



## City of Bismarck, North Dakota

Utility Cost of Service  
& Rate Design Study:

*Stakeholder Meeting:  
Phase II – Cost  
Allocation*

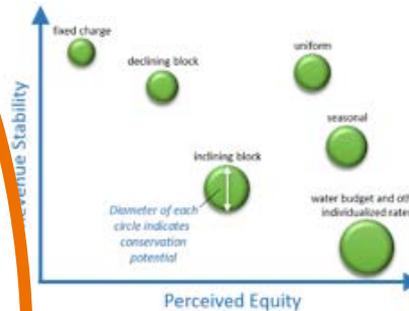
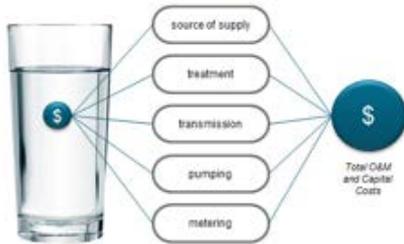
*September 5, 2018*

# Big Picture Refresher

- The review of strengths, weaknesses, and opportunities happens first (Phase I)
  - Public meetings on 5/7 and 6/11; Commission on 6/26
- **Detailed analytical work will commence during the next phase of work (Phase II)**
  - Public meeting on 8/1 – revenue requirements
- Once we are done, will prepare and present report, provide models, etc. (Phase III)

# Where we are in the process

Phase II Steps



## Revenue Requirements

- Operating Costs
- Capital Costs
- Financial Policies
  - Debt Coverage
  - Reserves

## Cost Allocation

- Evaluate Available Data
- Establish Classes
- Identify Methodology
- Compare Results to Current Revenue

## Rate Design

- Evaluate Objectives
- Identify Structures
- Set Parameters
- Customer Impacts

## Other Fees/Charges

- Trunkline Assessment
- Miscellaneous Fees
- Curb Stop Repair
- Back-Up Coverage
- Unannexed Surcharge

**Active Stakeholder Participation**

## What we will cover for each utility

**Quick recap of 2019 revenue requirements**

**Cost allocation process**

- Customer usage patterns and characteristics
- Recommended customer classes
- Cost allocation methodology

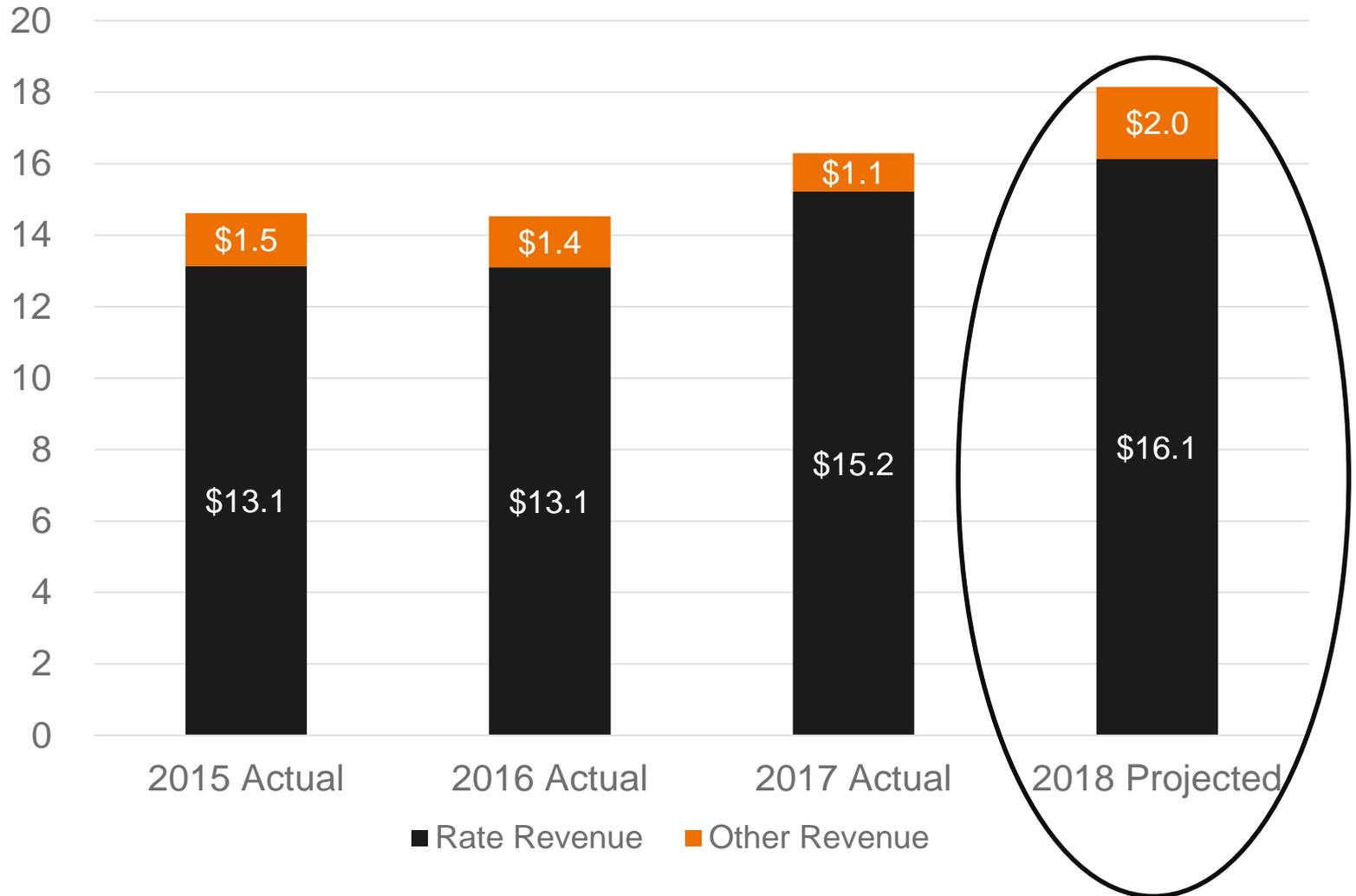
**Review initial cost allocations by customer class and compare to current revenue**

**Goal: Understand characteristics and cost to serve each customer class, and receive input**

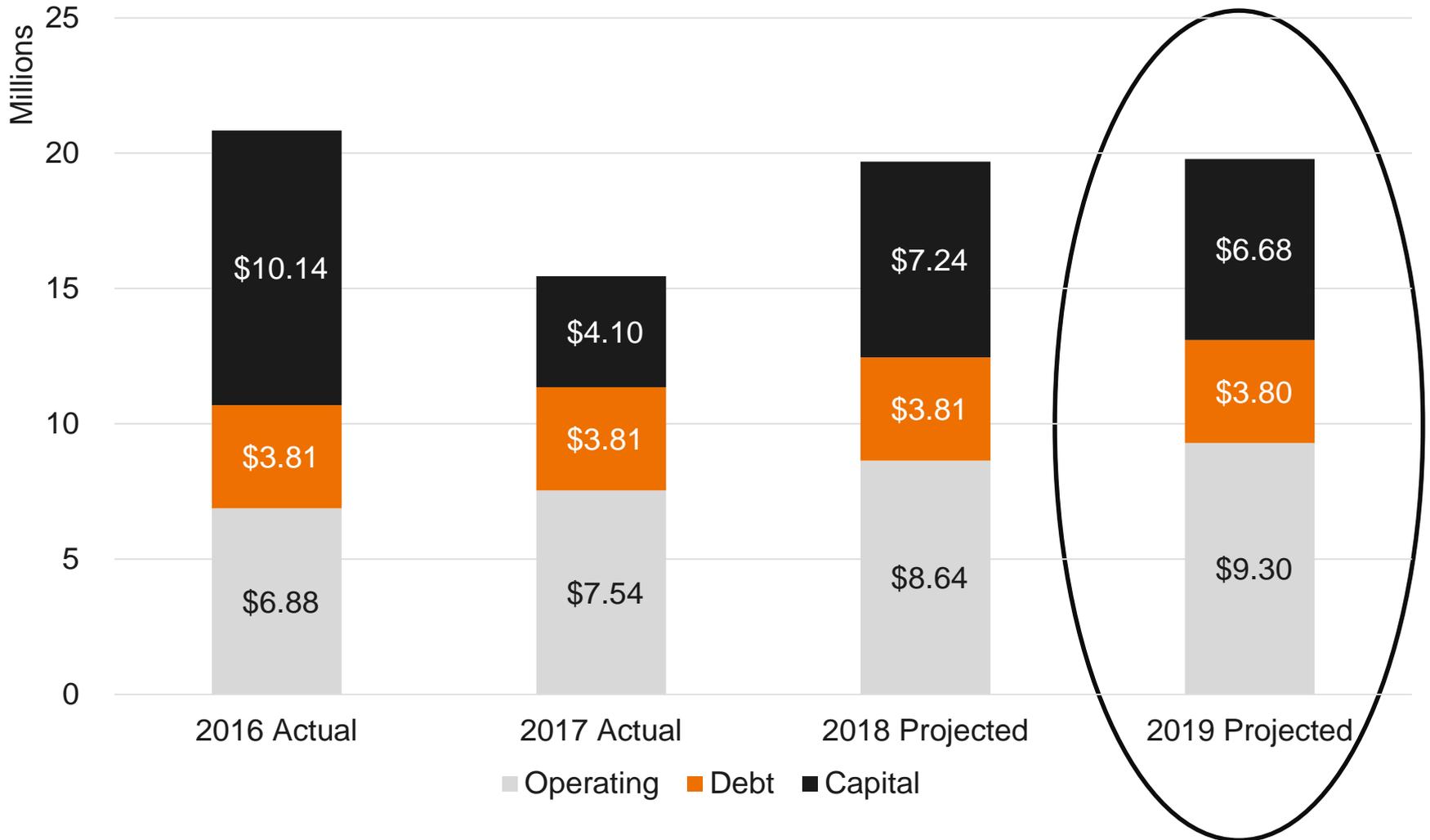
**Ask lots of questions & provide comments!**

Water Utility System

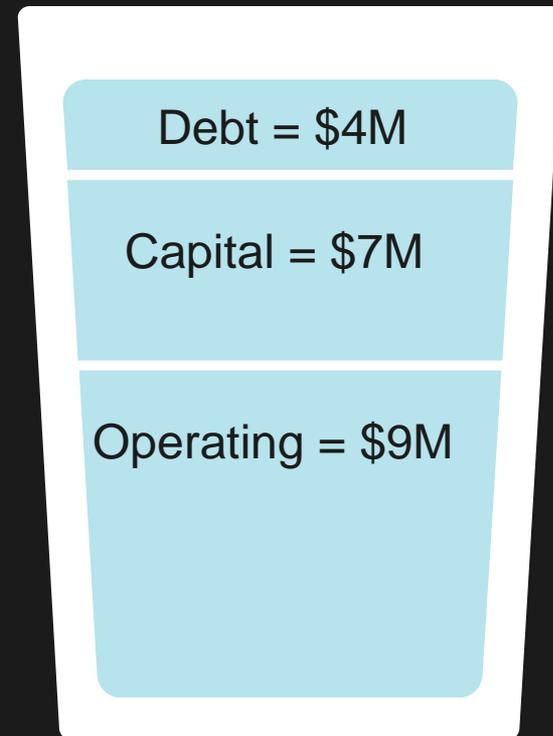
# Total Annual Revenue (\$ in Millions)



