



City of Bismarck, North Dakota

Utility Cost of Service
& Rate Design Study:

*Stakeholder Meeting:
Phase II – Rate
Design*

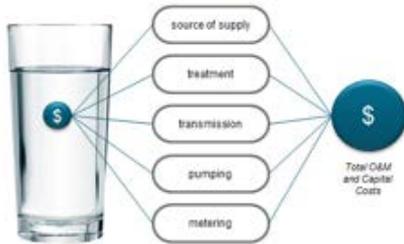
September 19, 2018

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
 - Public meeting on 9/5 – cost of service
- 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

Recap of cost allocation process

- Customer usage patterns and characteristics
- Recommended customer classes
- Cost allocation methodology
- Allocations and current revenue by customer class

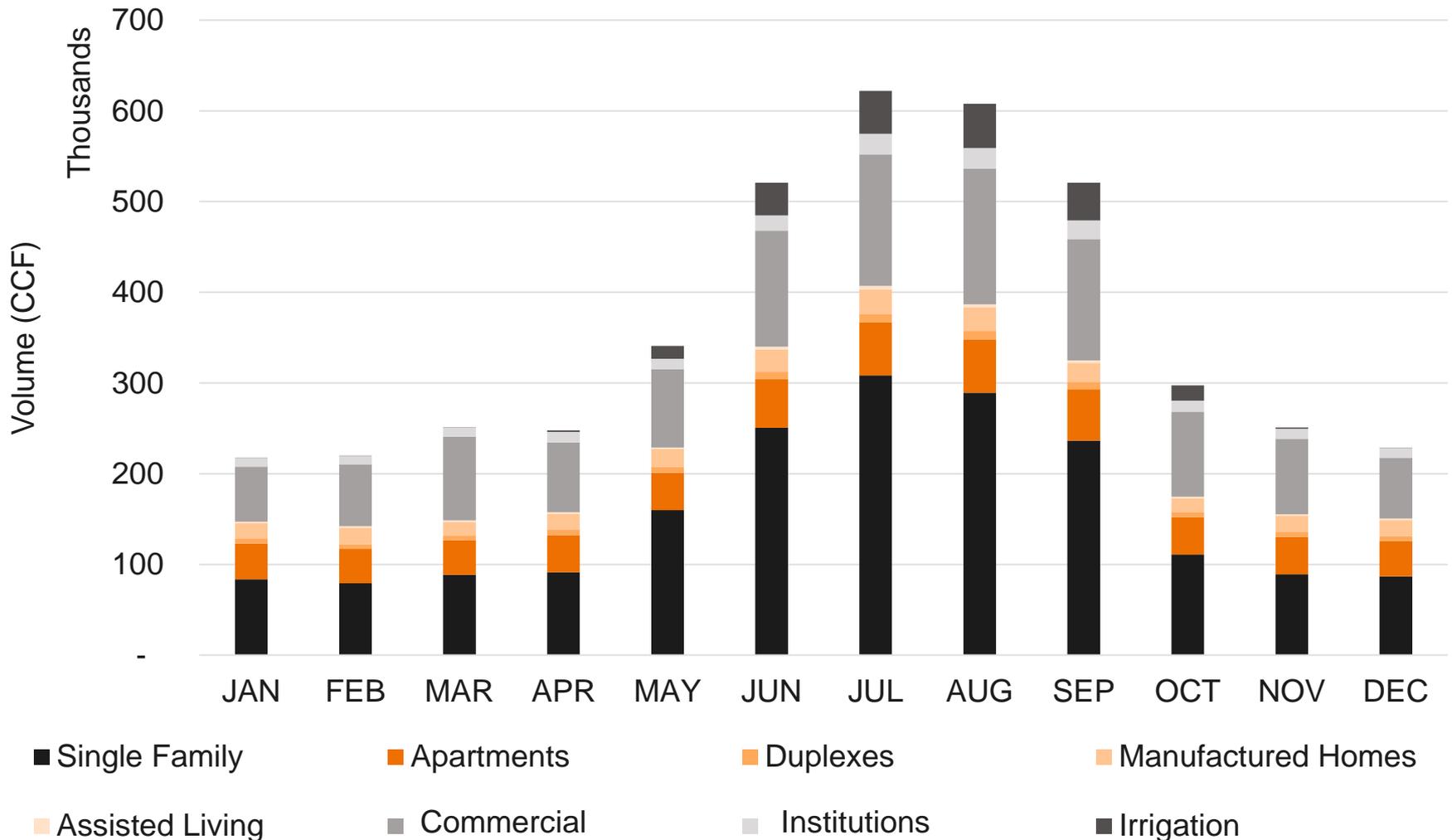
Review initial rate structures for each class

Goal: Understand basis of new rate structures and corresponding impact to customer bills

