improvements.
5	70044	Forcemain Transmission System TSP	Restore, rehabilitate or replace aging wastewater force mains and install new force mains within the Collier County Water-Sewer District network consisting of 409 miles of pipe and more than 1,100 air release valves through a Technical Support Program (TSP) to maintain compliance and meet operational needs. Wastewater air-release valves are being raised above ground to reduce the potential for sanitary service overflows (SSOs), to eliminate confined space access issues, to decrease maintenance costs and to provide a safe working environment for wastewater collections maintenance staff. This is a multi-year program that anticipates the renewal of 3-5 miles of piping and 150 air release valves per year on a prioritized basis. A new force main is planned as an essential second wastewater path to the SCWRF from Rattlesnake Hammock Road in order to provide system reliability, to avert a potential adverse environmental event and to allow for maintenance of the County's aging force main system. Plans may also include infrastructure improvements in Basins 101, 305 and 306 as part of the Basin Program.
6	70046	Wastewater Pump Station TSP	Restore, rehabilitate, install and/or relocate high-priority pump stations and sub-master pump stations within the installed-base of more than 750 locations. This is a multi-year Technical Support Program (TSP) that includes the renewal of approximately 10 stations per year, including mechanical, electrical, and structural components such as pumps, motors, pipes, valves, wet wells, odor control, electrical controls, containment, structures, lighting, and fencing. Projects include but are not limited to Basins 101, 305 and 306 as part of the Basin Program. Based on current rehabilitation schedules wastewater pump stations will be restored once every 50 years.

Row No.	Project No.	Project Name	Description
7	70050	Master Pump Station TSP	Restore, rehabilitate, rebuild and install high-priority wastewater master pump stations within the installed-base of 22 locations through a Technical Support Program (TSP) to maintain compliance and meet operational needs. Rehabilitations include mechanical, electrical, and structural components such as pumps, motors, pipes, wet wells, odor control, containment, structures, lighting, and fencing. Projects include but are not limited to the design and construction of the new Heritage Bay Master Pump Station, the Pelican Bay Master Pump Station 109 and the reconstruction of Master Pump Station 306 near Sabal Bay. Work may also occur in Basins 101, 305 and 306 as part of the Basin Program.
8	70051	Collection Power System TSP	Restore and rehabilitate electrical power systems through a Technical Support Program (TSP) for more than 750 pump stations to maintain compliance for routine operations and meet operational needs. Strategically placed generators and/or diesel engine pumps at approximately 30 additional locations are required to maintain compliance and provide service during storm events and power failures to critical facilities and near environmentally sensitive regions. These critical facilities service hospitals, nursing homes, and shelters. This is a multi-year program that is planned to address approximately 5 stations per year. Backup power or backup pumping is planned for, but not limited to, the communities of Village Walk, Island Walk, Vineyards, Emerald Lakes and Naples Boulevard. Projects may also include, but are not limited to, infrastructure in Basins 101, 305 and 306 as part of the Basin Program.
9	70053	NCWRF Power System TSP	Restore and rehabilitate electrical power systems that have reached the end of their useful life at the North County Water Reclamation Facility (NCWRF) through a Technical Support Program (TSP) to maintain compliance and meet operational needs. Within the MLE portion of the facility, there are 10 motor control centers (MCCs), 250 circuit breakers, 15 transformers, 20 motors, 20 variable frequency drives (VFDs) and soft-starters, 10 distribution panels, and 4 generator sets with automatic transfer switches. Within the Orbal (north) portion of the facility, there are 5 MCCs, 100 circuit breakers, six transformers, 10 motors, 10 VFDs and soft-starters, 7 distribution panels, and 2 generator sets with automatic transfer switches. This is a multi-year program. Projects include but are not limited to: replacing or rehabilitating VFDs, replacing worn circuit breakers, rebuilding generator sets and renovating generator enclosures.
10	70055	SCWRF Power System TSP	Restore and rehabilitate the electrical power systems that have reached the end of their useful life at the South County Water Reclamation Facility (SCWRF) through a Technical Support Program (TSP) to maintain compliance and meet operational needs. There are 14 Motor Control Centers (MCCs), 100 breakers, 10 transformers, 20 motors, 20 VFDs and soft-starters, 6 distribution panels, and 4 generator sets with automatic transfer switches. This is a multi-year program that rehabilitates 2 generators and replaces the associated 12-year-old switch gear. Projects include, but are not limited to: upgrade of IQ pump station MCCs, Rotork actuators on valves that presently do not have motor operation and clarifier motor upgrades.
11	70060	NCWRF SCADA TSP	Restore and rehabilitate the Supervisory Control and Data Acquisition (SCADA) systems for the North County Water Reclamation Facility (NCWRF) through a Technical Support Program (TSP) to eliminate obsolescence of existing programmable logic controllers (PLCs) and various instrumentation used to constantly monitor and control the treatment process. This program will increase reliability, sustainability, and operational efficiency. This is a multi-year program for the upgrading of 25 PLCs at this facility. Currently, engineering design will begin for upgrading 5 PLCs located near the influent chamber, finals clarifiers and aeration basins that are nearing obsolescence and are scheduled to be replaced.
12	70061	SCWRF SCADA TSP	Restore and rehabilitate the Supervisory Control and Data Acquisition (SCADA) systems for the South County Water Reclamation Facility (SCWRF) through a Technical Support Program (TSP) to eliminate obsolescence of existing programmable logic controllers (PLCs) and various instrumentation used to constantly monitor and control the treatment process. This program will increase reliability, sustainability, and operational efficiency. This is a multi-year program. There are 17 PLCs at this facility with 3 PLCs that are currently not visible by plant SCADA operations which are planned to be replaced and integrated.
13	70177	WW Biosolids Management	“Purpose: Plan, design and construct facilities to include processing, treatment, and reuse of biosolids from regional wastewater treatment plants in a beneficial and cost-effective way. Options include: bio-reactor; bio-gas to energy production; drying and pelletizing; and/or composting. Method: Fixed term contracts, RFP and competitive bids. End State: Maintain compliance and improve program performance in the management, disposition and use of biosolids, consistent with the no-odor policy.”
14	70202	County Utility Standards	Utilize design consultants to provide independent peer review of specific Collier County Water-Sewer District infrastructure detail drawings based on input and feedback from County staff and specific advisory committees. The Board of County Commissioners annually approves the Utility Standards Manual update.
15	71058	General Legal Services	Obtain expert legal counsel for water, wastewater, and reuse issues. Provide appropriate legal representation for various complex or specialized water and wastewater related matters to stay in compliance.

