City of Tampa, Florida
TAMPA WATER DEPARTMENT

# POTABLE WATER MASTER PLAN

Prepared For: Tampa Water Department
The City of Tampa

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# 1.0 INTRODUCTION

## 1.1 Background

The City of Tampa, Florida, provides potable water, wastewater and reclaimed water service to its customers, through the Tampa Water Department. The Tampa Water Department (TWD) provides treatment and delivery of drinking water to a population of approximately 645,000 people in a service area that encompasses 211 square miles. In addition to providing water service to the residents of the City, the TWD also provides service to portions of the unincorporated Hillsborough County and the City of Temple Terrace.

The TWD is responsible for maintaining its potable water treatment, storage, pumping, transmission and distribution infrastructure in accordance with regulations to serve existing customers and meet future growth needs. The TWD maintains a six year Capital Improvement Plan (CIP) to ensure infrastructure projects are funded, designed and constructed on schedule. Repair and replacement cycles currently comprise the majority of the CIP. To ensure that capital projects are properly prioritized and scheduled the TWD periodically updates a master facilities plan.

The TWD is also responsible for the City's water conservation program, which has been in effect since 1990. The success of this water conservation program has helped TWD to maintain its potable water service without interruption during the extreme drought conditions in recent years. As a whole, the TWD's water conservation efforts have helped maintain the City's low adjusted gross per capita water consumption of 99 gallons per capita per day (City SWFWMD Water Use Permit FY08 Annual Report). TWD maintains a staff of water conservation coordinators to provide information and assistance to customers, including implementation of ongoing Rain Sensors, ICI (Industrial-Commercial-Institutional Water Efficiency Evaluations), Plumbing Retrofit, Rain Barrel Workshops, Community Water-Wise Awards and Water Stewardship PSA Contest conservation programs. The TWD has also adopted a 5-tier water conservation rate structure and conducts a comprehensive public education and awareness program to further promote water conservation.

In furtherance of water conservation, the TWD also distributes reclaimed water which is produced by the Wastewater Department at the City's Howard F. Current Advanced Wastewater Treatment Plant on Hooker's Point. As of July 2009, there were 3,890 active reclaimed water meters and the City has embarked on an ambitious program to expand the availability of reclaimed water to significantly increase future service. By making high quality reclaimed water available to customers for non-potable water applications, such as irrigation and industrial processes, the water supply is conserved for potable water uses for current and future customers. Planning and design efforts are currently underway to expand the reclaimed water system as recommended in the 2009 TWD Reclaimed Water Master Plan.

### 1.2 Objective

The TWD faces the challenge of expanding and maintaining its potable water supply, treatment and transmission infrastructure to continue the high standard of service to its customers. Challenges including aging pipes and equipment, new and re-development, more stringent water quality regulations and rising labor and material costs need to be addressed to prioritize allocation of the TWD's available funding. To help meet these challenges this Potable Water Master Plan includes strategy for managing existing infrastructure and planning new facilities to meet expansion and facility-replacement needs. This Potable Water Master Plan (Master Plan) provides the TWD recommended capital improvements for the next 10-years sized to meet a 20-year planning horizon (Year 2030). The specific objectives of the Plan include:

- *Reliability* Maintain the physical condition of the system through proactive rehabilitation, repair and replacement to minimize loss of service
- *Risk* Reduce likelihood and consequence of failure of water assets
- *Capacity* Deliver adequate capacity
- *Growth* Accommodate for future growth with cost effective solutions
- *Quality* Maintain water quality in the distribution system
- *Redundancy* Provide multiple delivery points to all served areas

The TWD is updating its Master Plan to help meet bonding requirements, confirm the TWD's current six year CIP, and identify capital requirements for the 10-year time horizon. As part of the Master Plan update, TWD facilities were evaluated to identify short and long term potable water production, high service pumping, finished storage, transmission and distribution capacity and repair and replacement needs. Included in the evaluation was a comparison of existing facility capacities with projected future needs to ensure compliance with TWD level of service standards. TWD facilities were prioritized with a risk based evaluation to identify high priority repair and replacement projects. The capacity and repair and replacement evaluations generated a list of prioritized projects with costs recommended for next 10-years, sized to serve a 20-year planning period.

The funding of the recommended capital improvements is addressed in a separate analysis and report authorized by the TWD: the Financial Feasibility Study (PRMG, ongoing).

# 2.0 EXISTING POTABLE WATER SYSTEM

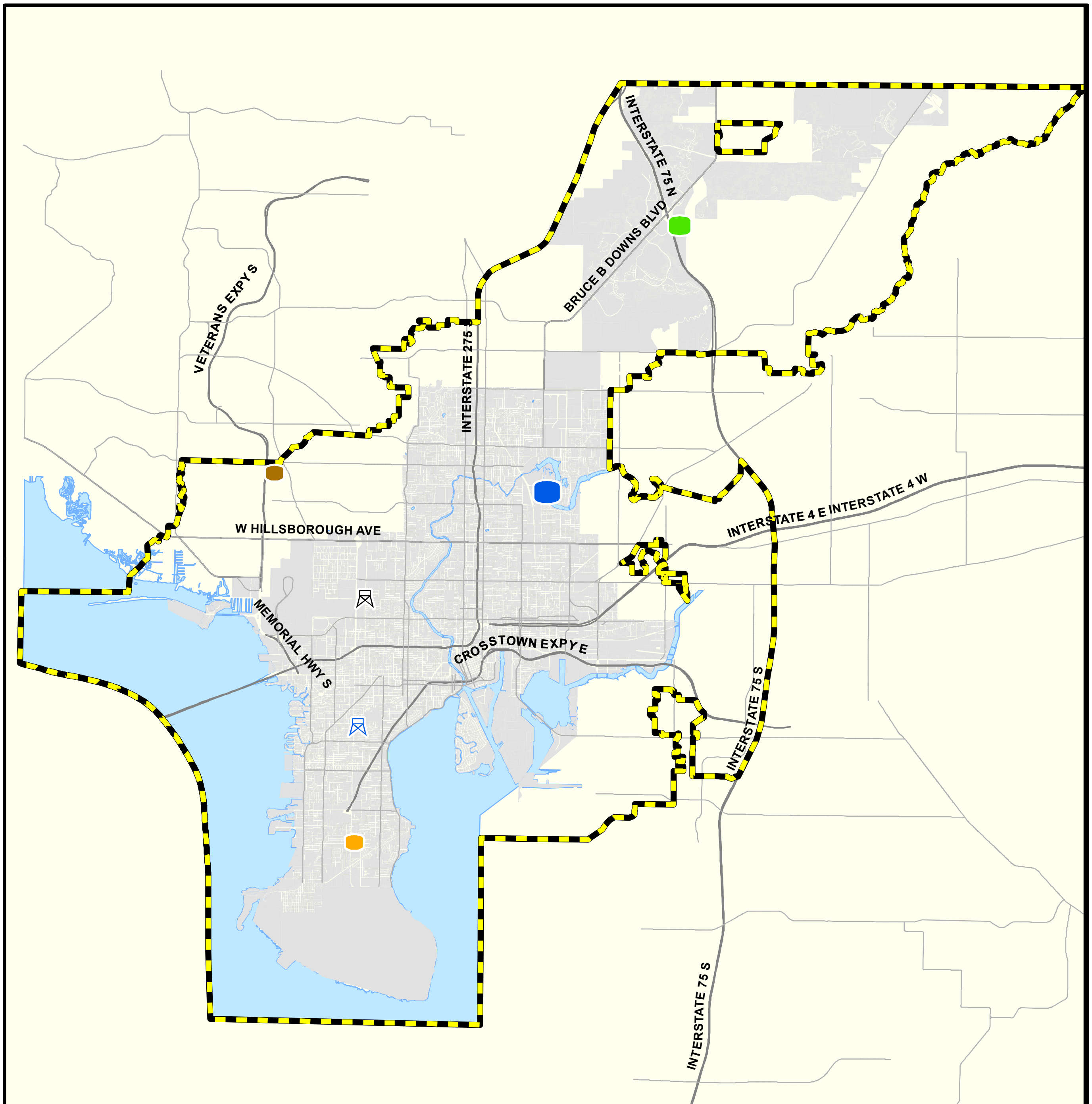
## 2.1 Service Area

Currently the water system serves approximately 546,000 permanent residents and a total functional population of 657,000 in its 211 square mile service area (City of Tampa SWFWMD Water Use Permit FY08 Annual Report) including the City, surrounding areas of unincorporated Hillsborough County and the portions of the City of Temple Terrace. Approximately 95% of the service area is served by the Tampa Water Department system. The remaining 5% of the service area population is served by private wells.

## 2.2 Water Supply

The primary source of potable water supply for the TWD is the Hillsborough River Reservoir at the DLTWTF. The Southwest Florida Water Management District limits withdrawals to an average annual rate of 82 million gallons per day. In order to protect the river from over withdrawal SWFWMD has also established seasonal minimum flows and levels (MFLs) in the river, which also impact the City's permitted withdrawals (Lower Hillsborough River Low Flow Study Results and Minimum Flow Recommendation, Southwest Florida Water Management District (SWFWMD), 2006). Withdrawals from the Hillsborough River are augmented by other sources during extended dry periods when minimum flows established by SWFWMD for the River are reached:

- Sulphur Springs - Under certain conditions, water from Sulphur Springs is aerated and pumped to the Hillsborough River Reservoir to help the City comply with the permitted and established minimum flows and levels. The SWFWMD Water Use Permit allows the City to pump a maximum of 20 million gallons per day from the springs but limits the City to an annual average of 5 million gallons per day. The water used to augment the reservoir cannot be used to increase the average annual rate of 82 million gallons per day.
- Tampa By-Pass Canal - Through the interlocal agreement with Tampa Bay Water (TBW), the City also uses the Tampa By-Pass Canal east of the City for augmentation. The agreement with TBW allows the City to use water from the canal when necessary during dry periods to help maintain minimum flows and levels in the Hillsborough River. The interlocal agreement allows an annual average of 20 million gallons and a maximum of 40 million gallons per day. This source is also used for augmentation, but does not increase the allowable 82 million gallons per day withdrawal from the river.
- ASR - The City also has Aquifer Storage and Recharge (ASR) wells which are used for storage. During wet weather periods, water is pumped underground for later use. The ASR wells have a storage capacity of one billion gallons. The wells are permitted for 10 million gallons per day for a withdrawal period of 100 days. Future plans for ASR are to expand the existing 10-MGD system to a 30-MGD system by 2020.
- Tampa Bay Water - All other required water supply is provided by Tampa Bay Water, in accordance with the interlocal agreement. Tampa Bay Water owns and operates a




**LEGEND**

N

0 10,000 20,000

*Feet*

**Treatment Facilities/Repump Stations**

- DLTWTF
- Morris Bridge WTF
- Interbay Repump Station
- Northwest Repump Station
- Palma Ceia Elevated Tank
- West Elevated Tank

- Major Streets
- Water
- City of Tampa Limits
- Service Area Boundary

R E

**City of Tampa**

**Existing Water Service Area**

**FIGURE 2-1**

G:\0gis\0810_Tampa_WMP_MXDs\ServiceArea

number of well fields, a surface water reservoir in southern Hillsborough County, a desalination plant that draws water from Tampa Bay, treatment facilities, high service pumping facilities, and transmission facilities to supply water to its member governments. TBW's supply includes the Morris Bridge wellfield that was purchased from the City of Tampa that now supplies treated water to the City when needed.

With the available options for augmenting the primary water supply from the Hillsborough River Reservoir, including the Tampa Bay Water interconnections to the City's system from the regional network of water sources, the City has a secure potable water supply for the future under normal climatic conditions.

