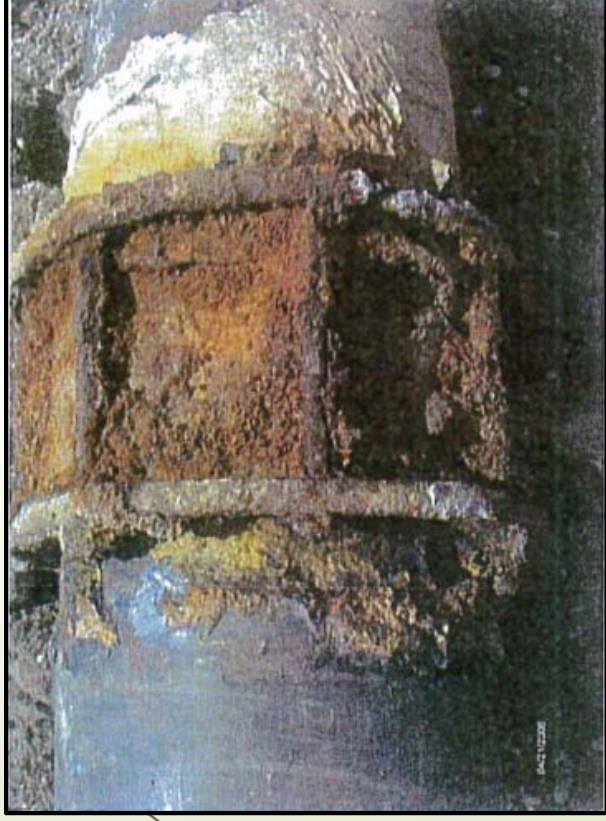


Quarterly Update to BPU Water Systems (DW, WP & NP)

By: Jack Richardson, PE

Deputy Utility Manager – Gas, Water, Sewer (GWS)

BPU Meeting – January 17, 2018



1



Water Distribution Pipeline
Eastern Area Corroded 6" Steel
Corroded Pipeline with Leak

Water Production Pipeline
Eastern Area & Down Town Area
Corroded Coupling Example

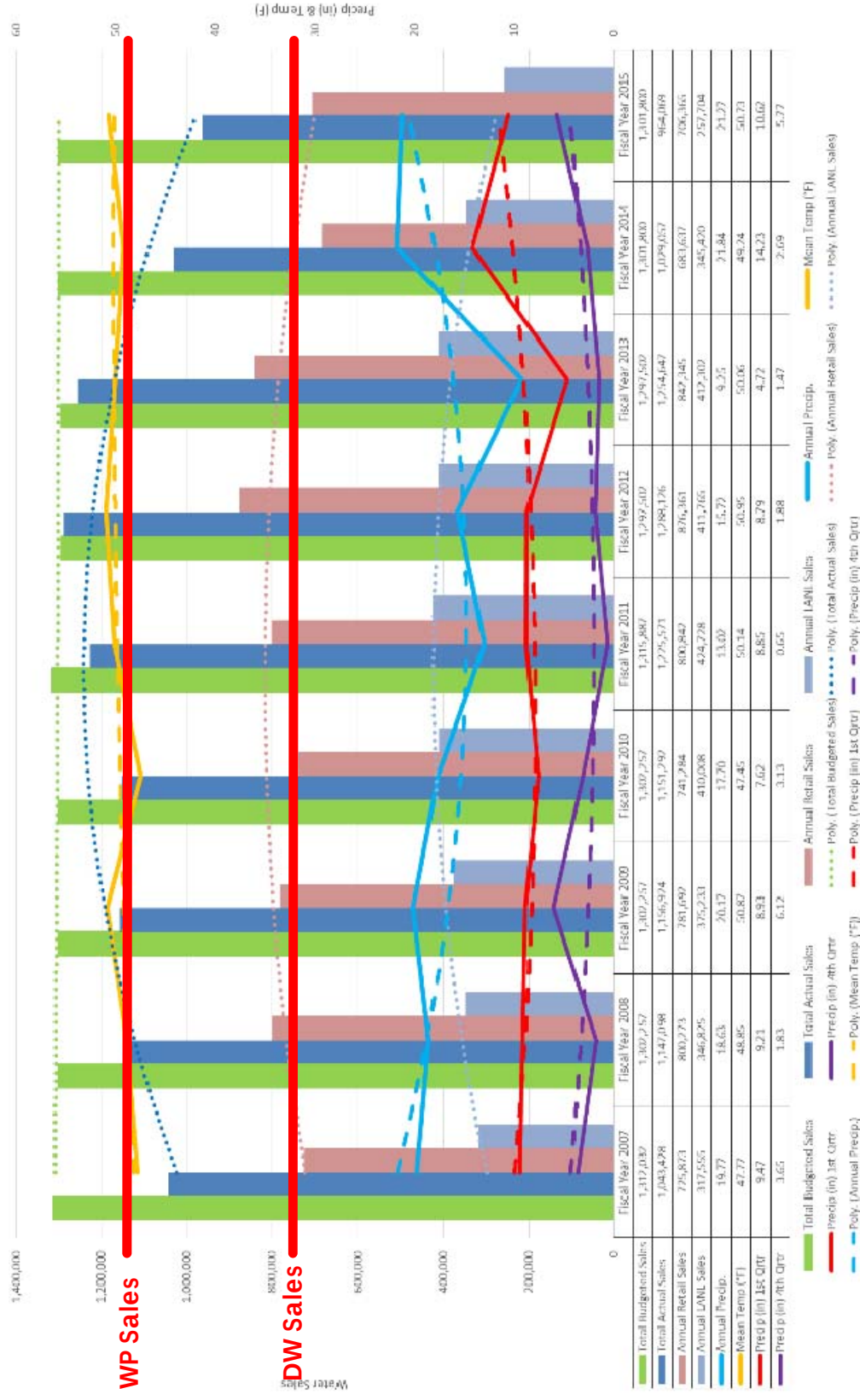
GWS ORGANIZATIONAL STRUCTURE

These folks in the red box are responsible for all water system O&M – but they are also responsible for all gas distribution and wastewater collection system O&M.



Budget vs Actual Water Sales w/ Precip. & Temp.

Budgeted versus Actual Water Sales with Precipitation & Temperature Variables



2007 Study – Executive Summary

**DEPARTMENT OF PUBLIC
UTILITIES
INCORPORATED COUNTY OF
LOS ALAMOS**



**WATER SYSTEMS
CONDITION ASSESSMENT
2007**

EXECUTIVE SUMMARY

Local governments throughout the nation are at a turning point where significant new investments will be required as many water infrastructure assets approach their useful lives. Since pipes have long service lives, our generation is the first to have to place pipes and other infrastructure into these systems. Strategies need to be developed to pay for the replacement of these assets and design an efficient decision process for doing this. The time will come to replace the existing infrastructure over several generations and replacing water infrastructure based on age and service life alone is not a realistic achievement due to the extensive costs. This condition assessment of the distribution and transmission systems will assist the Utility Department in implementing an informed and affordable replacement program.

The water distribution system's most pressing needs are main and service replacements on the oldest infrastructure due to the materials used in the construction of that era. Capital improvement planning should include ongoing budgeting and replacement of portions of the distribution system in the Western Area, Eastern Area and North Community. In addition, the Western Area and North Community also have the oldest and most deteriorated roadway infrastructure. Water infrastructure in the Western Area, Eastern Area and North Community should be completed before, or as part of, roadway projects. Operation and maintenance practices with respect to sewer and water loss prevention are effective, extend the service life of the infrastructure, and should be continued. Per criteria established by the industry and by comparison with other water utilities fire protection and water loss are exemplary.

Western Area, Eastern
Area & North Community
aged pipe replacement.

Meter O&M and Water
Loss practices – continue.

Water System 2007 Condition Assessment Discussion Points

❖ **Water Production Pipelines are shown on slide 6**

▲ Yellow Highlighted Linear Pipelines are WP pipelines scheduled for R&R within the 10-Year CIP Plan.

▲ R&R (Repair or Replacement) – Current thinking is that modern pipeline repair systems have been developed to the point where they are less intrusive and more cost efficient. These rehabilitation approaches will be given a thorough investigation before any pipeline replacement activities are planned.

▲ Circled Highlighted Pipeline was originally included in the 10-Year CIP Plan but has been deferred indefinitely due to the potential Chromium Plume contamination at Pajarito Well # 3.

▲ Planned pipeline R&R projects are on pipelines constructed in the 1950-1969 time frame (49 to 58 year old pipe).

▲ Not all 1950-1969 pipelines are planned for R&R. Only the pipelines of this age that have known deficiencies based on historic repetitive leaks and visual inspection condition assessments.

❖ **Town Site Water Distribution Pipelines are shown on slide 7**

▲ Yellow Highlighted Linear Pipelines are DW pipelines scheduled for R&R starting within the 10-Year CIP Plan and finishing within the proposed 20-Year CIP Plan.

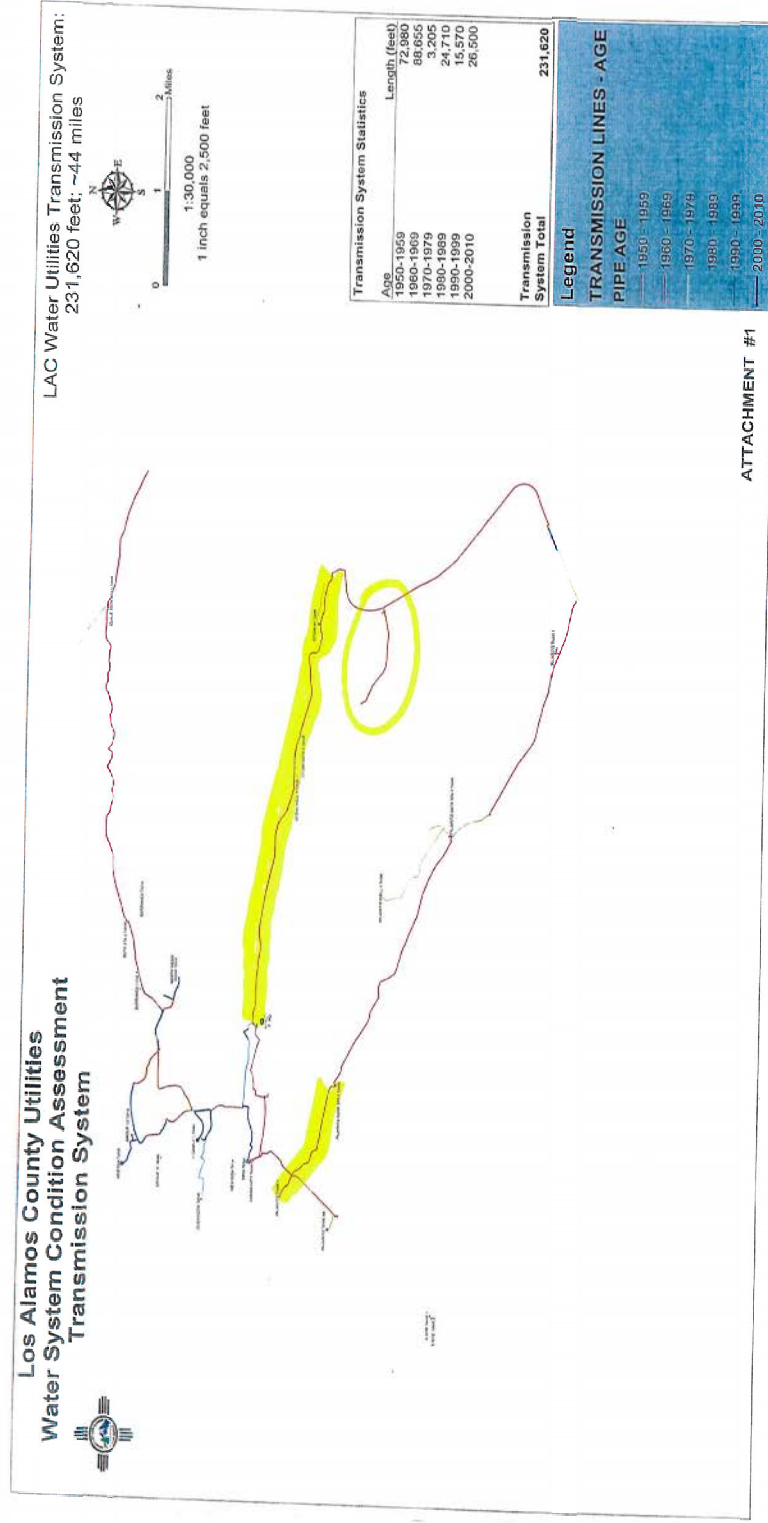
▲ Circled Highlighted Pipeline has already been replaced over the past few years as a component of the multiple year CIP road improvement CIP effort by in coordination with Public Works.

▲ Planned pipeline R&R projects are on the same era (49 to 58 year old) pipe with known deficiencies.

❖ **White Rock Water Distribution Pipelines are shown on slide 8**

▲ No 1950-1959 time frame (58 years old) pipelines exist in the White Rock area. A majority of the pipe in White Rock is 1960-1969 era, but this pipe was installed under a better construction regime (better inspection of installation materials and methods). There are relatively few known serious deficiencies in the water distribution system throughout the White Rock area that would call for large scale R&R efforts.

Los Alamos County Water Production Pipelines





2007 Condition Assessment Accomplishments – 1 of 2

2007 Condition Assessment Pipeline Replacement Accomplishment Highlights (DW)

- Western Area Residential Water Pipelines

- 1950's era pipelines replaced in coordination with a series of Public Works street improvement projects. Corroded cast iron mains and galvanized steel delivery lines replaced with new ductile iron and flexible plastic lines.
- Replacement required due to age and deteriorated condition mostly due to inadequate construction techniques (lack of bedding on rock trench bottom and large rock fragments backfilled directly on pipe).

■ 2007 Condition Assessment Pipeline Replacement Future Planning (DW & WP)

- Near term 10-Year and long term 20-Year CIP plans call for major R&R (repair & replacement) of older pipelines in North Community and Eastern Area. Enhanced GIS based asset management tools with improved emphasis on visual condition assessment will allow for targeted replacement while allowing older but still good condition pipelines to remain in service.

■ 2007 Condition Assessment Meter Replacements & Leak Prevention Highlights & Future Planning (DW)

- Meter Replacements.
 - Starting in 2008 DPU has met it's goal of replacing 350 water meters per year.
 - 2016 – 2021 expedited meter replacement occurring to improve accuracy and AMI compatibility.
- Annual Leak Detection Surveys.
 - Starting in 2005 DPU has contracted out a water pipeline leak detection effort. Approximately 15% of all three water systems pipelines (DW, WP & NP) are surveyed each year.

2007 Condition Assessment Accomplishments - 2 of 2

- **2007 Condition Assessment Aged Large Meter Set Replacement Accomplishment Highlights (DW, WP & NP)**
 - All large meters serving the major NP customers have been replaced with new meters that have a SCADA monitoring, and sometimes control, component. (FY17 & FY18)
 - Tsankowi Water Production Point of Service meter has been replaced. (FY17)
 - An annual program of high use and large meter checks has been instituted.
- **2007 Condition Assessment Well & Booster Station Motor Control Equipment Accomplishment Highlights (WP)**
 - Replacement of all antiquated, and no longer supported, motor control centers & equipment. (FY19 last)
 - Replacement of 20+ year old SCADA equipment: remote radio transmitting units; master radios & computer stations. (FY17 through FY19)
- **Non-2007 Condition Assessment NP System Improvement Accomplishment Highlights (NP)**
- Completed the first ever NP System Master Plan in 2013.
- Renovated the NP system to add 500,000 gallons of storage available to serve the Golf Course and other North Mesa NP customers with gravity flow service. This allowed the elimination of irrigation pump stations at the Golf Course, North Mesa Ball & Soccer Fields and the Los Alamos Middle School service.
- Modified the NP pipeline between Bayo Canyon and North Mesa to be underground and protected from winter freezing damage. This allows irrigation by NP customers during dry winter periods (2017/2018 winter).

Ongoing Strategy for Operating and Maintaining the Water Systems

- ❖ **INPUT #1 - Condition Assessment (Latest = 2007)**
- ▲ Provided a 2007 condition assessment of the water distribution & production systems. Significant items highlighted included:
 - Pipeline Age & Condition – Extensive old and corroded steel pipe
 - PRV Stations (Pressure Reducing Valve Stations) – Needing minor R&R
 - Fire Flows & System Hydraulics – Generally Good (North Mesa pipeline upsizing – included in 10-Year CIP)
 - Meters (Condition and Proper Size) – Large service customer regulator & meter age, condition and proper size
 - Water Loss – 2004 through 2006 average = 8.8% versus 2013 through 2017 average = 12.42%
 - ❑ Probable difference in source numbers and methodology and increasing deterioration of some pipelines with leakage
- ❖ **INPUT #2 - Asset Management Team (AMT) Program**
- ▲ Two teams (Water Distribution & Water Production/NP System) efforts consist of front line supervisors (with daily input from field crews), engineering and finance & admin staff to programmatically address O&M and capital replacement requirements and system upgrade opportunities
- ▲ Identify and prioritize portions of the water systems that need attention in order to provide safe and reliable service to our customers
- ▲ AMT program features quarterly meetings plus one additional pre-annual AMT Governance Team meeting
- ❖ **OUTPUT - Bi-Annual Budget / Annual Budget Update & Revision / Quarterly System Condition Assessment (Field & Financial)**
- ▲ AMT's analyze the water systems in order to recommend O&M and CIP improvements that are used to develop the annual budget (O&M and CIP) to meet all water systems requirements
- ▲ AMT's revised schedules will allow the review of financial statements at quarterly meetings to monitor progress and the relationship between expenditures and accomplishments. AMT's are responsible to recommend revisions to any existing plan or program in response to actual conditions in the field as conditions change.