# Total Annual Expenditures (\$ in Millions)



# THE COST TO FILL A GLASS OF WATER



*Represents current projections for FY 2019*

# "Levelized" Plan of Adjustments

Water System

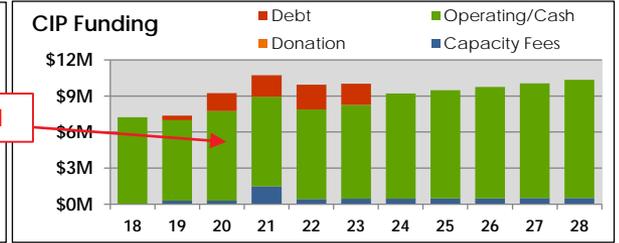
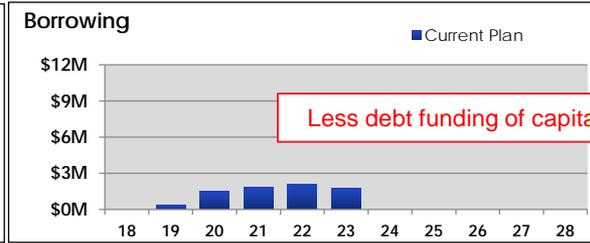
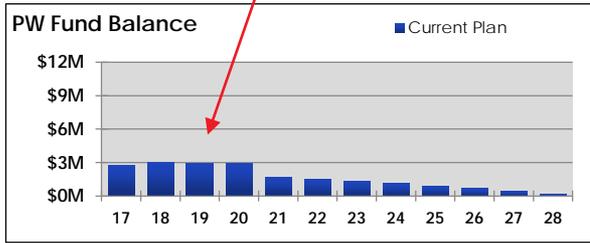
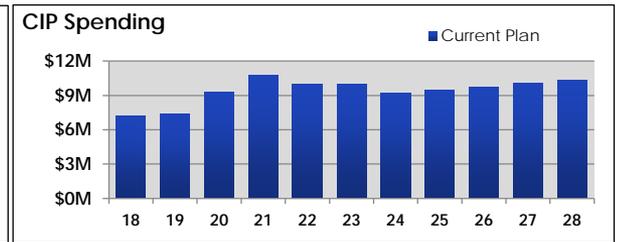
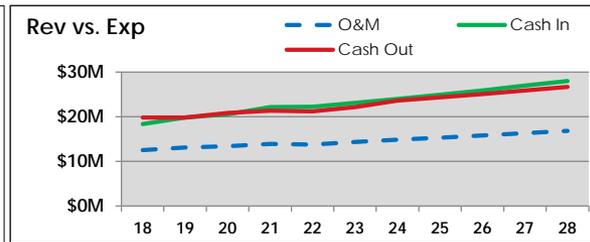
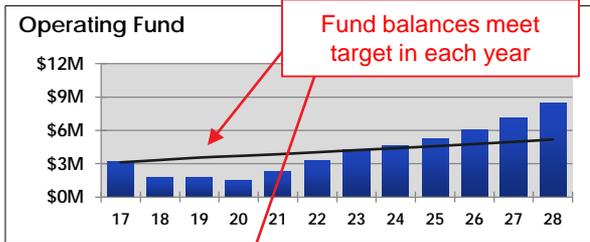
CALC LAST2  
SAVE OVR2  
CTRL

## FAMS-XL Bismarck, ND - Water Fund

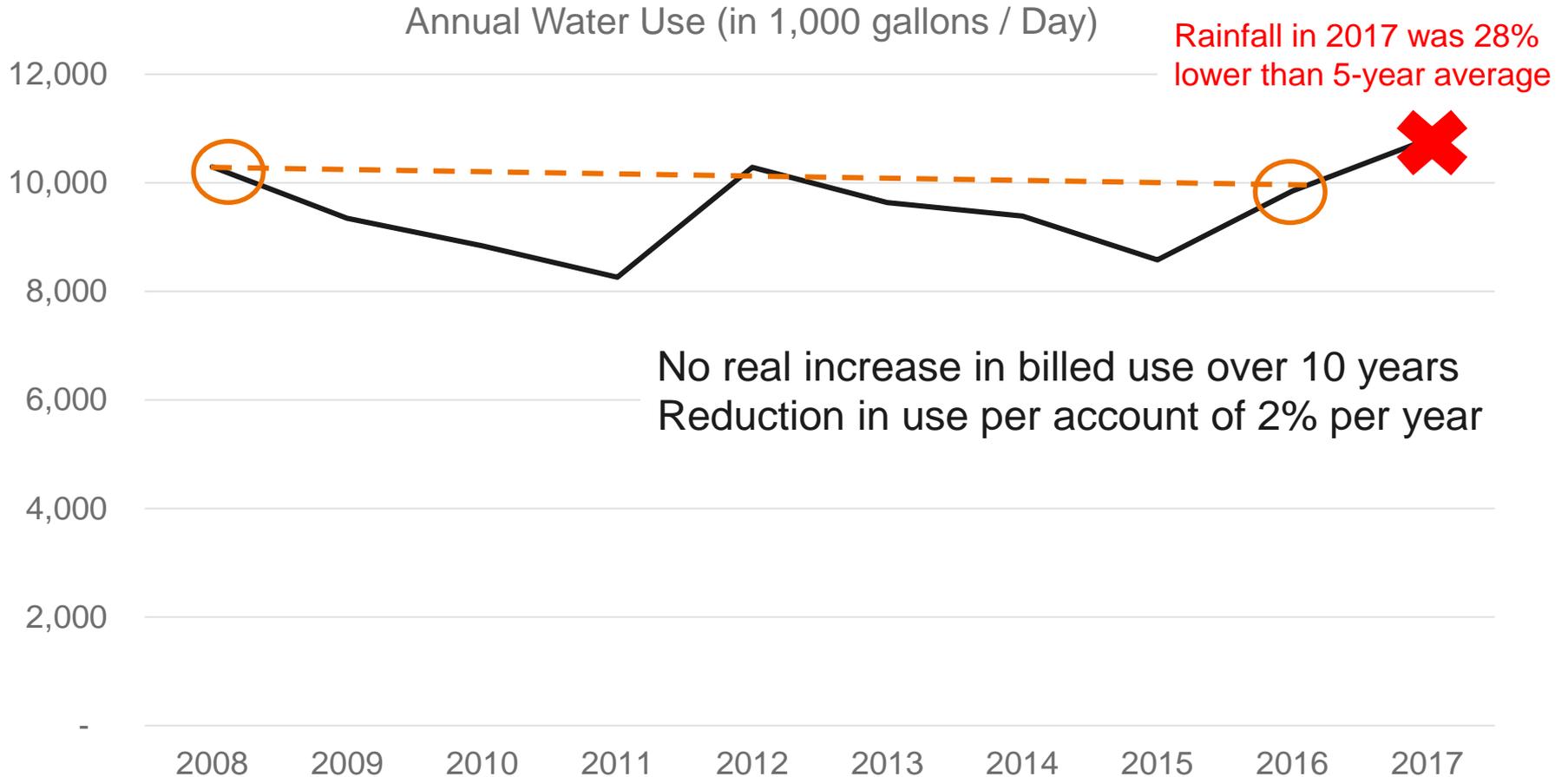


Level plan of rate increases beyond FY 2019

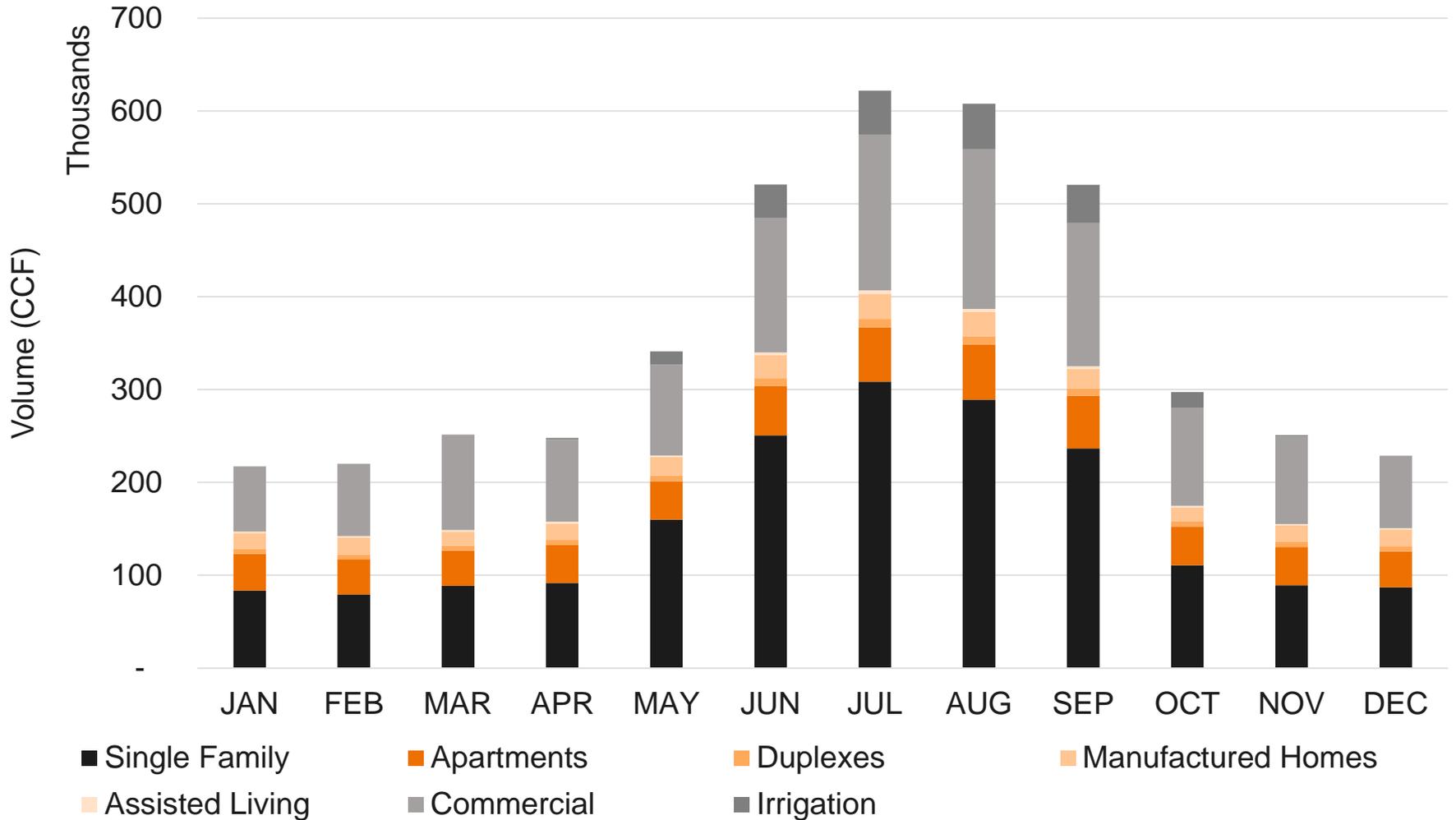
	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2022	FY 2027
Water Rate Plan	0.00%	8.00%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	19.83%	42.43%
Curb Stop Rate Plan	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Senior-Lien DSC	2.70	2.93	2.98	2.99	3.64	3.60	3.67	3.80	3.93	4.06	4.22		
Average Bill (9 CCF)	\$31.65	\$34.03	\$35.16	\$36.33	\$37.54	\$38.79	\$40.07	\$41.40	\$42.77	\$44.21	\$45.69		
Change \$		\$2.38	\$1.13	\$1.17	\$1.21	\$1.25	\$1.28	\$1.33	\$1.37	\$1.44	\$1.48	Check	-