## 2.3 Water Treatment

The TWD treats its Hillsborough River surface water supply with the David L. Tippin Water Treatment Facility (DLTWTF). Treatment capacity of the facility, depending upon the quality of the raw water, is up to 120 million gallons per day. The DLTWTF was constructed in 1924 and because of its uniquely restored Moorish-Spanish decor is designated an American Water Landmark. While the architecture of Tampa's original water treatment plant has been preserved, the treatment process was upgraded to state of the art micro-sand ballasted coagulation/flocculation with ozone oxidation. The DLTWTF's upgrades, expansions and modernizations have continued TWD's production of high quality, safe drinking water meeting applicable regulations and permit conditions. The DLTWTF houses a state-certified drinking water laboratory to ensure water quality exceeds all state and federal standards as established by U.S. Environmental Protection Agency and Florida Safe Drinking Water Guidelines. In 2008, the facility received the *Partnership for Safe Water, Ten Year Director's Award* for the ongoing commitment to improving water quality beyond current regulatory requirements. The DLTWTF also has a residuals processing facility that processes organic by-products from the treatment process for recycling to beneficial uses, such as commercial fertilizer.

## 2.4 Finished Water Storage

Finished potable water is stored at the DLTWTF in underground clear wells which have a combined capacity of 20 million gallons. There are also two ground water storage tanks at the Morris Bridge Repump Station with a capacity of 5 million gallons each. Additionally, the system contains other remote finished water storage tanks that are filled directly from the distribution system. Two elevated tanks, the West Tampa and Palma Ceia elevated tanks, each have a capacity of 1.5 million gallons. The two other remote ground storage facilities are the Northwest Repump Station 3 million gallon tank and the Interbay Repump Station 5 million gallon tank. An equivalent storage volume of 2 million gallons was estimated for the TBW interconnections and should be verified with the Hillsborough County Health Department. Combined, these give the TWD a total of 43 million gallons of storage. However, pump suction line locations at the DLTWTF and Morris Bridge Repump Station reduce the effective storage to 12.5 million gallons and 7.5 million gallons, respectfully, resulting in a total effective storage of 33 million gallons, including the 2 million gallons of equivalent Tampa Bay Water storage.

## 2.5 High Service Pumping

TWD has 23 major high service pumps available to deliver finished potable water through the transmission and distribution system. At the DLTWTF, there are eight electrically driven high service pumps with a pumping capacity of 173 million gallons per day. The Morris Bridge Repump Station has six electrically driven high service pumps with a total rated capacity of 91 million gallons per day. The Northwest Repump Station has three electrically driven pumps with a total rated capacity of 12 million gallons per day and similarly, the Interbay Repump Station is being upgraded with six electrically driven pumps with a total rated capacity of 18 million gallons per day. Although not currently connected or guaranteed available, the Tampa Bay Water Highway 301 connection could also provide up to 30 million gallons per day “equivalent” high service pumping capacity. TWD has an inline booster pump station at Busch Boulevard that provides an internal system pressure boost and are not included as capacity. Tampa Bay Water maintains a booster pump station called the Tampa/Hillsborough Interconnect (THIC) at North Boulevard that pumps finished water out of TWD’s system to wholesale users in Hillsborough County. There are also pumps located on the West Tampa and Palma Ceia Elevated Storage Facilities, however, these facilities are relatively low capacity and could be subject to future removal; therefore, were not included as pumping capacity. The total pumping capacity of the TWD system is 294 million gallons per day, and 324 million gallons per day when including the “equivalent” capacity of the Highway 301 TBW interconnect.

## 2.6 Transmission and Distribution

After treatment, water is pumped through a transmission and distribution system consisting of 2,177 miles of pipe ranging from 2-inches to 54-inches in diameter. TWD also maintains approximately 133,000 active meters and 13,478 fire hydrants in the distribution system (Jeff Hough, TWD as of November 2009). The transmission/ distribution system contains several types of pipe including ductile iron, pre-stressed concrete cylinder pipe, asbestos cement, polyvinyl chloride (PVC), high density polyethylene (HDPE), cast iron, and galvanized steel in the smaller sizes. Pipe installed during the early years was primarily cast iron. The first cast iron mains were not coated or lined as was standard practice at that time. Through the years, it became evident that certain types of water could affect the interior of cast iron pipe leading to deterioration and tuberculation. As a result ductile iron pipe with cement mortar lining became the standard to prevent tuberculation and increase durability. The TWD has an ongoing program to replace old cast iron, galvanized iron and asbestos cement mains to improve water quality and prevent unscheduled loss of service.

## 2.7 Potable Water Demands

The TWD’s existing potable water demands totaled approximately 79 million gallons per day in 2008 (City of Tampa – SWFWMD Water Use Permit FY08 Annual Report). Demands are anticipated to increase as the system grows and expands its customer base. Population growth estimates, as provided in the City’s 2008 Comprehensive Plan Potable Water Element, were used to estimate water demand projections. The population projections provided in the Potable Water Element were prepared by the Hillsborough County Planning Commission based on 2005 University of Florida Bureau of Economic and Business Research (BEBR) Medium County-wide population projections. The County-wide population projections were disaggregated into areas within the County using development trends, vacant land tracts, built out land use, City development orders and development of regional impact (DRI) information. The resulting TWD water service area projections are presented, as provided in the 2008 Comprehensive Plan Potable Water Element, in Table 2-1. The 2008 Comprehensive Plan Potable Water Element also provides functional population estimates, in addition to residential population, to include water demand from seasonal and non-residential populations. The resulting functional population projections are also presented in Table 2-1.

Projected potable water demands, for the purposes of infrastructure planning, were estimated by applying the City's Comprehensive Plan Potable Water Element standard level of service to functional population projections. The City recently reduced its potable water demand level of service from 145 to 125 gallon per day per person as a result of successful conservation efforts. Resulting projected demand conditions for the years 2010, 2015, 2020, 2025 and 2030 are presented in Table 2-1. Projected demands were checked against Southwest Florida Water Management District projections and found to agree reasonably and be suitably conservative for the purpose of potable water infrastructure planning.

**Table 2-1. Current and Projected Potable Water Demands**

| Component | 2005 | 2008 | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| Resident Population [1] | 550,634 | 546,262 | 589,385 | 626,707 | 667,066 | 707,425 | 738,762 |
| Functional Poulation [2] | 655,993 | 657,313 | 707,262 | 752,048 | 800,479 | 848,910 | 886,515 |
| Gross Average Daily Demand (MGD) [3] | 75.4 | 78.8 | 88.4 | 94.0 | 100.1 | 106.1 | 110.8 |
| Gross Maximum Daily Demand (MGD)[4] | 100.3 | 104.8 | 117.6 | 125.0 | 133.1 | 141.1 | 147.4 |
| Gross Average Unit Consumption (gpcd) | 115 | 120 | 125 | 125 | 125 | 125 | 125 |
| Estimated Average Daily Potable Offset (MGD) [5] | 0.0 | 0.0 | 0.7 | 6.9 | 10.8 | 12.2 | 12.2 |
| Adjusted Average Daily Demand (MGD) [6] | 75.4 | 78.8 | 87.7 | 87.1 | 89.3 | 93.9 | 98.6 |
| Adjusted Gross Maximum Daily Demand (MGD)[5] | 100.3 | 104.8 | 116.6 | 115.9 | 118.7 | 124.9 | 131.1 |

[1] COT Comprehensive Plan Potable Water Element Projected Residential Population except 2008 that is from the 2008 SWFWMD Annual Water Use Permit Report
[2] COT Comprehensive Functional Population (Residential Population x 1.2) except 2008 that is from the 2008 SWFWMD Annual Water Use Permit Report
[3] Based on 2008 SWFWMD Annual Water Use Permit Report, 2005-2008 water supply facility distribution meter data and COT Comprehensive Plan Potable Water Element (extrapolated from 2025 to 2030) and includes wholesale water exported from the TWD distribution system
[4] Potable water offset from reclaimed water in year 2010 and beyond from Reclaimed Water Master Plan April 2009 spreadsheet
[5] Based on maximum day factor of 1.33 (Based on Comp Plan level of service and HDR Expansion Evaluation Report)
[6] Adjusted demand includes estimated potable water offset from reclaimed water system expansion

The City has plans to aggressively implement reclaimed water distribution systems for irrigation in key locations in the City. The 2009 Reclaimed Water Master Plan estimated potable water offsets of up to 12.2 million gallons per day resulting from the planned implementation as shown in Table 2-1. Figure 2-2 illustrates historical and projected gross and adjusted (for offset from reclaimed water) potable water demand projections.

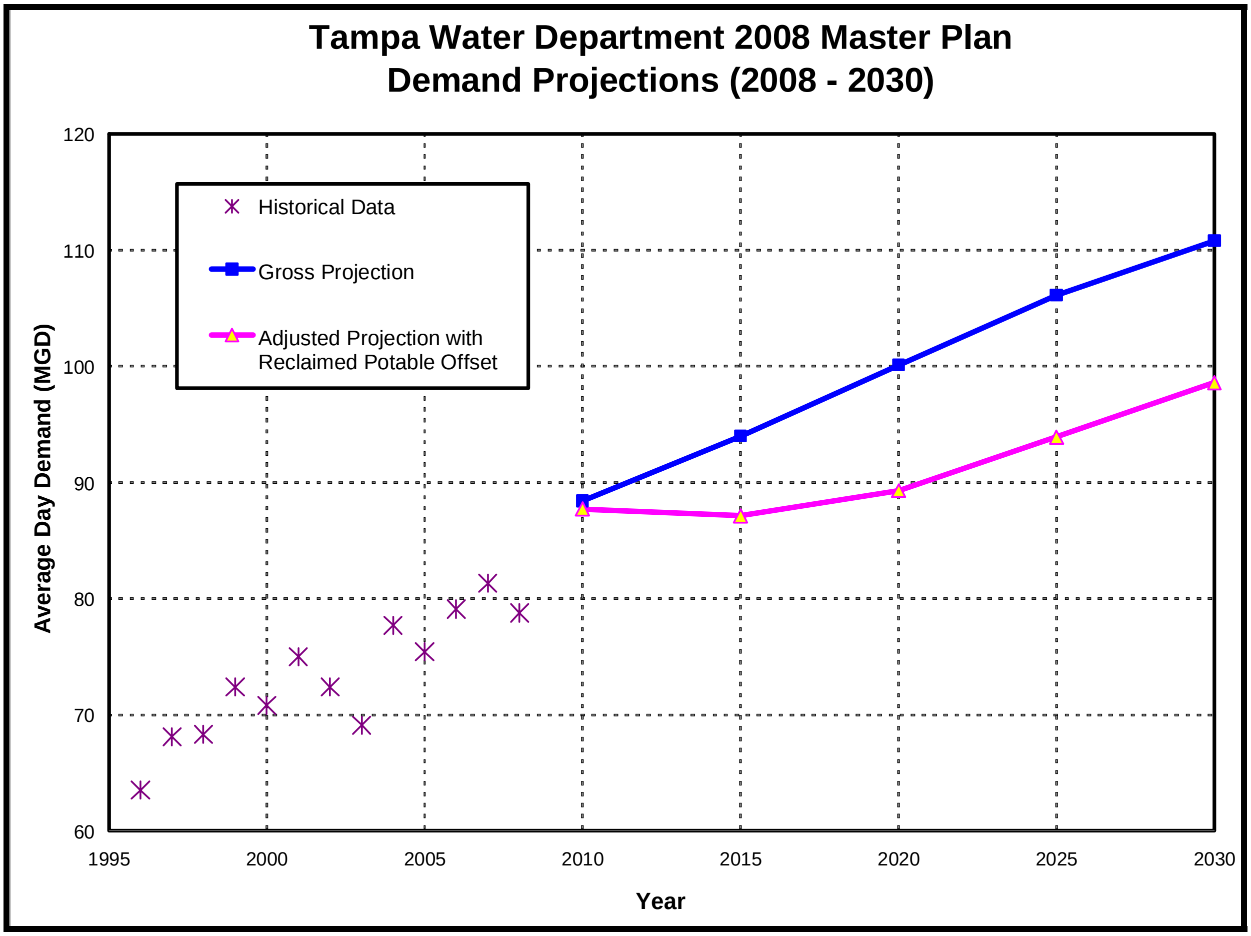



**Figure 2-2. TWD Potable Water Demand Projections**

# 3.0 CAPACITY EVALUATION

## 3.1 Production Capacity

Potable water production for the Master Plan capacity evaluation includes raw water, treatment and wholesale purchase. TWD's current Water Use Permit (WUP) allows the utility to produce 82 MGD on an annual average basis and 120 MGD under maximum day conditions from the City-owned and operated DLTWTF. The City also has an agreement with Tampa Bay Water for a wholesale purchase connection, Morris Bridge, with a capacity of 40 MGD. There is also an emergency point of connection at Highway 301, which has additional 30 MGD potable finished water transfer capacity if activated. The City also investigated a potential Tampa Bay Water funded 26 MGD ADD expansion of the DLTWTF. Details have not been fully defined, however, it is anticipated that the any production capacity expansion of the DLTWTF would be funded by Tampa Bay Water. TWD would then purchase any water above the current DLTWTF capacity from Tampa Bay Water at a similar net cost as the Morris Bridge and Highway 301 connections. Therefore, expansion of the DLTWTF is anticipated to have no supply cost advantage for the City versus wholesale purchase at the Morris Bridge or Highway 301 connections in the 20-year planning horizon analyzed.