Row No.	Project No.	Project Name	Description
16	72505	Physical/Cyber Security Wastewater	Multi-year program to provide both physical and virtual assessments of assets that are imbedded in critical compliance-driven operations, including physical access points such as gates, fences, card access and recording devices, as well as cyber threats such as network intrusion and cyber hacking that could directly impact operations. Evaluate and prioritize mitigation to resolve risk and exposure to maintain compliance with Department of Homeland Security requirement and sustainability of existing levels of service.
17	72541	Wastewater SCADA Compliance	Multi-year program to acquire, manage and maintain 7 software applications, 4 licenses and 3 support agreements for Supervisory Control and Data Acquisition (SCADA) systems used throughout the Wastewater Department to maintain compliance and meet demand. Software that requires annual agreements are used for SCADA, Programmable Logic Controllers, pump management, variable frequency drives, and communications management.
18	73045	FDOT Utility Projects / Wastewater	Plan, design, and construct Collier County Water-Sewer District infrastructure driven by Florida Department of Transportation (FDOT) construction projects. Costs were based on the use of the standard Memorandum of Agreement (MOA). Upcoming FDOT projects requiring utility relocations include: US41 from CR951 to Greenway Road, US41 from Greenway Road to Six L's Farm Road, I-75 at CR951 Ultimate Interchange Build Out, various intersection improvements, lighting improvements, traffic signal upgrades and installations.
19	73065	Countywide Wastewater Projects	Plan, design, and construct Collier County Water-Sewer District infrastructure driven by intra-county divisions. Upcoming projects include utility relocations driven by the LASIP Stormwater project and improvements to intersection and stormwater systems. Interdivisional coordination with utility construction projects to maintain compliance and provide reliable services with minimal impact to the community.
20	73922	WW Collection SCADA Telemetry	Restore and rehabilitate the Supervisory Control and Data Acquisition (SCADA) systems for the Collections System through a Technical Support Program (TSP) to ensure compliance and provide operational control. SCADA upgrades are being implemented to control VFDs within the wastewater collection system. The program includes repair and replacement of SCADA equipment including transmitter control units (TCUs) and antennas at more than 780 pump stations, and storm-hardening of the central SCADA systems at the Wastewater Collections office on Shirley Street, and providing a resilient mission critical system that maintains compliance of the entire county's wastewater infrastructure.
21	73944	System Improvements Billing & Customer Service	Provide a mobile work order system for utility technicians to electronically receive, create, and update work orders in the field. This will eliminate multiple manual data entries and enable real-time status of work performed. The project provides incremental functionality to the existing billing application, enabling entry of work order codes to customer calls used in conjunction with the utility GIS to enhance reporting, ensuring all meters are accounted for and billed appropriately.
22	73968	NCWRF Technical Support Program	Provide planned repairs and modifications needed to meet demand and remain in compliance at the North County Water Reclamation Facility (NCWRF) through a multi-year Technical Support Program (TSP). This facility is densely packed on 76-acres and treats approximately 3 billion gallons of wastewater per year. Two separate treatment processes (MLE and Orbal) each produce high quality Irrigation Quality (IQ) water. The major pieces of equipment that need to be kept operational include the pretreatment structure with 4 screens, 4 grit removal mechanisms and 5 influent channels, 12 MLE aeration basins, 3 orbal oxidation ditches, 9 clarifiers, 20 filters, and 10 disinfection chambers. There are 4 mechanical screens and grit chambers, 7 odor control units, 7 blowers, 200 pumps, 150 valves, 40 flow meters, 32 analyzers, 8 chemical storage/distribution systems, 5 IQ water storage ponds, 5 belt presses, and 4 holding tanks. Projects include but are not limited to the restoration and rehabilitation of filter set #2, IQ valve replacement, RAS/WAS pump and VFD replacement, minor operations building renovations and sludge holding tank lining replacement. In addition, plan, design and construct biosolids processing and treatment facility improvements.
23	73969	SCWRF Technical Support Program	Provide planned repairs and modifications needed to meet demand and to remain in compliance at the South County Water Reclamation Facility (SCWRF) through a multi-year Technical Support Program (TSP). This facility is located on 48-acres in a residential area, and treats approximately 2.6 billion gallons of wastewater per year. The major pieces of equipment that need to be kept operational include a pretreatment building with 5 channels, 14 MLE aeration basins, 4 clarifiers, 8 filters, and 4 disinfection chambers. This facility also includes 3 mechanical screens, 4 grit chambers, 4 odor control units, 8 blowers, 60 pumps, 120 valves, 25 flow meters, 25 analyzers, 5 chemical storage/distribution systems, 1 IQ water storage pond, 5 belt presses, and 2 holding tanks. Needs include, but are not limited to the restoration and rehabilitation of: disinfection chambers, clarifier structural and mechanical components, and energy efficien turbo blower installation. In addition, plan, design, and construct biosolids processing and treatment facility improvements.