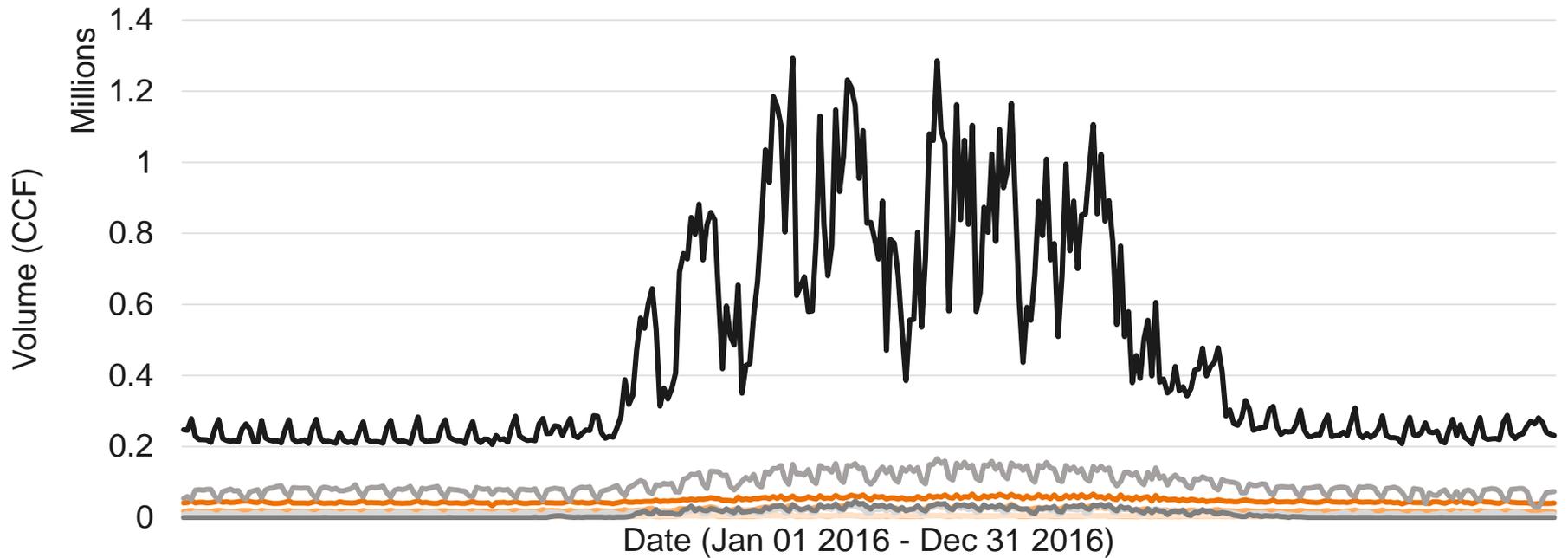
Ask lots of questions & provide comments!

Water Utility System

Deep dive into 2016 monthly water use



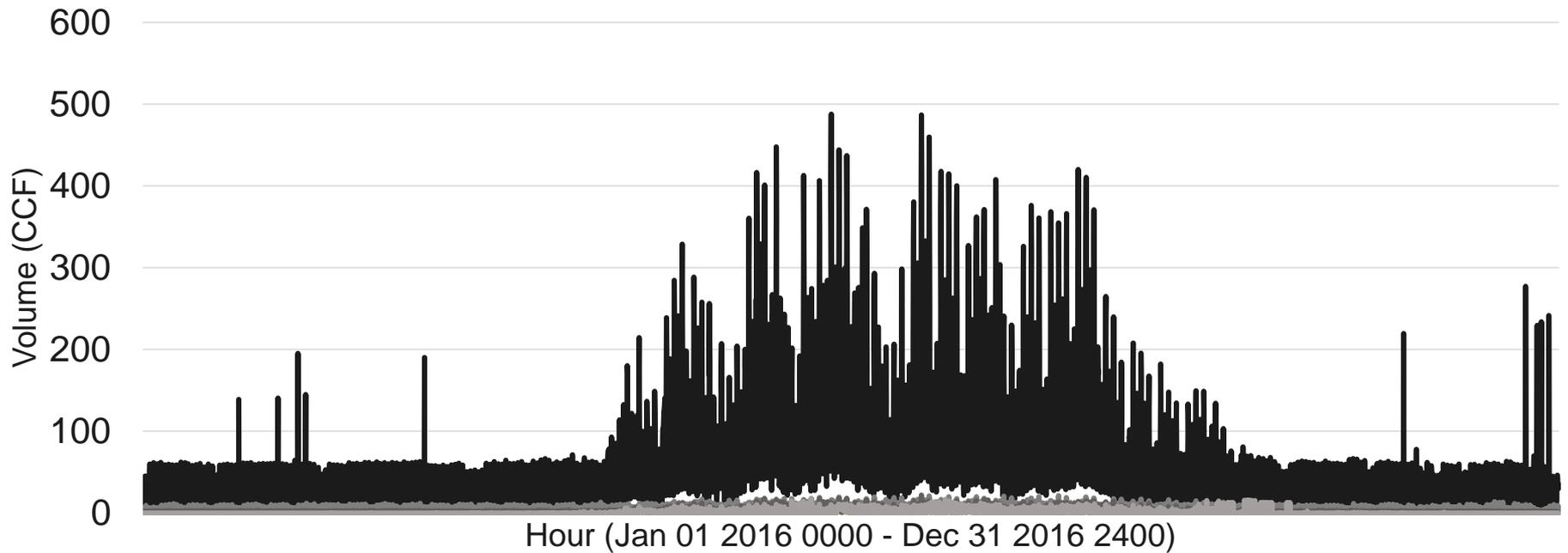
Deeper dive into customer data



- Single Family
- Duplexes
- Apartments
- Manufactured Homes
- Assisted Living
- Commercial
- Institutions
- Irrigation

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



- Single Family
- Duplexes
- Apartments
- Manufactured Homes
- Assisted Living
- Commercial
- Institutions
- Irrigation

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

Summary of data evaluated (tabular)