A comparison of TWD's current production capacity with projected demands indicates that significant Tampa Bay Water finished water transfer will be required in the future as shown in Table 3-1. With the current DLTWTF raw water, treatment and hydraulic limitations, hydraulic modeling indicated that the TWD now (year 2009) requires approximately 5-8 MGD of equivalent raw water average day demand (ADD) and approximately 10-20 MGD of equivalent maximum day demand (MDD) treatment capacity from the Tampa Bay Water wholesale connections. The TWD actually purchased approximately 6 MGD ADD of potable water from Tampa Bay Water in 2008 (2008 SWFWMD Water Use Permit Annual Report, City of Tampa). The need for the Tampa Bay Water wholesale supply is projected increase to approximately 29-36 MGD of equivalent raw water ADD and approximately 38-43 MGD of equivalent MDD treatment capacity in year 2030. Based on capacity limitations at the DLTWTF and Morris Bridge, TWD will need to utilize the Highway 301 point of connection, in addition to the ongoing use of the Morris Bridge point of connection, on a full time basis as an additional potable water source to meet projected demands between 2020 and 2030.

An alternative valving configuration at the Morris Bridge Repump Station was proposed in the hydraulic analysis section to optimize production of available DLTWTF supply. The alternative valving would create a pressure zone at Morris Bridge allowing higher pressure discharge to the north of the Morris Bridge Repump Station (newer piping in the Northeast-New Tampa area) while maintaining separated lower pressure discharge to the south of the Morris Bridge Repump Station. Creating the pressure zone at Morris Bridge could result in significantly less purchase of wholesale water in the future based on theoretical hydraulic model simulations. The pressure zone would allow the City to reduce Morris Bridge Repump Station discharge pressures to the south thereby increasing DLTWTF supply input (within production and supply constraints) without decreasing Morris Bridge discharge pressures to the north. The pressure zone would also allow for filling of the Morris Bridge Repump Station tanks from the DLTWTF while the

**Table 3-1. Capacity Evaluation Summary**

| Component | 2008 | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|---|
| Resident Population [1] | 546,262 | 589,385 | 626,707 | 667,066 | 707,425 | 738,523 |
| Functional Poulation [2] | 657,313 | 707,262 | 752,048 | 800,479 | 848,910 | 886,227 |
| Gross Average Daily Demand (MGD-ADD) [3] | 78.8 | 88.4 | 94.0 | 100.1 | 106.1 | 110.8 |
| Projected Gross Maximum Daily Demand (MGD-MDD)[4] | 104.8 | 117.6 | 125.0 | 133.1 | 141.1 | 147.3 |
| Gross Average Unit Consumption (gpcd) | 120 | 125 | 125 | 125 | 125 | 125 |
| Average Daily Potable Offset from Reclaimed Water (MGD) [5] | 0 | 0.7 | 6.9 | 10.8 | 12.2 | 12.2 |
| Raw Water | | | | | | |
| Permitted Average Daily Withdrawal (MGD-ADD) | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 |
| Average Daily Raw Water Surplus/Deficit (MGD-ADD) | 3.2 | -6.4 | -12.0 | -18.1 | -24.1 | -28.8 |
| Treatment | | | | | | |
| Permitted Maximum Daily Treatment Capacity (MGD-MDD) | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 |
| Maximum Daily Treatment Surplus/Deficit (MGD-MDD) | 15.2 | 2.4 | -5.0 | -13.1 | -21.1 | -27.3 |
| Production | | | | | | |
| Equivalent Maximum Daily Production Limit (MGD-MDD) | 109.1 | 109.1 | 109.1 | 109.1 | 109.1 | 109.1 |
| Equivalent Maximum Daily Production Surplus/Deficit (MGD-MDD) | 4.3 | -8.5 | -16.0 | -24.1 | -32.1 | -38.3 |
| High Service Pumping | | | | | | |
| Level of Service High Service Pumping Capacity (MGD-PHD) | 259.0 | 259.0 | 259.0 | 259.0 | 259.0 | 259.0 |
| Required High Service Pumping Demand (MGD-PHD) | 130.8 | 143.6 | 151.0 | 159.1 | 173.4 | 173.4 |
| High Service Pumping Surplus/Deficit (MGD-PHD) | 128.2 | 115.4 | 108.0 | 99.9 | 85.6 | 85.6 |
| Finished Storage | | | | | | |
| Level of Service Effective Storage Volume (MGAL) [6] | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 |
| Required Storage Volume (MGAL) | 30.5 | 33.7 | 35.6 | 37.6 | 39.6 | 41.2 |
| Storage Surplus/Deficit (MGAL) | 2.5 | -0.7 | -2.6 | -4.6 | -6.6 | -8.2 |

[1] COT Comprehensive Plan Potable Water Element Projected Residential Population for 2010 to 2025
[2] COT Comprehensive Functional Population (Residential Population x 1.2) for 2010 to 2025
[3] Based on 2007-2008 water customer meter data, 2005-2008 water supply facility distribution meter data and SWFWMD Population Growth Forecast
[4] Based on max day factor of 1.33 (Based on Comp Plan level of service and HDR Expansion Evaluation Report)
[5] Potable water offset from reclaimed water implementation in year 2010 and beyond from the Reclaimed Water Master Plan April 2009 spreadsheet
[6] Effective storage volume includes an estimated 2 million gallons of volume from Tampa Bay Water facilities via interconnects

Morris Bridge Repump Station simultaneously pumps to the north, also increasing utilization of available DLTWTF supply.

It should be noted that the permitted production supply availability is subject to climatic conditions. Seasonal shortages can occur due to extreme drought conditions such as the one the region experienced in spring 2009. The City participates in regional water supply planning with

Tampa Bay Water. It is recommended that the City jointly pursue an additional drought-proof supply source with Tampa Bay Water via the regional water supply planning efforts.

### 3.2 High Service Pumping Capacity

In addition to the DLTWTF, TWD has high service pumping facilities at the Morris Bridge, Northwest, and Interbay Repump Stations. Although not currently connected or guaranteed available, the Tampa Bay Water Highway 301 connection will also provide "equivalent" high service pumping capacity. TWD's Busch Boulevard booster pump station provides an internal system pressure boost and does not provide equivalent high service pump capacity; therefore, was not included in the analysis. Tampa Bay Water maintains an inline booster pump station called the Tampa/Hillsborough Interconnect (THIC) pump station at North Boulevard that pumps water out of the distribution system to wholesale users. The THIC pump station does not provide effective capacity and was not included in the pumping analysis. There are also high service pumps located on the West Tampa and Palma Ceia Elevated Storage Facilities, however, these facilities are relatively low capacity and could be subject to future removal and were therefore, not included in the pumping analysis.

Based on published design capacities and the hydraulic modeling performed in the Master Plan, the firm high service pump capacities for the TWD facilities were determined. The term "firm" refers to all but the largest pump on at each pumping facility. The new pumps currently being installed at the Interbay Repump Station will be online in 2009 and were considered "existing" for this analysis.

The capacity evaluation contained in the Production, Pumping and Storage Capacity Evaluation (Reiss Engineering, May 2009) indicates that the DLTWTF, the repump stations and the Tampa Bay Water connections have ample "equivalent" high service capacity to meet future 2030 projected demands, understanding that the Highway 301 connection may need future upgrades.

### 3.3 Finished Storage Capacity

Using the State regulations, TWD level of service standards, hydraulic model runs and pumping capacities, finished water storage capacities were calculated for the DLTWTF, Morris Bridge Repump Station, Northwest Repump Station, Interbay Repump Station and elevated tanks. The analysis results are contained in the Production, Pumping and Storage Capacity Evaluation (Reiss Engineering, May 2009). From the storage capacity analysis, it was concluded that the City currently has sufficient effective storage to meet demand and fire reserve storage criteria. However, there is an estimated 0.7 million gallon storage need in year 2010 that increases to 3 million gallons in 2015 and 8 million gallons in year 2030. It should be noted that, per Florida Administrative Code (FAC) 62-555.320 Design and Construction of Public Water Systems, storage in consecutive systems can count as storage for wholesale supply. Based on this rule, two million gallons of equivalent storage was included in the TWD's effective storage calculation to account for the wholesale connections with Tampa Bay Water. The estimation of equivalent storage should be verified with state water regulators.

The TWD is currently developing projects at the DLTWTF and Morris Bridge to reclaim some of the 10 million gallons of non-effective storage. The projects could potentially increase the effective storage by 4 million gallons or more. The TWD is also considering a remote storage facility in the Northeast service area to potentially address the storage requirements and boost pressure in the New Tampa area. There is also a potential to use the TWD ASR facility as effective storage as noted in the DLTWTF Expansion Evaluation (2008) which used a 10 million gallon storage credit for the ASR facility. It should be verified with Hillsborough County Health Department regulators that the ASR system storage can be used for finished water storage credit. The potential ASR storage credit could delay construction of additional storage and help comply with the City's finished water storage level of service standards. Furthermore, conservation and reclaimed water potable offsets will also help address future storage needs.