Examples of Operation & Maintenance Program Efficiency – 1 of 2

❖ **Eliminating One FTE in Water Production (FY15)**

- ▲ Long term employee was not replaced after retirement in FY 2015
 - Reduces the number of FTE's in WP from 10 to 9
 - Loss of FTE is coincident with a significant increase in activity on the NP water system. Remaining personnel responsible to complete all duties

❖ **Enhanced PRV Station O&M in Water Distribution (& Water Production – inc. NP)**

- ▲ Pressure Reducing Valve Station field inspection forms are being upgraded so that asset management condition assessment information will be collected annually and placed into a digital file related to the GIS
- ▲ GWS staff have recommended multiple approaches to the renewed emphasis on O&M, in lieu of full CIP replacement. Suggestions that have been or will be implemented:
 - ❑ Add air venting pipes to vaults where possible (not under a street). Replace non-venting vault covers with vented covers for in street stations.
 - ❑ Purchase mobile sand blasting and mobile paint equipment set ups to R&R PRV vault piping and valves. Replace corroded fasteners with new SS fasteners. This effort should minimize the number of PRV stations that require full replacement and minimize the PRV portion of the CIP plan.

❖ **Incorporating GIS More as an O&M Tool in Addition to Being the Standard Mapping Tool**

- ▲ Will provide for easier and quicker access to water system documentation by adding field form data to the GIS data sets either by attaching scanned images of the field forms or inputting the field form data into a GIS data set
- ▲ Will provide for easy access to records during preparation for AMT meetings – thereby reducing time and perceived record keeping weaknesses
- ▲ Enhanced field forms for all infrastructure (not just PRVs) matched to upgraded GIS data sets are being developed, tested and implemented
- ▲ GIS water system O&M tool initiation is scheduled for late in FY 2018

Examples of Operation & Maintenance Program Efficiency – 2 of 2

- ❖ **Reprogramming Automatic Control System in Water Production**
- ▲ Completed and operational for the Pajarito Line (PW2, PW4, PW5, PB1, PB2, PB3, Pajarito Tanks 4 & 4A and related PW & PB tanks)
- ▲ Provides for automatic operation to keep the system full and running smoothly. Requires some additional programming to incorporate peak power signal reading and control to avoid peak power electric demand charges on occasion
- ▲ Additional storage required on the Otowi Line & Guaje Line before full automatic control can be established at those locations (long term CIP planned projects)
- ❖ **Reprogramming Automatic Control System in Non Potable Water System**
- ▲ Completed and operational for the new North Mesa Portion (Bayo BS, NM BS, Bayo, Middle School & Group 12 Tanks)
- ▲ Provides for automatic operation to keep the system full and running smoothly. Includes additional metering and flow control equipment and programming at the Golf Course and North Mesa Ball Fields (two largest users) to avoid over use of water or emptying of the tank
- ❖ **Improved Communication, Understanding and Cooperation with LAFD**
- ▲ Revised fire hydrant testing policy so that LAFD coordinates with GWS to provide for DPU operation of water valves and hydrants during hydrant testing to minimize water hammer damage to existing pipelines

Water Production Well Water Quality Monitoring Discussion

❖ **DOE and DPU Current Monitoring Schedule is Quarterly for All DPU Water Production Wells**

- ▲ This has been the historic schedule for monitoring for many years
- ▲ If the known chromium plume reaches the DOE monitoring wells immediately up gradient of the nearest DPU production well (PW3 – or PM3) then monitoring is expected to be increased to monthly
- ▲ National EPA standards for chromium are an allowable 100 PPB (parts per billion). New Mexico State standards are 50 PPB. If chromium is found in the DPU production well, above historic background levels of 2 to 6 PPB, then a future decision as to when PW3 is taken off line will occur.

❖ **DPU's Well Insurance**

- ▲ DPU has maintained an insurance policy since taking over ownership of the water production system from DOE that ensures that any DPU production well that must be taken off line due to DOE contamination will either be replaced in kind or have a treatment system installed that removes any contaminant to below relevant drinking water standards.

❖ **Otowi Well No. 2**

- ▲ The DPU is currently developing the first new production well in the system since taking ownership of the water production system. This well is anticipated to be equivalent in capacity to the existing PW3 well.

❖ **Otowi Booster No. 1 Replacement**

- ▲ The DPU has included this project in the near term (10-Year) CIP Plan. The existing OB1 station is connected to a completely deteriorated pipeline that leaks onto NM Hwy 502 between the “Y” intersection and the top of the hill.
- ▲ It has been deferred until the OW2 well has been completed and the capacity of OW2 is known. The capacity of this replacement booster station will be sized to accommodate both the new OW2 and the existing OW1 wells allowing for the existing OW1 well to be put into service.
- ▲ This booster station will allow for water from OW2 to directly serve either the White Rock community or the Town Site Down Town area; boosting flexibility and redundancy in the overall system.

Otowi Well No. 2

■ **Schedule**

- Well Site Construction & Surface Casing: November 14th through December 15th (complete)
- Main Well Drilling, Casing, Testing, Surveying: January 11th through March 23rd (contractual)
- Design of Well House, Pump, Motor and Motor Driver Equipment: March 23rd through June 30th
- Construction of Well House, Setting Pump & Motor and Motor Driver Service: June 30th through November 24th (estimated)

■ **Costs**

- Well (Drilled, Tested, Complete): \$3,000,000 (budget)
- Well House & Equipment: \$1,500,000 (budget)

■ **Well Discussion Highlights**

- Located per original system planning documents dated circa 1990's. OW2 is the third of four potential wells proposed for the "Otowi Well Field".
- Planned for natural gas engine generator equipment motor driver with electric power grid backup. Able to pump when grid is down or when grid is at peak power; avoiding peak power demand charges or inconvenient shut downs to avoid peak power demand charges.
- If anticipated quantity is accomplished; able to serve as a water source in the event PW3 well becomes contaminated by the chromium plume.

Otowi Well No. 2 – Site Panorama



Otowi Well No. 2 – Site Access Off LA Canyon Road



Otowi Well No. 2 – Drill Stem Pipe



Otowi Well No. 2 – Drill Bits



Water Meter Change Out Program Discussion Points

❖ **Historic Water Meter Change Outs**

- ▶ Typical minimum expected life of a water meter is 20 years. (battery related)

- ▶ Average number of water meters in the water distribution system at any one time is 7,050.

- ▶ 7,050 / 20 Years = 352.50. DPU has recently had an annual goal of 350 water meter change outs per year. This was decided as the appropriate approach to maintain adequately functional water meters throughout the system.

❖ **Current Temporary Accelerated Water Meter Change Out Program**

- ▶ Recent improvements to the new style of water meter being installed have significantly improved the accuracy at low flows. Newer style water meters also have improved compatibility with modern AMI (Automated Metering Infrastructure) systems. A significant portion of the existing water meters being replaced throughout the system are near or at the end of their expected life and would have been replaced anyway.

- ▶ Installation of all new meters during the temporary accelerated program will provide multiple benefits:

- ❑ Improve meter reading accuracy and lower the unaccounted for water loss percentage.
- ❑ Standardize the water meters throughout the system thereby improving efficiencies for AMI incorporation and GWS O&M.
- ❑ Provide the opportunity/incentive to complete R&R maintenance activities on related meter service appurtenances (shut off valves, leaking connections, meter cans and/or lids, etc.)

- ▶ Temporary Accelerated Program is expected to run from FY2016 through FY2021.

❖ **Cost / Benefit of the Temporary Accelerated Water Meter Change Out Program**

- ▶ Costs for the accelerated program are expected to average approximately \$300,000 per year over historic costs.

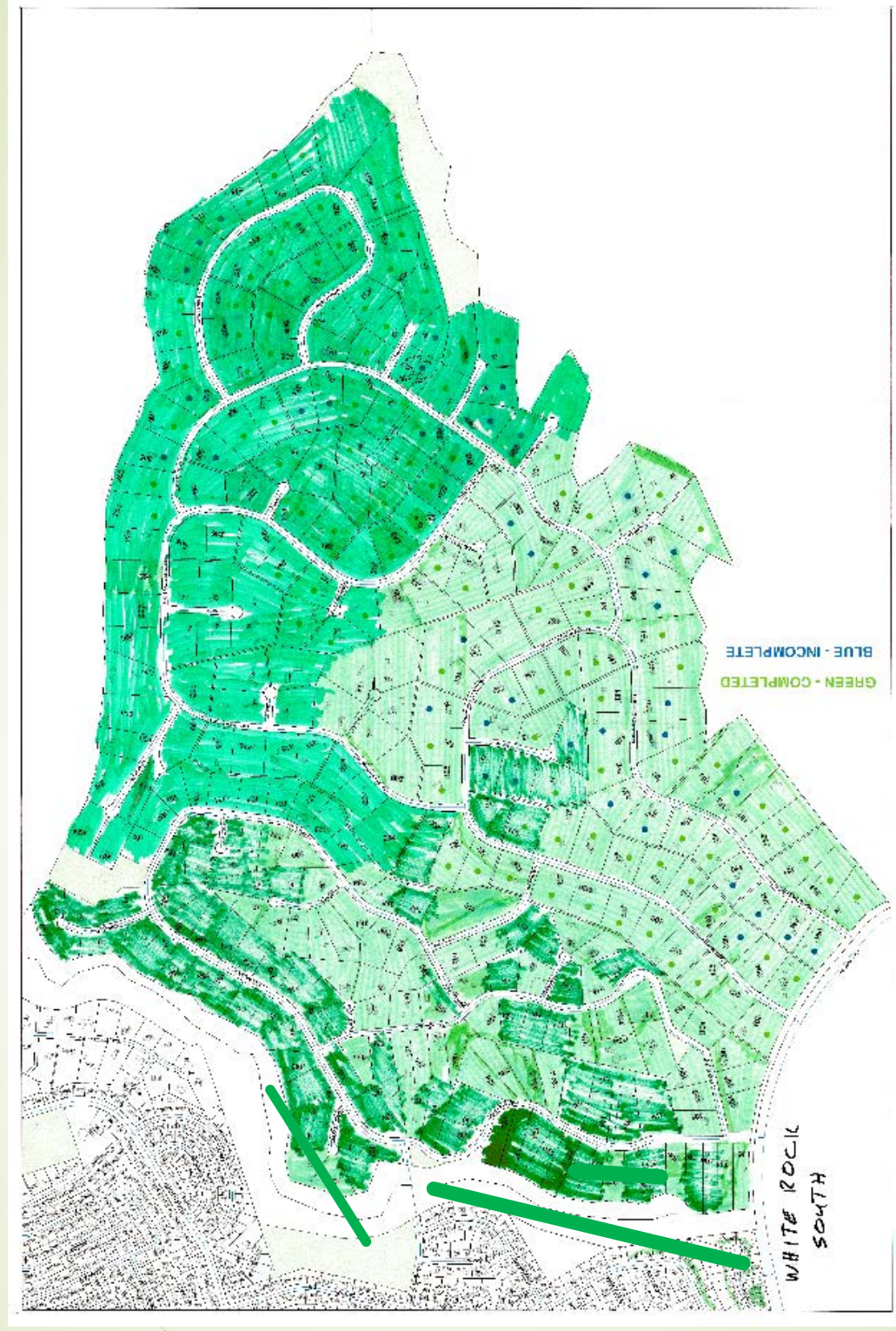
- ▶ Meter reading costs are expected to decrease by approximately \$165,000 per year through labor reductions due to the implementation of AMI.

- ▶ $\$1,800,000 / \$165,000 = 11$ years to break even before savings on meter reading begins to accumulate.

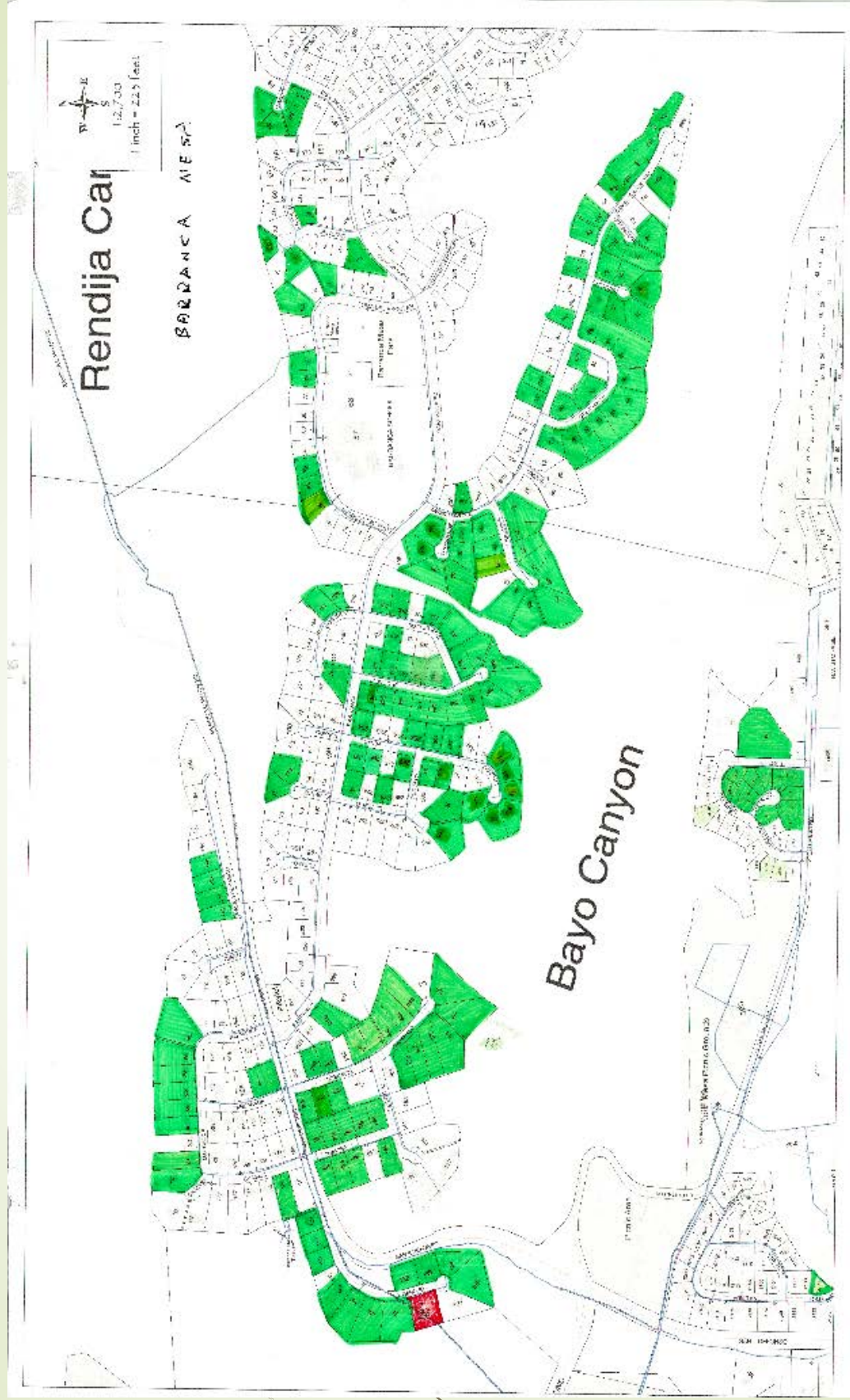
Water Meter Change Out Program – White Rock North



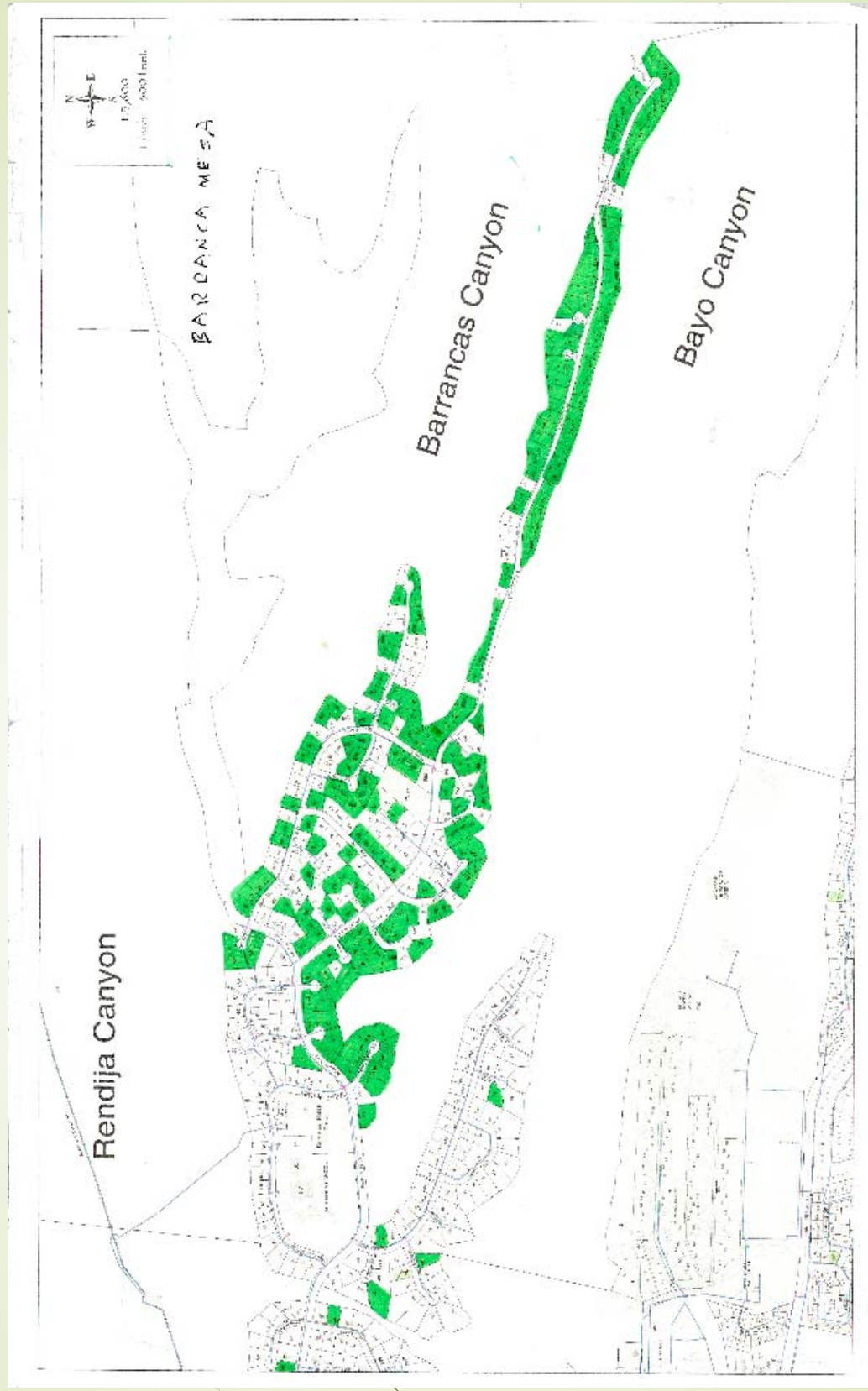
Water Meter Change Out Program – White Rock South



