

# Internal Monitoring Report

Policy #: O-2A Water Quantity

Monitoring Frequency: Annually

Date: September 29, 2015

I certify that the following information is true.

Signed  \_\_\_\_\_, General Manager

## Policy Language:

*Current and future customers will receive water that meets or exceeds industry-accepted levels of service for fire protection and pressure.*

*This includes:*

- 1. Water delivered to hydrants at proper flow rates for fire protection.*
- 2. Water delivered to the customer tap at a pressure that meets industry-accepted low, high, and emergency operation criteria.*
- 3. Water used for outdoor irrigation under drought-free conditions.*

## General Manager's interpretation and its justification:

This Outcomes policy requires that the Utility budget for, fund, prioritize, plan for, design, and construct the necessary system improvements to provide adequate water quantity to all areas of the system. The Level of Service Memo developed as part of the East Side Water Supply project for the Utility, attached, establishes minimum standards for system supply, pressure, and fire protection capacity. These standards guide system component design, evaluation, and expansion. A copy of the 2015 approved 6 year capital budget (2015-2020) outlining planned capital projects to address identified deficiencies is attached for your information and use.

Actual system performance is measured against the Utility's established level of service. Data is obtained using the Utility's Supervisory Control and Data Acquisition (SCADA) system and from information derived from the Utility's distribution system computer model. Using the Utility Master Plan the capital project list is reviewed and updated based on current system characteristics, operational records, and project priorities. From that analysis the annual capital budget is developed and implemented.

A major update of a portion of the 2006 Water Master Plan and associated capital improvement plan was completed as part of the East Side Water Supply project in mid 2012. This update included Pressure Zones 3, 4, 5 and 6E. A formalized update of the

Utility Master Plan is tentatively scheduled to begin in 2016. This planned update will develop current water use statistics and build future water demand projections for long term planning. The Master Plan will also look at distribution and supply system deficiencies and fire protection capacity.

Other sources of data that will be used for this monitoring report will be consumer complaints and other records maintained by the Utility.

### **Data directly addressing the General Manager's interpretation:**

1. *Water delivered to hydrants at proper flow rates for fire protection.*

The fire flow analysis developed in the 2006 Water Master Plan, Figure 5-8, is attached to this memo for information and use. This fire flow capacity analysis will be updated during the comprehensive Master Plan update. Fire flow capacity for the east side of the system was evaluated as part of the 2012 ESWS study. The 2012 analysis is included as Figure 26. These documents provide a graphical representation of the fire flow capacity across the system as determined by the system hydraulic computer model. The figures also identify general areas of fire flow deficiency.

The Master Plan establishes projects that will mitigate the identified fire flow deficiency areas. These projects require significant capital investment and are typically budgeted for and implemented over the course of several years. We have reported on these projects in previous reports to the Board as the projects are developed and implemented.

Areas of fire flow deficiency identified in the 2006 Water Master Plan and 2012 ESWS plan and itemized in the Utility's Capital Improvement Program include but are not necessarily limited to: 1) Arbor Hills neighborhood; 2) Pressure Zone 4; 3) Lakeview Zone 5; and 4) North Sherman Avenue commercial area. Details of each project area follow:

#### **Arbor Hills:**

*Identified Project Alternative:* Construction of a 2,000 gpm booster pumping station and 16-inch transmission main between Zones 6 & 7 in the Arbor Hills area.

#### **Project Phases:**

Phase 1: 2009 Approximately 2 miles of 16-inch transmission main was installed from Raymond Road toward Arbor Hills.

Phase 2: 2010 Installation of approximately 1 mile of 16-inch transmission main – this phase completed the connection complete between Raymond Road and Greenway View

Phase 3: 2012 Installation of 0.55 miles of 16-inch transmission main north of Pumping Station 118 to the UW Arboretum – This section includes a crossing of the beltline highway and greatly improved hydraulic capacity on the suction side of the pumps.

Phase 4: 2012 Construction of Booster Pumping Station 118, a 2,000 gallon per minute capacity facility located in Leopold Park

Phase 5: 2015: 1300 feet of 16-inch transmission main from the Railroad corridor to Park Street along North Avenue is currently under construction.