Row No.	Project No.	Project Name	Description
24	74310	State Revolving Fund	Administer the loan contracts with Florida Department of Environmental Protection (FDEP) for the lowest cost source of external funding - State Revolving Fund (SRF) loans. Work with external loan administrator to assess the availability, administration, and closeout of SRF loans. A financially viable utility through prudent administration of external funding.
25	75018	Financial Services	Utilize outside consultants to prepare feasibility reports, perform rate studies, asset valuations, and acquisitions. The external consultants are utilized in situations where an independent perspective is required; or specialized financial analysis is needed. Provide independent financial assessments to aid in business decision-making.
26	75019	GM Comprehensive Plan	Utilize consultants to assist in addressing changes to key documents and data used to prepare the following: the Utilities portion of the Annual Update and Inventory Report (AUIR), updates to the Growth Management Plan (GMP), Evaluation and Appraisal Report (EAR) of the Growth Management Plan, and updates to the Land Development Code (LDC) to ensure sustained compliance within the CCWSD.
27	75017	Public Utilities Hydraulic Analysis	Provide hydraulic evaluation and analysis of all water, wastewater and irrigation quality water infrastructure. Hydraulic models are used to verify availability for Planned Unit Developments, concurrency, and master planning. Models are also used by operations to predict pressures, flow rates, and water quality under varying conditions; they are essential for determining the appropriate emergency response in the event of pipe breakage. Flows can be modeled and redirected with minimum disruption to the community. Hydraulic analysis will identify opportunities for cost-savings resulting from pump station operations, diurnal curve management, pressure management, and pipe sizing. Maintained compliance and operations through this current year execution of a multi-year program.
New Wastewater 414 (Renewal/Replacement) Projects			
28	TBD	West Interconnect Extension	Plan, design and construct wastewater force mains for a western interconnection of the wastewater transmission system within the Collier County Water-Sewer District through an ongoing program to maintain compliance and meet operational needs. This program will be built in phases ultimately running along Livingston Road from Radio Road north to Immokalee Road. A new force main will continue to be constructed near Golden Gate Parkway as an essential wastewater path to the NCWRF from the South County Service Area in order to provide system reliability, to avert a potential adverse environmental event and to allow for maintenance of the County's aging force main system.
29	TBD	WW Collections Facilities Projects	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacement and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the Wastewater Collections Facility. Also, to implement a program to enhance the utilization and life cycle expectancy of the Wastewater Collection Facility by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
30	TBD	SCWRF Facilities Projects	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacement, and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the South County Water Reclamation Facility. Also, to implement a program to enhance the utilization and life cycle expectancy of the South County Water Reclamation Facility by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
31	TBD	NCWRF Facilities Projects	To optimize the operating efficiency and increase the safety of the facility by completing Capital projects relating to rehabilitation, replacement and optimizations of HVAC Systems, roofs, security systems, and other vertical assets existing in the North County Water Reclamation Facility. Also, to implement a program to enhance the utilization and life cycle expectancy of the North County Water Reclamation Facility by maintaining facilities in satisfactory operating condition by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
32	TBD	Improvements to Divert Flows from South to North Service Area	Diverting South County service area flows to North County service area is recommended to manage South County service area growth. The project includes the design and construction of pump stations and force main improvements to divert flows from the South to North Service Areas; improvements include but are not limited to expansion of MPS 104.00 (5,000 gpm expansion); 24-inch Western Interconnect along Livingston Road; a new inline booster pump station to pump flows from South County service area to North County; modifications at MPS 305, 309, 310, 312, and 313 to divert station flows to proposed interconnects; another force main from MPS 104 to Livingston Road; and another force main to the NCWRF. Engineering design is expected to begin within the next ten years.