Water Meter Change Out Program – Barranca Mesa West



Water Meter Change Out Program – Barranca Mesa East



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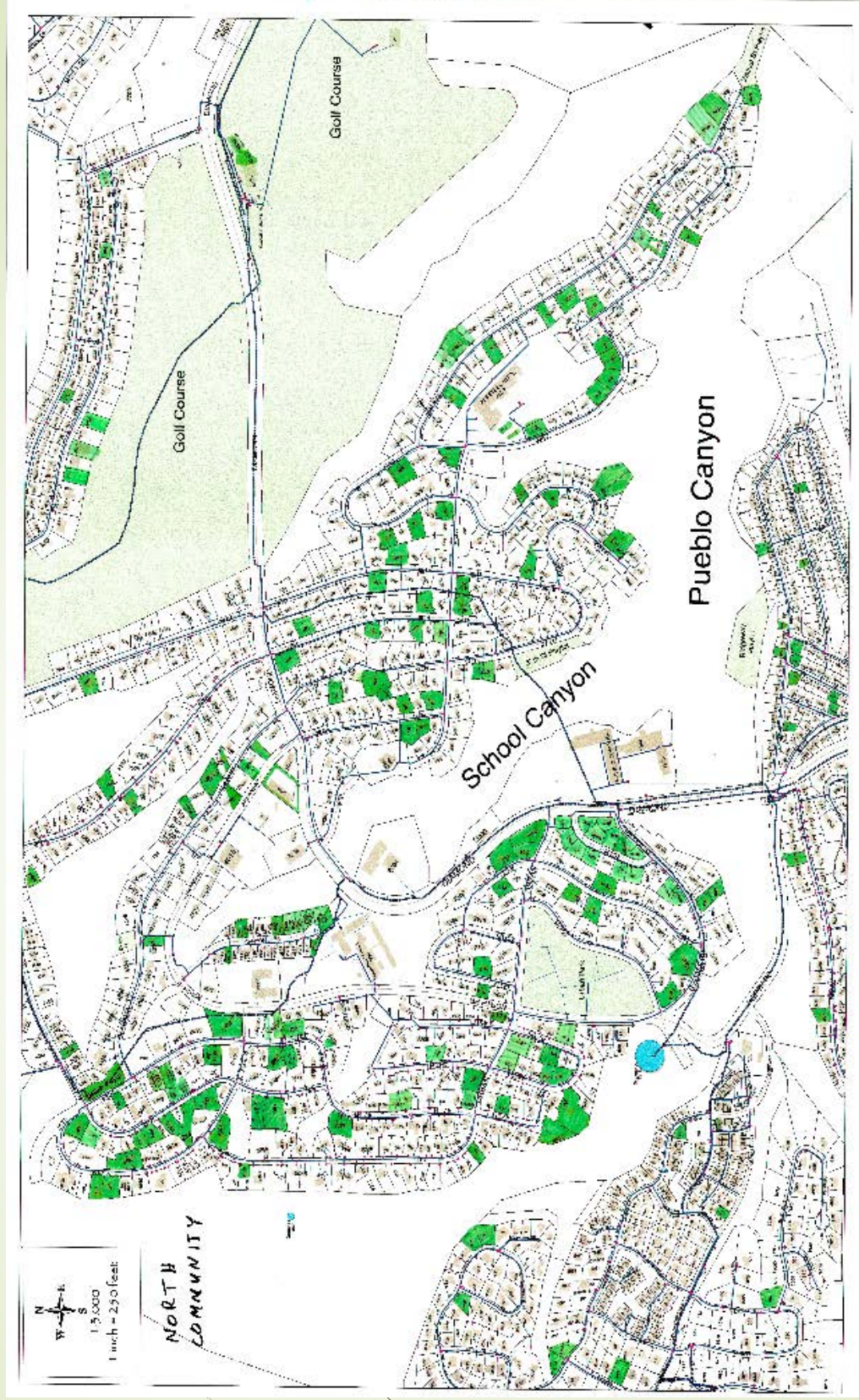
Water Meter Change Out Program – North Mesa East



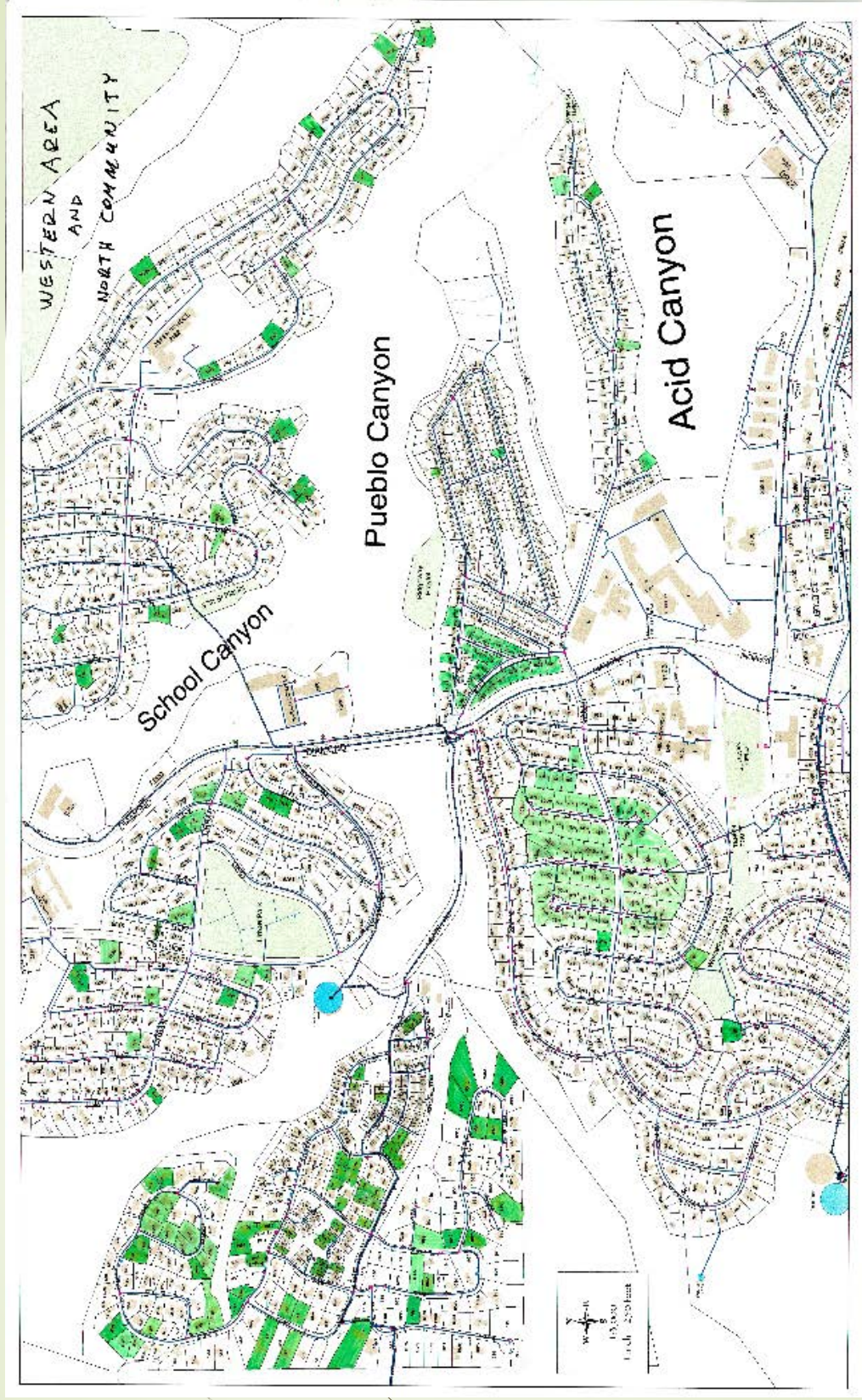
Water Meter Change Out Program – North Community & Ponderosa Estates



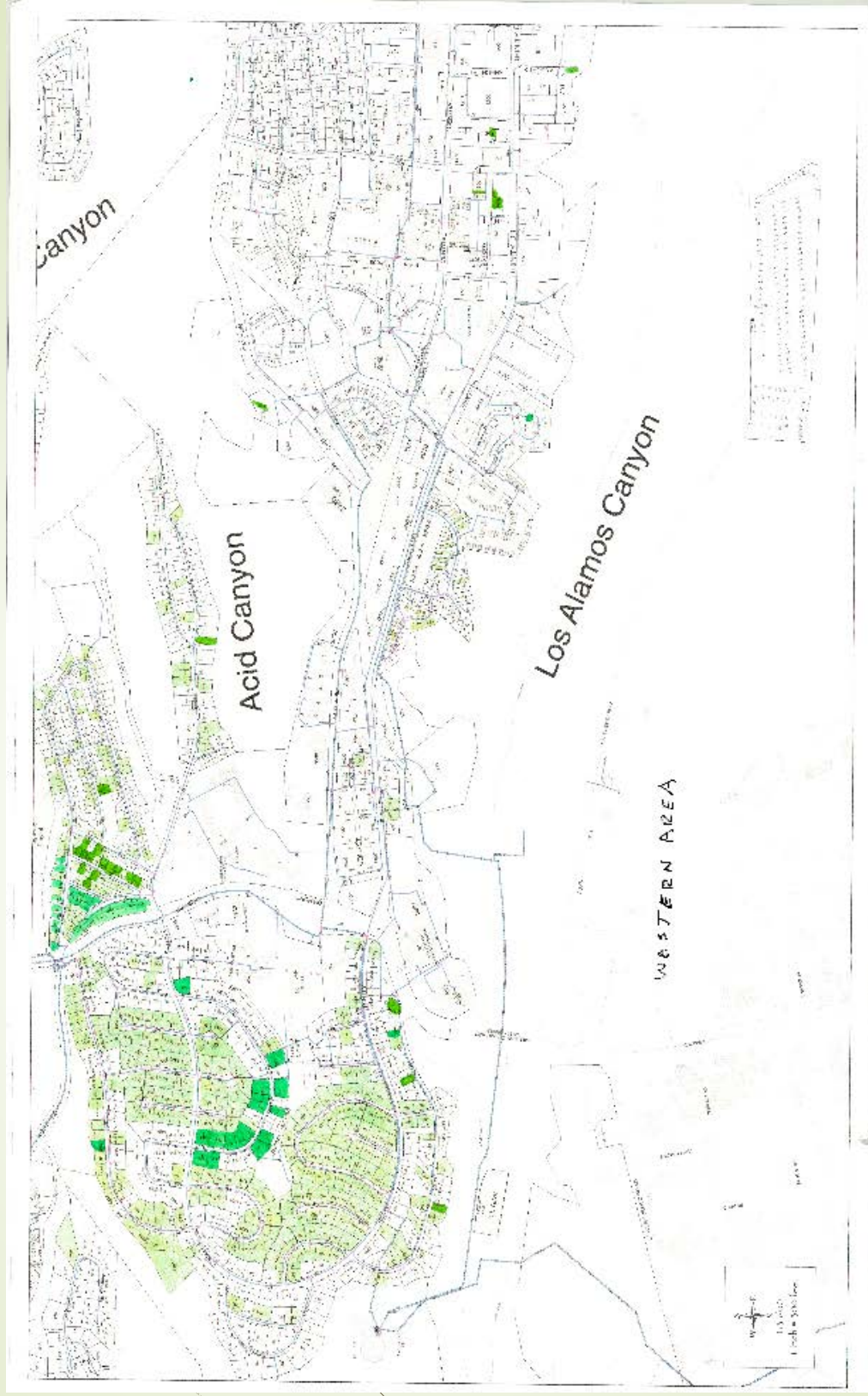
Water Meter Change Out Program – North Community



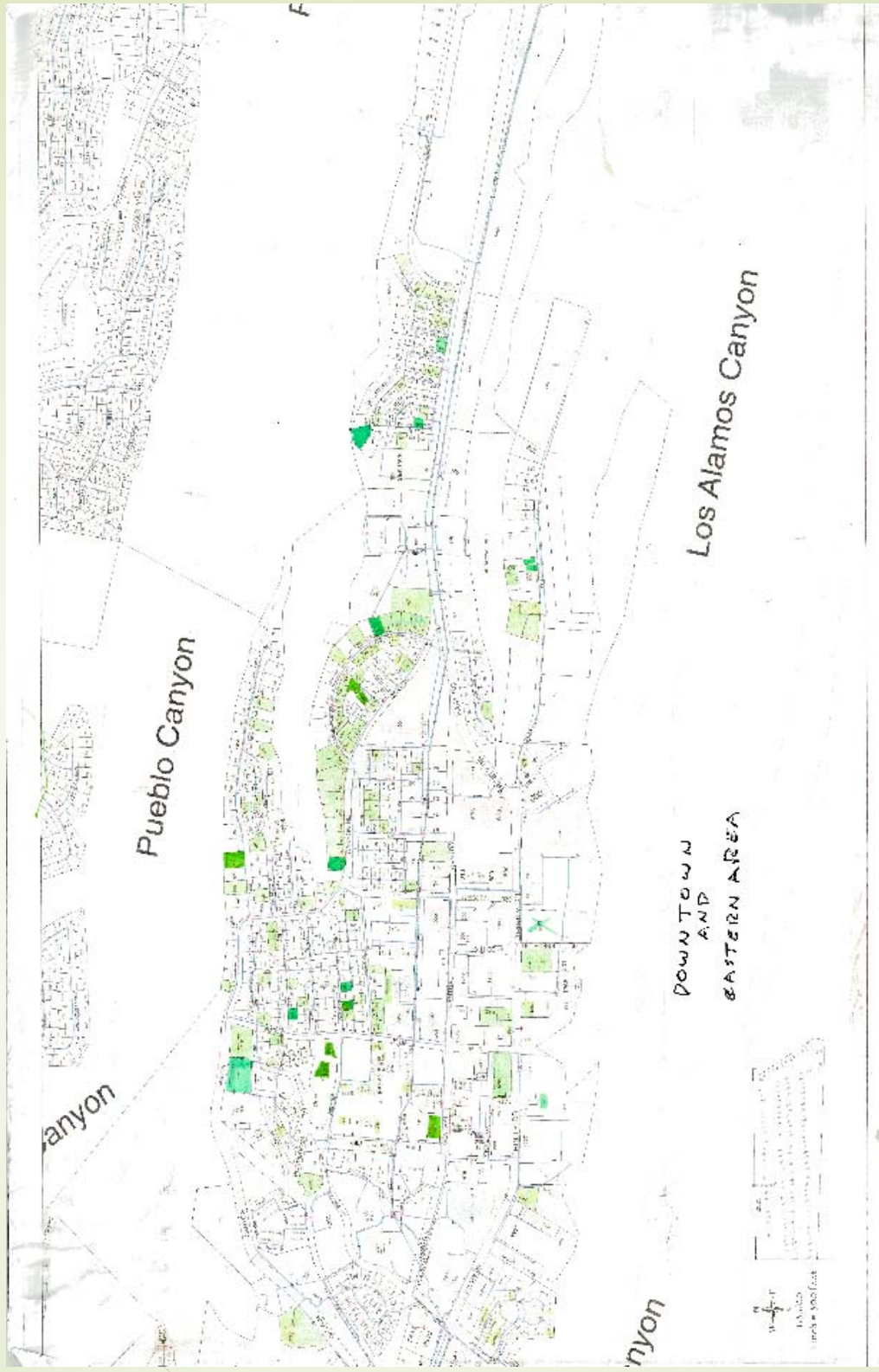
Water Meter Change Out Program – Western Area & North Community