Phase 6: 2016: Planned construction of approximately 2000 feet of 16-inch transmission main under the new bike path from Fish Hatchery Road to North Avenue to complete the connection between Booster Pumping Station 118 and Well 18.

Results:

The Cannonball pipeline and BPS 118 system accomplish two main objectives. It allows the transfer of water between Pressure Zone 6 and Pressure Zone 7 and back again. The new facility significantly improves fire protection to the Arbor Hills area. With construction of the Cannonball pipeline and BPS 118, the Arbor Hills neighborhood and the Todd Drive area of the Beltline Highway now have a redundant water supply. At Leopold Elementary School fire flow capacity increased from approximately 1500 gpm to an estimated 4000 gpm bringing it into compliance with Utility fire flow capacity standards. Similar increases in fire fighting capacity were realized throughout the Arbor Hills neighborhood. With the completion of all phases of the project in 2016, the pumping station will have the capacity to move approximately 1.5 million gallons of water per day from the Park Street area to Raymond Road. This improvement is greatly increasing reliability and operational flexibility in the system.

Pressure Zone 4:

Identified Project Alternative: Construct a second well, pumping station and reservoir within Zone 4 to provide redundancy and improve fire protection. This work will bring the southern portion of Pressure Zone 4 into compliance with Utility standards.

Project Phases:

Phase 1: 2009/2010 Selection of Well Site

Phase 2: 2011/2012 Test well installation and water quality testing.

Phase 3: 2013: Drill and develop production well.

Phase 4: 2014: MWU selected SEH for engineering design development services for the project. A project that includes a detached reservoir, treatment facility, pumping station and storage garage was developed for design.

Phase 5: 2015: A 1.5 million gallon reservoir was bid and is currently under construction. The reservoir will be completed by the summer of 2016.

Phase 6: 2017: Due to budget constraints the construction of the well house, filtration plant and pumping station was delayed to 2017. It is anticipated that the facility will be fully operational in early 2018.

Results:

When completed, Well 31 will provide the needed additional fire flow capacity and water supply redundancy to Zone 4 and bring it into compliance with the established utility level of service.

**Lakeview and Northport Drive Area Zone 5 and 6:**

Identified Project Alternative: Fire flow capacity deficiencies are noted in Zone 6 on the enclosed figures around Northport Drive in the Green Avenue/Troy Drive and on Packers and near the airport. In Zone 5 fire flow deficiencies have been identified around the Dane County Human Services building and throughout the residential area. To mitigate these deficiencies, it is proposed to construct a new two zone reservoir and upgrade an existing pumping station in the Lake View Park area to bring the fire flow capacity and reliability of the supply system for Zones 5 & 6 into compliance with Utility standards.

Project Phases:

Phase 1: Design and construct a dual zone reservoir to serve Zones 5 and 6. The upper 300,000 gallon reservoir will replace an aging 55,000 gallon structure that has served the area since the 1930's. The new Zone 5 tank will provide the necessary fire flow capacity and emergency backup supply for the area.

The lower tank will be a 1,000,000 gallon facility that will serve Zone 6 and provide additional emergency water storage capacity. The need for additional storage capacity on the north side was identified in the 2006 Water Master Plan and verified in the 2012 ESWS plan. A dual zone reservoir to mitigate both Zone

5 and Zone 6 is proposed due to lack of availability of a second site on the north side and the proximity of the Dane County Regional Airport.

Phase 2: Design and construct a new pipeline connecting Northport Drive with the new reservoir and the pump station feeding Zone 5. This will increase capacity and stabilize supply to Zone 6.

Phase 3: Upgrade the existing water pumping station that fills the reservoir and feeds Zone 5. This upgrade will improve fire protection capacity and bring Zone 5 into compliance with the established Utility minimum level of service.

Results:

Replacing and enlarging the Zone 5 reservoir, constructing a new connection to Zone 6, and upgrading the pumping station will improve overall water system operation and reliability. Construction on the reservoir project started in May 2015 and is expected to be complete by the fall of 2016. Piping upgrade is scheduled for 2017. The pumping station upgrade is budgeted for 2018.

***North Sherman Avenue commercial area:***

Identified Project Alternative: A fire capacity deficiency has been identified in the commercial area around North Sherman Avenue, the Aberg Avenue area and around Oscar Meyer. This fire flow issue will be addressed with the upgrade of Well 7 and hydraulic improvements to the distribution system.