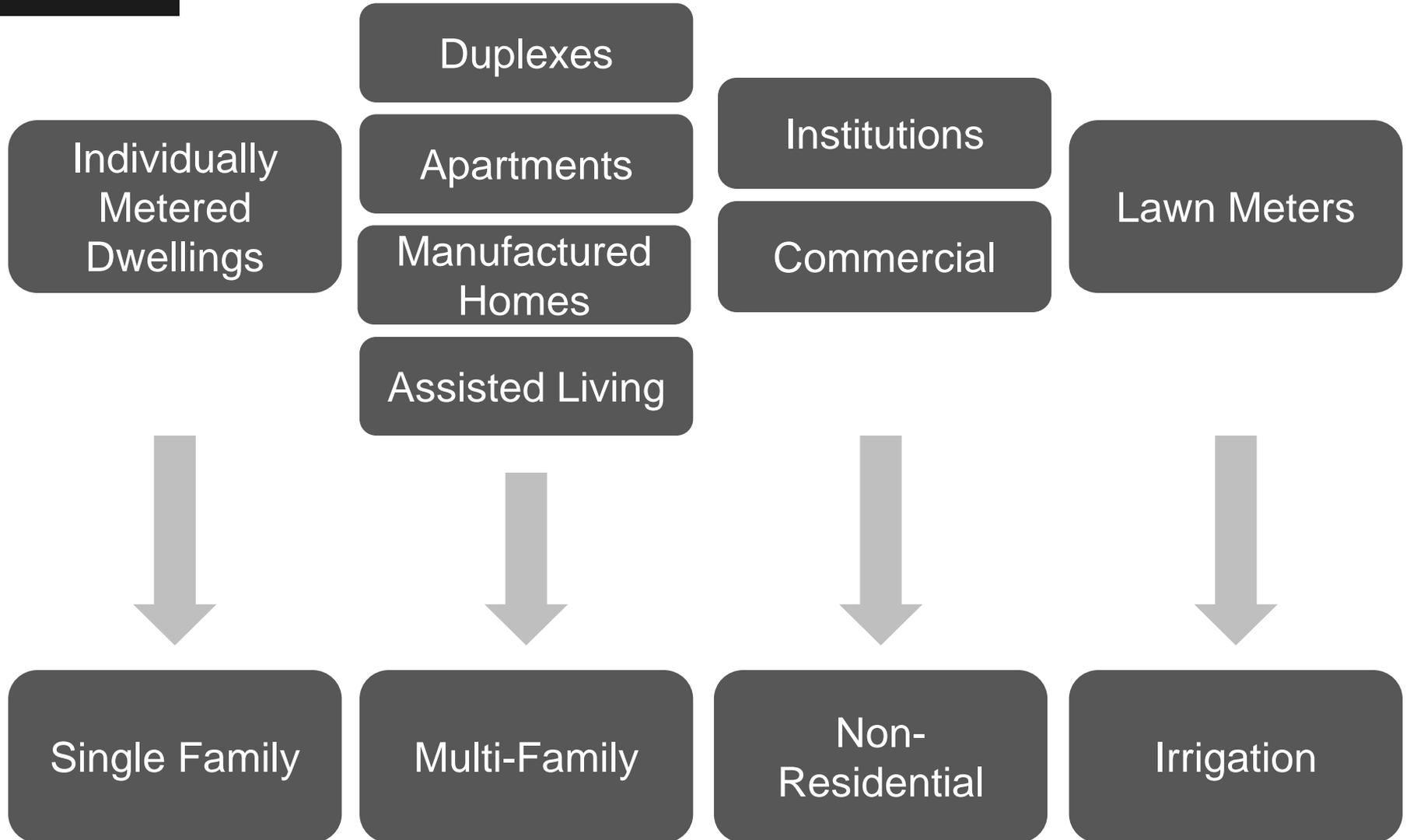
Customer Type	# of Accounts	2016 Water Use (CCF)	Peak Day Factor (Peak Day ÷ Avg Day)	Peak Hour Factor (Peak Hour ÷ Avg Hour)
Single-Family	17,306	1,964,193	2.9	9.0
Duplexes	730	84,704	1.9	3.0
Apartments	1,060	582,398	1.4	3.1
Manufactured Homes	30	251,916	1.9	2.3
Assisted Living	14	29,356	1.6	1.9
Commercial	2,066	1,121,241	1.8	3.8
Institutions	156	159,780	2.2	4.0
Irrigation	224	231,459	4.2	15.3
Lincoln	1	125,678	2.9	3.7
South Central	1	117,336	2.3	2.7

Peak day and peak hour factors presented are non-coincident and may occur during different periods.

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



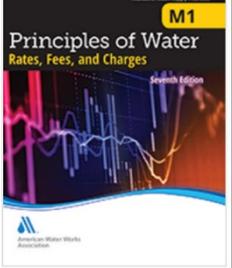
Summary of data by customer class

Customer Class	# of Accounts	2016 Water Use (CCF)	Peak Day Factor (Peak Day ÷ Avg Day)	Peak Hour Factor (Peak Hour ÷ Avg Hour)
Single Family	17,306	1,964,193	2.9	9.0
Multi-Family	1,834	948,373	1.5	2.2
Non-Residential	2,222	1,281,021	1.8	3.0
Irrigation	224	231,459	4.2	15.3