Row No.	Project No.	Project Name	Description
33	TBD	Fac Infrastructure Maint Wastewater	Preventive Maintenance and O&M Program - Contractors to do regular preventive maintenance for wastewater facilities to include inspection of roofs, gates, garage doors, fences, HVAC, site, fire sprinklers, cameras, card access. Cost based on Facilities Assessment completed in February 2014.
Existing Irrigation Quality Water 414 Projects			
34	70056	IQ Power System TSP	Restore and rehabilitate the electrical power systems, including switchgear, breakers, and motor control centers that have reached the end of their useful life, within the Irrigation Quality (IQ) water distribution system through a Technical Support Program (TSP) to maintain compliance and meet operational needs. There are six pump stations in the IQ system, each containing two to six pumps. Each pump requires electrical power systems to operate. This is a multi-year program that will repair and/or replace 10 to 20-year-old electrical control panels and switch boards as needed.
35	70062	IQ System SCADA TSP	Provide telemetry communications and Supervisory Control and Data Acquisition (SCADA) systems at eight remote Irrigation Quality (IQ) water sites in order to more accurately and efficiently manage and comply with contractual terms and conditions, including allotments of IQ water delivered per Florida Department of Environmental Protection (FDEP) permits. Also, restore and rehabilitate the SCADA systems in other portions of the IQ system through a Technical Support Program (TSP) to eliminate obsolescence of existing programmable logic controllers (PLCs), communication network and protocol specifications and various pieces of instrumentation used to monitor and control the process. This is a multi-year program that will increase reliability, sustainability, and operational efficiency. There are 51 PLCs in the IQ system with an average of five being replaced per year with a replacement priority based on fiber optic network availability.
36	74030	IQ Aquifer Storage and Recovery - Livingston Road	Plan, design, and construct three additional Aquifer Storage and Recovery (ASR) wells (for a total of five) located at the Livingston Road wellfield north of Immokalee Road to meet the demands of existing and future IQ customers. This project provides for construction and startup of the ASR wells in compliance with the Florida Department of Environmental Protection (FDEP) regulations, as well as cycle testing to insure the proper operation of the ASR system.
37	74401	IQ Water System TSP	Restore, rehabilitate and install infrastructure of the Irrigation Quality (IQ) water system needed to meet customer demand, and contractual and regulatory compliance through a multi-year Technical Support Program (TSP), including the rehabilitation of 5 IQ pump stations, isolation valves, and air release valves, as well as meters, pumps, and motors. This program allows operations to accurately measure water sold, ensuring accurate revenue generation; delivers water to the customer per contractual agreements; and, allows for system isolation for regulatory compliance. As the reclaimed water system is more than 20 years old; these projects are necessary to maintain the distribution system in working condition. Projects include, but are not limited to: flow meter and valve replacement, Point of Delivery equipment installations, and Eagle Lakes pond site maintenance.
New Irrigation Quality Water 414 Projects			
38	TBD	IQ Expansion Business Plan	Plan, design, and construct required IQ expansions to meet the demands of the CCWSD IQ customers as it grows over the next 20 years. Projects will work towards the goal of increasing IQ water usage from 40% to 60%. Projects include new Lower Tamiami wells in the south service area, supplemental water used for IQ, and water conservation initiatives.