Water Meter Change Out Program – Western Area



Water Meter Change Out Program – Down Town & Eastern Area



Water System CIP Planning Considerations : 1 of 3

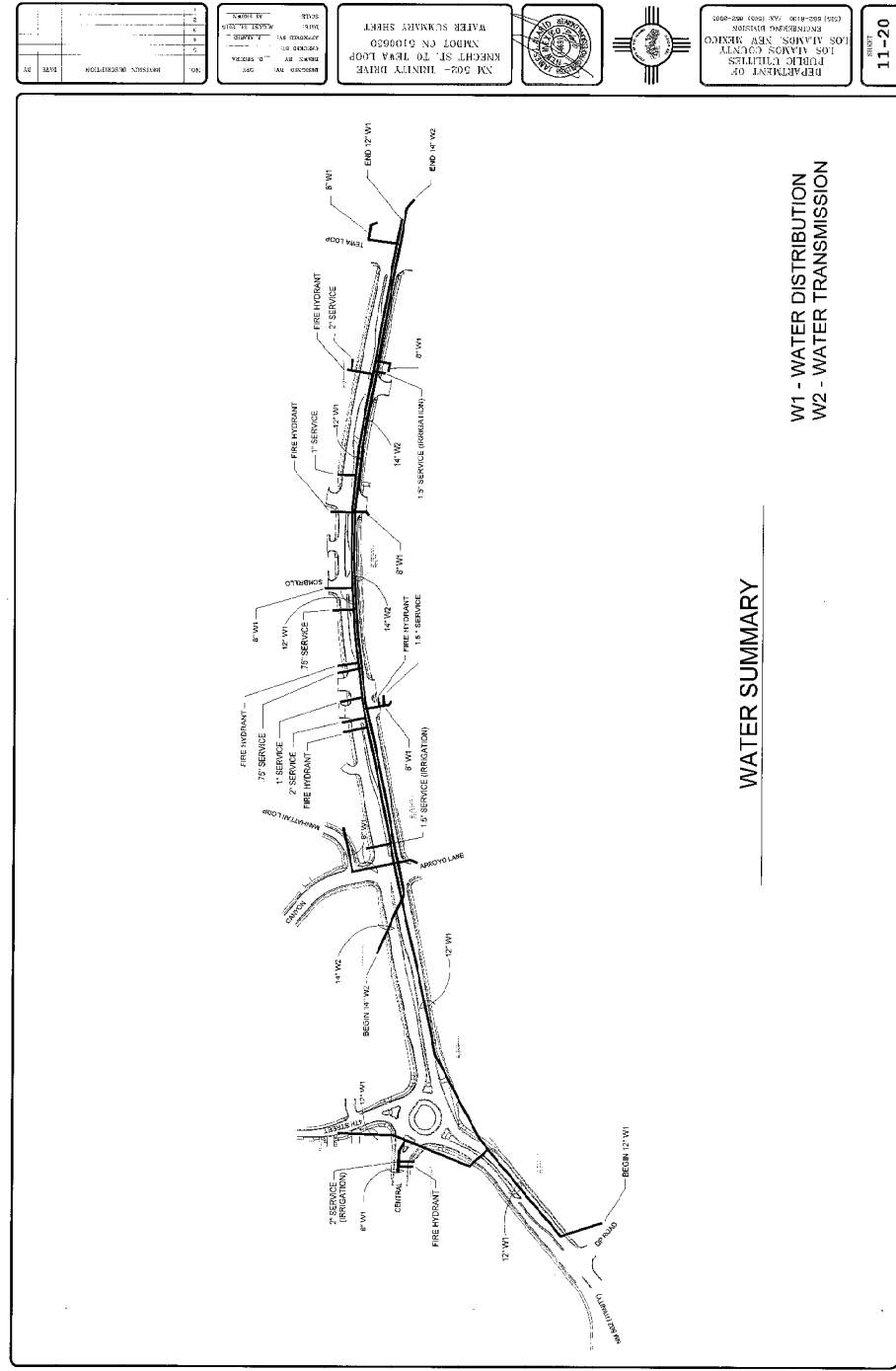
- ❖ **Renewed Emphasis on O&M Type R&R Rather Than Large Scale CIP Replacement Projects (WP, DW & NP)**
- ▶ Critical Infrastructure receives a higher risk factor and a higher probability of large scale replacement
 - Risk Factors and Existing Condition Assessments are being developed with the enhanced GIS Condition Assessment System
 - Enhanced GIS Condition Assessment System will assist the DPU in developing future CIP plans
 - Enhanced GIS Condition Assessment System will also assist the DPU in analyzing and reporting system values: Installed Cost; Present Worth (depreciated net book value); Full Replacement Cost. This will enable better coordination and tracking of system value with the Office of Management & Budget.
- ▶ NM 502 CIP Projects have been added back into the FY19 & FY20 Updates to the 20-Year Financial Analysis of the Water System used to develop proposed water rates over the 20-Year planning period
 - NM DOT's third attempt at soliciting bids for this project resulted in No Bids. The previous two attempts resulted in the low bidder being significantly over the project's estimated costs.
 - NM DOT may cancel or significantly modify the original NM 502 Project. This Project included gas, water distribution, water production, wastewater collection, electric distribution and communications conduit portions totaling \$2.42 million. DPU is in the process of requesting our pre-paid contribution for utilities be returned expeditiously in the event of cancellation
 - The gas and water system portions are critical to the efficient operations of the respective systems and have known deficiencies. Even if the DOT NM 502 Project is cancelled, DPU proposes to complete these projects independently

Proposed Risk Assessment Matrix

RISK MATRIX		Hazard Effect / Consequence				
Risk Type		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Harm To People (Safety - Health)		No injury or health risk	First aid case - exposure to minor health risk	Medical treatment case - exposure to major health risk	Serious injuries requiring medical treatment - reversible impact on health	Fatality or loss of quality of life - irreversible impact on health
Environmental Impact		No environmental harm	Minimal environmental harm - easily remediable	Material environmental harm - remediable short term	Serious environmental harm - remediable with major effort and expense	Major environmental harm - remediable for restoration not possible - only mitigation
Business Impact - Material or Financial Loss		No business disruption - no material or financial loss	Brief business disruption - minor material or financial loss	Partial shutdown - moderate material or financial loss	Partial loss of operation - major material or financial loss	Substantial or total loss of operation - significant material or financial loss
Legal & Regulatory		None to low level legal issue	Minor legal issue or breach of law - non-compliance	Serious breach of law - investigation & report to authorities - prosecution and/or moderate penalty possible	Major breach of law - considerable prosecution and penalties	Very considerable penalties and prosecutions - multiple law suits and jail terms possible
Impact on Reputation - Social - Community		Slight impact - public awareness may exist but no public concern	Limited impact - local public concern	Considerable impact - regional public concern	National impact - national public concern	International impact - international public concern
		Risk Factor				
Likelihood	Examples / Events					
Almost Certain	Frequent occurrence - one or more times per year - likely to recur within 1 year - almost certain - (1 in 10)	2	3	4	5	5
Likely	Infrequent occurrence - less than once per year - likely to recur within 5 years - likely - (1 in 100)	2	2	3	5	5
Possible	At least one occurrence has happened at some time - could recur within 10 years - possible - (1 in 1,000)	1	2	3	4	5
Unlikely	At least one occurrence has happened at some time - could happen within 20 years - unlikely - (1 in 10,000)	1	1	2	3	4
Rare	Occurrence has never been known to occur - highly unlikely it will occur within 20 years - rare - (1 in 100,000)	1	1	2	2	3
Risk Factor		Risk Level				
5		Extreme				
4		High				
3		Medium				
2		Low				
1		Virtually None				
		Guidelines for Risk Matrix				
		Eliminate, avoid, implement specific action plans & procedures to manage & monitor. Immediate action required.				
		Proactively manage. Prioritised action required.				
		Actively manage. Planned action required.				
		Monitor and manage as appropriate. Actioned by routine procedures.				
		Routine monitoring. No action required.				



NM 502 Project - Water Distribution Pipelines



Water Systems CIP Planning Considerations : 2 of 3

- ❖ **Renewed Emphasis on Sustainable Cash Flows and Cash Balances Meeting Financial Policy Goals (WP, DW & NP)**
- ▶ Financial Policy Goals have been established.
 - Financial Policy Goals will drive the proposed rate setting discussions into the future.
 - The overarching goal is to reliably provide safe drinking water with excellent customer service. One of the main goals is also to establish and maintain adequate cash balance reserves in each of the Water Fund sub-funds: Water Production & Water Distribution (including the NP Water System) independently respective to each sub-fund.
- ❖ **Enhanced PRV Station O&M Program (mostly DW but some WP & NP)**
- ▶ Original CIP project was to replace virtually all PRV valves and piping inside existing PRV stations. Many valves exhibit advanced corrosion due to lack of air venting and very moist environment.
 - Cost of CIP projects was reduced from an original estimate of \$3,000,000 to replace 40 PRV stations to a current \$2,100,000 to replace 28 PRV stations over 20 years.
 - Success of the proposed PRV station O&M program may allow for additional savings on PRV station replacements
 - New equipment is being purchased to facilitate the new O&M program in FY18 (sand blast & paint mobile equipment)
- ❖ **Deferral of One Major Well/Booster Station Replacement Project from the 20-Year CIP Plan (WP)**
- ▶ Original CIP plan, developed for the 20-year planning period, included the early year's new well (OW2 - FY18 & FY19) and the existing booster station replacement (OB1 - FY21). It also included an additional replacement well would be required for the already failed Guaje Well No. 1A. It further included two additional replacement wells based on the assumption that two existing wells would fail in the next 20 years.
 - In order to lower the total projected CIP costs for the water systems, one of the major well projects has now been deferred to beyond the existing 20-year planning period. The new OW2 well and OB1 booster station (allowing OW1 To come on line) is anticipated to enable production coverage in the more than one of the currently active older existing wells fails within the next 20 years.

DPU Financial Policy for Cash Reserves

In Each Utilities Sub Fund:

- 180-Days of Budgeted O&M Expenditures Recommended – or – 90-Days Minimum Floor
- Debt Service Reserve (Sufficient to Fund All Debt Service for the Following Year)
- Contingency Reserve (**Only One Occurrence in any Single Year**)
 - WP = \$750,000 Replace a Well House or Booster Station
 - DW = \$750,000 Replace a Water Tank
 - NP = \$750,000 Replace a Water Tank or Booster Station
- Retirement/Reclamation Reserve (**Only One Occurrence in any Single Year**)
 - WP = \$150,000 Abandon a Well House or Water Tank or Booster Station
 - DW = \$150,000 Abandon a Water Tank
 - NP = \$150,000 Abandon a Water Tank or Booster Station
- Cash Balance and Cost / Risk Sharing Between Water System Groups
 - DW and WP Group's Budget for Contingency and Retirement/Reclamation Reserves are Split 50/50
 - NP is Embedded Within WP so NP Reserves are Considered Covered by WP Reserve
- Actual (or Annuitized) CIP Program Expenditures for the Following Year – or – The System's Annual Depreciation Plus 2.5% (whichever is greater) – **Future Discussion is Warranted**
 - WP = \$1,350,000 Compared to \$1,500,000 (H) & \$750,000 (F)
 - DW = \$575,000 Compared to \$750,000 (H) & \$500,000 (F)
 - NP = Not Calc'd Compared to \$210,000 (F) {From NP Master Plan}

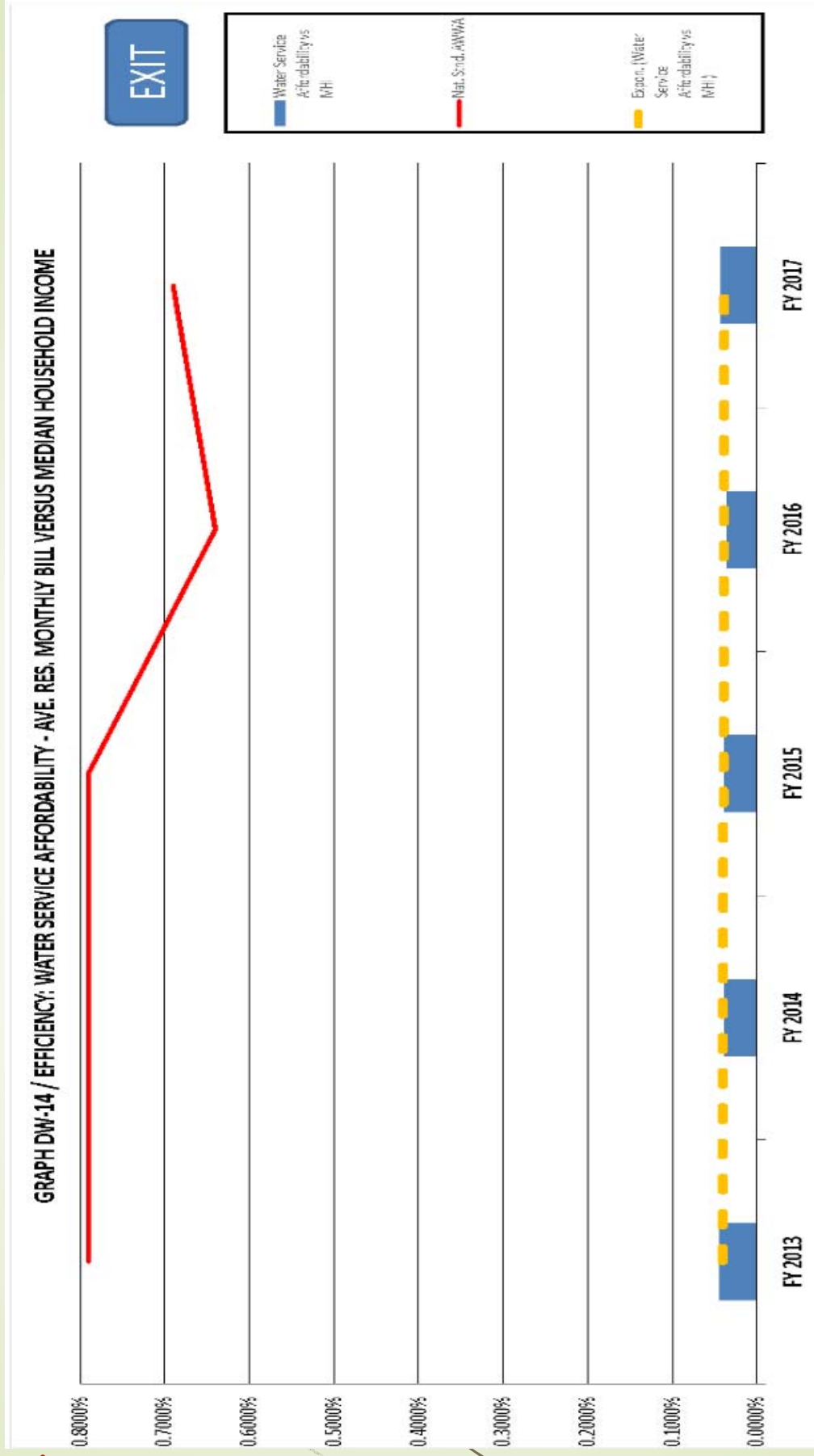
Water Systems CIP Planning Considerations : 3 of 3

- ❖ **General Reduction in Proposed Annual Expenditures Through Deferral of Major Projects in the 20-Year CIP Plan (WP & DW)**
- ▲ The original CIP plan, developed for the 20-year planning period, has been revised significantly.
 - Previous points of consideration have been discussed regarding well and booster station replacement deferrals and revisions to the PRV station program.
 - Other projects were re-evaluated to consider if continued O&M activities such as repairs of pipelines with some acceptable number of breaks could be continued in lieu of full pipeline replacement. It is anticipated that the enhanced asset management system being developed for FY18 will help DPU determine the appropriate level of O&M activity versus CIP activity required on a pipeline by pipeline basis.
 - CIP projects that are currently felt to be required, despite any level of effort for O&M activity, have been spaced out throughout the 20-year planning period in order to keep annual CIP expenditures for CIP as consistent year over year as practicable.

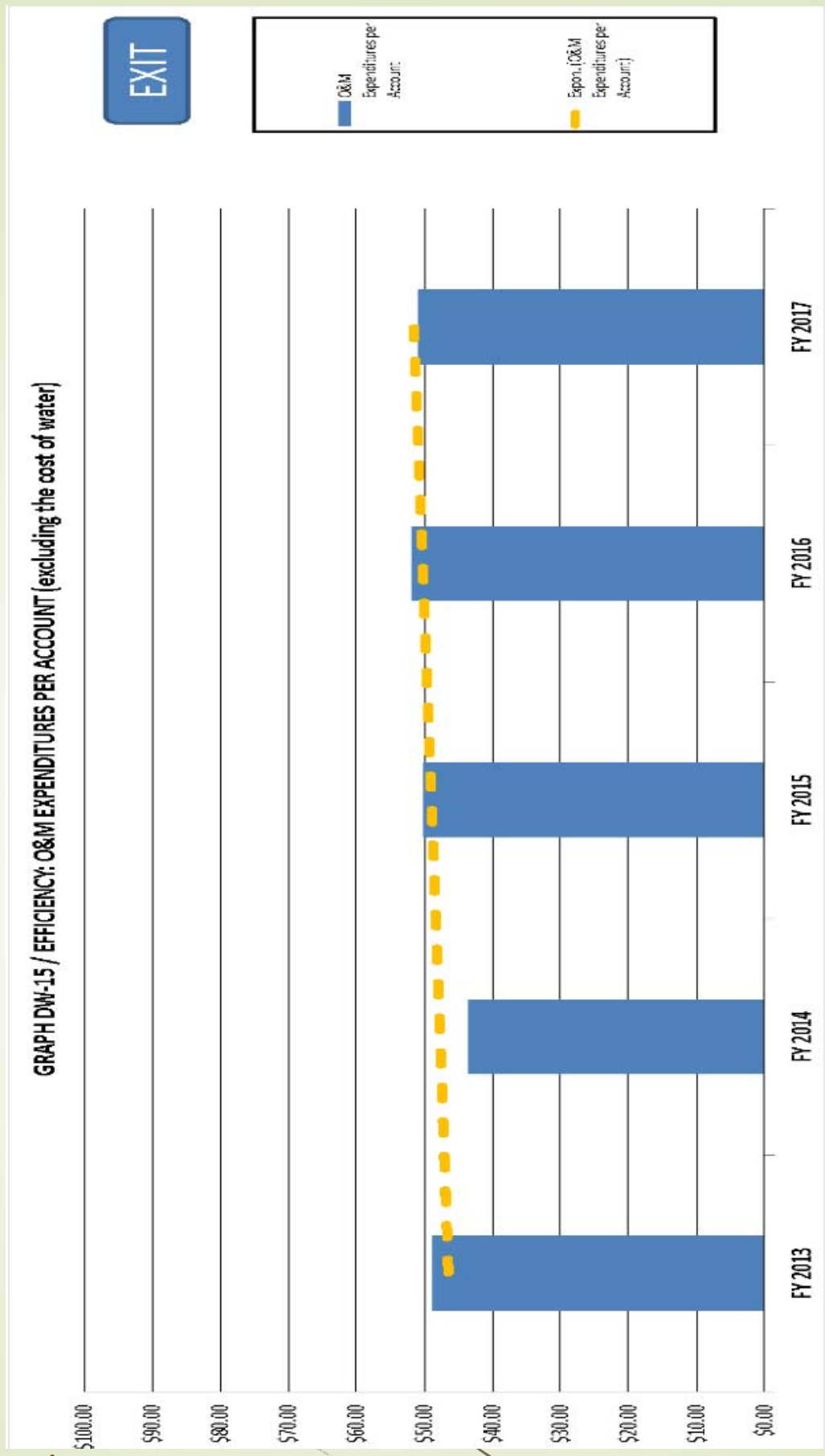
Measures/Targets/Benchmarks for Tracking Water Distribution System O&M