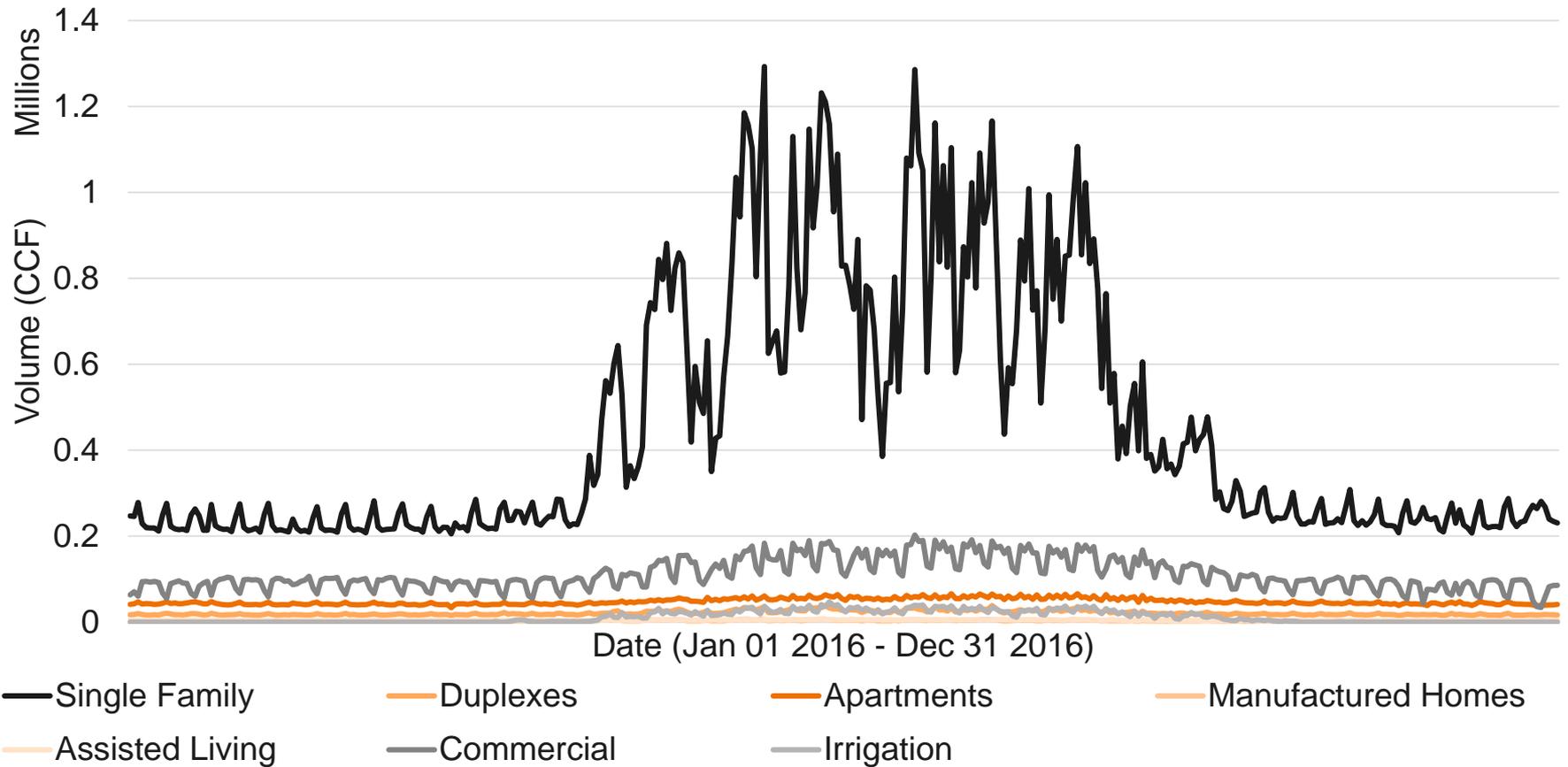
# How Our Water Use Has Changed



# Deep dive into 2016 monthly water use

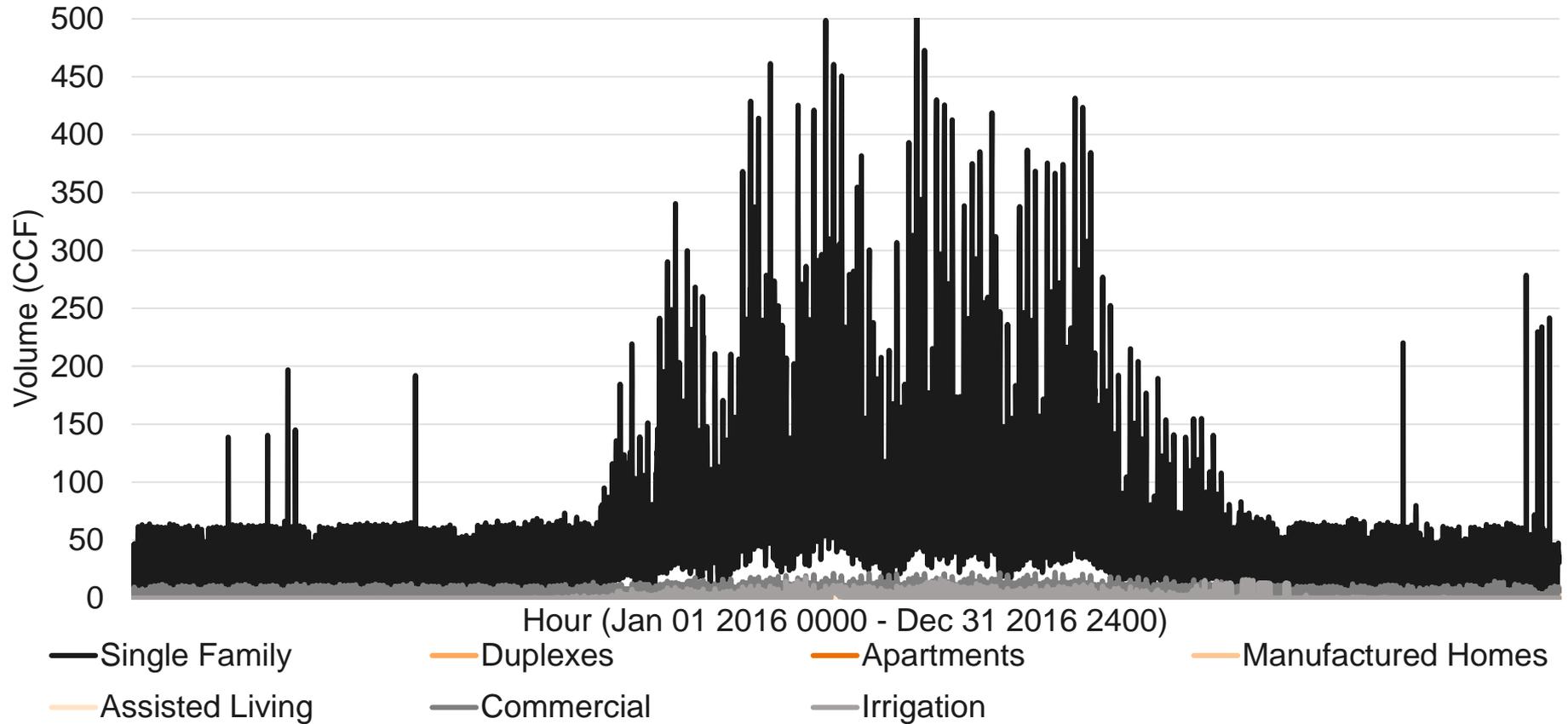


# Deeper dive into customer data



7.5 million data points from the Automated Meter Infrastructure Data were used for 2016 on a **daily** basis

# REALLY deep dive into customer data



175 million data points from the Automated Meter Infrastructure Data were used for 2016 on an **hourly** basis

# Summary of data evaluated (tabular)

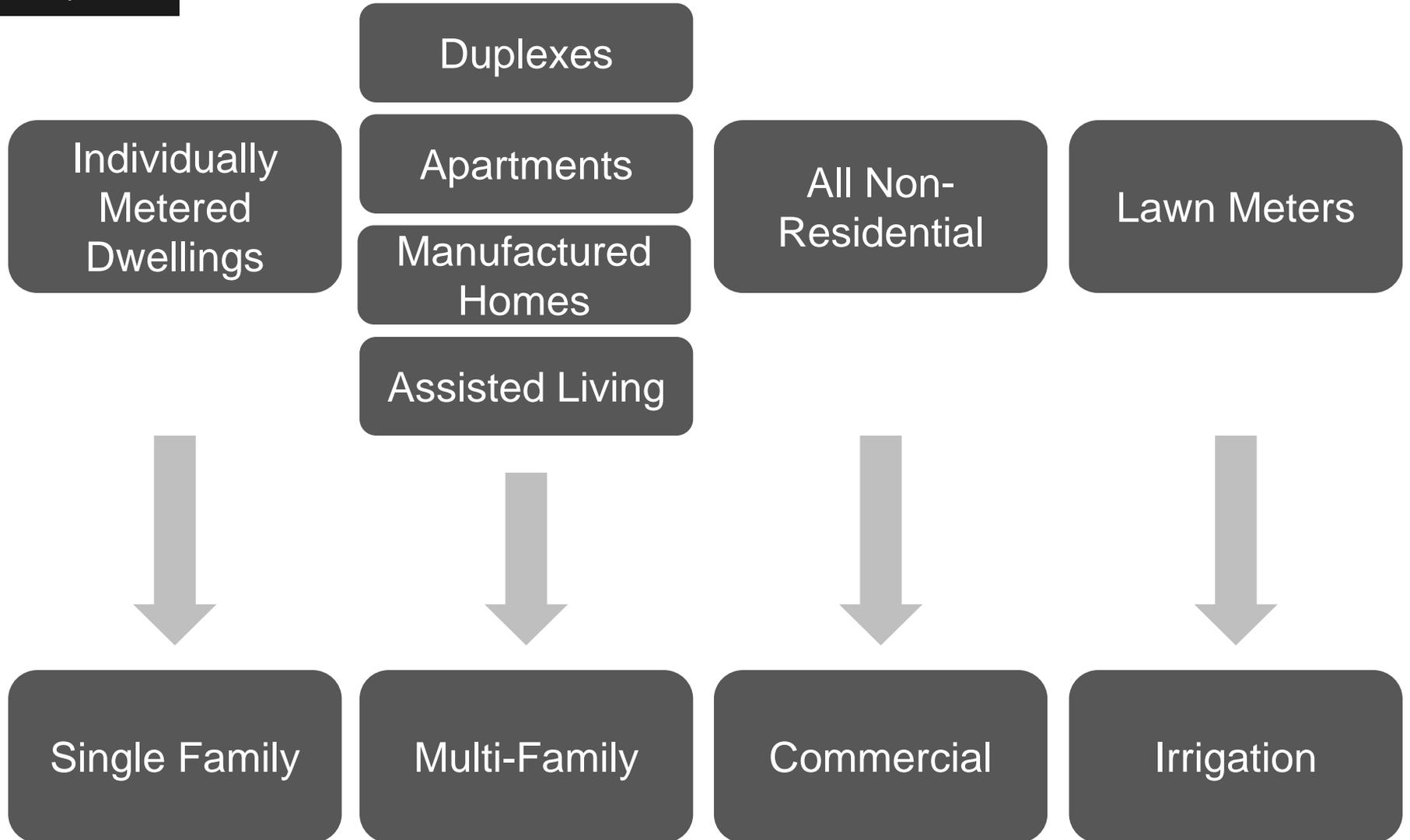
<b>Customer Type</b>	<b># of Accounts</b>	<b>2016 Water Use (CCF)</b>	<b>Peak Day Factor (Peak Day ÷ Avg Day)</b>	<b>Peak Hour Factor (Peak Hour ÷ Avg Hour)</b>
Single-Family	17,311	1,964,193	2.9	9.0
Duplexes	730	84,704	1.9	3.0
Apartments	1,060	582,398	1.4	3.1
Manufactured Homes	361	251,916	1.9	2.3
Assisted Living	14	29,356	1.6	1.9
Commercial	2,222	1,281,021	2.1	3.0
Irrigation	224	231,459	4.2	15.3