### 3.4 Transmission and Distribution Capacity

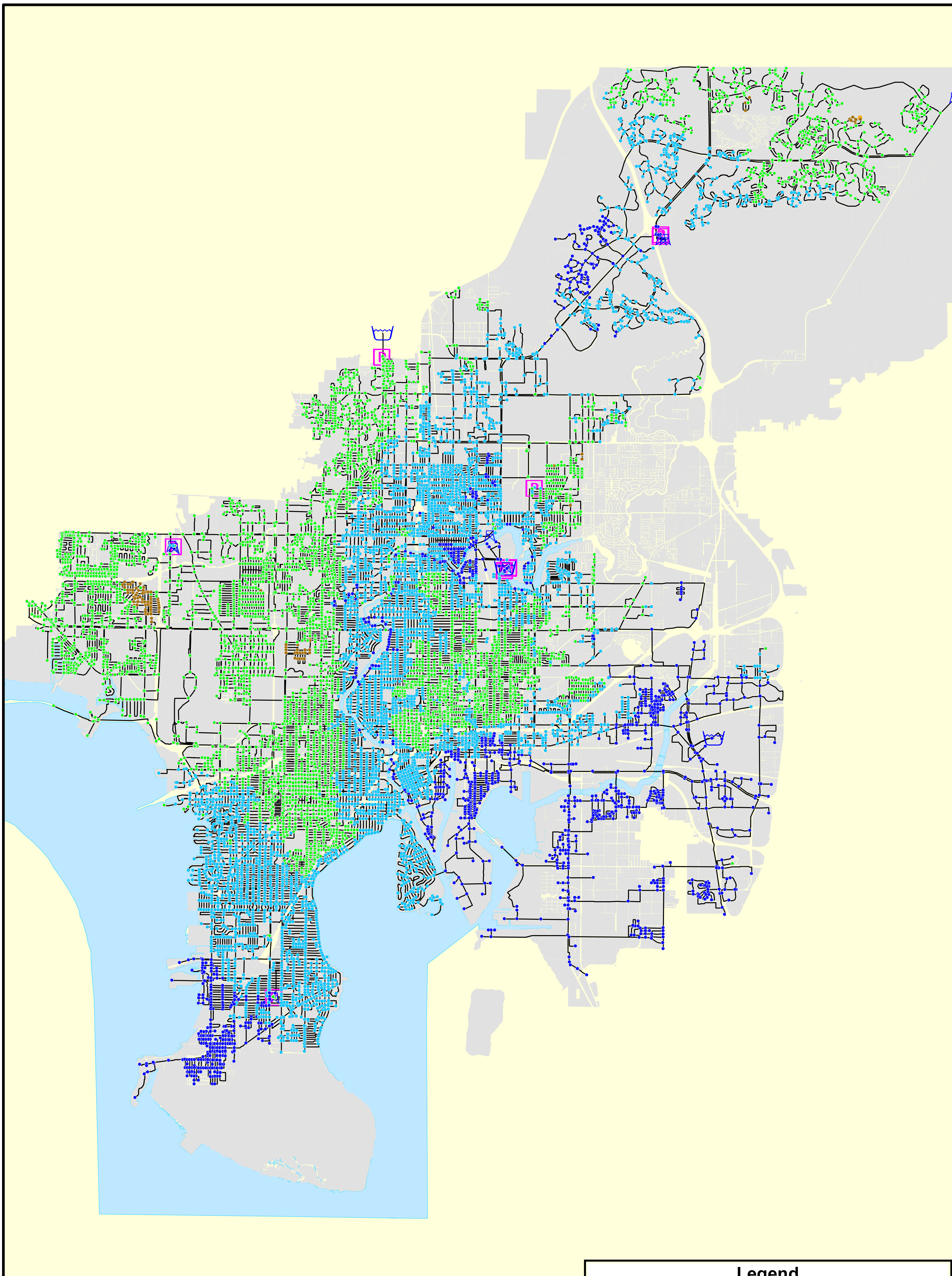
The hydraulic capacity of the TWD's potable water transmission/distribution system, with respect to existing and future conditions was evaluated and recommendations made regarding planned transmission/distribution improvements. Planned improvements include the South Tampa/Downtown Contribution In Aid of Construction (CIAC) transmission main, the Northeast Area (New Tampa) CIAC transmission main and remote storage/pumping facility, Utility Capital Improvement Projects (UCAP) transmission mains and Grid System Master Plan transmission mains. The impacts of revised potable water demand projections, planned potable water use offsets from reclaimed water implementation and alternative Tampa Bay Water connection locations on the potable water transmission/distribution system were evaluated with regards to optimizing capital improvements and minimizing transient flow (surge) in the potable water transmission/distribution system.

Figure 3-1 illustrates hydraulic model (Model) 2030 peak hourly flow (PHF) scenario compliance with TWD pressure standards after adding:

- Segments 2 and 3 of the CIAC transmission main to address the majority of the limited hydraulic capacity issues,
- Opening the US Highway 301 point of connection with a 60 to 70 psi service pressure to address the limited supply issue,
- For distribution mains that require fire hydrants to provide fire flow coverage, replacing all 4-inch and less diameter distribution mains with pipes 6 to 8 inch diameter pipes, and
- Short term distribution projects needed to meet TWD hydraulic criteria in the 2015 Model scenario as shown in Table 3-2, indicating the need for these main replacements by year 2015.

The Model transmission/distribution modifications addressed the TWD hydraulic criteria issues identified in the 2030 PHF scenario. Downtown/South Tampa CIAC segments 2 and 3, the New Tampa CIAC, and the Tampa Bay Water interconnects were scheduled to bring intermediate year scenarios into compliance with TWD hydraulic criteria as follows:

> **Downtown/South Tampa CIAC:** TWD plans to install the Downtown/South Tampa CIAC transmission main in four segments. Model output showed that with segments 1 and 4 of the Downtown/South Tampa CIAC transmission main provided adequate transmission capacity for the projected demand in the 2010, 2015 and 2020 scenarios.



## Legend

**Junction Pressure (psi)**

- Less than 0
- 0~30
- 30~40
- 40~45
- 45~60
- 60~70
- Greater than 70

**Pipe**

**Tank**

**Reservoir**

**Pump**

Water in Service Area

N
W E
S

0 5,000 10,000 20,000
Feet

City of Tampa
Water Master Plan
**2030 PHF Modeling Output After Transmission and Distribution Improvements**

FIGURE 3-1

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TWD would need to install segments 2 and 3 of the Downtown/South Tampa CIAC transmission main by 2030 (between 2020 and 2030) in order to meet projected capacity needs and avoid low pressure issues in the Downtown/South Tampa area.

**New Tampa CIAC:** TWD plans to install the New Tampa CIAC transmission main to provide additional capacity for the development of the New Tampa area. Model output indicated that the New Tampa CIAC transmission main would be required by year 2015 to maintain adequate commercial and transmission fire flow in the New Tampa area. According to the hydraulic model results, TWD should install the New Tampa CIAC by 2015 in order to meet fire flow requirements for the projected growth. It was determined however, that the 30 inch portion of the New Tampa CIAC can be downsized to 24 inch diameter based on the Model results. The New Tampa CIAC remote pump station and storage was not required by year 2030 based on hydraulic capacity. The need for a storage facility in the New Tampa area could be related to total system storage requirements as addressed in another section of the Master Plan.

**Other Transmission/Distribution Improvements:** Other planned transmission/ distribution improvements include completion or implementation of the UCAP transmission main R&R projects and the Grid System Master Plan transmission projects. Model output shows that although these projects will aid in providing redundancy within the transmission/distribution system, they are not critical to transmission capacity based on hydraulic modeling of projected demands through 2030.

**Table 3-2. Year 2015 Hydraulic Capacity Based Distribution System Improvements**

| Diameter (inch) | Material | Length (feet) | From | To | Along | Solution |
|---|---|---|---|---|---|---|
| 2 | Enamel | 612 | Woodbridge Boulevard | Cul De Sac | Edenwood Place | Replace with 6" diameter pipe |
| 2 | Enamel | 536 | Homestead Drive | Cul De Sac | Lacera Drive | Replace with 6" diameter pipe |
| 2 | Enamel | 507 | N. 19th Street | Dead End | E. Louisiana Avenue | Replace with 6" diameter pipe |
| 2 | Enamel | 529 | N. 31st Street | Dead End | E. 17th Street | Replace with 6" diameter pipe |
| 4 | Transite | 1207 | E. Busch Boulevard | Dead End | N. 52nd Street | Replace with 6" diameter pipe |
| 6 | PVC | 380 | Riverhills Drive | Dead End | Brightwater Boulevard | Replace with 8" diameter pipe |
| 6 | PVC | 765 | Saltwater Run Place | Lucaya Drive | Liberty Bell Drive | Replace with 8" diameter pipe |
| 6 | PVC | 419 | Lucaya Drive | Dead End | Liberty Bell Drive | Replace with 8" diameter pipe |

# 4.0 REPAIR AND REPLACEMENT PRIORITIZATION

Utilizing the risk based asset prioritization and interviews with Production and Distribution personnel, R&R projects were reviewed, developed and ranked for an approximate 10-year planning horizon (FY 2009 to FY 2018).

## 4.1 Production R&R

Treatment plant production, process, pumping and storage equipment repair and replacement projects were developed and scheduled by TWD Production staff and consultants. Meetings were held with TWD Production staff to verify the ranking of the projects. The resulting production and treatment facilities repair and replacement prioritization list is provided in Table 4-1. The proposed production R&R projects are primarily focused on the David L. Tippin Water Treatment Facility (DLTWTF) and include modifications to the ozone system, clear wells, raw water pump replacement, required minimum flows projects and miscellaneous treatment improvements. Based on a review of the recommended production R&R replacement rate and meetings with Production staff, two additional projects were added to the 10-year list: sludge processing lines and dam rehabilitation.

## 4.2 Storage and Pumping R&R

For finished storage and pumping facilities the likelihood and consequence of failure scores were assigned and combined to estimate a risk score for each facility. The risk based asset prioritization matrix with corresponding risk priorities is illustrated in Figure 4-1. Based on the risk matrix results for the remote storage and pumping systems and interviews with TWD Production staff, it was determined that, in addition to the ongoing upgrade of the Interbay Repump Station, the two elevated tanks, Palma Ceia and West Tampa, would be in the highest R&R priority category (Priority 1) and are scheduled in the current 6-year CIP. It was also determined that the Northwest Repump Station would be in the Priority 2 repair/replacement category to be upgraded in the next 10 years. TWD has also performed a study that recommended additional high service pump R&R at the DLTWTF and the Morris Bridge Repump Station to add variable frequency drives and redundancy. Planned and ongoing projects at the DLTWTF, Morris Bridge Repump Station and Interbay Repump Station will also provide added finished water storage R&R.

## 4.3 Transmission and Distribution R&R

Significant R&R projects are also required for transmission/distribution pipes, services, hydrants and valves over the next 10 years. The City’s existing R&R program is prioritized on replacement of the 2” mains with new larger ductile iron mains that will provide fire flow protection for neighborhoods and address a major cause of pipe failures and water quality issues. As shown in Figure 4-2, summarization of the TWD’s historical pipe break database indicated the majority of current pipe failures occur in the cast iron (CIP), galvanized steel (GS) and asbestos cement (AC) pipe materials. The TWD pipe break database also indicated the vast majority of the failures occurred in 2-inch diameter range pipe sizes as illustrated in Figure 4-3.

**Table 4-2. Summary of Production/Treatment Assets Scheduled for Improvement**

| Master Plan Priority | Type | Project Title | Target Start Year | Target End year |
|---|---|---|---|---|
| 0 | TRR | UCAP - Sulphur Springs Upper Weir and Pump Station Project | 2008 | 2010 |
| 4 | TRR | Ozone Compartment Isolation | 2009 | 2009 |
| 5 | TRR | Treatment Improvements | 2009 | 2018 |
| 6 | TRR | US Highway 301 Interconnect Connection | 2009 | 2009 |
| 9 | MIS | Security Improvements - Water Facilities | 2009 | 2018 |
| 11 | TRR | Basin 5-8 & Clear Well Rehab | 2009 | 2009 |
| 13 | LHR | MFL - Sulphur Springs - Upper Gates | 2009 | 2009 |
| 14 | LHR | MFL - Blue Sink Pipeline | 2009 | 2010 |
| 16 | TRR | Dam Rehabilitation | 2009 | 2009 |
| 18 | TRR | Sludge Processing Feed Lines & Gas Scrubbing | 2009 | 2009 |
| 21 | TRR | Pump Replacement Program | 2009 | 2010 |
| 22 | TRR | Ozone Generator | 2010 | 2011 |
| 24 | TRR | On-Line Monitoring Distribution | 2009 | 2009 |
| 25 | MIS | Public Art | 2009 | 2018 |
| 28 | TRR | DLT Blending Chamber | 2010 | 2011 |
| 29 | TRR | Elevated Storage Tank Rehabilitation Program | 2010 | 2014 |
| 30 | TRR | Filter Control Replacement Program | 2010 | 2013 |
| 31 | TRR | DLT PLC/SCADA Replacement | 2010 | 2011 |
| 32 | TRR | Belt Filter Press Rehabilitation | 2011 | 2011 |
| 33 | TRR | Morris Bridge Pressure Zone Modifications | 2010 | 2011 |
| 38 | TRR | Water Intake Improvements | 2011 | 2012 |
| 42 | TRR | DLT Filter Bed Modification | 2011 | 2012 |
| 50 | TRR | Northwest Repump Station Rehab | 2015 | 2015 |
| 53 | TRR | DLTWTF High Service Pump Replacement | 2014 | 2014 |
| 56 | LHR | MFL - Placeholder | 2016 | 2016 |
| 60 | TRR | Treatment R&R - Future General | 2015 | 2018 |
| 63 | TRR | Supply R&R - Future General | 2015 | 2018 |