TABLE 8-2

COLLIER COUNTY GOVERNMENT

PUBLIC UTILITY PLANNING AND PROJECT MANAGEMENT DEPARTMENT

2014 WASTEWATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS 2015-2019
WASTEWATER AND IRRIGATION QUALITY WATER

Row No.	Project No.	Project Name	FY 2015 Proposed Budget	FY 2016	FY 2017	FY 2018	FY 2019	Summary FY 2015-2019
Existing Wastewater 414 (Renewal/Replacement//Enhancements) Projects								
1	50105	Integrated Asset Management	$ 1,078,000	$ 694,000	$ 430,000	$ 520,000	$ 564,000	$ 3,286,000
2	70014	Real Property/Infrastructure Audit	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 250,000
3	70031	Utilities Master Plan	$ 5,000	$ 100,000	$ 5,000	$ 5,000	$ 300,000	$ 415,000
4	70043	Gravity Transmission System TSP	$ 5,900,000	$ 3,255,000	$ 5,750,000	$ 6,000,000	$ 6,030,000	$ 26,935,000
5	70044	Forcemain Transmission System TSP	$ 4,600,000	$ 6,000,000	$ 7,000,000	$ 5,500,000	$ 6,000,000	$ 29,100,000
6	70046	Wastewater Pump Station TSP	$ 1,300,000	$ 2,500,000	$ 2,266,000	$ 2,250,000	$ 1,250,000	$ 9,566,000
7	70050	Master Pump Station TSP	$ 3,500,000	$ 3,300,000	$ 5,630,000	$ 4,500,000	$ 5,311,000	$ 22,241,000
8	70051	Collection Power System TSP	$ 500,000	$ 527,500	$ 500,000	$ 749,604	$ 500,000	$ 2,777,104
9	70053	NCWRF Power System TSP	$ 427,000	$ 300,000	$ 660,000	$ 680,000	$ 575,000	$ 2,642,000
10	70055	SCWRF Power System TSP	$ 325,000	$ 375,000	$ 500,000	$ 550,000	$ 500,000	$ 2,250,000
11	70060	NCWRF SCADA TSP	$ 300,000	$ 300,000	$ 300,000	$ 400,000	$ 300,000	$ 1,600,000
12	70061	SCWRF SCADA TSP	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 200,000	$ 1,400,000
13	70177	WW Biosolids Management	$ -					$ -
14	70202	County Utility Standards	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 125,000
15	71058	General Legal Services	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000
16	72505	Physical/Cyber Security Wastewater	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 250,000
17	72541	Wastewater SCADA Compliance	$ 60,000	$ 65,000	$ 69,000	$ 75,000	$ 80,000	$ 349,000
18	73045	FDOT Utility Projects / Wastewater	$ -	$ -	$ 1,500,000	$ -	$ 500,000	$ 2,000,000
19	73065	Countywide Wastewater Projects	$ 200,000	$ 825,000	$ 200,000	$ 200,000	$ 200,000	$ 1,625,000
20	73922	WW Collection SCADA Telemetry	$ 50,000		$ -			$ 50,000
21	73944	System Improvements Billing & Customer Service	$ -	$ -	$ -	$ -	$ -	$ -
22	73968	NCWRF Technical Support Program	$ 2,860,000	$ 2,346,000	$ 3,460,600	$ 3,730,000	$ 4,500,000	$ 16,896,600
23	73969	SCWRF Technical Support Program	$ 3,025,000	$ 3,327,500	$ 3,660,400	$ 4,000,000	$ 4,500,000	$ 18,512,900
24	74310	State Revolving Fund	$ -					$ -
25	75018	Financial Services	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 150,000
26	75019	GM Comprehensive Plan	$ -					$ -
27	75017	Public Utilities Hydraulic Analysis	$ 15,000	$ 20,000	$ 20,000	$ 25,000	$ 25,000	$ 105,000
New Wastewater 414 (Renewal/Replacement) Projects								
28	TBD	Western Interconnect Extension	$ 2,400,000					$ 2,400,000
29	TBD	WW Collections Facilities Projects	$ -	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 200,000
30	TBD	SCWRF Facilities Projects	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000
31	TBD	NCWRF Facilities Projects	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000