# Things to consider when establishing customer groups or classes

- Service characteristics
- Facility requirements
- Location
- Demand patterns
  - Average, maximum day, peak hour, monthly distribution
- Administrative requirements
- IT/Billing system capability
- Property uses
- Community/Stakeholder feedback

# Recommended Customer Classes

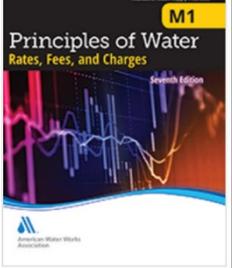
Water System



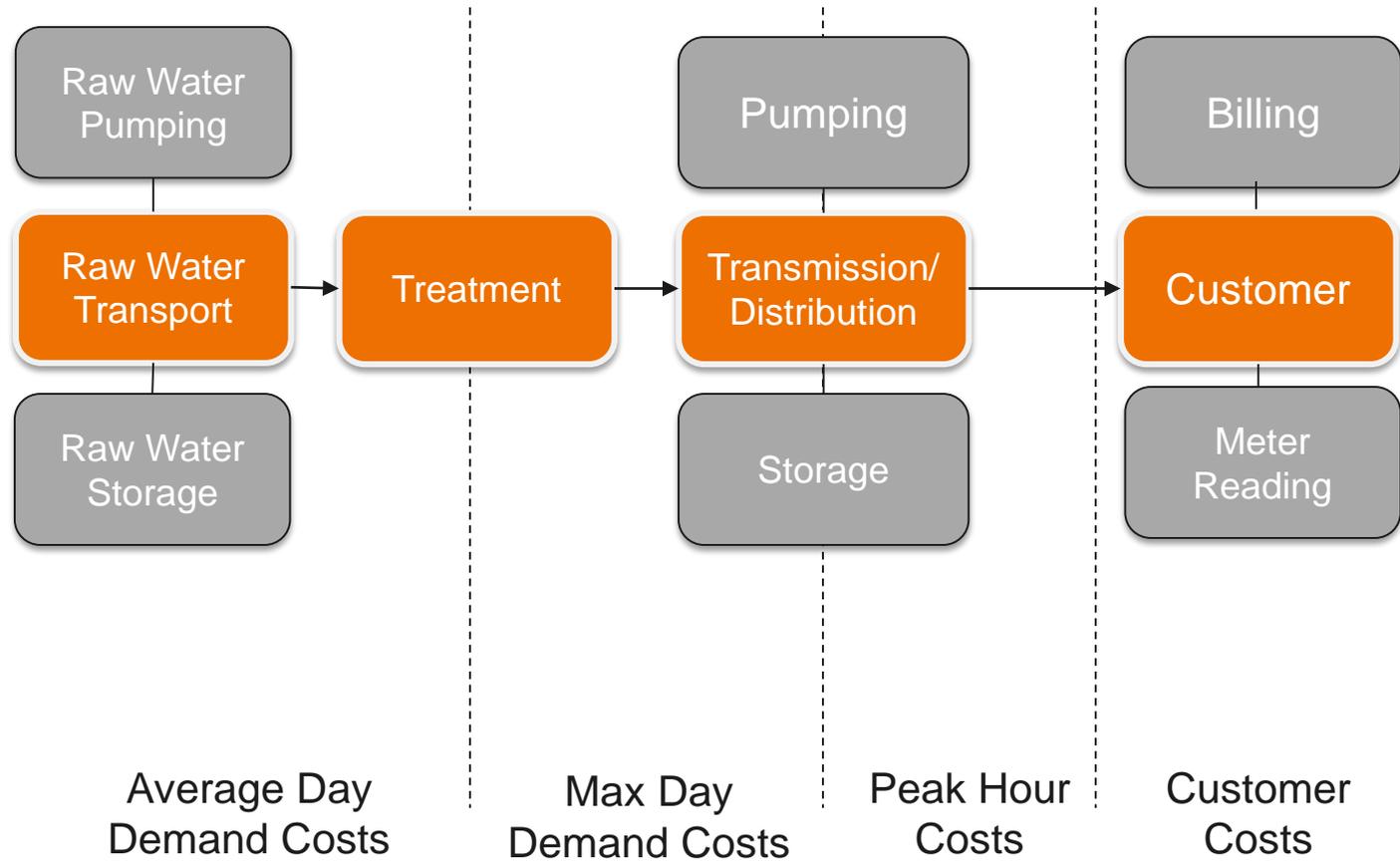
# Summary of data by customer class

<b>Customer Class</b>	<b># of Accounts</b>	<b>2016 Water Use (CCF)</b>	<b>Peak Day Factor (Peak Day ÷ Avg Day)</b>	<b>Peak Hour Factor (Peak Hour ÷ Avg Hour)</b>
Single Family	17,311	1,964,193	2.9	9.0
Multi-Family	1,834	948,373	1.5	2.2
Commercial	2,222	1,281,021	2.1	3.0
Irrigation	224	231,459	4.2	15.3

Implementation challenge: Consistent classification of same property uses with different metering configurations. Will require account auditing to identify property use in billing system and ensure equity.



# Started with a "By the Book" Process



# Function costs (\$ in millions) & units of service

<b>Functions →</b>	<b>Supply</b>	<b>Treatment</b>	<b>Distribution</b>	<b>Customer</b>	<b>Total</b>
<b>2019 Cost of Service →</b>	<b>\$3.1</b>	<b>\$6.7</b>	<b>\$8.5</b>	<b>\$1.5</b>	<b>\$19.8</b>
Average/Total Demands	100%	41%	21%		<b>\$7.7</b>
Maximum Day Demands		59%	30%		<b>\$6.4</b>
Peak Hour Demands			49%		<b>\$4.1</b>
Number of Accounts				100%	<b>\$1.6</b>

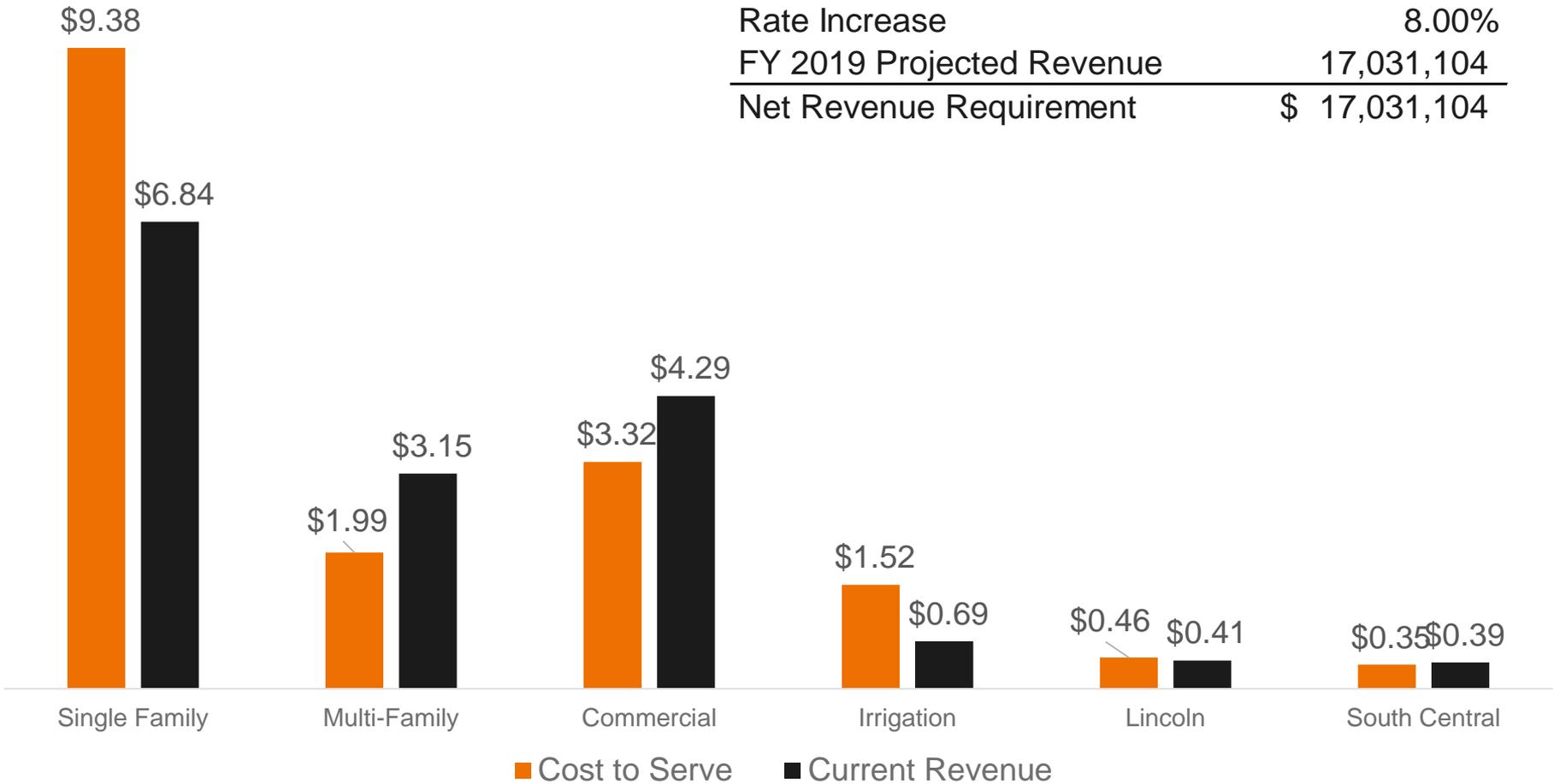
Allocation of costs between average day, maximum day, and peak hour based upon ratio of observed water system demands

# Units of service by customer class

<b>Customer Class</b>	<b># of Accounts</b>	<b>Avg. Day Demand (CCF)</b>	<b>Max Day Demand Per AMI (CCF)</b>	<b>Peak Hour Demand per AMI (CCF)</b>
Single Family	17,311	5,383	15,558	48,558
Multi-Family	1,834	2,598	3,923	5,612
Commercial	2,222	3,510	7,370	10,283
Irrigation	224	634	2,682	9,715