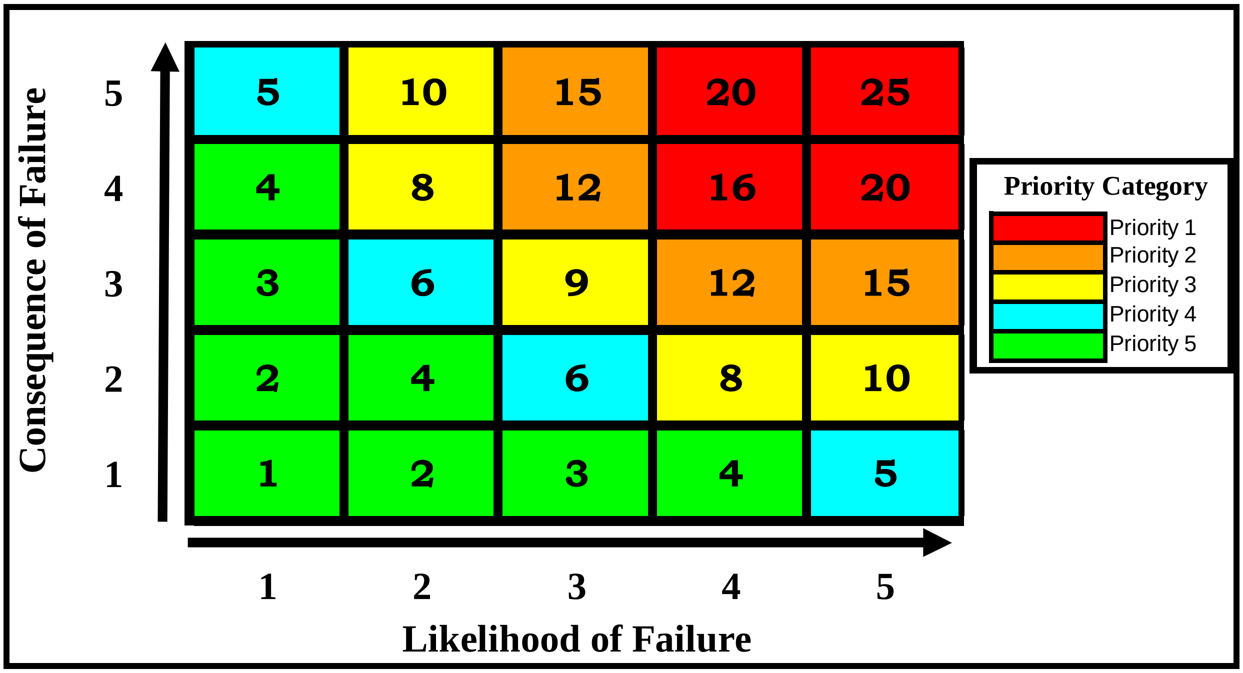



**Figure 4-1. Risk Based Asset Prioritization Matrix**

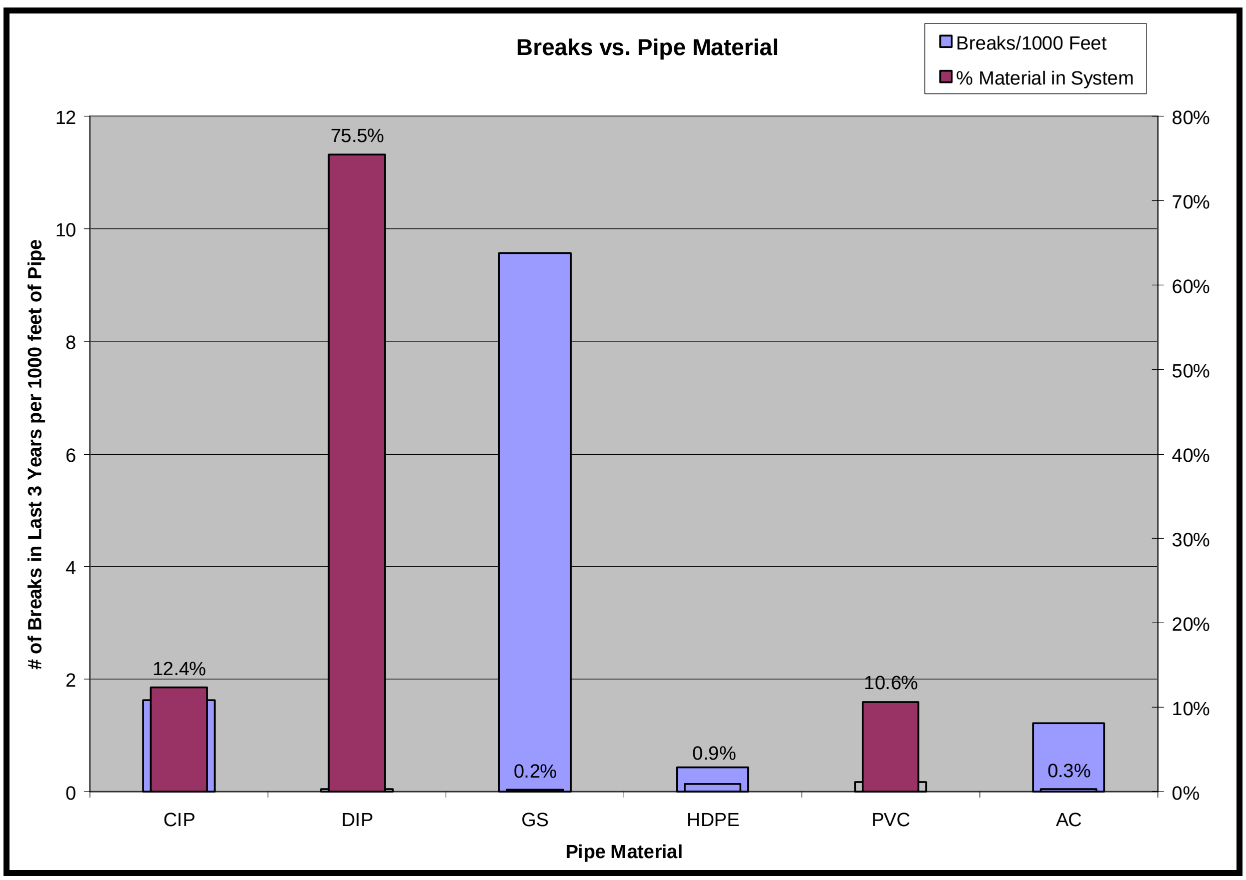



**Figure 4-2. Historical Pipe Breaks vs. Pipe Material**

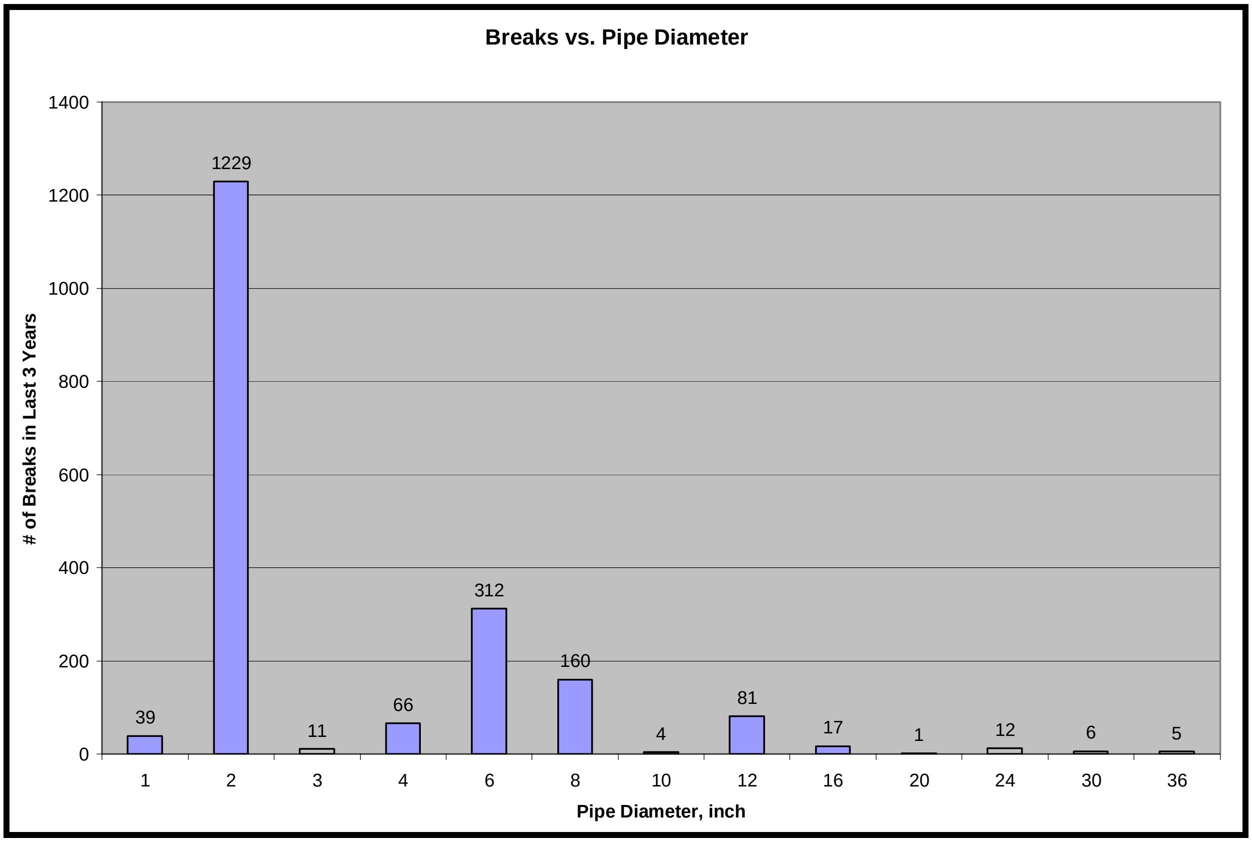
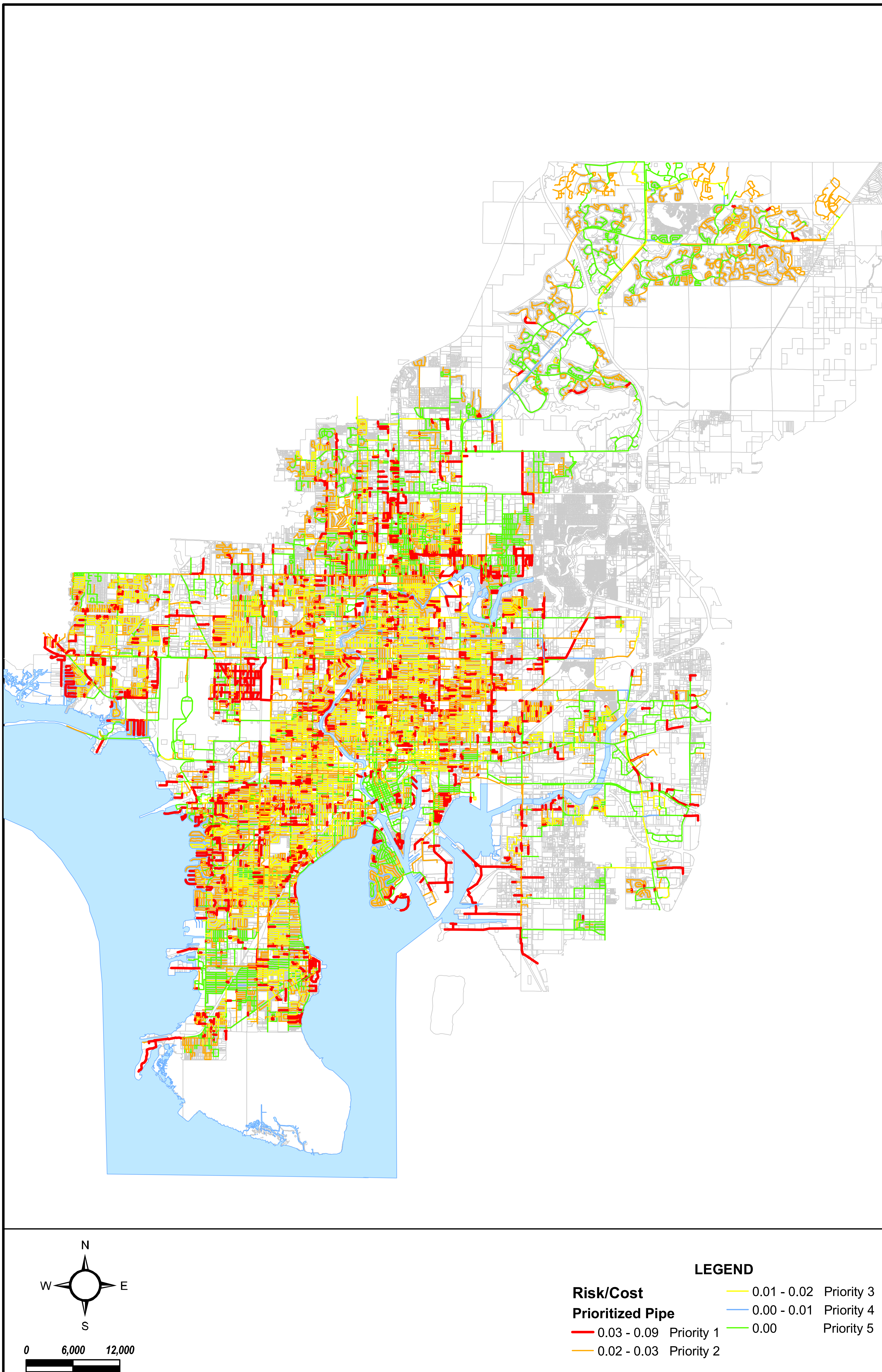