- ❖ **PRIMARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (all)**
- ▶ Percent of LA County Residential Rate Compared to Neighboring Community's Rates – Based on 6,000 Gals per Month (%)
- ▶ **Water Service Affordability – Based on Ave Res Monthly Bill per Median Household Income (%)**
- ▶ O&M Expenditures per Account (\$/ All Accounts)
- ▶ **Total Gallons Sold to Distribution (MG)**
- ▶ **Main Pipeline Breaks per 100 Miles of Pipeline (#/100 miles)**
- ▶ **Unaccounted for Water Loss (%)**
- ❖ **SECONDARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (representative only, not all)**
- ▶ **Damages per 1,000 Locate Tickets (#/1,000 Tickets)**
- ▶ **Planned Maintenance as a Percent of Total Maintenance (planned maint. hours/planned + corrective maint. hours) (%)**
- ▶ **System Renewal and Replacement (CIP Expenditures for R&R/Total Present Worth of Gas System) (%)**
- ❖ **PERFORMANCE MEASURES WITH TARGETS OR BENCHMARKS**
- ▶ **Performance Measures with known national standards for system comparison are in GREEN (Typically AWWA standards)**
- ▶ **Performance Measures with a DPU Strategic Plan or Conservation Plan Goal are in Magenta**
- ▶ **Performance Measures with both a DPU Strategic Plan or Conservation Plan Goal and a national standard comparable goal are in Cyan**
- ▶ Measures are collected and reviewed monthly via a 12 month moving average graph. Annual FY performance measures data is transferred from the annual data sets to a multi-year data set for year over year / multi-year comparison. Full implementation scheduled for late FY 2018

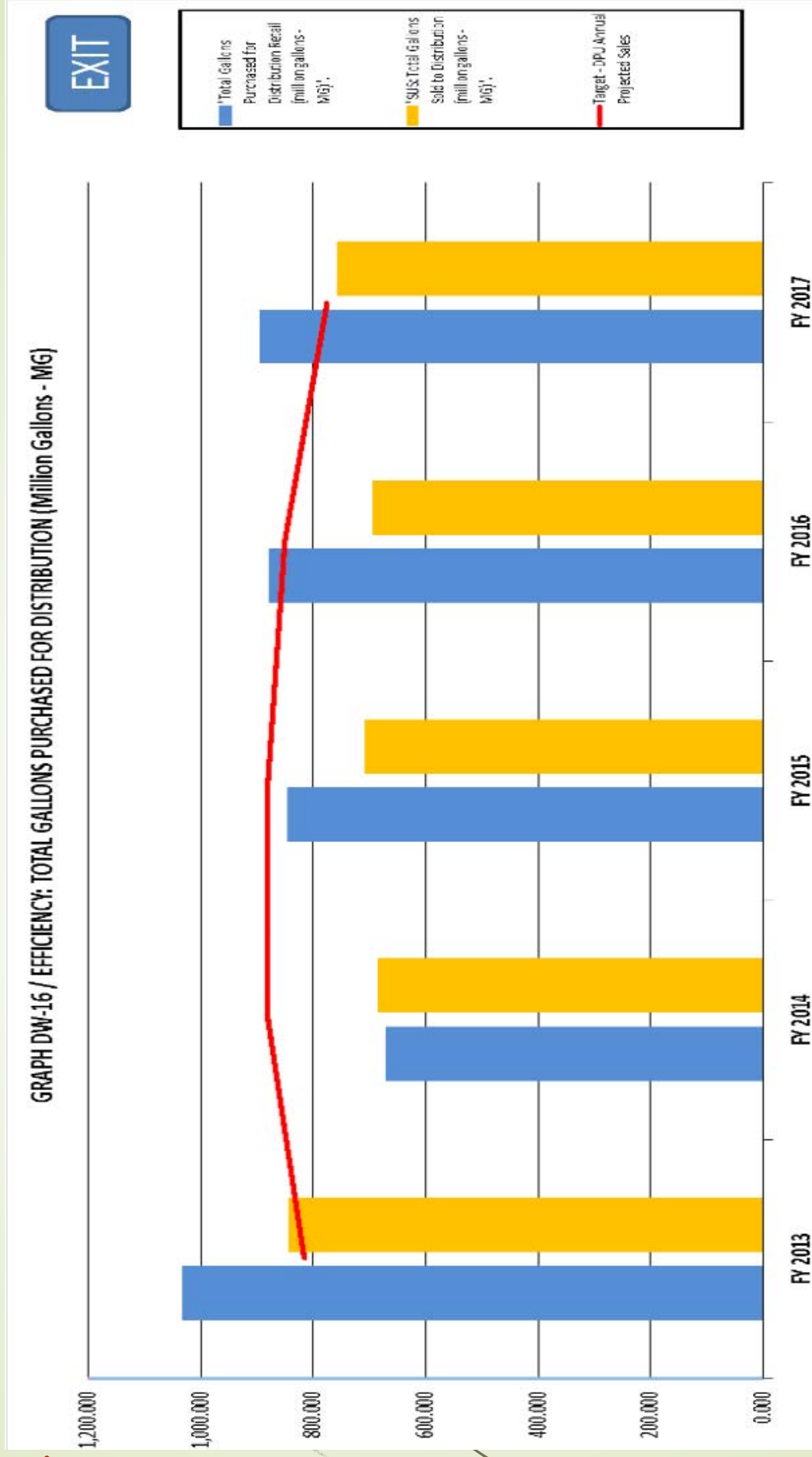
Water Distribution – Primary Key Organizational Performance Measure



Water Distribution – Primary Key Organizational Performance Measure

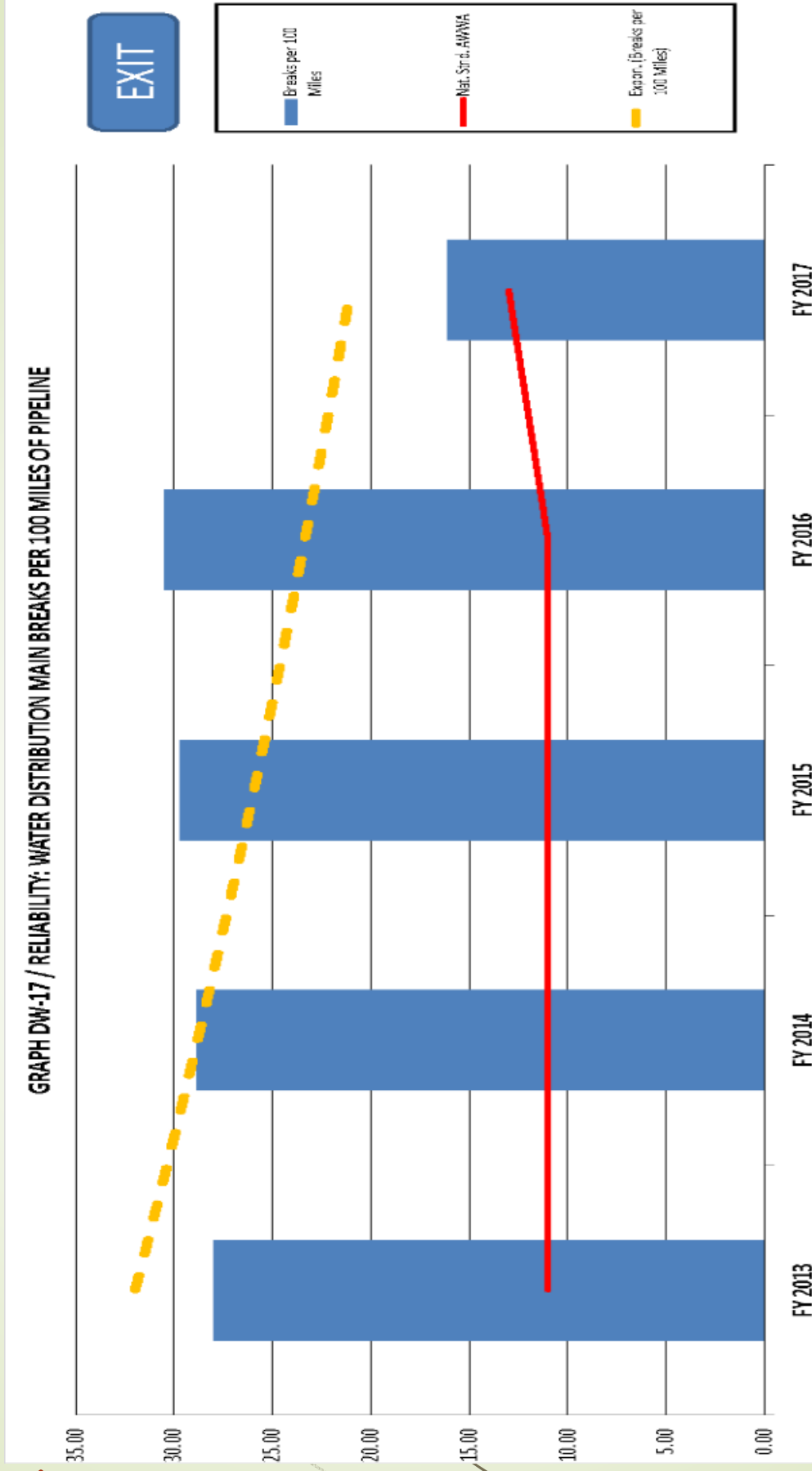


Water Distribution – Primary Key Organizational Performance Measure

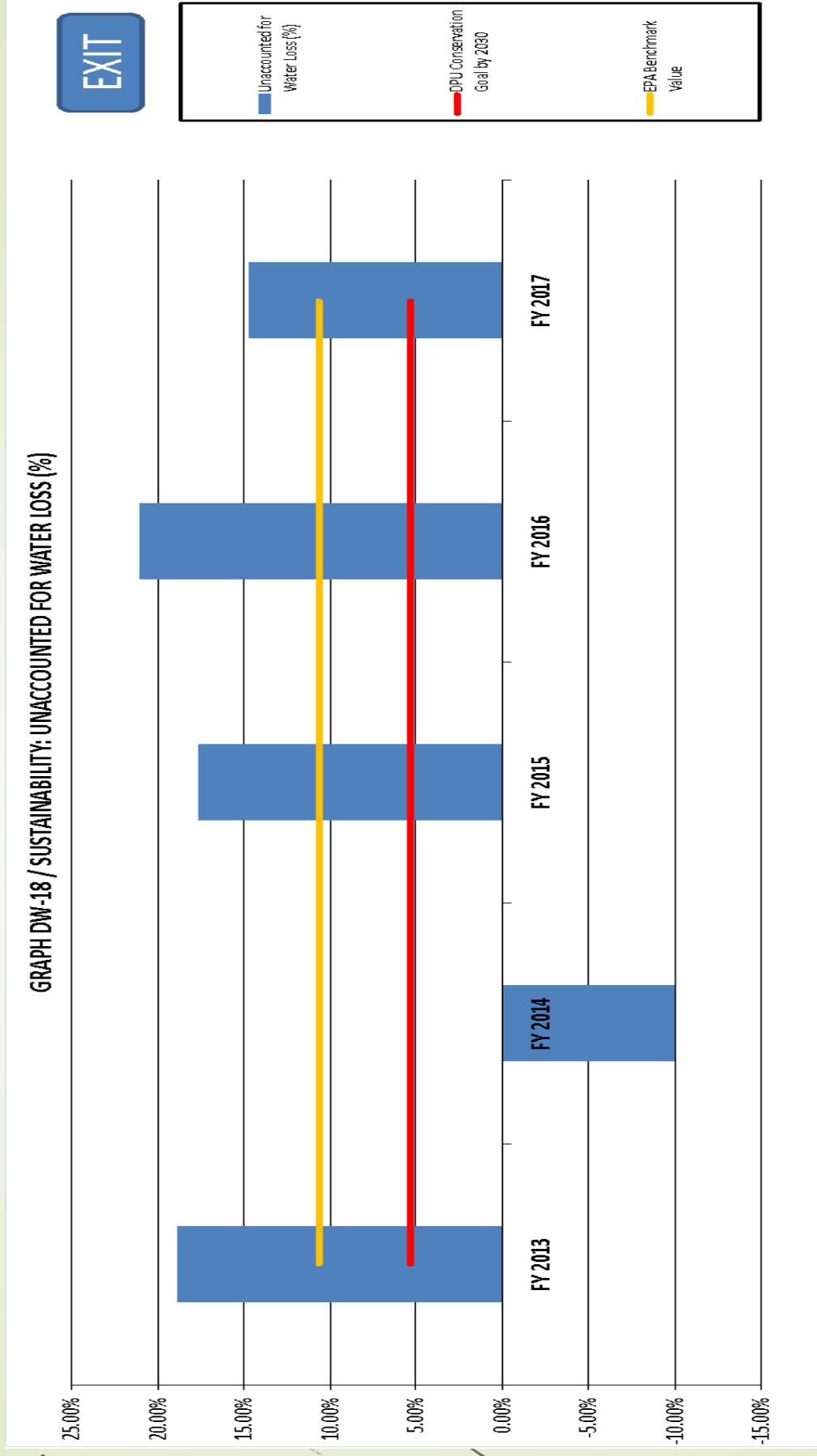


EXIT

Water Distribution – Primary Key Organizational Performance Measure



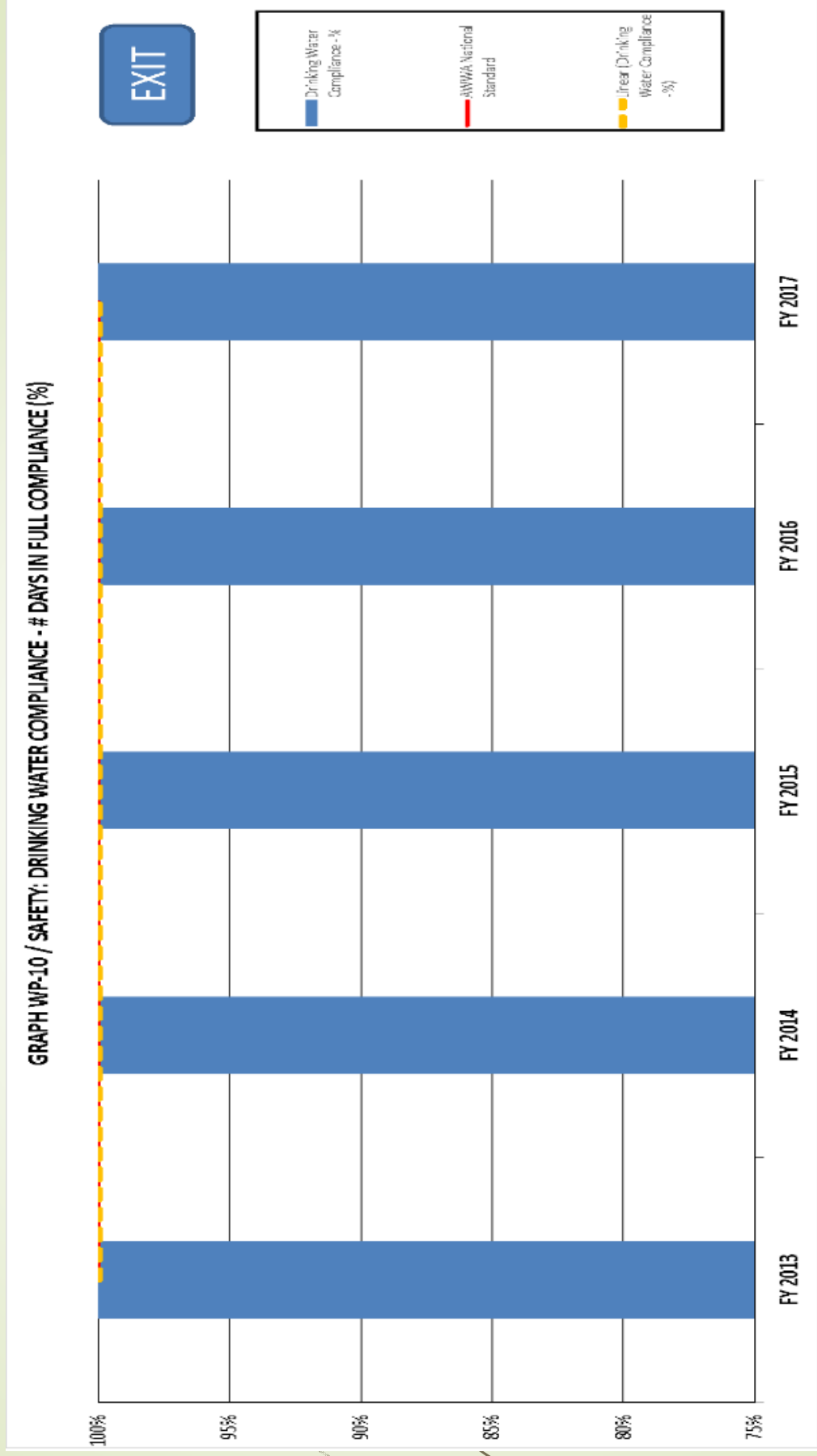
Water Distribution – Primary Key Organizational Performance Measure