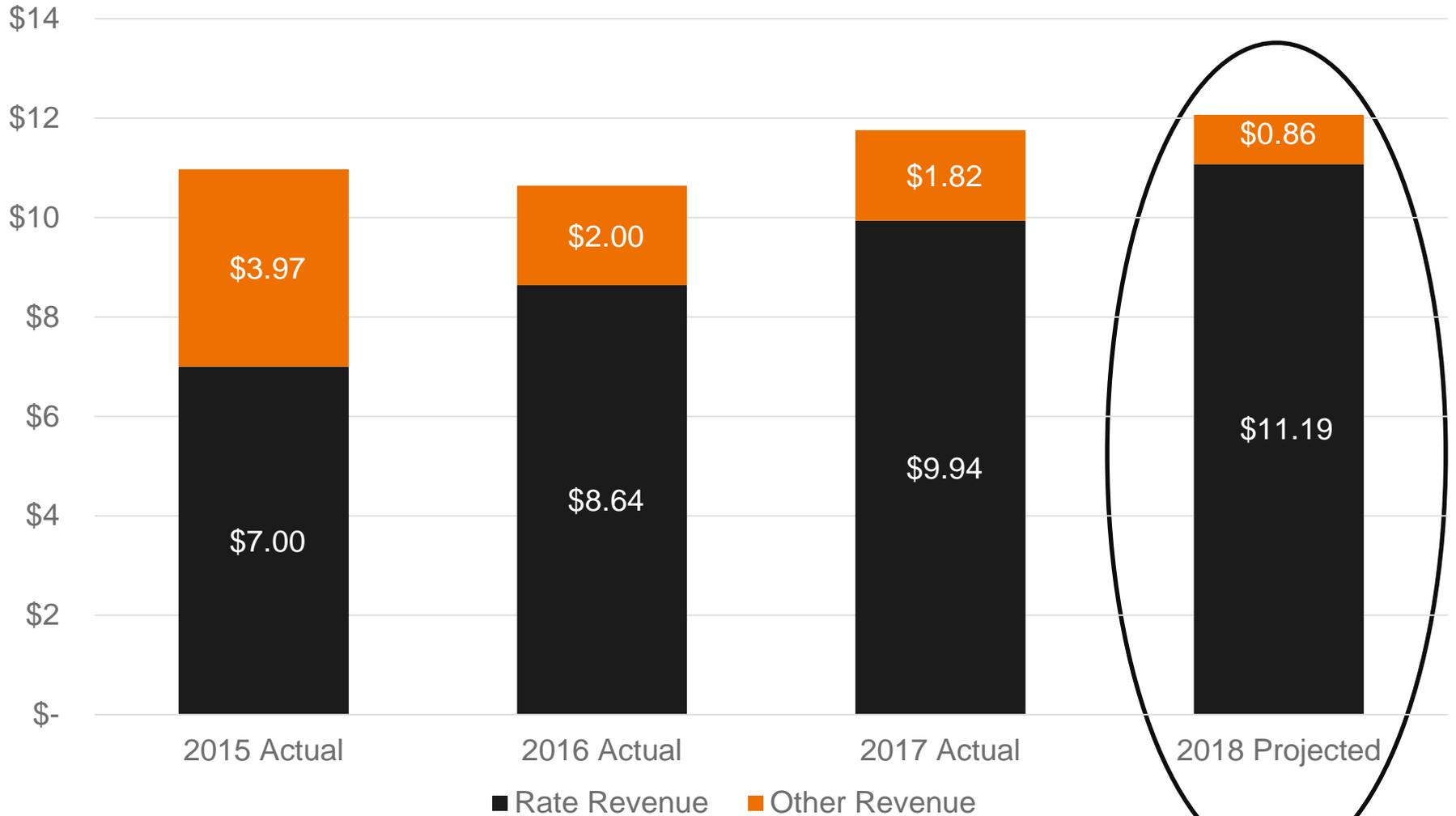
# Cost to Serve vs. Current Revenue (\$M)

Current Revenue	15,769,541
Rate Increase	8.00%
FY 2019 Projected Revenue	17,031,104
<b>Net Revenue Requirement</b>	<b>\$ 17,031,104</b>

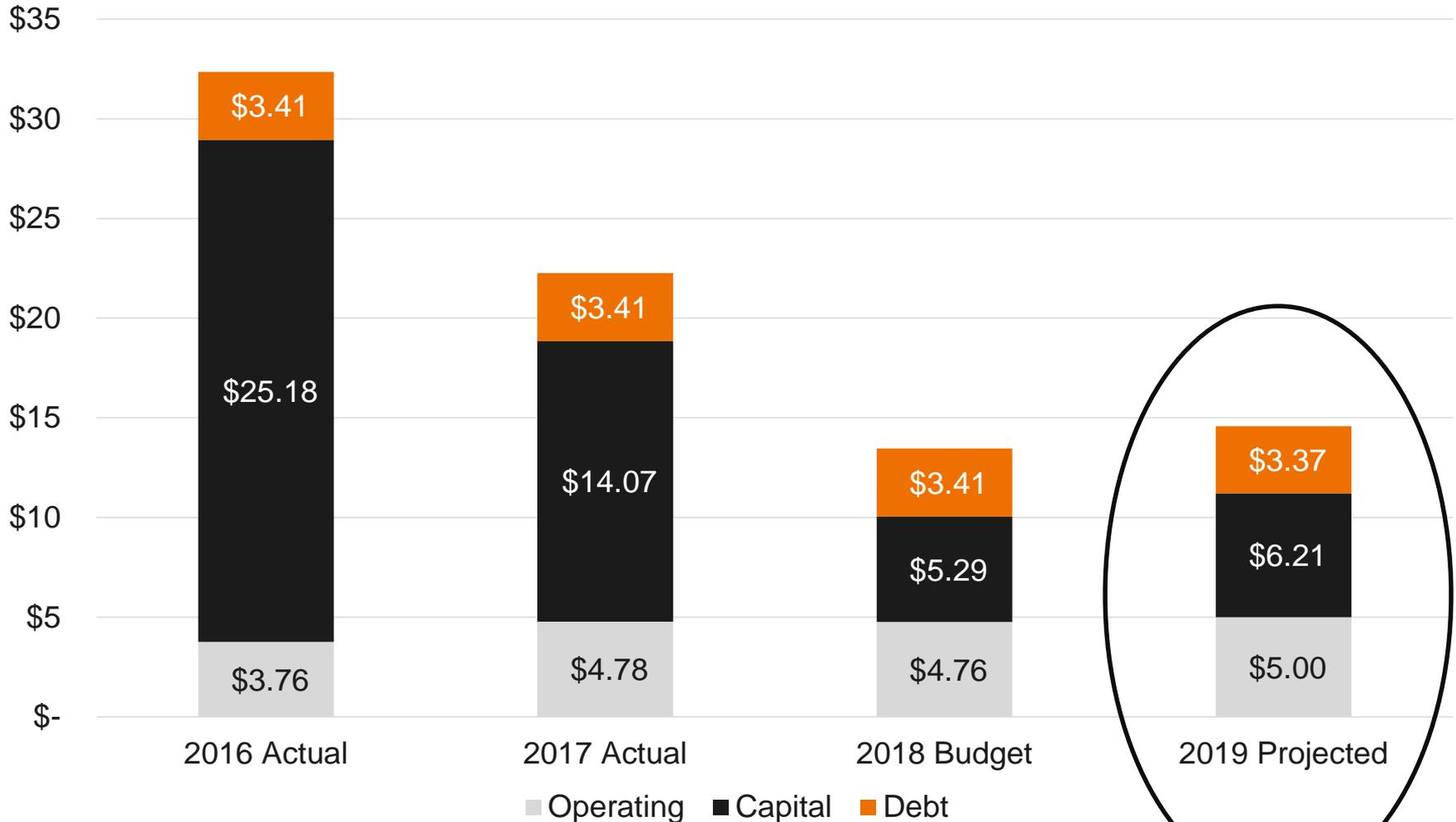


Sewer Utility System

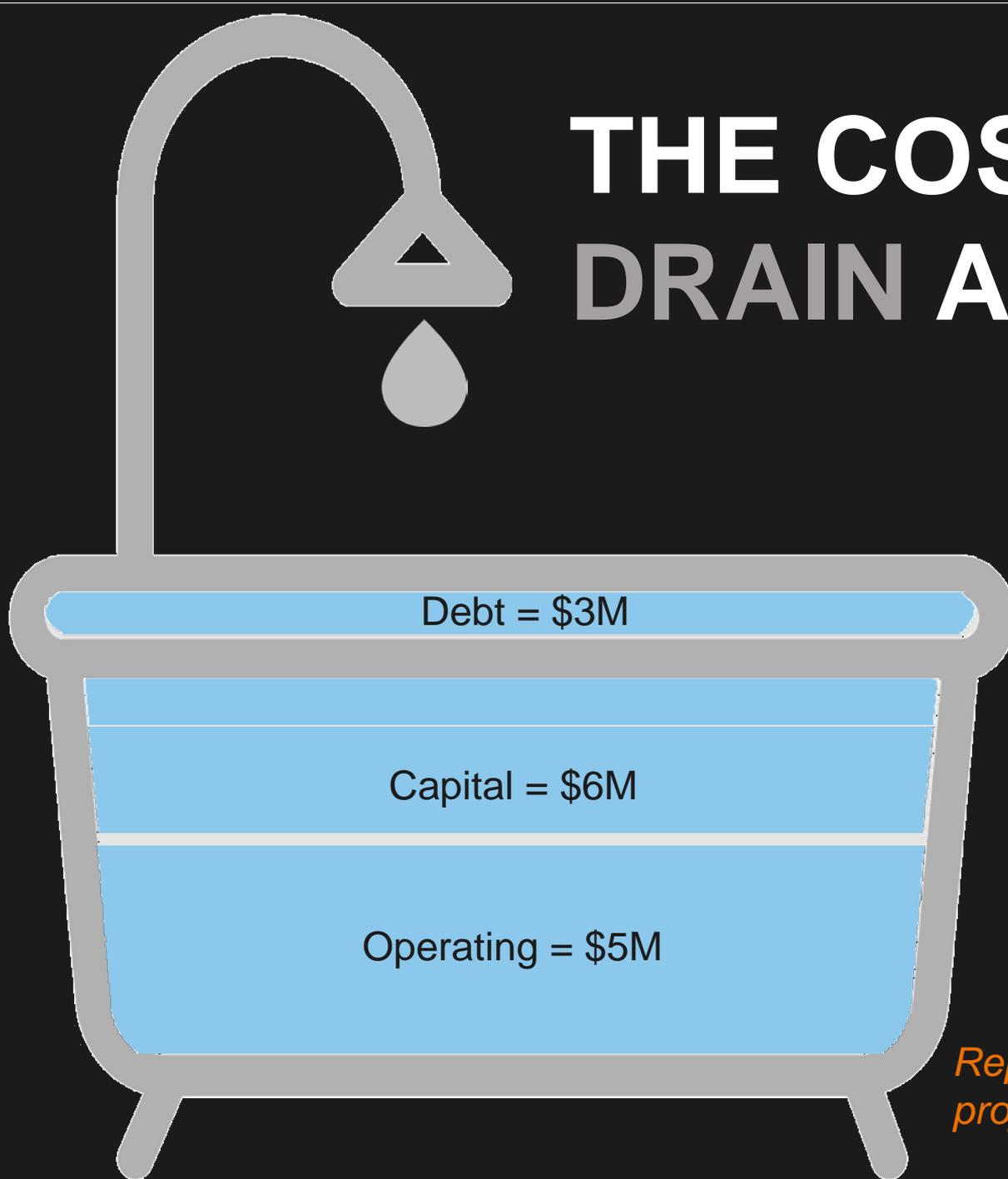
# Total Revenue (\$ in Millions)