**Figure 4-3. Historical Pipe Breaks vs. Pipe Diameter**

The risk reduction versus cost based project prioritization indicated that replacement of the old 2" mains is a prudent strategy. The prioritization also indicated that several high risk transmission mains should also be included in the R&R program. While the TWD currently has relatively few transmission R&R projects identified in the 6-year CIP, the planned Downtown/South Tampa CIAC transmission main will provide transmission redundancy and help meet future demands. The resulting highest risk reduction versus cost transmission and distribution pipes were grouped into R&R projects as shown in Figure 4-4.




CITY OF TAMPA
WATER MASTER PLAN
**Risk Reduction vs. Cost Based Transmission/Distribution Prioritization**

FIGURE 4-4

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# 5.0 CONCLUSIONS

## 5.1 Supply and Production

*Conservation and Reclaimed Water Potable Offsets*

1. For consistency with the City's Comprehensive Plan Potable Water Element, this analysis was performed without considering reductions in demand from conservation and reclaimed water potable offsets. Depending on funding availability, future planned reclaimed water projects could reduce potable water demands by an estimated 12 MGD ADD over the next 15 years. Adjusted demands would reduce production, pumping and storage capacity requirements, but would not significantly impact the 10-year conclusions of this analysis since significant increases in capacities are not required.

*Water Supply Optimization*

2. The hydraulic analysis indicated that by 2020 the TWD will need to utilize the Highway 301 point of connection at 60 to 70 psi, in addition to the ongoing use of the Morris Bridge point of connection, on a full time basis as an additional potable water source to meet transmission/distribution system needs if the DLTWTF capacity remains the same.
3. Supplying water from a potentially expanded DLTWTF or the Tampa Bay Water Highway 301 point of connection require the same transmission/distribution improvements, i.e., neither source has a hydraulic advantage in the 20-year planning horizon analyzed.
4. Creating the proposed pressure zone at Morris Bridge could optimize the use of available DLTWTF supply, resulting in less purchase of Tampa Bay Water wholesale water in the future according to theoretical hydraulic model simulations. Creating the pressure zone at Morris Bridge would allow for more Morris Bridge tank filling with available DLTWTF supply water and allow the Morris Bridge Repump Station discharge pressure to the south to be lowered thereby utilizing more available DLTWTF supply (within existing production and supply constraints) without adversely affecting the New Tampa area pressures. A small energy savings could also be realized.

*Treatment and Production*

5. The existing potable water TWD production facility (DLTWTF) and TBW connections at Morris Bridge and Highway 301 have ample capacity to meet the TWD projected demands to the year 2030 given the Tampa Bay Water connections are providing adequate pressures. Long term combined capacities associated with Tampa Bay Water connections should be verified and included in future supply agreement updates.
6. While the 2008 TWD potable water average daily demand (ADD) was only 1-2 MGD above the permitted maximum of the DLTWTF and Hillsborough River withdrawal limits, the TWD purchased approximately 6 MGD of water from TWD. This was due to drought conditions, maximum daily demand peaks and the current pump and piping configuration at Morris Bridge Repump Station.
7. Hydraulic modeling indicates that during existing demand conditions and with the existing pump and piping configuration at Morris Bridge Repump Station, the TWD would purchase at least 5 MGD of equivalent raw water ADD and 10-20 MGD of equivalent MDD treatment capacity from the TBW connections.
8. By year 2030, TWD will need to purchase approximately 29 MGD of equivalent raw water ADD and approximately 38 MGD of equivalent raw water MDD treatment

capacity from the TBW connections if the current Morris Bridge Repump configuration is maintained and the DLTWTF is not expanded.

9. TWD Production staff maintains production and treatment infrastructure database and prioritizes and schedules repair and replacement.
10. TWD undertook major improvements to the DLTWTF in the last 10 years and has capital projects planned that will invest roughly 16% of the estimated value of the facility over the next 6 years to improve and rehabilitate treatment and production components.

## 5.2 High Service Pumping and Finished Storage

*High Service Pumping*

11. Including completion of the ongoing high service pump installation at the Interbay Repump Station, the DLTWTF and TWD repump stations have ample high service pumping capacity to meet future 2030 projected demands.
12. Existing and future high service pumping and remote storage facility operating protocols were determined based on input from TWD Production staff and hydraulic modeling results, and served as the basis for this transmission/distribution capacity analysis.
13. To help resolve low pressure issues in the New Tampa area and minimize purchase of wholesale water, the Morris Bridge Repump Station could be valved to create a separate pressure zone to the north of the station. The pressure zone creation would allow the Morris Bridge Repump Station to pump north at a higher pressure and pump south through a separate pipe south of the station at a lower pressure to protect the older distribution piping in that direction.
14. Creating a pressure zone at Morris Bridge would require the addition of a third “small” pump in the vacant pump can to provide “n+1” redundancy for the proposed north Morris Bridge pressure zone. Additionally, one or two of the existing “small” pumps would require upsizing between years 2020 and 2030.
15. One remote storage and repump station is being rehabbed this year (Interbay) and three more facilities are in the 6-year CIP for R&R (Morris Bridge, and Palma Ceia and West Tampa elevated tanks).
16. The Northwest Remote Storage and Repump Station should be scheduled for R&R in the next 10 years as well.

*Finished Storage*

17. Florida Administrative Code (FAC) 62-555.320 Design and Construction of Public Water Systems states that storage in consecutive systems can be provided by the wholesale supplier. Therefore, some of TBW’s available storage at the Regional Water Treatment Plant near the Highway 301 connection and facilities supplying the Morris Bridge connection can be counted as effective storage for TWD. For the purposes of this evaluation, a total effective storage of 2 million gallon (1 million gallon at each connection) was assumed. This assumption should be verified via a detailed engineering and permitting investigation.
18. The demand and fire reserve criteria indicate that the TWD currently has sufficient finished water storage, but will experience deficits of 0.7 million gallons in year 2010 and 3 million gallons in year 2015 and 8 million gallons in year 2030.
19. The City is considering rehabilitation projects to potentially recover 4 or more million gallons of effective storage at the DLTWTF and the Morris Bridge Repump Station.
20. Projected long term finished water deficits (8.2 million gallon in year 2030) could be

addressed via demand reductions, further recovery of DLTWTF effective storage, potential increase in Tampa Bay Water connection equivalent storage credits, and future remote storage facilities potentially located in the Northeast service area.

21. The potential 10 million gallon ASR storage credit used in the DLTWTF Expansion Evaluation (2008) could delay construction of additional storage and help comply with the finished water level of service. That study's concept of ASR storage credits should be verified via a detailed engineering and permitting investigation.

## 5.3 Transmission and Distribution

*Transmission/Distribution System Capacity Improvements*

22. Population and development growth and fire flow requirements in the service requires that some transmission/distribution improvements will be required over the next 20 years. The need for transmission capacity improvements has been mitigated by projected reductions in potable water demand due to the implementation of reclaimed water for public access irrigation.
23. Distribution improvements were identified to meet peak demand hydraulic requirements and to add adequate fire flow. The distribution improvements consisted of replacing existing undersized distribution pipes with larger pipes.
24. The non-CIAC transmission UCAP and Grid System Master Plan projects are not required in the next 20 years based on the hydraulic analysis: the need for these projects would be repair and replacement driven and to potentially handle new velocity patterns from the Downtown/ South Tampa CIAC transmission main.

*Downtown/South Tampa CIAC*

25. Segments 2 and 3 of the Downtown/ South Tampa CIAC transmission main (from Downtown to South Tampa) is required by 2030 (online between 2020 and 2030) according to the hydraulic model.
26. Segments 1 and 4 of the Downtown/South Tampa CIAC would increase service pressures by 2 to 3 psi in the South Tampa area according to the hydraulic model.
27. Segments 2 and 3 of the Downtown/South Tampa CIAC could increase service pressures by an additional 2 to 3 psi (in addition to segments 1 and 4) in the South Tampa area according to the hydraulic model.

*New Tampa CIAC*

28. The New Tampa CIAC transmission main is required to maintain adequate commercial and transmission fire flow in the New Tampa area by 2015.
29. The New Tampa CIAC remote storage and pump station is not required to meet hydraulic capacity needs by year 2030; the need for the facility would be based on total system storage requirements addressed elsewhere in the Master Plan.

*Transmission/Distribution System R&R*

30. The City has an ongoing R&R program as part of its current CIP that will replace roughly 9% of transmission and distribution mains over the next 6 years.
31. While the TWD currently has relatively few transmission R&R project identified in the 6-year CIP, the planned Downtown/South Tamp CIAC transmission main will provide transmission redundancy and meet future demands.
32. The majority of the current pipe failures occur in 2 inch diameter mains and in cast iron pipe materials.
33. There are a significant amount of joint failures occurring associated with transmission

(16" and larger) cast iron mains. An example of this is the Himes Avenue 16" main that has had several significant joint failures over the last several years.

34. The City's existing R&R program was prioritized on replacement of the 2" mains with new larger ductile iron mains that will provide fire flow protection for neighborhoods and address a major cause of pipe failures based on the City's R&R pipe projects scheduled for fiscal years 2008 and 2009.
35. Replacement of existing asbestos cement pipe material in the distribution system should be a high priority because of the high cost of repairs.
36. Using raw risk based prioritization indicates that TWD should prioritize on larger transmission mains over smaller distribution mains; conversely risk reduction vs. cost prioritization indicates that TWD should prioritize on the smaller distribution pipes over larger transmission pipes.