Measures/Targets/Benchmarks for Tracking Water Production System O&M

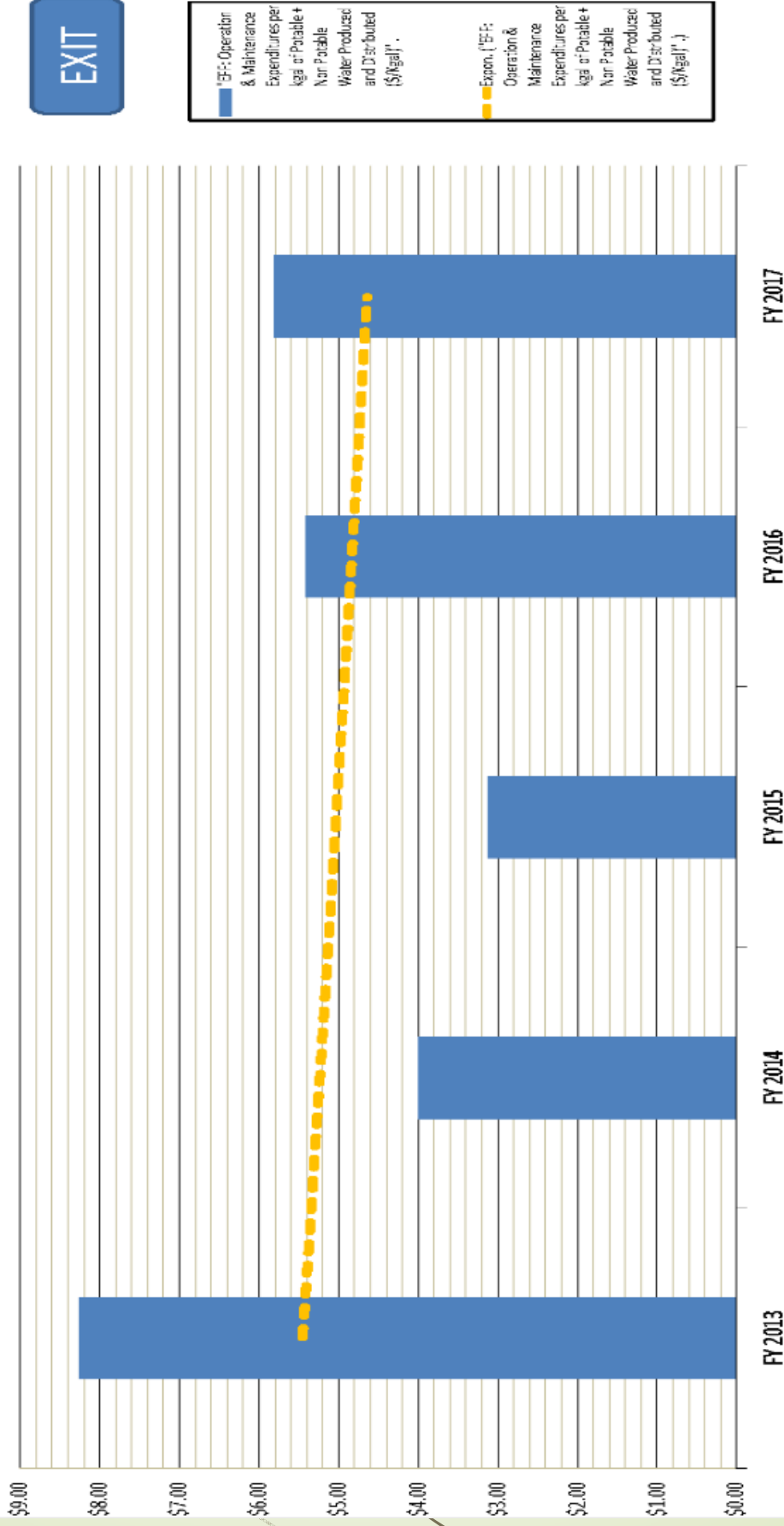
- ❖ **PRIMARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (all)**
- ▶ **Percent of Days in Full Compliance (%)**
- ▶ **O&M Expenditures per Kgal (\$/Kgal) – Total for both Potable & Non Potable Systems**
- ▶ **Total Potable Water Produced (MG)**
- ▶ **Total Non Potable Water Produced & Distributed (MG)**
- ▶ **Main Pipeline Breaks per 100 Miles of Pipeline (#/100 miles)**
- ▶ **Energy Consumption per Million Gallons Potable Water Produced (kWh/MG)**
- ▶ **Gallons per Capita Daily Water Produced (GPCD)**
- ❖ **SECONDARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (representative only, not all)**
- ▶ **Damages per 1,000 Locate Tickets (#/1,000 Tickets)**
- ▶ **Planned Maintenance as a Percent of Total Maintenance (planned maint. hours/planned + corrective maint. hours) (%)**
- ▶ **System Renewal and Replacement (CIP Expenditures for R&R/Total Present Worth of Gas System) (%)**
- ❖ **PERFORMANCE MEASURES WITH TARGETS OR BENCHMARKS**
- ▶ **Performance Measures with known national standards for system comparison are in GREEN (Typically AWWA standards)**
- ▶ **Performance Measures with a DPU Strategic Plan or Conservation Plan Goal are in Magenta**
- ▶ **Performance Measures with both a DPU Strategic Plan or Conservation Plan Goal and a national standard comparable goal are in Cyan**
- ▶ **Measures are collected and reviewed monthly via a 12 month moving average graph. Annual FY performance measures data is transferred from the annual data sets to a multi-year data set for year over year / multi-year comparison. Full implementation scheduled for late FY 2018**

Water Production – Primary Key Organizational Performance Measure



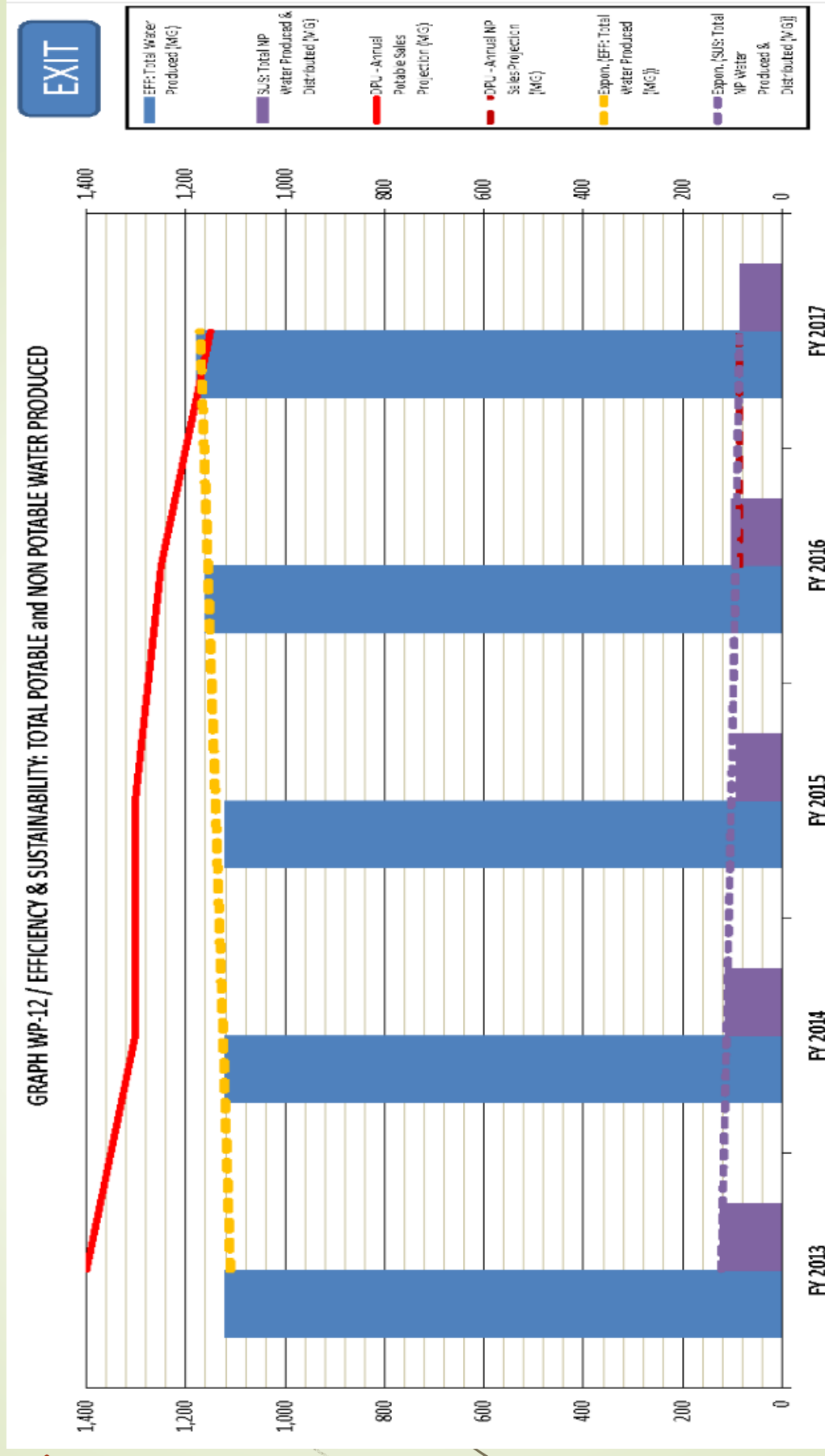
Water Production – Primary Key Organizational Performance Measure