# Total Expenditures (\$ in Millions)



# THE COST TO DRAIN A TUB



*Represents current  
projections for FY 2019*

# "Levelized" Plan of Adjustments

Sewer System

CALC LAST2  
SAVE OVR2  
CTRL

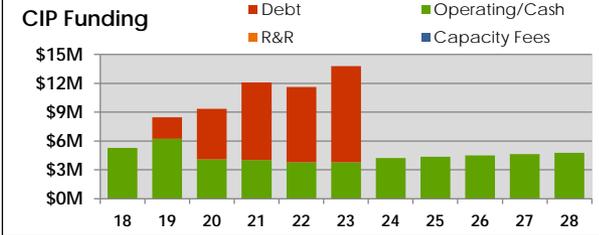
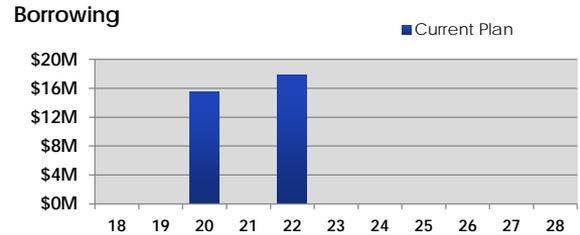
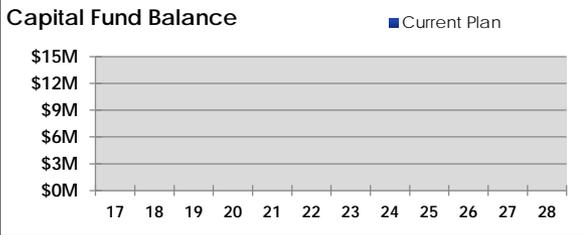
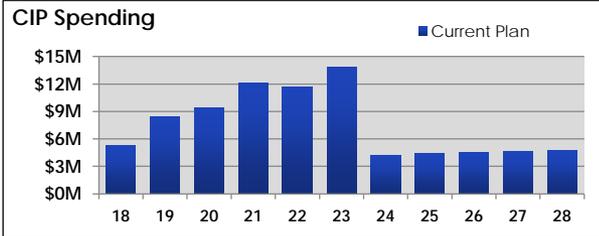
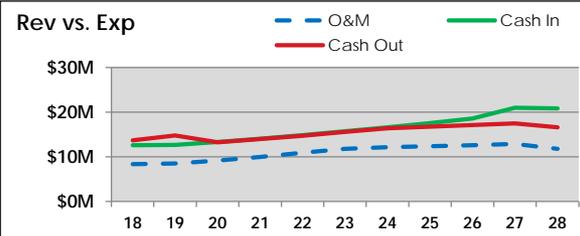
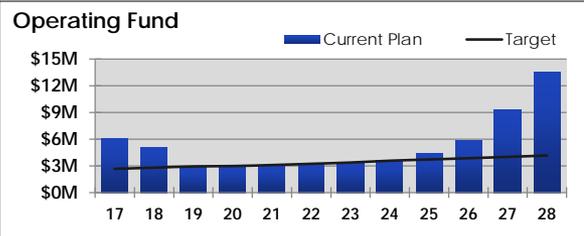
FAMS-XL

Bismarck, ND - Sewer Fund

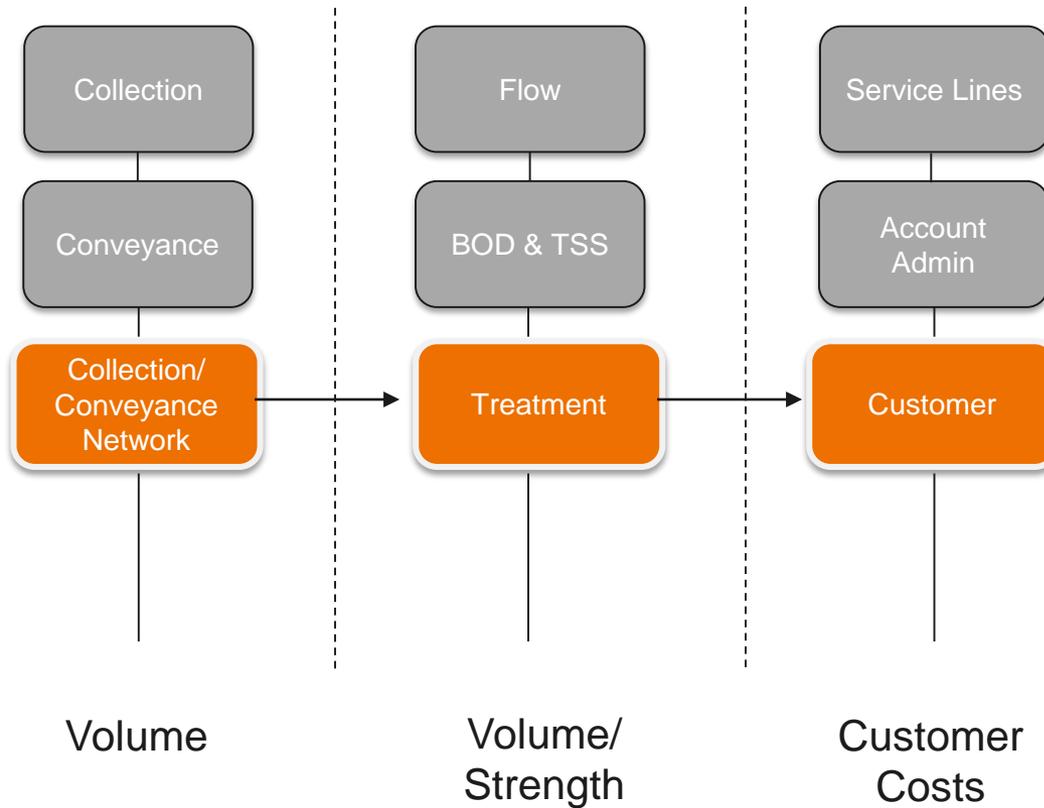
Level rate increases



	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2022	FY 2027
Sewer Rate Plan	0.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	21.56%	55.10%
Backup Surcharge	0.00%	-33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Senior-Lien DSC	2.14	2.27	2.11	1.97	1.79	1.70	1.80	1.92	2.06	2.20	3.05		
Avg Bill (9 CCF)	\$35.95	\$37.57	\$39.45	\$41.45	\$43.48	\$45.62	\$47.88	\$50.24	\$52.73	\$55.34	\$58.07		
Change \$		\$1.62	\$1.88	\$2.00	\$2.03	\$2.14	\$2.26	\$2.36	\$2.49	\$2.61	\$2.73	Check	-



# Started with a "By the Book" Process



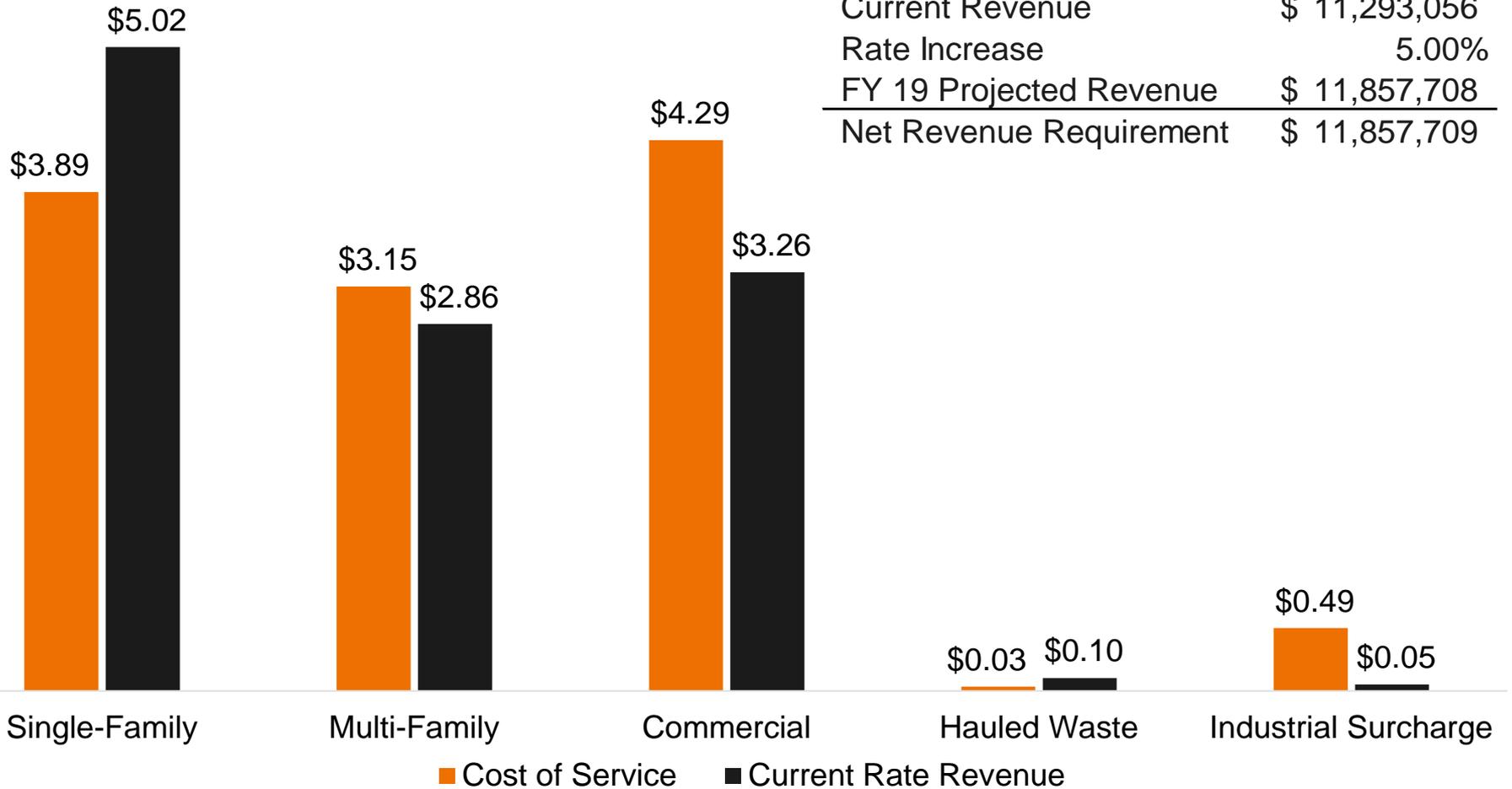
# Function costs (\$ in millions) & units of service

Functions →	Collection	Treatment - Flow	Treatment - BOD	Treatment - TSS	Pretreatment Mgmt	Customer	Total
<b>2019 Cost of Service →</b>	<b>\$4.2</b>	<b>\$4.2</b>	<b>\$2.8</b>	<b>\$3.2</b>	<b>\$0.2</b>	<b>\$0.1</b>	<b>\$14.7</b>
Flow (CCF)	100%	100%					<b>\$8.4</b>
BOD (lbs)			100%				<b>\$2.8</b>
TSS (lbs)				100%			<b>\$3.2</b>
Non-residential flow (CCF)					100%		<b>\$0.2</b>
Number of Accounts						100%	<b>\$0.1</b>

# Units of service by customer class

Customer Type	# of Accounts	Flow (CCF)	BOD (lbs)	TSS (lbs)
Single Family	18,301	990.616	1,545,996	2,164,395
Multi-Family	1,832	728,061	1,136,242	1,590,739
Commercial	1,995	944,029	1,473,291	2,062,607
Hauled Waste	N/A	1,748	27,274	38,183
Industrial Surcharge	N/A	116,932	797,232	184,861