*Madison Avenue Pressure Zone*

37. Creating a pressure zone in the Madison Avenue area could allow the DLTWTF to be operated at 75 psi. Three alternatives were developed to mitigate high pressures in the Madison Avenue area by locating two pressure reducing valves on key transmission pipes supplying the Madison Avenue area.

*Transient Flow Surge*

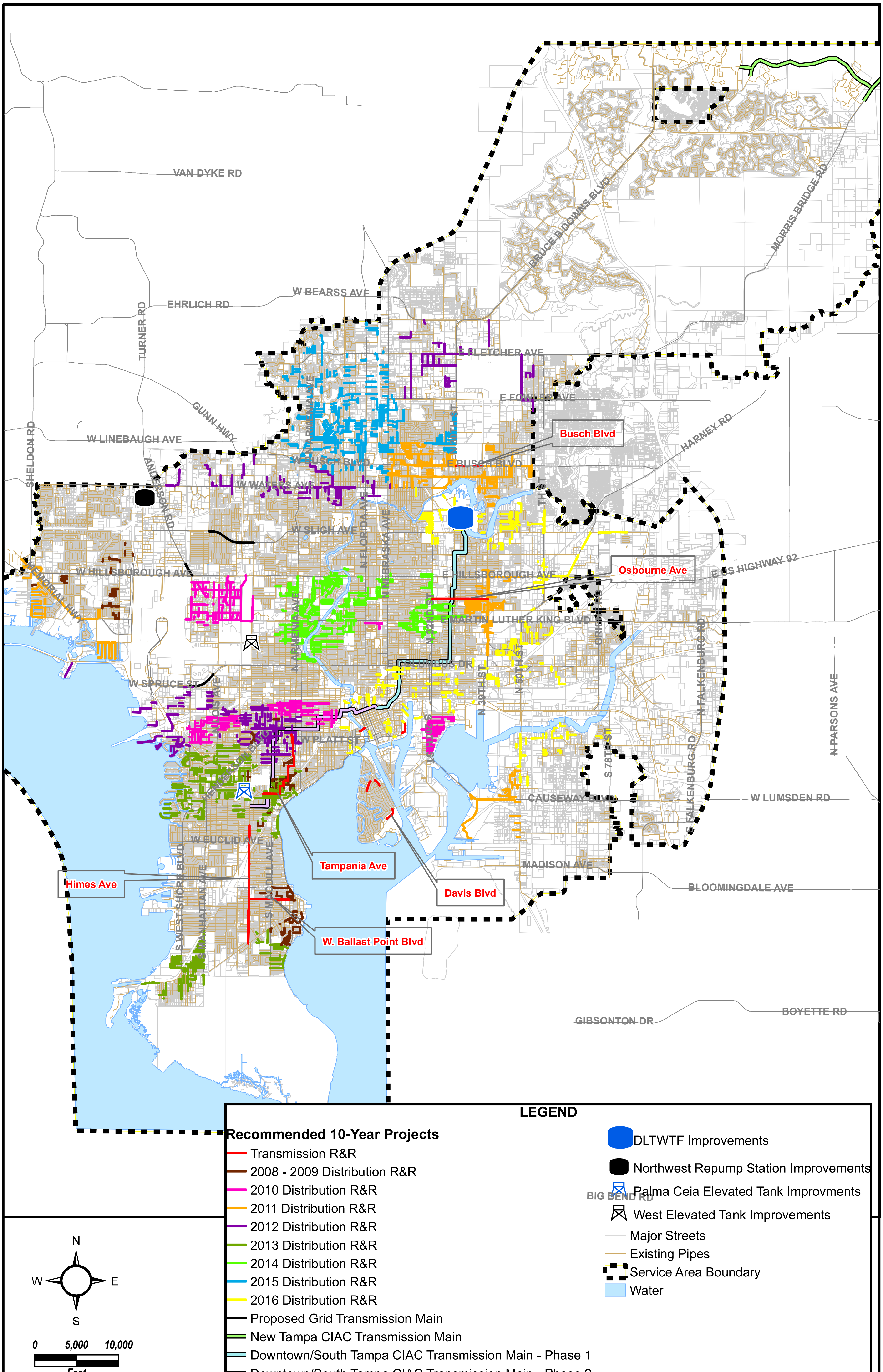
38. The primary cause of the existing surge issues in the South Tampa area is the filling and drawing cycles of the Interbay Repump Station and the intermittent MacDill AFB demands.
39. The Himes Avenue transmission main is experiencing leaks due to worn and failing pipe joints. The leaks are being accelerated by the significant, daily pressure swings (25+ psi) and transient flow surges occurring at the Interbay Repump Station.
40. Transient flow surge impacts, particularly in the South Tampa area on Himes Avenue near the Interbay Repump Station will be minimized by completion of the ongoing Interbay Repump Station upgrade and proposed operational changes and by employing slow opening and closing valves at the MacDill AFB tank fill location.
41. The potential for transient surge will be increased in transmission mains at Downtown/South Tampa CIAC transmission main connection points due to increased velocities.
42. Other than the transmission mains near connection points, the surge potential in South Tampa will not be significantly increased by the Downtown/South Tampa CIAC.

## 5.4 Project Prioritization

Based on the R&R and capacity needs a 10-year project prioritization list was developed. The project list was organized based on estimated implementation year; however, the implementation year may vary according to specific utility needs and funding and financing constraints. The recommended 10-year prioritized project list including specific projects, organized by project type and year, is provided in Table 5-1. The cost summary includes break downs by Pipeline R&R, CIAC Adjacent, Production, Pumping and Storage (Plant) R&R, Miscellaneous, Reclaimed Water, and Lower Hillsborough River projects. The total cost of the 10-year project list is approximately$806,600,000. Key recommended potable water CIP projects are show in Figure 5-1.

**Table 5-1. Water Master Plan 10-Year Prioritized Projects (5/26/09)**

| Master Plan Priority | Type | Project Title | Target Start Year | Target End year | Funding Notes | FY2009-2018 10-Year Total |
|---|---|---|---|---|---|---|
| 0 | DRR | UCAP - 19th Street Water Pipeline Replacement Project | 2008 | | | $0 |
| 0 | DRR | UCAP - 22nd Avenue Water Pipeline Replacement Project | 2008 | | | $0 |
| 0 | DRR | UCAP - Downtown Water Pipeline Replacement Project | 2008 | | | $0 |
| 0 | DRR | UCAP - Bay to Bay Water Pipeline Replacement Project | 2008 | | | $0 |
| 0 | DRR | UCAP - Palma Ceia Water Pipeline Replacement Project | 2008 | | | $0 |
| 0 | DRR | UCAP - Distribution Main Adjacent to CIAC Replacement Project | 2010 | 2010 | | $10,700,000 |
| 0 | TRR | UCAP - Sulphur Springs Upper Weir and Pump Station Project | 2008 | | | $0 |
| 1 | DRR | Transmission R&R - Joint Seal Test Project Himes Ave | 2009 | 2009 | | $500,000 |
| 2 | DRR | Transmission R&R - Himes Avenue | 2009 | 2009 | | $3,396,654 |
| 3 | DRR | Service Line Replacement (Poly-B/Gal) | 2009 | 2017 | $2.23M FY09, $2M Annual Recurring | $16,230,000 |
| 4 | TRR | Ozone Compartment Isolation | 2009 | 2009 | | $1,250,000 |
| 5 | TRR | Treatment Improvements | 2009 | 2018 | $0.475M Annual Recurring | $4,625,000 |
| 6 | TRR | US Highway 301 Interconnect Connection | 2009 | 2009 | Payment to Tampa Bay Water | $754,163 |
| 7a | DRR | New Fire Service | 2009 | 2017 | $0.5M FY09, $0.25M Annual Recurring | $2,500,000 |
| 7b | DRR | New Customer Main Extension | 2009 | 2017 | $0.6M FY09, $0.3M Annual Recurring | $3,000,000 |
| 7c | DRR | New Metered Service | 2009 | 2017 | $0.175M FY09, $0.1M Annual Recurring | $975,000 |
| 8 | DRR | FDOT Projects | 2009 | 2018 | $0.1M Annual Recurring | $1,000,000 |
| 9 | MIS | Security Improvements - Water Facilities | 2009 | 2018 | | $1,000,000 |
| 10 | DRR | Distribution R&R - Palm River AC, Drew Park, Melrose St, Davis Island | 2009 | 2009 | | $6,285,417 |
| 11 | TRR | Basin 5-8 & Clear Well Rehab | 2009 | 2009 | $2.5M in FY08 | $6,178,000 |
| 12 | DRR | Downtown & South Tampa CIAC Segments 1 & 4 | 2008 | 2010 | | $25,000,000 |
| 13 | LHR | MFL - Sulphur Springs - Upper Gates | 2009 | 2009 | | $909,500 |
| 14 | LHR | MFL - Blue Sink Pipeline | 2009 | 2010 | | $7,714,000 |
| 15 | DRR | BBD Widening Phase 1 | 2009 | 2009 | | $14,000,000 |
| 16 | TRR | Dam Rehabilitation | 2009 | 2009 | | $400,000 |
| 17 | DRR | Distribution R&R - Bayerle Circle Area | 2009 | 2009 | | $10,512,827 |
| 18 | TRR | Sludge Processing Feed Lines & Gas Scrubbing | 2009 | 2009 | | $1,750,000 |
| 19 | REC | Reclaimed Expan - Bayshore | 2009 | 2010 | $1.373394 M Design in Start Year | $15,684,834 |
| 20 | REC | Reclaimed Expan - Downtown | 2009 | 2011 | $0.7M Design in Year1, $2.2M in Year 2 | $8,591,101 |
| 21 | TRR | Pump Replacement Program | 2009 | 2010 | $2.5M in Start Year | $5,000,000 |
| 22 | TRR | Ozone Generator | 2010 | 2011 | $0.8M in Start Year | $4,000,000 |
| 23 | DRR | Distribution Upgrade and Relocation w/HC | 2009 | 2010 | $0.705M in Start Year | $100,000 |
| 24 | TRR | On-Line Monitoring Distribution | 2009 | 2009 | $0.1M in Start Year | $125,000 |
| 25 | MIS | Public Art | 2009 | 2018 | $0.01M Annual Recurring | $100,000 |
| 26 | DRR | Distribution R&R - Atlas E4, F4, F8-9, G8-9 | 2010 | 2010 | | $9,879,541 |
| 27 | DRR | Distribution R&R - Atlas G12, I8, I10, I14 | 2010 | 2010 | | $14,246,876 |
| 28 | TRR | DLT Blending Chamber | 2010 | 2011 | $0.8M in Start Year | $8,000,000 |
| 29 | TRR | Elevated Storage Tank Rehabilitation Program | 2010 | 2014 | $0.25M in Start Year | $750,000 |
| 30 | TRR | Filter Control Replacement Program | 2010 | 2013 | $0.2M from Start to End Year | $800,000 |
| 31 | TRR | DLT PLC/SCADA Replacement | 2010 | 2011 | $0.3M in Start Year | $3,000,000 |
| 32 | TRR | Belt Filter Press Rehabilitation | 2011 | 2011 | $0.25M in FY11, $0.1M in FY16 | $350,000 |
| 33 | TRR | Morris Bridge Pressure Zone Modifications | 2010 | 2011 | $0.3M in Start Year | $3,000,000 |
| 34 | DRR | Transmission R&R - W Ballast Point Boulevard | 2011 | 2011 | | $1,176,080 |
| 35 | DRR | Transmission R&R - Busch Boulevard | 2011 | 2011 | | $1,229,855 |
| 36 | DRR | Valve Program | 2011 | 2018 | $0.4M Annual Recurring from ~FY11 | $3,200,000 |
| 37a | DRR | Distribution R&R - Atlas J14, K14-15 | 2011 | 2011 | | $4,019,097 |
| 37b | DRR | Distribution R&R - Atlas F15, G15 | 2011 | 2011 | | $8,669,544 |
| 37c | DRR | Distribution R&R - Atlas C13-14, C15-16 | 2011 | 2011 | | $13,395,990 |
| 37d | DRR | Distribution R&R - Atlas G5-6 | 2011 | 2011 | | $6,230,134 |
| 38 | TRR | Water Intake Improvements | 2011 | 2012 | $0.5M in Start Year | $5,000,000 |
| 39 | REC | Reclaimed Expan - Zone A (Tampa Airport) | 2011 | 2012 | $1.038M in FY 09, $0.67M in Start Year | $9,084,008 |
| 40 | REC | Reclaimed Expan - Zone B (Tampa Stadium) | 2010 | 2011 | $0.581M in Start Year | $6,975,360 |
| 41 | REC | Reclaimed Expan - Zone C (University of Tampa) | 2010 | 2011 | $0.839M in Start Year | $5,360,720 |
| 42 | TRR | DLT Filter Bed Modification | 2011 | 2012 | $0.1M in Start Year | $1,600,000 |
| 43 | DRR | Transmission R&R - Cast Iron Pipe Clean, Reline and Joint Rehab | 2012 | 2013 | $3.0M in Start Year | $6,000,000 |
| 44a | DRR | Distribution R&R - Atlas I7, G11-12, H5, H8, H12 | 2012 | 2012 | | $14,386,452 |
| 44b | DRR | Distribution R&R -Atlas C8-9-10-11-12, D9-10-11-12 | 2012 | 2012 | | $7,189,052 |
| 44c | DRR | Distribution R&R -Atlas A13-14, A16, B16, M13-14-15 | 2012 | 2012 | | $4,563,243 |
| 45 | DRR | Transmission R&R - Osborne Ave | 2013 | 2013 | | $1,942,883 |
| 46a | DRR | Distribution R&R - Atlas N7, N9, O6-7-8 | 2013 | 2013 | | $6,020,759 |
| 46b | DRR | Distribution R&R - Atlas J8-9-10, K8-9-10 | 2013 | 2013 | | $18,785,299 |
| 47 | DRR | New Tampa CIAC | 2013 | 2014 | $1.7M in Start Year | $17,244,920 |
| 48 | REC | Reclaimed Expan - Zone D (Port Sutton) | 2011 | 2012 | $0.6499M in Start Year | $7,788,000 |
| 49 | DRR | Transmission R&R - Tampania Avenue | 2015 | 2015 | | $7,806,986 |
| 50 | TRR | Northwest Repump Station Rehab | 2015 | 2015 | | $5,000,000 |
| 51 | DRR | Fire Line Backflow Preventer Retrofit | 2015 | 2018 | Equally divided from Start to End Year | $18,000,000 |
| 52a | DRR | Distribution R&R - Atlas F10-11-12, G10-11-12 | 2014 | 2014 | | $19,648,271 |
| 52b | DRR | Distribution R&R - Atlas G13, F14 | 2014 | 2014 | | $6,973,850 |
| 53 | TRR | DLTWTF High Service Pump Replacement | 2014 | 2014 | | $25,000,000 |
| 54 | REC | Reclaimed Expan - Residential | 2009 | 2016 | $5.26M in FY09 | $78,256,354 |
| 55 | REC | Reclaimed Expan - Curren Plant | 2014 | 2015 | $2.4M in Start Year | $24,000,000 |
| 56 | LHR | MFL - Placeholder | 2016 | 2016 | $2.45/1000 gal x 3 cfs x 6 mo/yr x 2 yr | $1,800,000 |
| 57 | DRR | Downtown & South Tampa CIAC Segments 2 & 3 | 2017 | 2018 | Equally divided from Start to End Year | $35,000,000 |
| 58 | DRR | Distribution R&R - Atlas A10-11-12, B10-11-12-13-14, C10-11-12, M11-12 | 2015 | 2015 | | $26,530,639 |
| 59a | DRR | Distribution R&R - Atlas D13-14-15-16, E14-15-16 | 2016 | 2016 | | $7,480,516 |
| 59b | DRR | Distribution R&R - Atlas E16-17-18, F15-16, G12-13-14-15-16, H12-13 | 2016 | 2016 | | $14,034,100 |
| 59c | DRR | Distribution R&R - Atlas H16-17-18, I15-16 | 2016 | 2016 | | $3,522,025 |
| 60 | TRR | Treatment R&R - Future General | 2015 | 2018 | Equally divided from Start to End Year | $20,000,000 |
| 61 | DRR | Grid System Priority 1 and 2 Projects | 2016 | 2017 | $1.5M in Start Year | $15,000,000 |
| 62 | DRR | Transmission R&R - General Future | 2017 | 2018 | $2.7$M in Start Year | $27,000,000 |
| 63 | TRR | Supply R&R - Future General | 2015 | 2018 | Equally divided from Start to End Year | $20,000,000 |
| 64 | DRR | Distribution R&R - General Future | 2017 | 2018 | $2.7$M in Start Year | $27,000,000 |
| 65 | DRR | Downtown & South Tampa CIAC Segments 2 & 3 | 2017 | 2018 | Equally divided from Start to End Year | $35,000,000 |
| 66 | REC | Reclaimed Expan -North Project | 2017 | 2018 | $5 M in Start Year | $47,338,000 |
| 99 | DRR | Delivery System Improvements | 2008 | | FY 2008 | $0 |
| 99 | DRR | FDOT Projects - FDOT Reimbursable | 2008 | | FY 2008 | $0 |
| **Pipeline R&R and Expansion Subtotal** | | | | | | $475,376,010 |
| **Production, Storage and Pumping R&R Subtotal** | | | | | | $116,582,163 |
| **Miscellaneous Projects Subtotal** | | | | | | $1,100,000 |
| **Reclaimed Water Projects Subtotal** | | | | | | $203,078,377 |
| **Lower Hillsborough River Projects Subtotal** | | | | | | $10,423,500 |
| **Total** | | | | | | **$806,560,050** |