Project Phases:

Phase 1: 2014/2015 re-construction of Unit Well 7 and the installation of an iron and manganese filtration system. The Well 7 filter project was completed and brought on line in June 2015 and is providing excellent water quality to the area.

Phase 2: To improve distribution system hydraulics and therefore improve fire fighting capacity, piping projects will be developed to move water east and north from Well 7. Pipe replacement projects that will upsize key pipe segments will increase capacity and mitigate the identified fire flow deficiencies.

Results:

Upgrading Well 7 with a filtration system and VFD driven booster pumps will improve water quality and provide operational flexibility to the system. Well 7 is situated in the north central area of Pressure Zone 6E and provides an excellent hydraulic location for water supply to the north and east sides. Replacing key pipe segments will result in improved system hydraulics and will maximize the benefit of upgrading Well 7.

East Side Water Supply Analysis: Fire flow availability was evaluated for the east side during the assessment of the system for the East Side Water Supply project. Figure 26 from the report presents the results of the fire flow analysis based on 2010 maximum day demands. Piping and facility projects are planned as noted in the approved Capital Improvement Plan that will address these issues over the next several years.

Master Plan Update and Development of an Asset Management Program: The Utility is planning an update of its Master Plan and will develop an Asset Management Program. The Utility has used a Master Plan since 1964 to provide the long term planning necessary to meet future water supply and system needs. The Asset Management Program will build on the Utility's 2005 Infrastructure Management Plan to assess the condition of existing assets and develop planned maintenance and replacement of those assets. The Asset Management Program will track costs associated with providing the established level of service including the cost of operation, maintenance and replacement. The objective of the asset management program is minimizing the lifecycle cost of all assets. Each of these programs will guide the Utility's long term capital planning to sustain minimum levels of service within the Madison system.

Hydrant Maintenance and Testing: The Utility routinely adds to, replaces, retires, and maintains the approximately 8,750 hydrants in the system. During 2014 the Utility inspected and serviced 4,250 hydrants as a part of the routine maintenance of the system. The Utility works closely with Madison Fire Department to ensure adequate fire protection capacity throughout the system. Flow testing is performed as requested on fire hydrants and recorded in the GIS database. The Utility's unidirectional flushing program systematically operates and exercises the majority of the Utility's hydrants annually. This program of hydrant maintenance and testing meets and exceeds WDNR requirements.

I report non-compliance with mitigation projects in progress and scheduled.

2. *Water delivered to the customer tap at a pressure that meets industry-accepted low, high, and emergency operation criteria.*

Pressure planning and design criteria for Madison Water Utility are established in Table 2 of the attached Level of Service Memo. A query of the system indicated that of approximately 8,750 fire hydrants with static pressure readings, approximately 0.1% were below 35 psi and 3% were greater than 100 psi. Some services require pressure reducing valves to reduce pressures to acceptable levels.

The master plan has identified areas within the system with high pressures. High pressure areas are evaluated as to the feasibility of moving them to a lower pressure zone or creating another pressure sub-zone using system pressure reducing valves.

Maintaining adequate fire flow in the area will remain a prime objective in considering any changes to pressure zone boundaries.

An area of chronic low pressure existed for many years around the Bunker Hill Reservoir (Reservoir 115) in the area just west of East Towne Mall. During 2015 we developed a project that converted the area from Pressure Zone 6E to Pressure Zone 3 and increased pressures from 35 psi to 65 psi. This project also provides redundant supply to the American Family area in the NE corner of the system. UW Health is constructing a new facility in the area and requires reliable service.

Projects are being planned for other low pressure areas as project opportunities and funding becomes available.

I report non-compliance with mitigation projects in progress and scheduled.

3. *Water used for outdoor irrigation under drought-free conditions*

During the 2015 reporting period, Madison Water Utility was not required to and did not issue an irrigation restriction due to water supply limitations within the system.

I report compliance.

**Attachments:**

1. 2015 approved capital budget
2. Level of Service Memo – January 10, 2011
3. 2006 Master Plan Fire Flow Capacity Map Figure 5-8
4. Figure 26 – 2010 East Side Maximum Day Fire Flow Availability