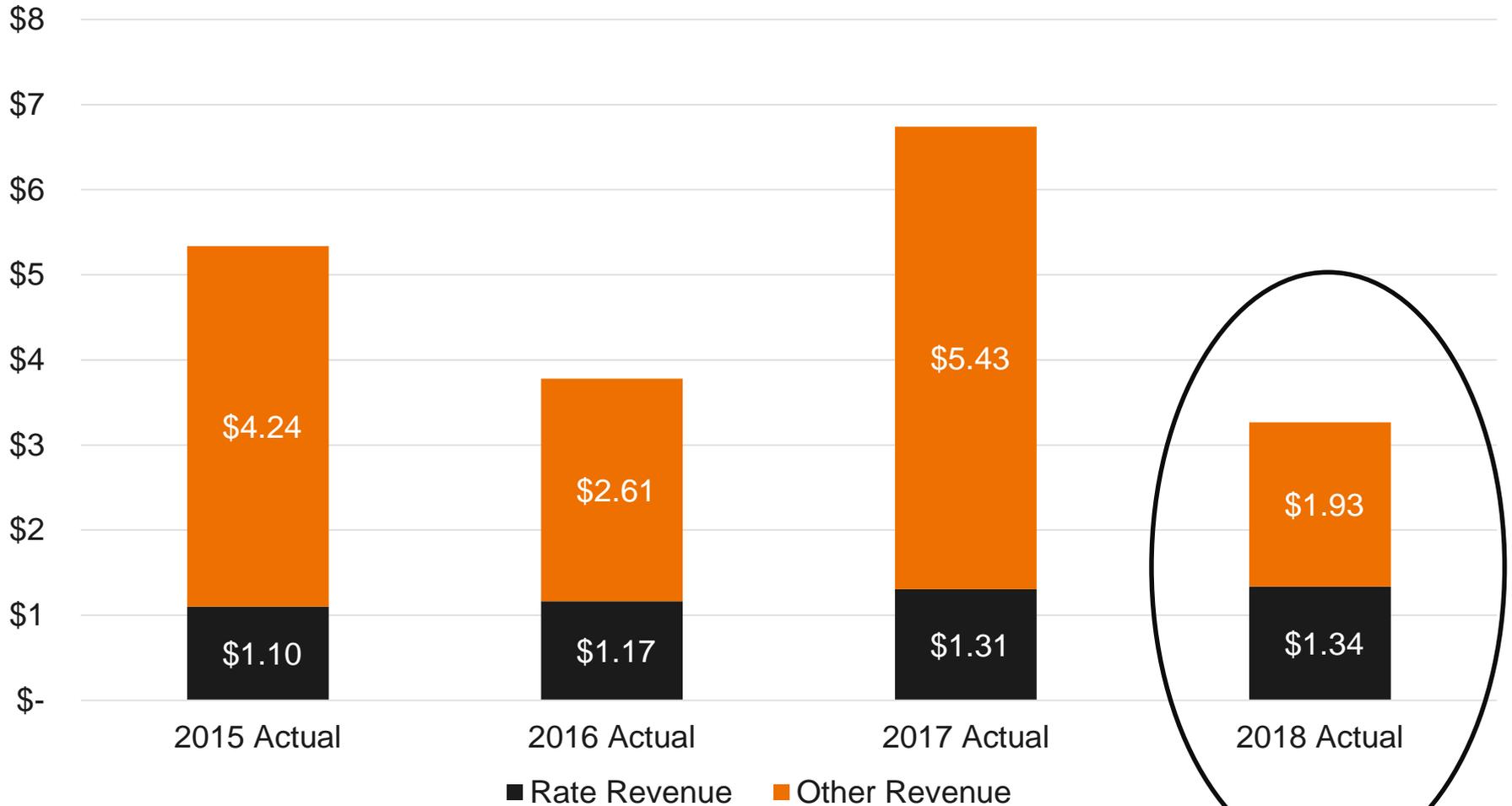
# Cost to Serve vs. Current Revenue



Current Revenue	\$ 11,293,056
Rate Increase	5.00%
FY 19 Projected Revenue	\$ 11,857,708
Net Revenue Requirement	\$ 11,857,709

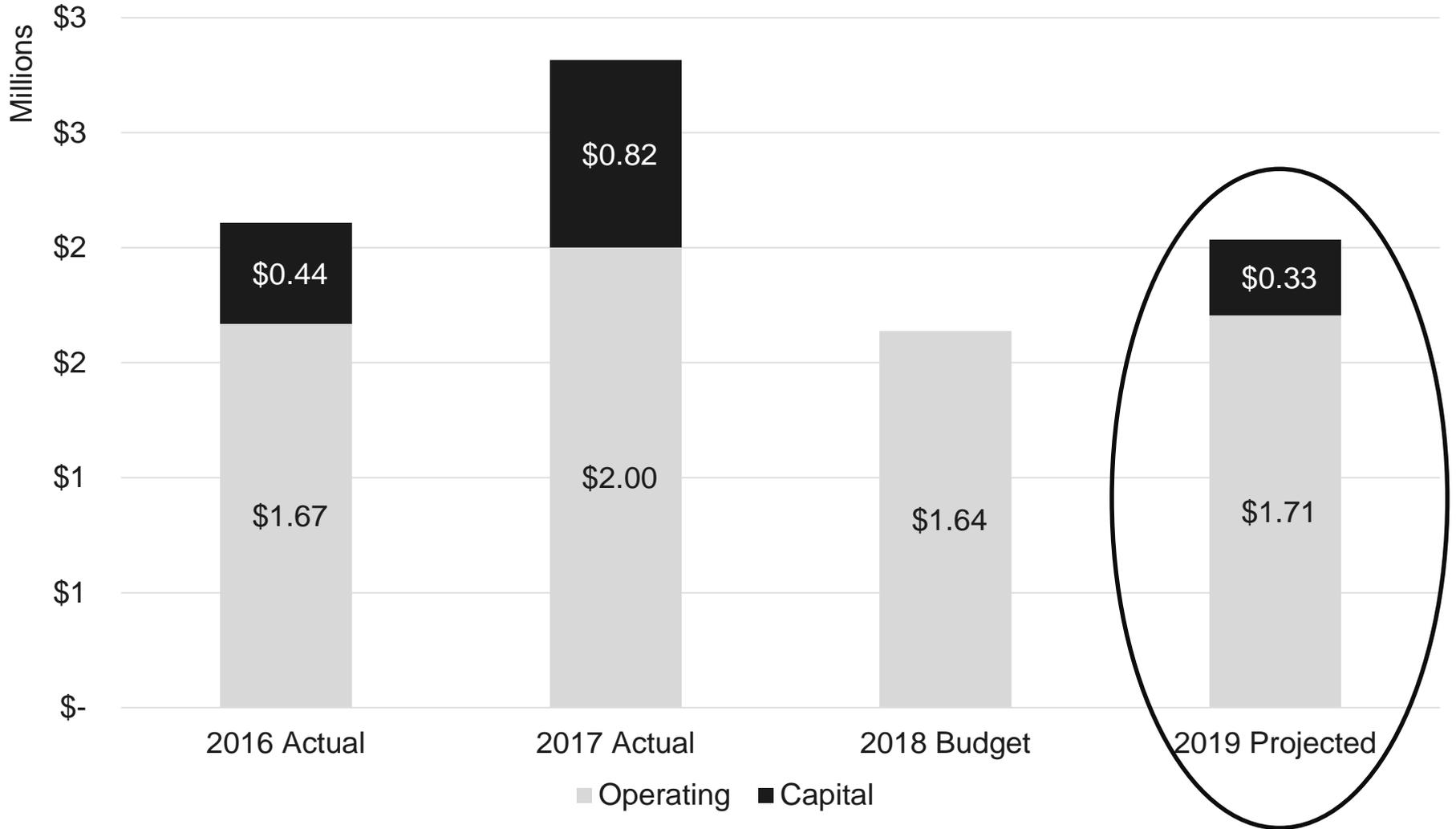
# Stormwater Utility System

# Total Revenue (\$ in Millions)



\*Other revenue includes unannexed surcharge revenue through FY 18.

# Total Expenditures (\$ in Millions)



# THE COST TO REMOVE the RAIN



*Represent current  
projections for FY 2019*

# Stormwater financial plan

Stormwater System

CALC  
SAVE

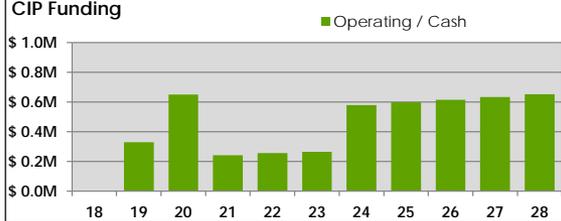
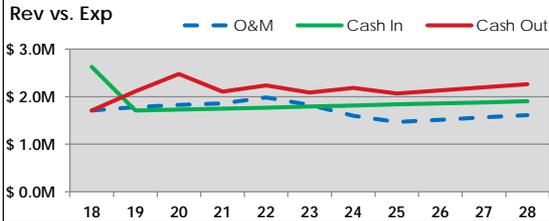
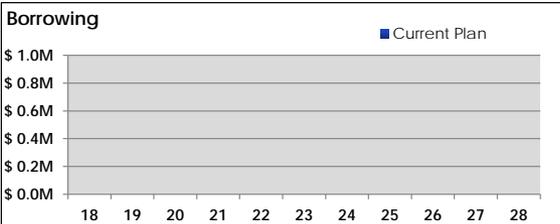
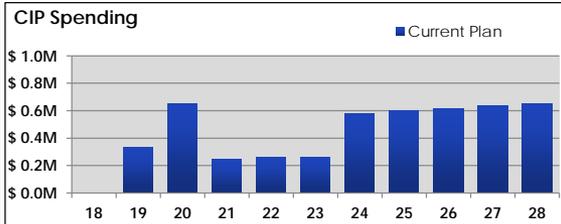
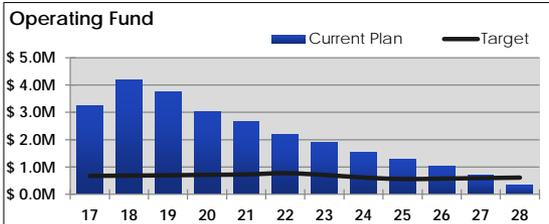
Remove unannexed surcharge

FAMS-XL

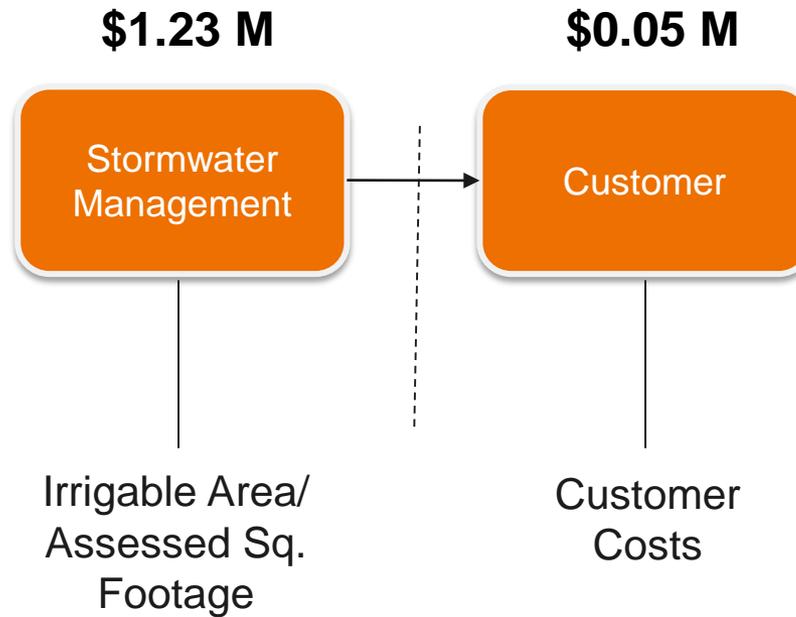
Bismarck, ND - Stormwater Fund



	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2023	FY 2028
Stormwater Fee Rate Plan	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Surcharge Rate Plan	0.00%	-100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-100.00%	
Res Charge (8-16k ASF)	\$4.65	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70	\$2.70		
Change \$		(\$1.95)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	Check	