Row No.	Project No.	Project Name	FY 2015 Proposed Budget	FY 2016	FY 2017	FY 2018	FY 2019	Summary FY 2015-2019
32	TBD	Improvements to Divert Flows from South to North Service Area	$ -	$ -	$ -	$ -	$ -	$ -
33	TBD	Fac Infrastructure Maint Wastewater	$ 450,000					$ 450,000
TOTAL WASTEWATER 414 Projects			**$ 27,750,000**	**$ 24,740,000**	**$ 32,756,000**	**$ 29,989,604**	**$ 31,840,000**	**$ 147,075,604**
Existing Irrigation Quality Water 414 Projects								
34	70056	IQ Power System TSP	$ 100,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 580,000
35	70062	IQ System SCADA TSP	$ 300,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,100,000
36	74030	IQ Aquifer Storage and Recovery -Livingston Rd	$ 500,000	$ 250,000	$ 250,000	$ 250,000	$ 150,000	$ 1,400,000
37	74401	IQ Water System TSP	$ 500,000	$ 400,000	$ 500,000	$ 500,000	$ 500,000	$ 2,400,000
			$ -					
New Irrigation Quality Water 414 Projects			$ -					
38	TBD	IQ Expansion/Business Plan	$ -					
TOTAL IQ WATER 414 Projects			**$ 1,400,000**	**$ 970,000**	**$ 1,070,000**	**$ 1,070,000**	**$ 970,000**	**$ 5,480,000**

TOTAL Fund 414 Projects	**$ 29,150,000**	**$ 25,710,000**	**$ 33,826,000**	**$ 31,059,604**	**$ 32,810,000**	**$ 152,555,604**

Total Wastewater Projects (414)	**$ 27,750,000**	**$ 24,740,000**	**$ 32,756,000**	**$ 29,989,604**	**$ 31,840,000**	**$ 147,075,604**
Total IQ Water Projects (414)	**$ 1,400,000**	**$ 970,000**	**$ 1,070,000**	**$ 1,070,000**	**$ 970,000**	**$ 5,480,000**
TOTAL WASTEWATER AND IQ PROJECTS	**$ 29,150,000**	**$ 25,710,000**	**$ 33,826,000**	**$ 31,059,604**	**$ 32,810,000**	**$ 152,555,604**