GRAPH WP-11 / EFFICIENCY: O&M EXPENDITURES PER Kgal PRODUCED

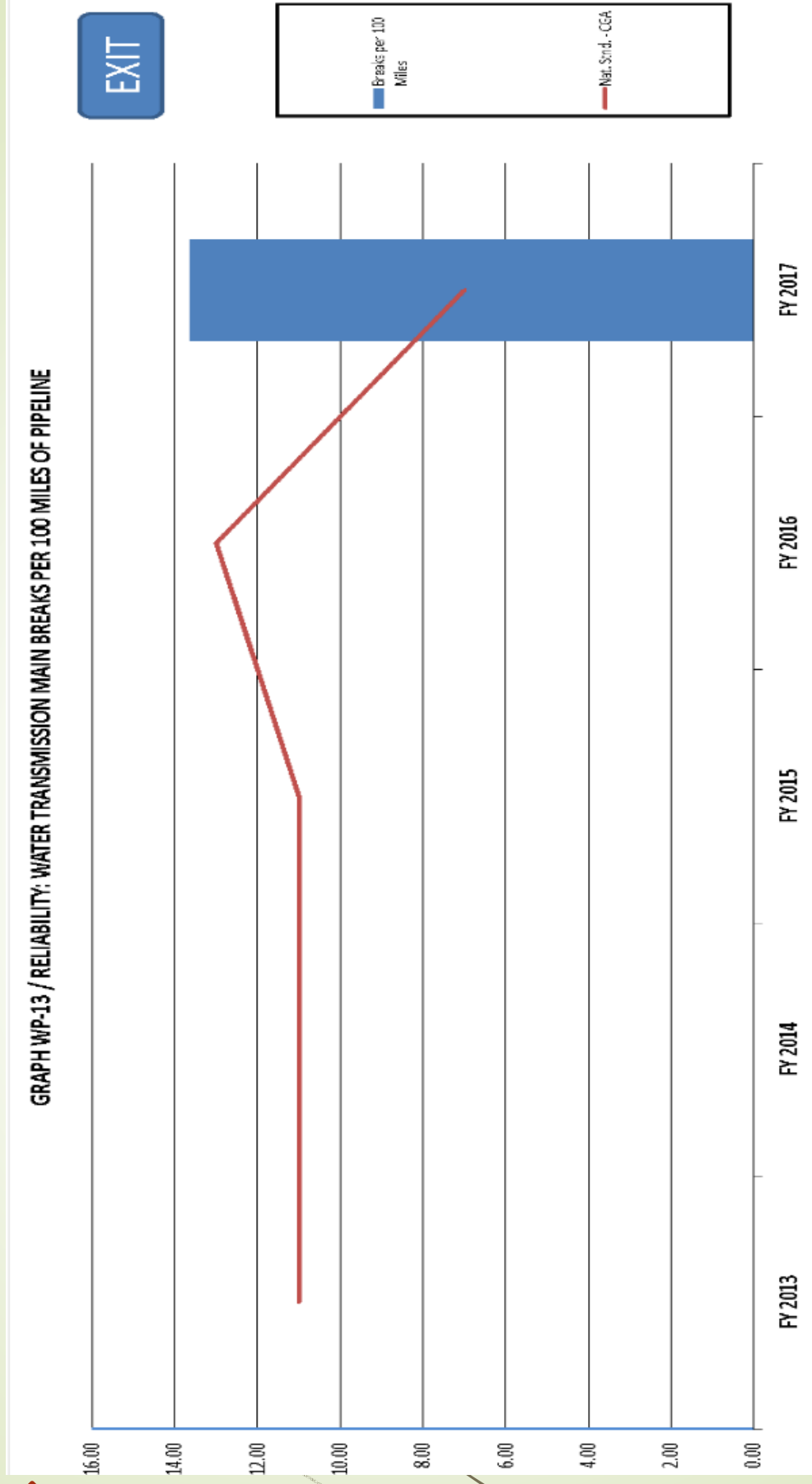


EXIT

Water Production – Primary Key Organizational Performance Measure

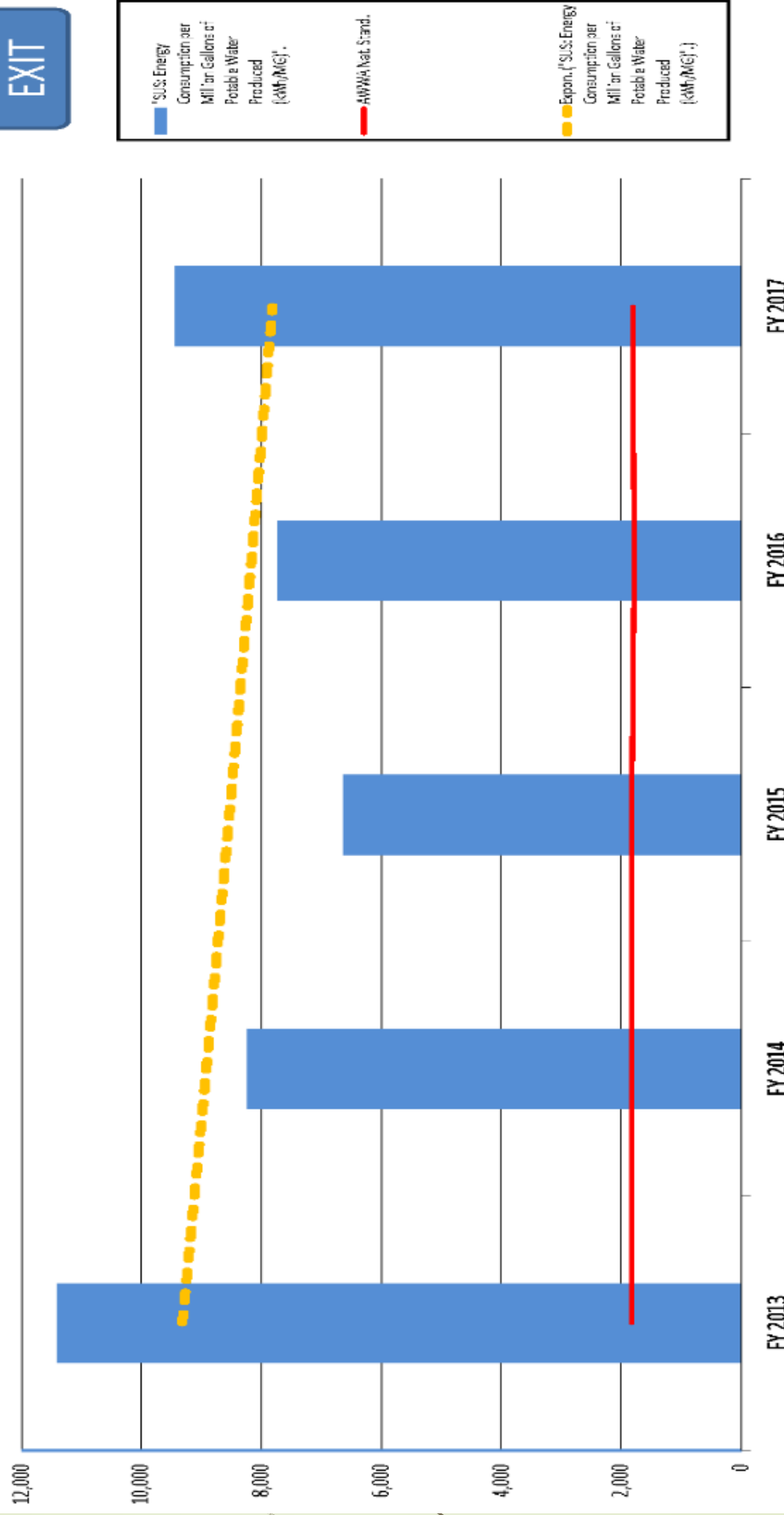


Water Production – Primary Key Organizational Performance Measure



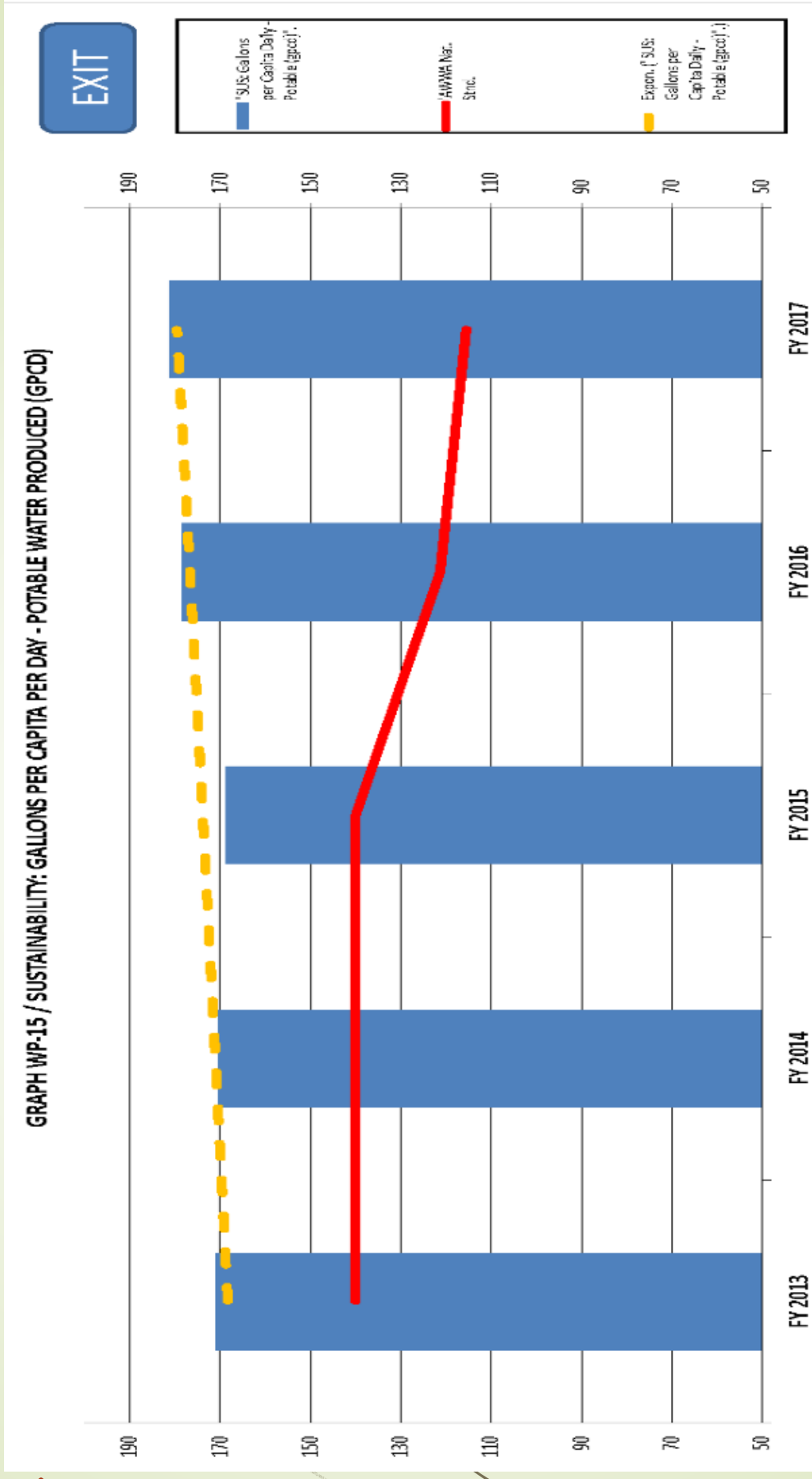
Water Production – Primary Key Organizational Performance Measure

GRAPH WP-14 / SUSTAINABILITY: ENERGY CONSUMPTION PER MILLION GALLONS POTABLE WATER PRODUCED (kWh/MG)



EXIT

Water Production – Primary Key Organizational Performance Measure



Measures/Targets/Benchmarks for Tracking Non Potable Water System O&M

❖ PRIMARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (all)

▶ Percent of Days in Full Compliance (%)

▶ O&M Expenditures per Kgal (\$/Kgal) – Only for Non Potable System

▶ Total Non Potable Water Produced & Distributed (MG)

▶ Main Pipeline Breaks per 100 Miles of Pipeline (#/100 miles)

▶ Gallons per Capita Daily Water Produced (GPCD) – Only for Non Potable System

❖ SECONDARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (representative only, not all)

▶ Damages per 1,000 Locate Tickets (#/1,000 Tickets)

▶ Planned Maintenance as a Percent of Total Maintenance (planned maint. hours/planned + corrective maint. hours) (%)

▶ System Renewal and Replacement (CIP Expenditures for R&R/Total Present Worth of Gas System) (%)

❖ PERFORMANCE MEASURES WITH TARGETS OR BENCHMARKS

▶ There are no known national standards Performance Measures for NP system comparison

▶ Performance Measures with a DPU Strategic Plan or Conservation Plan Goal are in Magenta

▶ Measures are collected and reviewed monthly via a 12 month moving average graph. Annual FY performance measures data is transferred from the annual data sets to a multi-year data set for year over year / multi-year comparison. Full implementation scheduled for late FY 2018

Non Potable Water System – Key Organizational Performance Measures

- ▶ UNDER DEVELOPMENT
- ▶ THANK YOU FOR YOUR PATIENCE

Water System Rates

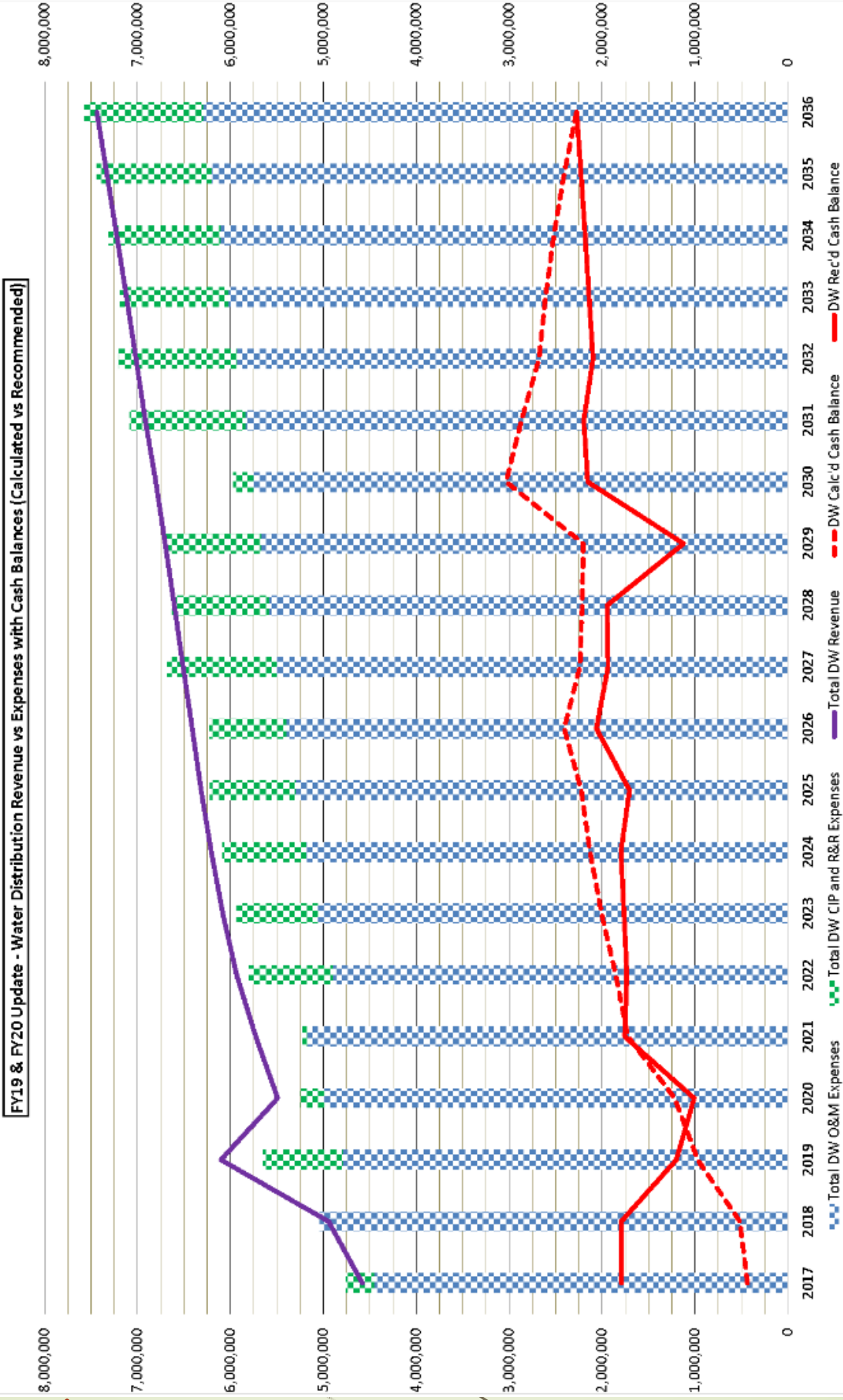
■ Rates Proposed to Meet Long Range (10 & 20 Year) O&M and CIP System Needs

- Financial Policy sets a goal for annual cash balance reserves to meet key criteria.
- Short term goal of rate setting is to maintain necessary and acceptable levels of both O&M and CIP expenditures while stabilizing cash balance reserves in both water system sub-funds (Water Production & Water Distribution) that meet DPU financial policy goals.
- Current status has the relatively high Water Production sub-fund cash balance reserves that offset the low Water Distribution sub-fund cash balance reserves – leaving the full Water Fund in adequate financial condition.

■ Bi-Annual Budget with 10 & 20 Year Forecast & Annual Budget Review & Revision Highlights

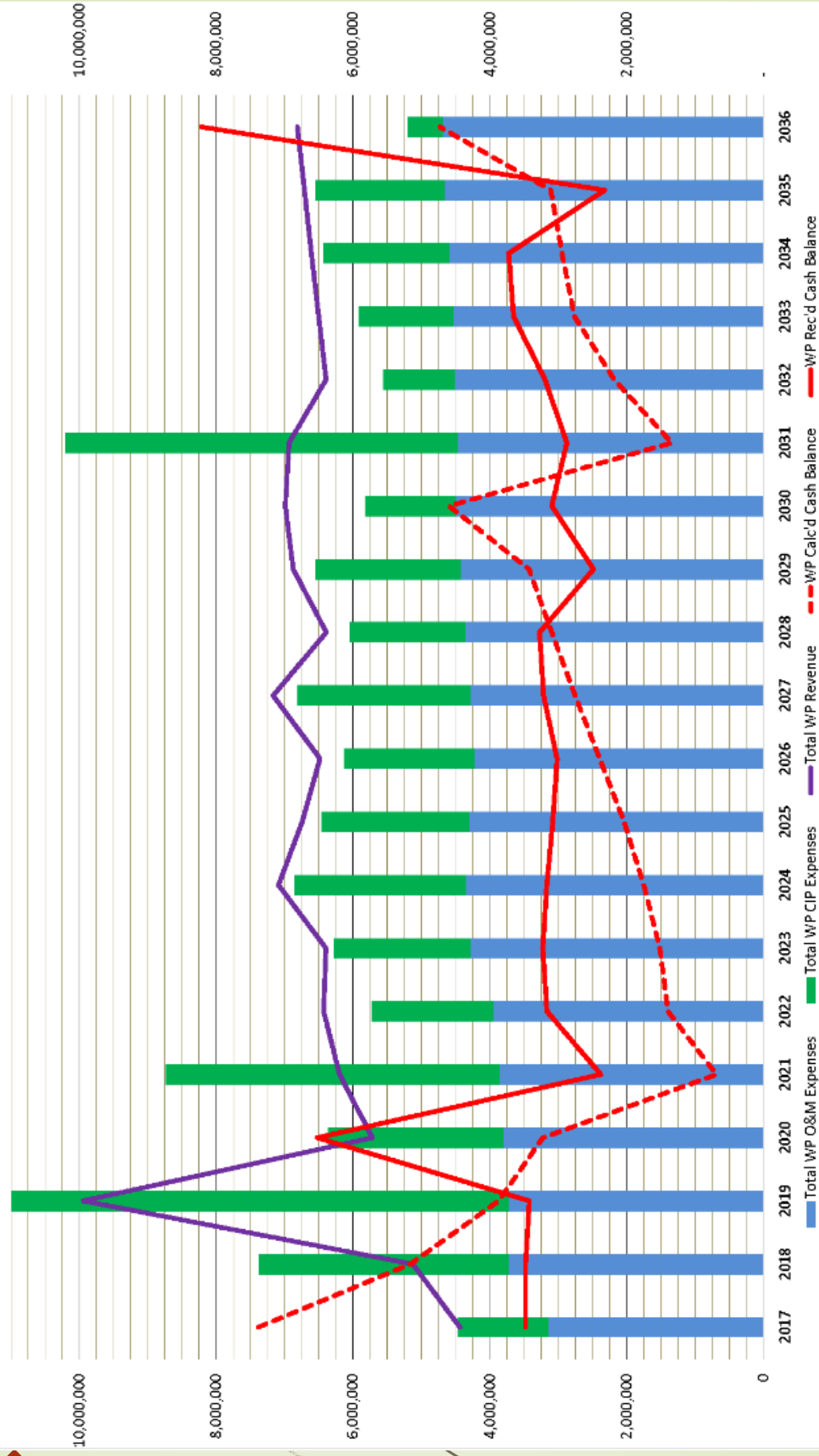
- AMT annual presentation is the basis for development of each FY budget.
- Renewed emphasis on annual O&M programs (PRV O&M Program, Leak Detection and Pipeline Repair, Large Service Meter Checks, Shut Off Valve Exercise and Repair).
- The historic period of aggressive CIP projects is over. This historic period's CIP expenditures have brought the water systems closer to the goal of being up to an acceptably modern condition. The historic practice of automatically replacing water lines in conjunction with other County projects (Streets or Facilities) is being reduced.
- A 20-Year Forecast Financial Model for the water systems that includes all proposed O&M and CIP projects is developed/updated every year for long range planning, budgeting, financial policy compliance and rate assessment purposes.

Water Distribution / 20-Year Revenue – Expenditure - Cash Balance Graph



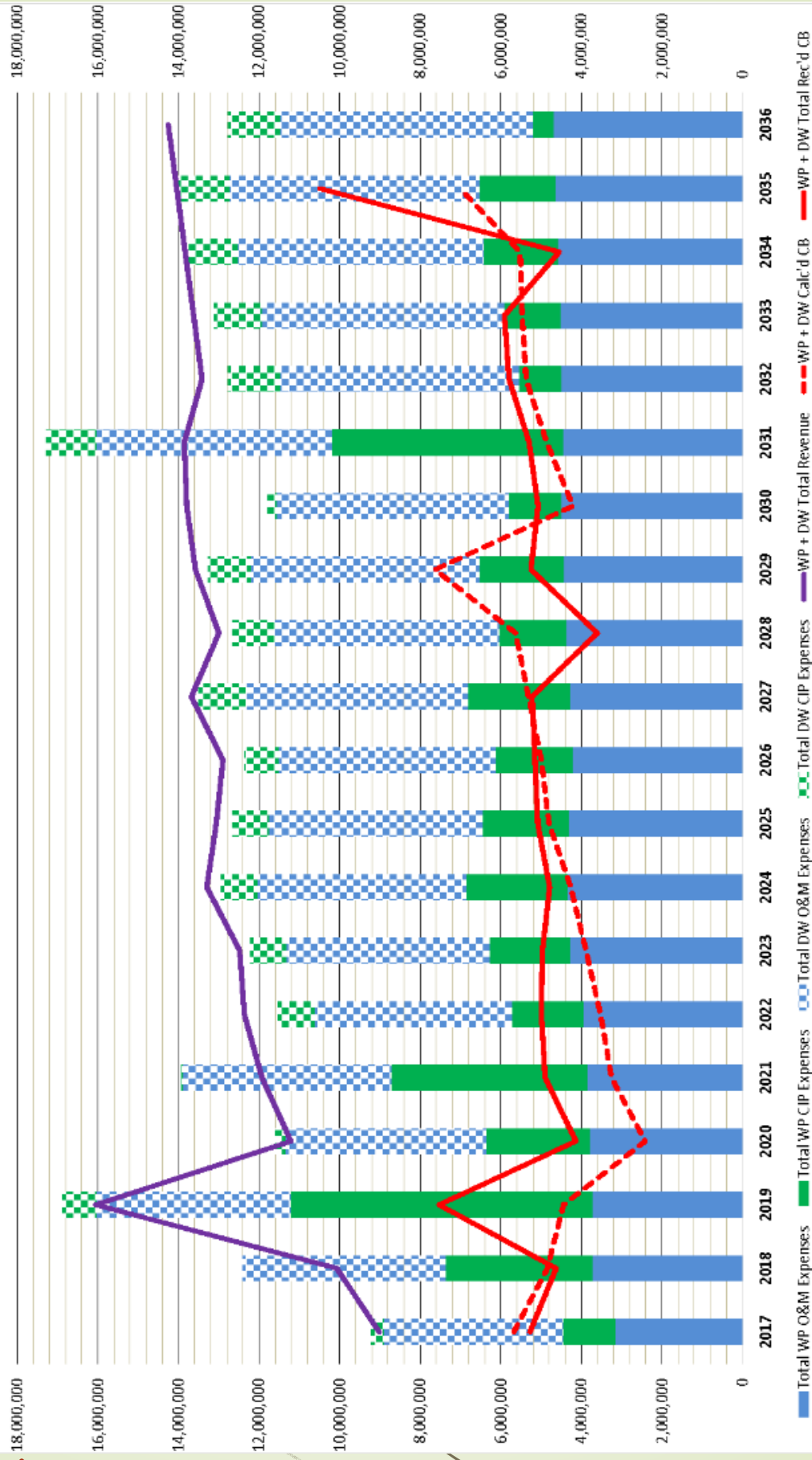
Water Production / 20-Year Revenue – Expenditure - Cash Balance Graph