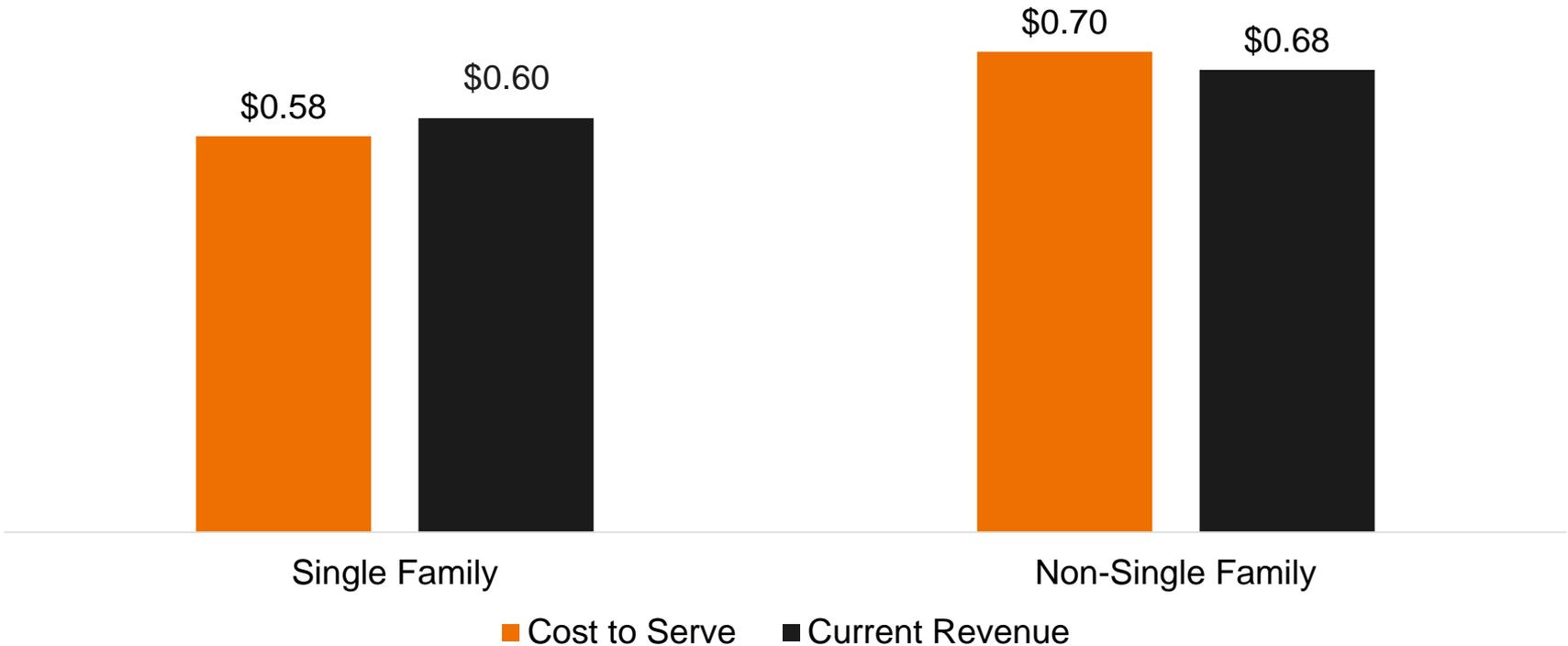
# Cost Allocation Process



	Impervious Area	Number of Customers
< 8,000 ASF	22M	7,374
8,000 - 16,000 ASF	58M	10,722
> 16,000 ASF	11M	1,314
<b>Single Family</b>	<b>91M</b>	<b>19,030</b>
<b>Non-Single Family</b>	<b>118M</b>	<b>2,583</b>

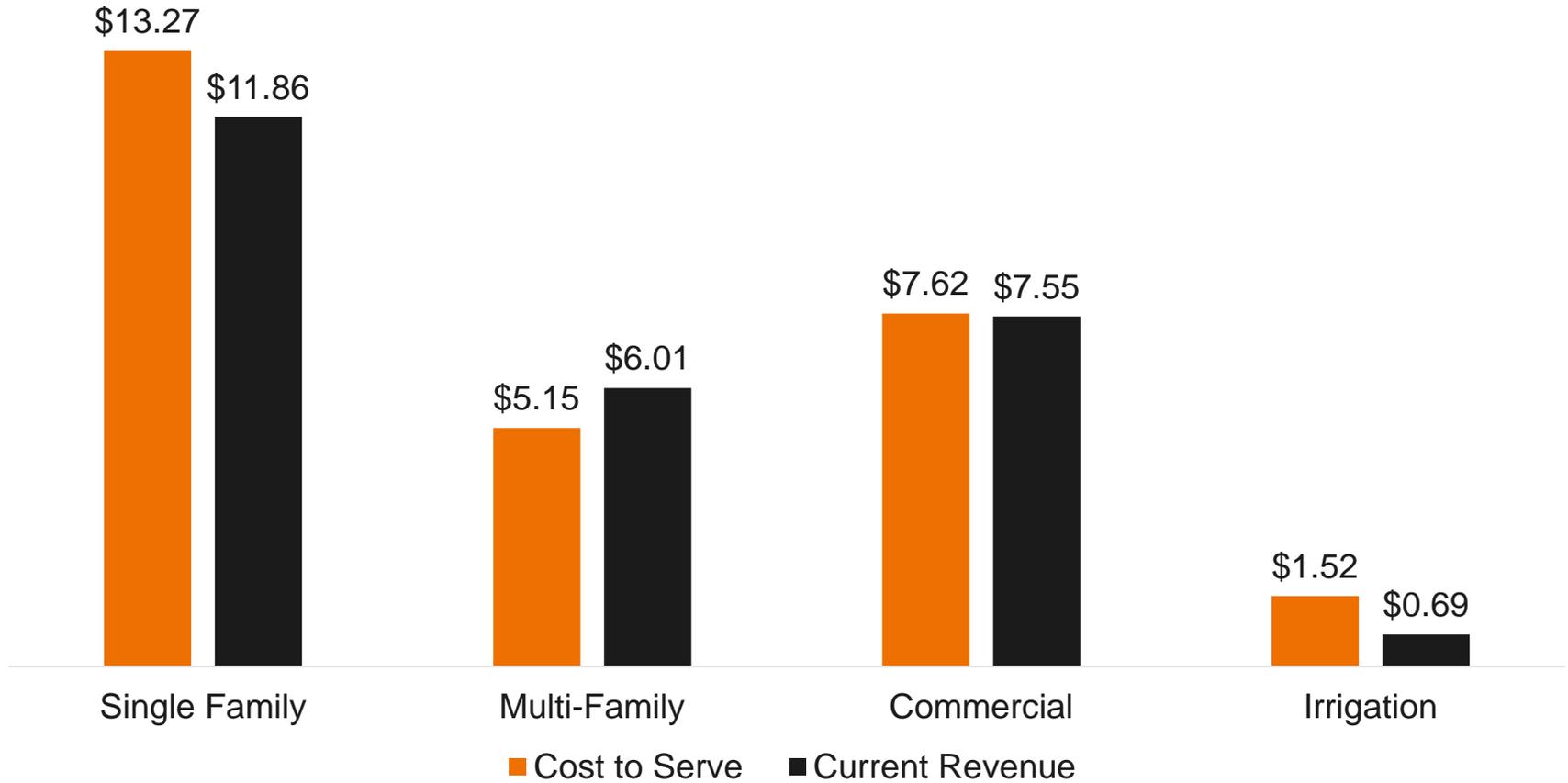
# Cost to Serve vs. Current Revenues (\$M)

Current Revenue	\$ 1,284,663
Rate Increase	0.00%
FY19 Projected Revenue	\$ 1,284,663
Net Revenue Requirement	\$ 1,284,663

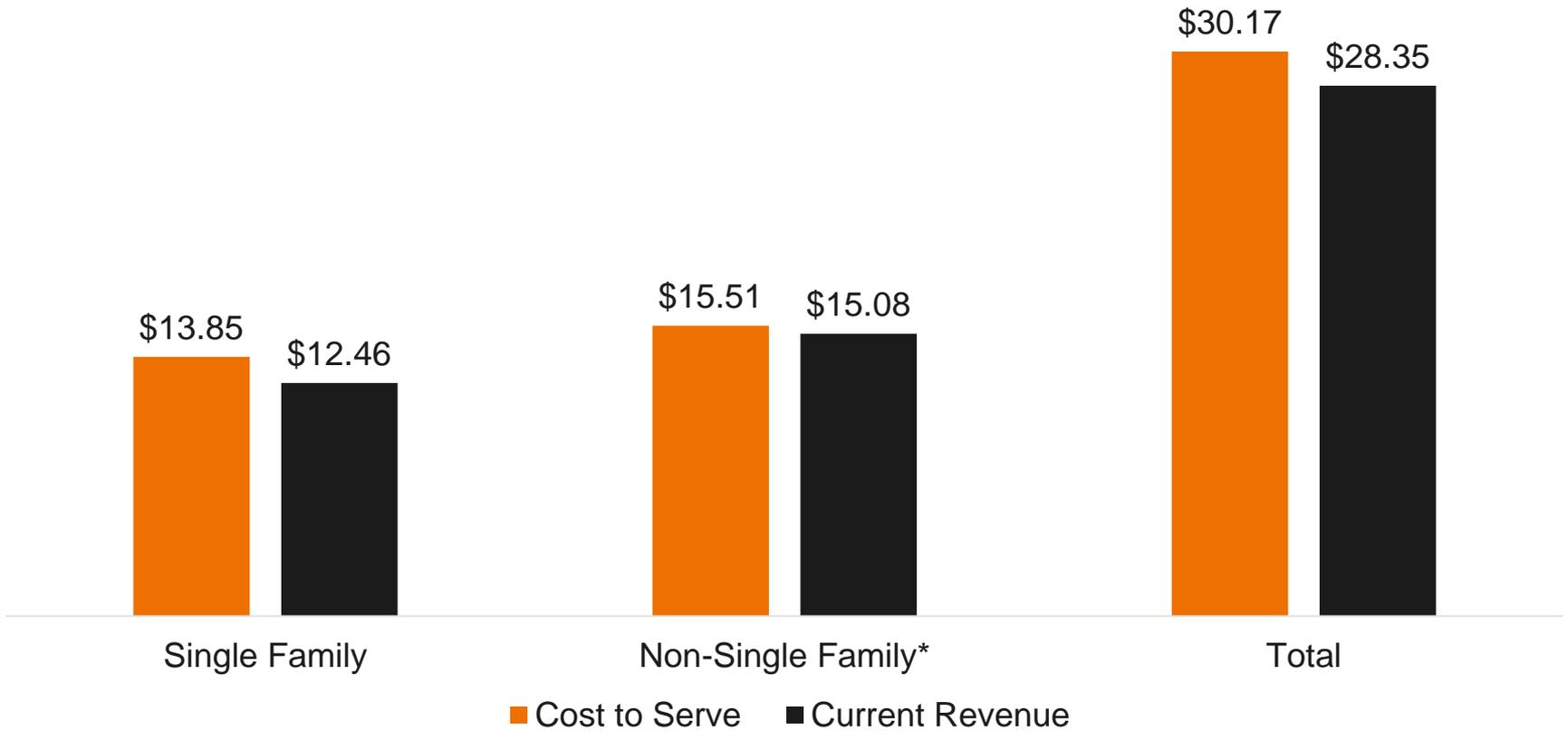


Bringing it Together & Remaining Schedule

# Cost to Serve vs. Current Revenue: Water and Sewer Utilities



# Cost to Serve vs. Current Revenue: Water, Sewer, and Stormwater



\*Includes Multi-Family, Commercial, and Irrigation Customer Classes

# Full schedule and remaining activities

Project Timeline

Phase	Task	Description	Month												
			May	June	July	August	Sept.	Oct.	Nov.	Dec.					
Phase I	Task 1	Project Initiation, Data Collection & "Rates 101"													
Phase I	Task 2	Evaluate Rates, Fees, Surcharges, and Policies													
Phase II	Task 3	Determine Revenue Requirements													
Phase II	Task 4	Conduct Cost Allocation Analysis													
Phase II	Task 5	Calculate New Rates, Fees & Charges													
Phase II	Task 6	Stakeholder Presentation													
Phase III	Task 7	Prepare & Present Report													
Phase III	Task 8	Provide Rate Model													

Kick-off Workshop: 5/7 & 5/8  
Public Input: 5/7 & 6/11  
Results to Commission: 6/26

Interactive Work Session #1

Interactive Work Session #2

Interactive Work Session #3

Interactive Work Session #4

Public Meetings

Staff Meeting to Wrap-Up

Prepare Report

Commission Presentation

Development of rate modeling tools included in tasks above

Model Training

**Focus of next meeting: Specific rates and customer impact analysis**

Additional Questions and Answers