* Note: budget has been developed using 2013 dollars

Table 8-3

COLLIER COUNTY GOVERNMENT

PUBLIC UTILITY PLANNING AND PROJECT MANAGEMENT DEPARTMENT

2014 WASTEWATER MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS 2015-2024

WASTEWATER AND IRRIGATION QUALITY WATER

Row No.	Project No.	Project Name	FY 2015-2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2020-2024	Summary FY 2015-2024
Existing Wastewater 414 (Renewal/Replacement/Enhancements) Projects										
1	50105	Integrated Asset Management	$ 3,286,000	$ 710,000	$ 777,000	$ 841,000	$ 907,000	$ 964,000	$ 4,199,000	$ 7,485,000
2	70014	Real Property/Infrastructure Audit	$ 250,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 250,000	$ 500,000
3	70031	Utilities Master Plan	$ 415,000	$ 5,000	$ 5,000	$ 100,000	$ 5,000	$ 5,000	$ 120,000	$ 535,000
4	70043	Gravity Transmission System TSP	$ 26,935,000	$ 8,423,458	$ 8,844,631	$ 9,286,863	$ 9,751,206	$ 10,238,766	$ 46,544,924	$ 73,479,924
5	70044	Forcemain Transmission System TSP	$ 29,100,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 25,000,000	$ 54,100,000
6	70046	Wastewater Pump Station TSP	$ 9,566,000	$ 8,052,550	$ 8,857,805	$ 9,743,586	$ 10,717,944	$ 11,789,738	$ 49,161,623	$ 58,727,623
7	70050	Master Pump Station TSP	$ 22,241,000	$ 7,600,000	$ 8,200,000	$ 8,800,000	$ 9,400,000	$ 10,000,000	$ 44,000,000	$ 66,241,000
8	70051	Collection Power System TSP	$ 2,777,104	$ 3,543,122	$ 3,897,434	$ 4,287,178	$ 4,715,895	$ 5,187,485	$ 21,631,114	$ 24,408,218
9	70053	NCWRF Power System TSP	$ 2,642,000	$ 850,000	$ 900,000	$ 950,000	$ 1,000,000	$ 1,050,000	$ 4,750,000	$ 7,392,000
10	70055	SCWRF Power System TSP	$ 2,250,000	$ 650,000	$ 700,000	$ 750,000	$ 800,000	$ 850,000	$ 3,750,000	$ 6,000,000
11	70060	NCWRF SCADA TSP	$ 1,600,000	$ 400,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 1,600,000	$ 3,200,000
12	70061	SCWRF SCADA TSP	$ 1,400,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,000,000	$ 2,400,000
13	70177	WW Biosolids Management	$ -						$ -	$ -
14	70202	County Utility Standards	$ 125,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 125,000	$ 250,000
15	71058	General Legal Services	$ 500,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,000,000
16	72505	Physical/Cyber Security Wastewater	$ 250,000	$ -	$ -	$ -	$ -		$ -	$ 250,000
17	72541	Wastewater SCADA Compliance	$ 349,000	$ 85,000	$ 90,000	$ 95,000	$ 100,000	$ 105,000	$ 475,000	$ 824,000
18	73045	FDOT Utility Projects / Wastewater	$ 2,000,000	$ -	$ 1,500,000	$ -	$ 1,500,000	$ -	$ 3,000,000	$ 5,000,000
19	73065	Countywide Wastewater Projects	$ 1,625,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,000,000	$ 2,625,000
20	73922	WW Collection SCADA Telemetry	$ 50,000	$ 460,000	$ 460,000	$ 460,000	$ 460,000	$ 460,000	$ 2,300,000	$ 2,350,000
21	73944	System Improvements Billing & Customer Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	73968	NCWRF Technical Support Program	$ 16,896,600	$ 4,606,059	$ 5,066,664	$ 5,573,331	$ 6,130,664	$ 6,743,730	$ 28,120,448	$ 45,017,048
23	73969	SCWRF Technical Support Program	$ 18,512,900	$ 4,871,793	$ 5,358,972	$ 5,894,869	$ 6,484,356	$ 7,132,792	$ 29,742,782	$ 48,255,682
24	74310	State Revolving Fund	$ -	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 50,000	$ 50,000
25	75018	Financial Services	$ 150,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 150,000	$ 300,000
26	75019	GM Comprehensive Plan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
27	75017	Public Utilities Hydraulic Analysis	$ 105,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 125,000	$ 230,000