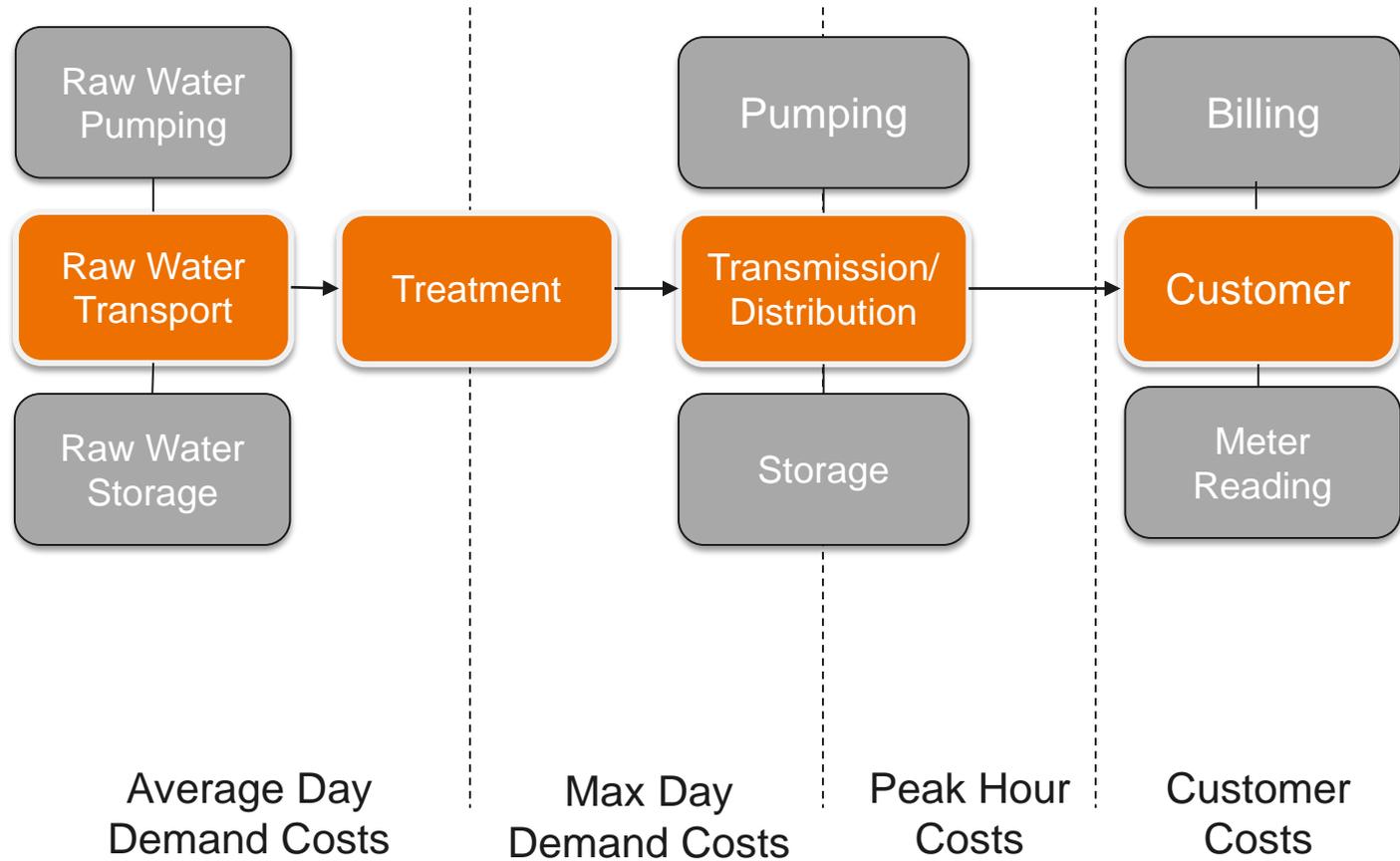
Implementation challenge: Consistent classification of same property uses with different metering configurations. Will require account auditing to identify property use in billing system and ensure equity.

Lincoln	1	125,678	2.9	3.7
South Central	1	117,336	2.3	2.7

Implementation challenge: Addressing Lincoln and South Central cost of service requirements vs. pricing per current contracts.