[FY19 & FY20 Budget Update - Water Production Revenue vs Expenses with Cash Balances (Calculated vs Recommended)]

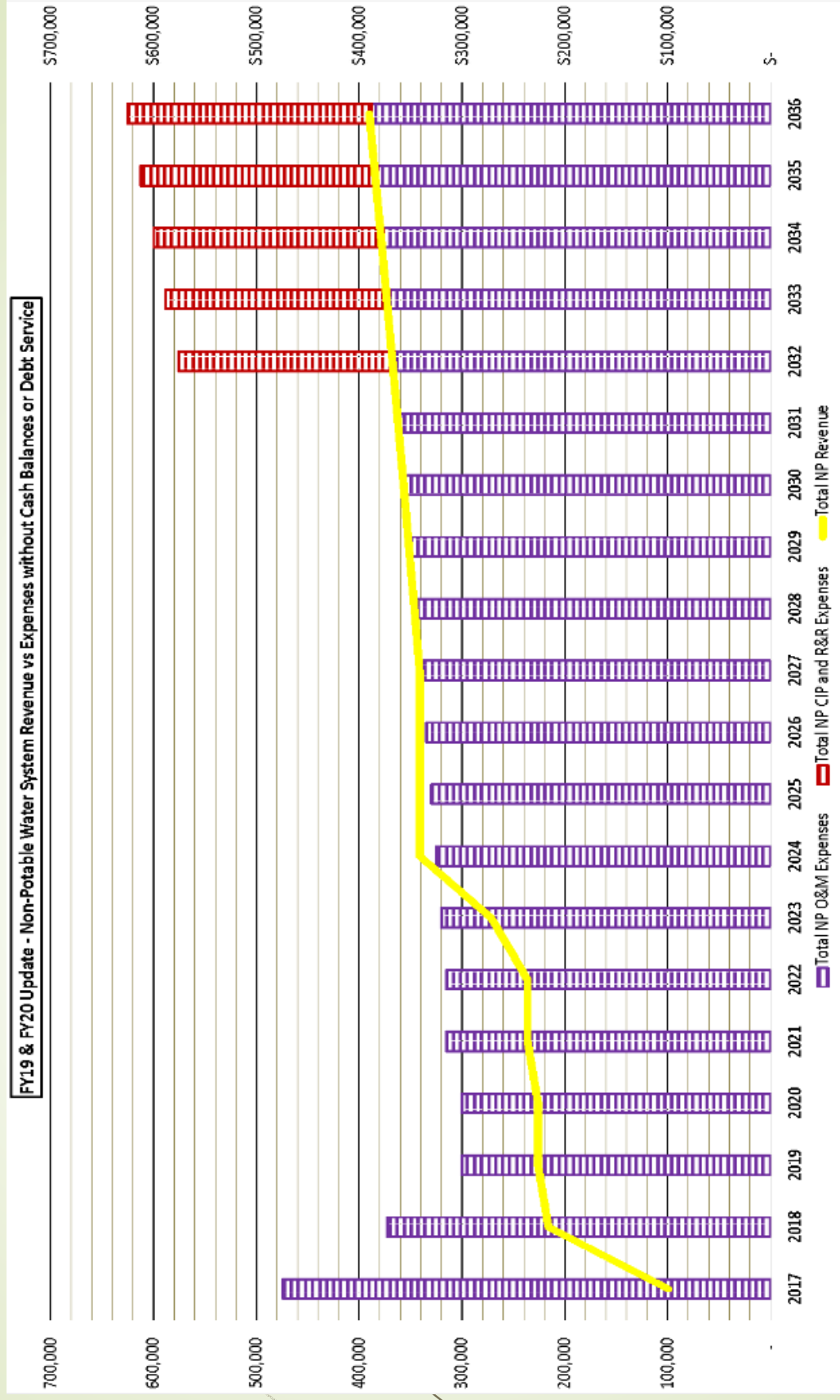


Total Water Fund (WP + DW) / 20-Year Revenue – Expenditure - Cash Balance Graph

FY19 & FY20 Update - WP + DW Total Revenue vs Total Expenses with Cash Balances (Calculated vs Recommended)



Non Potable Water System / 20-Year Revenue – Expenditure – Cash Balance Graph



[illegible]

FORECAST SUMMARY OF RATES PER KGAL PER YEAR FOR WATER DISTRIBUTION & WATER PRODUCTION & NON-POTABLE WATER SYSTEM - ALTERNATES TEN, TWENTY, THIRTY & FORTY (PLUS FIFTY)																					
Alternative	20-Year Average Rate	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Ten - WP	\$4.56	\$3.17	\$3.49	\$3.84	\$4.20	\$4.27	\$4.33	\$4.40	\$4.46	\$4.53	\$4.60	\$4.67	\$4.74	\$4.81	\$4.88	\$4.95	\$5.03	\$5.10	\$5.18	\$5.26	\$5.34
Ten - DW	\$6.38	\$4.61	\$5.07	\$5.58	\$5.85	\$5.94	\$6.02	\$6.11	\$6.21	\$6.30	\$6.39	\$6.49	\$6.59	\$6.69	\$6.79	\$6.89	\$6.99	\$7.10	\$7.20	\$7.31	\$7.42
Ten - NP	\$4.00	\$1.15	\$2.50	\$2.75	\$3.03	\$3.33	\$3.66	\$4.03	\$4.18	\$4.24	\$4.30	\$4.37	\$4.43	\$4.50	\$4.57	\$4.64	\$4.71	\$4.78	\$4.85	\$4.92	\$4.99
Twenty - WP	\$4.58	\$3.17	\$3.33	\$3.50	\$3.67	\$3.86	\$4.05	\$4.23	\$4.39	\$4.56	\$4.67	\$4.79	\$4.91	\$5.03	\$5.10	\$5.18	\$5.26	\$5.34	\$5.42	\$5.50	\$5.58
Twenty - DW	\$6.39	\$4.61	\$4.84	\$5.08	\$5.34	\$5.60	\$5.85	\$6.03	\$6.21	\$6.40	\$6.56	\$6.66	\$6.76	\$6.86	\$6.96	\$7.06	\$7.17	\$7.28	\$7.39	\$7.50	\$7.61
Twenty - NP	\$3.75	\$1.15	\$2.50	\$2.65	\$2.81	\$2.98	\$3.14	\$3.30	\$3.46	\$3.64	\$3.80	\$3.95	\$4.11	\$4.27	\$4.42	\$4.56	\$4.67	\$4.76	\$4.85	\$4.92	\$4.99
Thirty - WP	\$4.60	\$3.17	\$3.29	\$3.42	\$3.54	\$3.68	\$3.81	\$3.96	\$4.11	\$4.26	\$4.42	\$4.59	\$4.76	\$4.94	\$5.12	\$5.31	\$5.51	\$5.72	\$5.93	\$6.16	\$6.39
Thirty - DW	\$6.42	\$4.61	\$4.76	\$4.92	\$5.09	\$5.26	\$5.43	\$5.62	\$5.80	\$6.00	\$6.20	\$6.41	\$6.62	\$6.84	\$7.07	\$7.31	\$7.56	\$7.81	\$8.07	\$8.34	\$8.62
Thirty - NP	\$3.49	\$1.15	\$2.50	\$2.60	\$2.70	\$2.81	\$2.92	\$3.03	\$3.15	\$3.27	\$3.40	\$3.53	\$3.67	\$3.82	\$3.97	\$4.12	\$4.28	\$4.45	\$4.63	\$4.81	\$4.99
Forty - WP	\$4.57	\$3.17	\$3.43	\$3.66	\$3.86	\$4.05	\$4.24	\$4.40	\$4.54	\$4.65	\$4.75	\$4.85	\$4.92	\$5.00	\$5.07	\$5.15	\$5.22	\$5.30	\$5.38	\$5.46	\$5.55
Forty - DW	\$6.39	\$4.61	\$4.98	\$5.29	\$5.55	\$5.79	\$5.99	\$6.14	\$6.26	\$6.37	\$6.47	\$6.57	\$6.67	\$6.77	\$6.87	\$6.97	\$7.07	\$7.16	\$7.25	\$7.34	\$7.47
Forty - NP	\$3.85	\$1.15	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.54	\$2.58	\$2.61	\$2.65	\$2.69	\$2.73	\$2.77	\$2.82	\$2.86
Fifty - WP	\$4.52	\$3.17	\$4.00	\$4.06	\$4.12	\$4.18	\$4.25	\$4.31	\$4.37	\$4.44	\$4.51	\$4.57	\$4.64	\$4.71	\$4.78	\$4.85	\$4.93	\$5.00	\$5.08	\$5.15	\$5.23
Fifty - DW	\$6.34	\$4.61	\$5.61	\$5.69	\$5.78	\$5.86	\$5.95	\$6.04	\$6.13	\$6.22	\$6.32	\$6.41	\$6.51	\$6.61	\$6.70	\$6.80	\$6.91	\$7.01	\$7.12	\$7.22	\$7.33
Fifty - NP	\$4.15	\$1.15	\$2.50	\$3.88	\$3.93	\$3.99	\$4.05	\$4.11	\$4.17	\$4.24	\$4.30	\$4.37	\$4.43	\$4.50	\$4.56	\$4.63	\$4.70	\$4.77	\$4.84	\$4.92	\$4.99

- The current physical condition of the water distribution system overall is fair to good – with significant known portions in poor condition.
- The known portions in poor condition are pipelines that have been in the ground for 50 to 60 years. In addition, it is known, through visual inspection, that much of this known deficient older pipe was constructed using sub-standard construction methods.
- There are both short range (10-Year) and long range (20-Year) CIP plans to complete full replacement of all known deficient pipelines.
- After full completion of the long range CIP plan, the water distribution system should be considered to meet acceptable modern standards for material safety and capacity conditions such that future CIP projects could be considered to be typical R&R or O&M program efficiency enhancement projects.
- The increased emphasis on enhanced O&M activities – as opposed to continuous major CIP project completion – is being implemented and progress is expected in FY18. Toward the end of FY 2018, when the first phase of the GIS upgrade project has been completed, the enhanced O&M programs of the water distribution system will take another significant step forward.

WP Sub-Fund Summary – January 2018 Water Production Physical Condition Assessment – 2 of 3

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- ▶ The current physical condition of the water production system overall is good – with limited known portions in poor condition.
- ▶ The known portions in poor condition are pipelines that have been in the ground for 50 to 60 years. In addition, it is known, through visual inspection, that much of this known deficient older pipe was constructed using sub-standard construction methods.
- ▶ The 12 existing wells ages span between 30 and 50 years; with an expected life of 50 years. The short and long range CIP plan for the water production system includes regular significant expenditures for well replacement.
- ▶ There are both short range (10-Year) and long range (20-Year) CIP plans to complete full replacement of all known deficient pipelines.
- ▶ After full completion of the long range CIP plan, the water production system should be considered to meet acceptable modern standards for material safety and capacity conditions such that future CIP projects could be considered to be typical R&R or O&M program efficiency enhancement projects.
- ▶ The increased emphasis on enhanced O&M activities – as opposed to continuous major CIP project completion – is being implemented and progress is expected in FY18. Toward the end of FY 2018, when the first phase of the GIS upgrade project has been completed, the enhanced O&M programs of the water production system will take another significant step forward.

NP Sub-Fund Summary – January 2018 Non Potable Water Physical Condition Assessment – 3 of 3

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- ▶ The current physical condition of the NP water system overall is good – with limited known portions in very poor condition and some significant portions in new/excellent condition.
- ▶ The very poor infrastructure is the irrigation pump station at Overlook Park. This facility is over 30 years old, is situated outside exposed to the weather, and has received limited maintenance due to conflicting responsibilities between DPU and Parks. With the increased NP water rate comes the clarification that full responsibility for O&M now rests with DPU.
- ▶ The LA Reservoir pipeline replacement project is currently under construction. This project will allow for the use of LA Reservoir water to again flow into the NP system – starting with the 2018 irrigation season.
- ▶ Recent new construction includes new meters and SCADA at major users; additional 0.5 million gallons of storage with gravity flow and new pipelines to and from the new storage.
- ▶ The long range CIP plan for the NP system is totally contingent upon receiving grant/low interest loan funding from the State. CIP planning is expected to emphasize system expansion through the end of the short term plan with long term CIP projects being typical R&R or O&M program efficiency enhancement projects.
- ▶ The NP system infrastructure is also included in the increased emphasis on enhanced O&M activities. Toward the end of FY 2018, when the first phase of the GIS upgrade project has been completed, the enhanced O&M programs of the NP system will take another significant step forward.

- ▶ The current financial condition of the water distribution system is fair.
- ▶ The existing cash balance reserves of the water distribution system are below the requirements of the financial policy adopted by the Board of Public Utilities – as a separate and independent sub-fund. This is due in large part to previous years of optimistic projections of water sales (water revenues) while concurrently being aggressive in completing CIP projects to replace known deficient pipelines and PRV stations.
- ▶ The development of long range forecast models, combined with a renewed emphasis on O&M activities to reduce necessary CIP full replacement projects and the deferral of some required CIP projects to minimize early year cash flow expenditures, provides the platform for annual review of retail water rates to enable the water distribution sub-fund to meet all operational and financial goals into the future.
- ▶ All of the aforementioned programs and program expenditures are related to maintaining and operating the water distribution system in an efficient and effective manner. Furthermore, these costs need to be shared equitably by all customers which benefit from the use of all of the water systems: Water Distribution, Water Production & Non Potable Water System.
- ▶ The previous discussions on retail water rates appear to be on target with the current O&M and CIP planning. The retail water rates proposed in late 2016/early 2017, with a slight adjustment down for FY2020 (5.00% to 4.50%), continue to be recommended for implementation through the next 5 to 6 years in order to stabilize the DW sub-fund.

- ▶ The current financial condition of the water production system is good.
- ▶ The existing cash balance reserves of the water production system are above the requirements of the financial policy adopted by the Board of Public Utilities – as a separate and independent sub-fund. This is due in large part to previous years of adequate wholesale water rates and revenues while concurrently building a cash balance reserve adequate to fund some well replacement projects.
- ▶ The development of long range forecast models, combined with a renewed emphasis on O&M activities to reduce necessary CIP full replacement projects and the deferral of one anticipated well replacement CIP project to minimize later year cash flow expenditures, provides the platform for annual review of wholesale water rates to enable the water production sub-fund to meet all operational and financial goals into the future.
- ▶ All of the aforementioned programs and program expenditures are related to maintaining and operating the water production system in an efficient and effective manner. Furthermore, these costs need to be shared equitably by all customers which benefit from the use of all of the water systems: Water Distribution, Water Production & Non Potable Water System.
- ▶ The previous discussions on wholesale water rates appear to be mostly on target with the current O&M and CIP planning. The wholesale water rates proposed in late 2016/early 2017, adjusted up for FY21-FY23 (.50%/1.50%/1.75%), continue to be recommended for implementation through the next 5 to 6 years in order to maintain the WP sub-fund stability.

NP Sub-Fund Summary – January 2018 NP Water System Financial Condition Assessment – 3 of 3

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- ▶ The current financial condition of the non potable water system is poor.
- ▶ The finances of the NP system have historically been imbedded within the Water Production sub-fund. The NP water rates were set based on a best estimate with limited knowledge of actual costs attributable to the NP system available. It had been suspected for a while that the WP sub-fund had subsidized the NP system; therefore attempts to differentiate NP costs from WP costs began in FY2016.
- ▶ The 2013 NP System Master Plan analysis of the financial condition of the NP system as an independent system verified that subsidy; and recommended an NP water rate increase of 117% (from \$1.15 per Kgal to \$2.50 per Kgal). The FY2018 proposed rate increase, despite being advertised up to two years in advance, appeared to cause significant consternation among the NP system users; however, after detailed analyses using data from the more detailed cost differentiation started in 2016, it was shown that the NP water rate increase was justified.
- ▶ The proposed NP water rates shown within this presentation only capture projected O&M costs (no R&R CIP funds are being accumulated). NP rates are presumed to be held constant at the current \$2.50 per Kgal for the next 9 years – then beginning an annual inflationary climb by 1.50% per year. This would end the WP subsidy of the NP system by FY2024 – but only if the NP system continues to expand with increased sales as proposed. If the NP system is not expanded such that sales and revenues increase, then an NP water rate increase would be justified in order to at least cover O&M of the system.

Full Water Fund Summary – January 2018 Combined DW, WP & NP Water Systems Financial Condition Assessment – 3 of 3

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- ▶ The current overall financial condition of the entire Water Fund that includes both sub-funds of Water Distribution and Water Production (including the NP Water System) is good.
- ▶ The existing cash balance reserves of the Water Fund meet the requirements of the financial policy adopted by the Board of Public Utilities, as a combined set of independent sub-funds, for FY17 & FY18. This is due in large part to the current excess cash balance reserves within the Water Production sub-fund balancing the minimal cash balance reserves currently within the Water Distribution sub-fund.
- ▶ The NP System finances are relatively small and do not significantly affect the annual cash flow or cash balance of the Water Fund.
- ▶ Two major WP CIP projects (OW2 in FY18/19 & OB1 in FY21) will cause a temporary dip in the Water Fund cash balance below the financial policy goal. However, the Water Fund cash balance will return to financial policy goal levels within the short range planning period.
- ▶ The proposed water rates for each sub-fund (DW retail, WP wholesale & NP), shown within this presentation as modified and as previously discussed, are projected to meet all operational and financial goals of the Water Fund while simultaneously both improving and rebalancing the cash flow and cash balance reserve funds for each independent sub-fund such that the financial policy goals for each sub-fund are met within the short range planning period.