City of Tampa
Water Master Plan
**Proposed 10 Year Potable Water Projects**

**FIGURE 5-1**

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# 6.0 RECOMMENDATIONS

## 6.1 Supply and Production

*Supply and Production*

1. Long term capacities associated with Tampa Bay Water connections should be verified and included in future supply agreement updates.
2. TWD should potentially isolate the area north of Morris Bridge Repump Station in a pressure zone to maximize the use of DLTWTF finished water and reduce overall water production costs for the TWD.
3. It is recommended that the City jointly pursue an additional drought-proof supply source with Tampa Bay Water via the regional water supply planning efforts.
4. TWD Production staff should continue to maintain its treatment infrastructure database. The database should be updated to include replacement cost values and age for each asset.
5. TWD should continue to replace Production assets at a rate of approximately 3% per year of the total treatment and supply infrastructure value.
6. Schedule the Northwest Repump and Storage Station for rehabilitation and fitting with variable speed pumps in the next 10 years.

## 6.2 High Service Pumping and Finished Storage

*High Service Pumping*

7. Complete ongoing high service pump projects.

*Finished Water Storage*

8. Proceed with proposed projects to increase the effective storage at the DLTWTF and Morris Bridge Repump Station by at least 3 million gallons within the next five years.
9. A detailed engineering and permitting investigation should be performed to better estimate and confirm with regulators the consecutive system storage provided by connection to TBW's system at Highway 301 and Morris Bridge and potential storage credits for the ASR system.

## 6.3 Transmission and Distribution

*Transmission/Distribution*

10. Complete installation of the Downtown/South Tampa CIAC as planned, realizing that if necessary the installation of segments 2 and 3 of the Downtown/South Tampa CIAC transmission main could be delayed at least 5 years.
11. Complete the installation of the New Tampa CIAC, and reduce the size of the proposed 30 inch main to 24 inch diameter. However, the actual timing of this project should be confirmed with the New Tampa development progress.
12. To help resolve low pressure issues in the New Tampa area and minimize purchase of wholesale water, the Morris Bridge Repump Station should be valved to create a separate pressure zone to the north of the station. The two existing "small" pumps would be dedicated to the north. A third "small" pump would be added to the Morris Bridge Repump Station to provide redundancy for the north Morris Bridge pressure zone.
13. Consider creation a pressure zone in the Madison Avenue area to address high pressure

issues or address the distribution piping in repair and replacement efforts to resolve the high pressure-susceptible distribution areas.

14. Once completed, start up the Interbay Repump Station and allow the pumps and tank fill valve to operate as close to continuous as possible to minimize the station pressure swings.
15. Consider assigning a higher priority to cleaning, relining and joint rehabilitating the existing cast iron transmission mains directly connecting to the Downtown/South Tampa CIAC to minimize the potential for surge related failures from the new CIAC main.
16. Confirm that the MacDill AFB tank fill location, and any other large users with control valves, has modified the service control valves to open and close slowly.
17. TWD should continue to update its GIS database to include installation dates for each asset.
18. TWD should schedule and budget for R&R of Priority 1 assets (as defined in the Risk Based Asset Prioritization Memorandum, REI 2009) within the constraints of the average long term R&R rates based on asset service life. Note that the recommended Priority 1 assets were a combination of large diameter transmission R&R (raw risk reduction) and small 2” to 6” distribution R&R (risk reduction per cost).
19. Continue replacing the asbestos cement and 2” iron pipes in the system. Replacement pipes should be hydraulically optimized in size to minimize cost and water age, while providing adequate service and fire flow.
20. Consider including replacement of the Himes Avenue 16” main in the 2009 or 2010 CIP.
21. Refer to the Greater Seminole Heights Plan when planning projects in the Great Seminole Heights region.
22. Consider using the enclosed prioritized transmission/distribution project groupings to provide R&R guidance beyond the current 2009 list of scheduled projects.
23. Key large transmission mains, including the high priority and high consequence of failure mains (as defined in the Risk Based Asset Prioritization Memorandum, REI 2009), should be field inspected to support the conclusions of this evaluation.

## 6.4 Master Plan Implementation

24. Utilize the 10-Year list of prioritized projects to update future CIPs.
25. Coordinate implementation of the 10-Year project list with funding and financing constraints.
26. The asset prioritization effort was based on the best available information at the time and, as with all asset management programs, it should be re-evaluated as more condition and material data is collected.
27. The following planning tasks could be completed to assist with Master Plan updates, project preliminary designs, project prioritization and operational assistance:
    a. Update hydraulic model with new USF pipe GIS data.
    b. Create a water quality model scenario within the new hydraulic model and use it to help optimize capital improvements, operational flushing and remote tank operation.
    c. Complete a system wide water quality calibration on the distribution system.
    d. Use updated hydraulic model to generate a unidirectional flushing plan.
    e. Consider implementing a web based application to supply to distribution, water quality and operations staffs to overlay water quality model predicted results with

SCADA and field collected data to benchmark system performance. A web based water quality application could summarize historical water quality field data and water quality model output including predicted chloramine residuals to assist water quality staff with evaluating field water quality results. A water quality application would show trends, statistics and alarm ranges for each existing water quality sampling location based on historical data. A water quality application could include the water quality modeling output such as water age, bulk decay rates, pipe wall decay rates, chlorine residual, source trace, and point of entry chloramine residual set points and include maximum and minimum ranges for typical average daily water system operation. The net benefits of a water application would include:

i. Simultaneous access and evaluation of geo-spatial SCADA data, historical water quality data, and water quality modeling predictions
ii. Faster hydraulic model updates with field pressures and disinfectant inputs
iii. Cost effective, rapid water quality and hydraulic calibration
iv. Targeted distribution water quality troubleshooting and optimization
v. Water quality benchmarks for system performance
vi. Targeting and scheduling of a Unidirectional Flushing Program
vii. Simultaneous access and evaluation of geo-spatial SCADA data, historical water quality data, and water quality modeling predictions
viii. Prioritization of valve checking and exercising
ix. Potential reductions in operating costs for disinfection by monitoring lowest system disinfectant residual locations