Started with a "By the Book" process



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

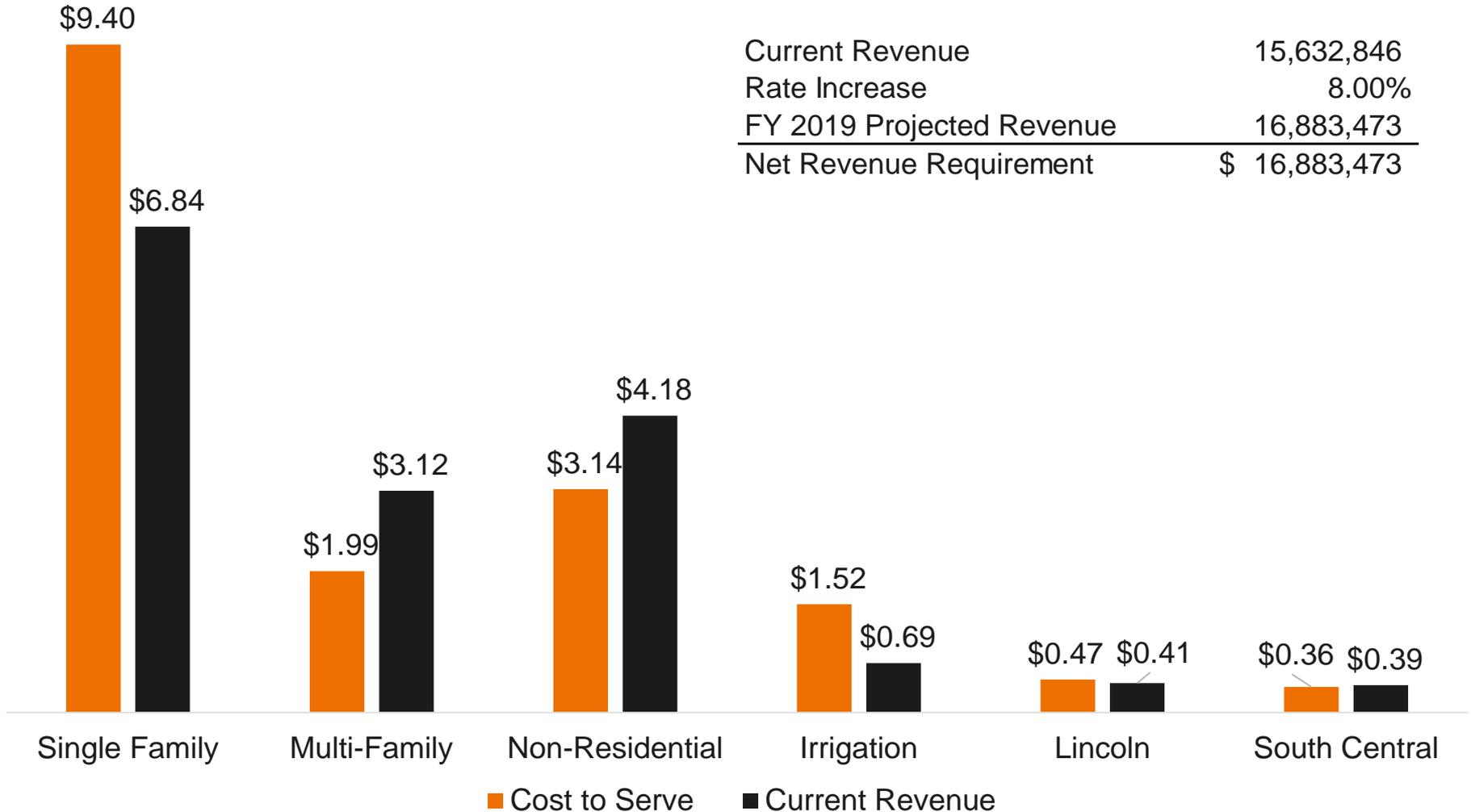
Functions →	Supply	Treatment	Distribution	Customer	Total
2019 Cost of Service →	\$3.1	\$6.7	\$8.3	\$1.7	\$19.8
Average/Total Demands	100%	41%	21%		\$7.7
Maximum Day Demands		59%	30%		\$6.4
Peak Hour Demands			49%		\$4.0
Number of Accounts				100%	\$1.7

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

Customer Class	# of Accounts	Avg. Day Demand (CCF)	Max Day Demand Per AMI (CCF)	Peak Hour Demand per AMI (CCF)
Single Family	17,306	5,383	15,558	48,558
Multi-Family	1,834	2,598	3,923	5,612
Non-Residential	2,222	3,510	6,388	10,283
Irrigation	224	634	2,682	9,715

Cost to serve vs. current revenue (\$M)



Current Revenue	15,632,846
Rate Increase	8.00%
FY 2019 Projected Revenue	16,883,473
Net Revenue Requirement	\$ 16,883,473

Proposed water rate structure

Single Family

- Customer charge
- Base charge (“Readiness-to-Serve”)
- Volumetric charge
 - Inclining block
 - 5 tiers based on data analysis
 - Tier 1 & 2 - Indoor use
 - Tier 3, 4 & 5 - Outdoor use
- Service line repair (“curb stop”) charge (\$2.00)
 - Not applicable to private drives

Multi-Family, Non-Residential, Irrigation

- Customer charge
- Base charge (“Readiness-to-Serve”)
- Volumetric charge
 - Uniform rate unique to each class based on cost of service

Basis of proposed water rate structure

Rate Design

Cost Component	Charge Type	How Charge is Applied
Customer Cost	Customer Charge	Per Bill
Average Day Cost	Base Charge (50%)	Scaled by Meter Size
Max Day Cost	Volume Charge	Per CCF of Metered Water Volume (different rates for each customer class)
Peak Hour Cost		

Water monthly fixed charge summary

Meter Size	Number of Meters	Max. Flow Rate (gpm)	Equiv. Factor	Current Base Rate	Proposed Base Rate	Customer Charge
5/8"	922	20	1.0	\$ 5.75	\$ 5.46	\$ 4.19
3/4"	9,171	30	1.5	6.50	8.19	4.19
1"	10,513	50	2.5	7.50	13.65	4.19
1.5"	979	100	5.0	18.00	27.30	4.19
2"	600	160	8.0	25.00	43.68	4.19
3"	196	350	17.5	35.00	95.55	4.19
4"	58	600	30.0	50.00	163.80	4.19
6"	28	1,350	67.5	100.00	368.55	4.19
8"	4	1,600	80.0	150.00	436.80	4.19
10"	2	4,200	210.0	200.00	1,146.60	4.19