Row No.	Project No.	Project Name	FY 2015-2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2020-2024	Summary FY 2015-2024
New Wastewater 414 (Renewal/Replacement) Projects										
28	TBD	West Interconnect Extension	$ 2,400,000						$ -	$ 2,400,000
29	TBD	WW Collections Facilities Projects	$ 200,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 700,000
30	TBD	SCWRF Facilities Projects	$ 500,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,000,000
31	TBD	NCWRF Facilities Projects	$ 500,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000	$ 1,000,000
32	TBD	Improvements to Divert Flows from South to North Service Area	$ -	$ 28,715,500	$ 12,498,000				$ 41,213,500	$ 41,213,500
33	TBD	Fac Infrastructure Maint Wastewater	$ 450,000						$ -	$ 450,000
TOTAL WASTEWATER 414 Projects			**$ 147,075,604**	**$ 74,912,482**	**$ 63,395,506**	**$ 53,021,827**	**$ 58,212,065**	**$ 60,766,511**	**$ 310,308,391**	$ 457,383,995
Existing Irrigation Quality Water 414 Projects										
34	70056	IQ Power System TSP	$ 580,000	$ 170,000	$ 180,000	$ 190,000	$ 200,000	$ 210,000	$ 950,000	$ 1,530,000
35	70062	IQ System SCADA TSP	$ 1,100,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,000,000	$ 2,100,000
36	74030	IQ Aquifer Storage and Recovery - Livingston Rd	$ 1,400,000	$ -	$ -				$ -	$ 1,400,000
37	74401	IQ Water System TSP	$ 2,400,000	$ 2,500,000	$ 2,750,000	$ 3,000,000	$ 3,250,000	$ 3,500,000	$ 15,000,000	$ 17,400,000
New Irrigation Quality Water 414 Projects										
38	TBD	IQ Expansion/Business Plan			$ 4,251,746	$ 4,676,921	$ 5,144,613	$ 5,659,074	$ 19,732,354	$ 19,732,354
TOTAL IQ WATER 414 Projects			**$ 5,480,000**	**$ 2,870,000**	**$ 7,381,746**	**$ 8,066,921**	**$ 8,794,613**	**$ 9,569,074**	**$ 36,682,354**	$ 42,162,354

TOTAL FUND 414	**$ 152,555,604**	**$ 77,782,482**	**$ 70,777,252**	**$ 61,088,748**	**$ 67,006,678**	**$ 70,335,585**	**$ 346,990,745**	**$ 499,546,349**

Total Wastewater Projects (414)	**$ 147,075,604**	**$ 74,912,482**	**$ 63,395,506**	**$ 53,021,827**	**$ 58,212,065**	**$ 60,766,511**	**$ 310,308,391**	**$ 457,383,995**
Total IQ Water Projects (414)	**$ 5,480,000**	**$ 2,870,000**	**$ 7,381,746**	**$ 8,066,921**	**$ 8,794,613**	**$ 9,569,074**	**$ 36,682,354**	**$ 42,162,354**
TOTAL WASTEWATER AND IQ PROJECTS	**$ 152,555,604**	**$ 77,782,482**	**$ 70,777,252**	**$ 61,088,748**	**$ 67,006,678**	**$ 70,335,585**	**$ 346,990,745**	**$ 499,546,349**

* Note: budget has been developed using 2013 dollars

Appendix B. Master Plan Conclusions

Public Utilities Master Plan Conclusions

Potable Water

LOSS Per-Capita Potable Water Demand = 150 gpcd

Permanent Population (2010) = 152,326

Permanent Population (2034) = 273,873

Additional WTP Capacity Requirement by 2034 = 5.4 MGD (Starting in 2028)

Additional Potable Water Storage Required by 2034 = 7 MG (Starting in 2024)

Wastewater

LOSS Per-Capita Wastewater Flow = 100 gpcd

Permanent Population (2010) = 174,054

Permanent Population (2034) = 283,102

Permanent Population (BO) = 300,213

Additional WWTP Capacity Requirement by BO = 4.9 MGD*
(Starting in 2030)

Total Collection System
Conveyance System Capacity (South to North)
Requirement by BO = 5.6 MGD (Starting in 2021)