Monthly single family tier sizing: Tier 1

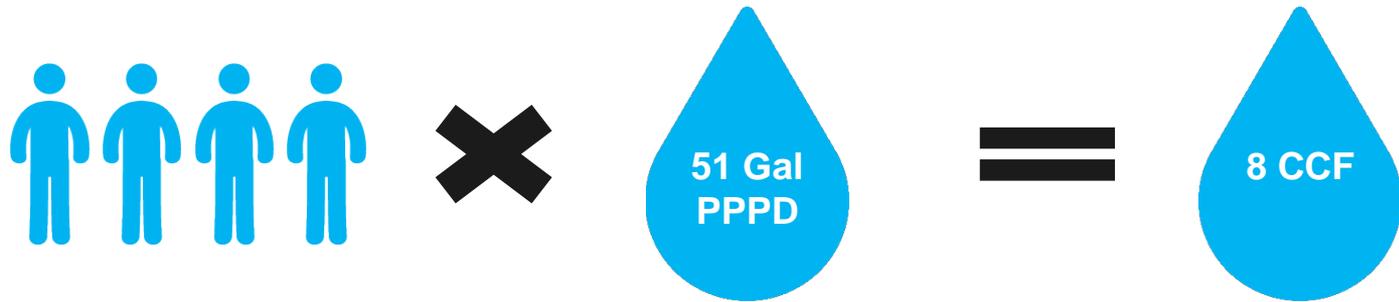


CCF per Month

Tier 1 = 4 CCF

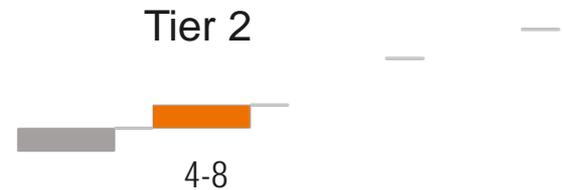


Monthly single family tier sizing : Tier 2

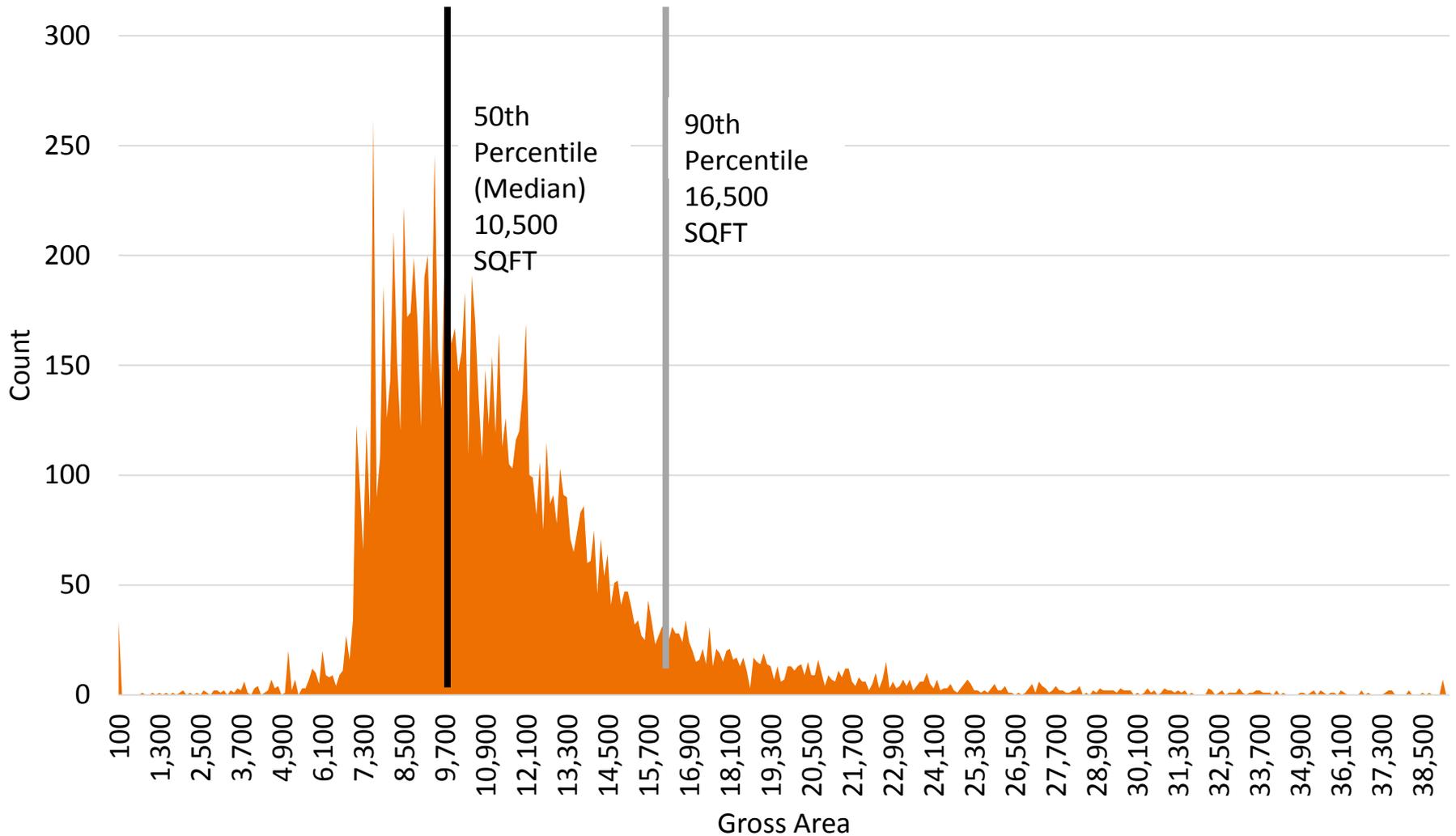


CCF per Month

Tier 2 = 8 CCF



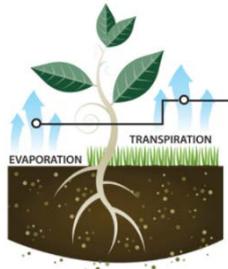
Distribution of single family lot sizes



Calculating irrigation requirements for the median parcel (10,500 ft²)



Parcel Size: 10,500
Landscape Area: 5,000



Evapotranspiration:
46 Inches



Beneficial Rainfall:
15 Inches



Irrigation System
Efficiency: 90%

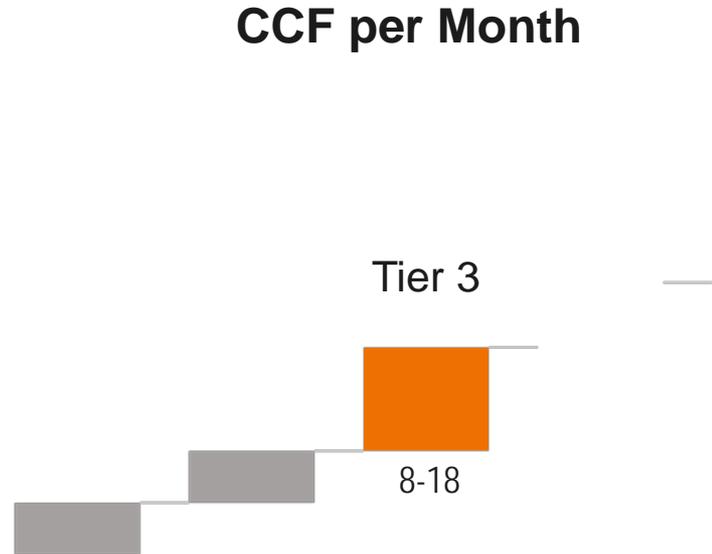
Irrigation Requirement = 10 CCF

Monthly single family tier sizing: Tier 3



Parcel Size: 10,500
Landscape Area: 5,000

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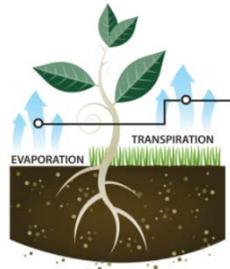


Tier 3 = Additional 10 CCF

Calculating irrigation requirements for the 90th percentile parcel (16,000 ft²)



Parcel Size: 16,000
Landscape Area: 8,000



Evapotranspiration:
46 Inches



Beneficial Rainfall:
15 Inches



Irrigation System
Efficiency: 90%

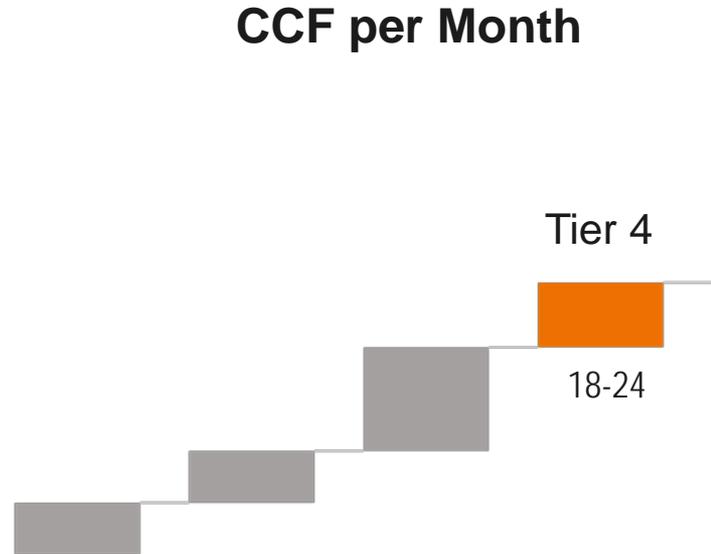
Irrigation Requirement = 16 CCF

Monthly single family tier sizing : Tier 4



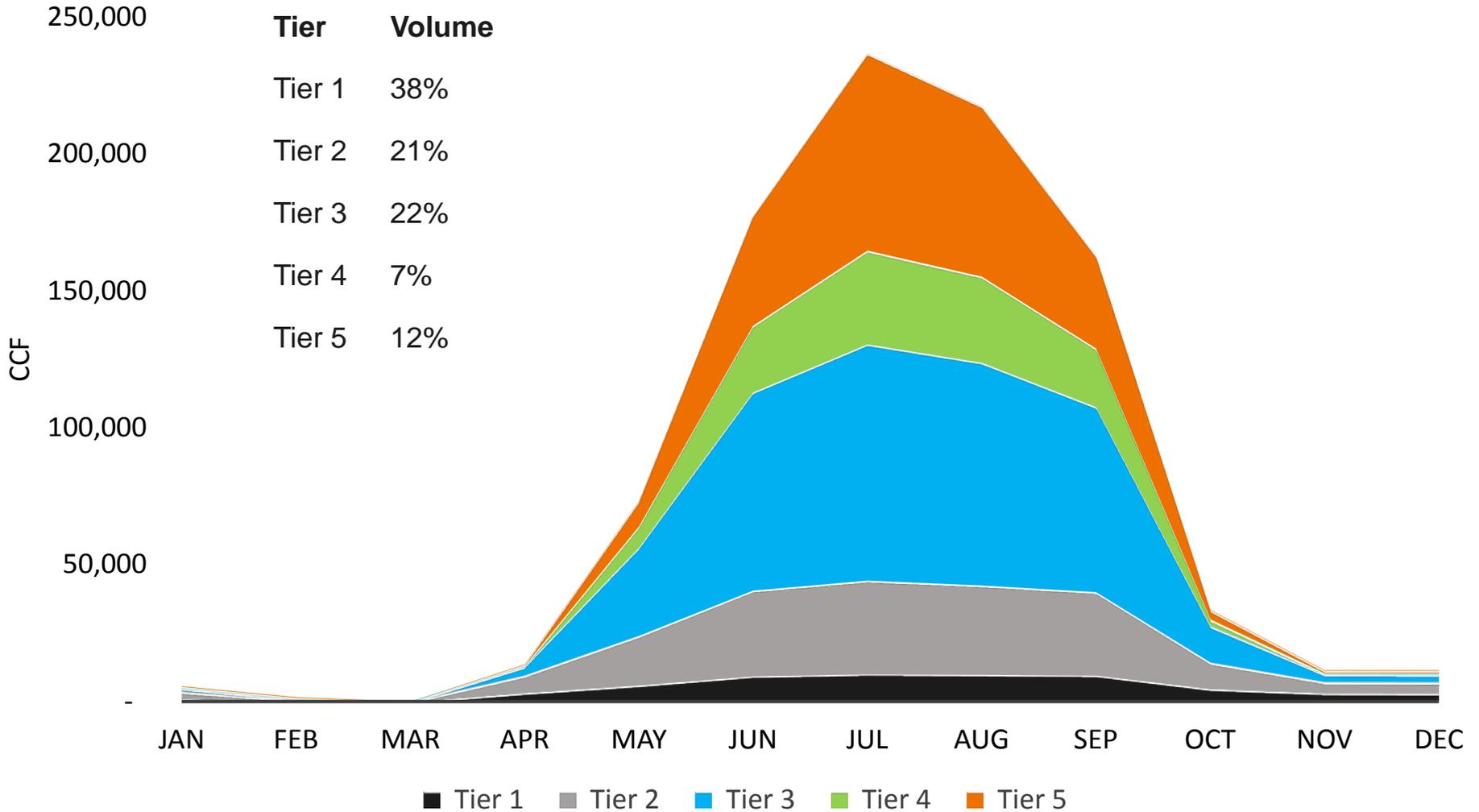
Parcel Size: 16,000
Add'l Landscape Area: 3,000

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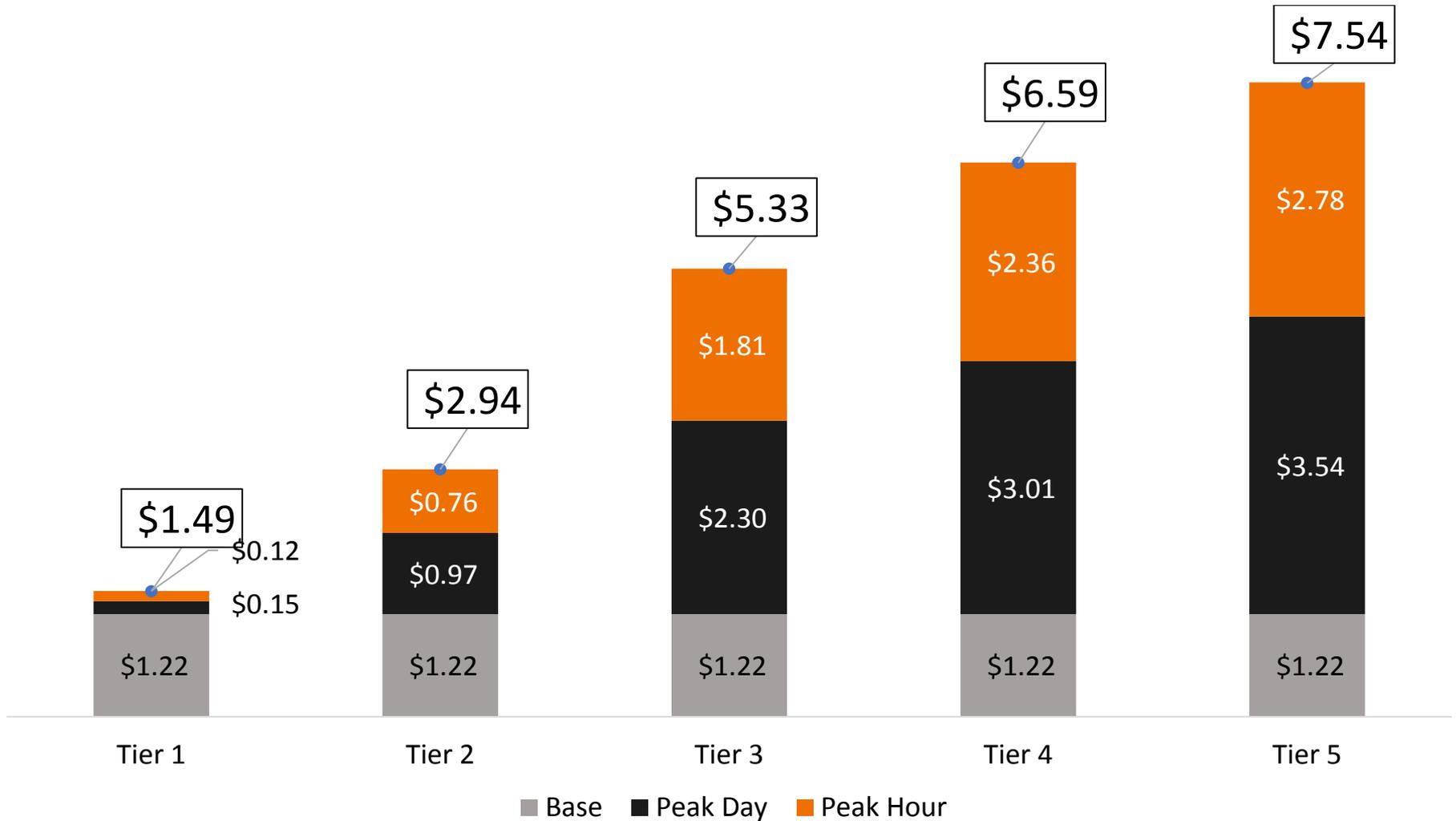


Tier 4 = Additional 6 CCF

Single family water use by tier

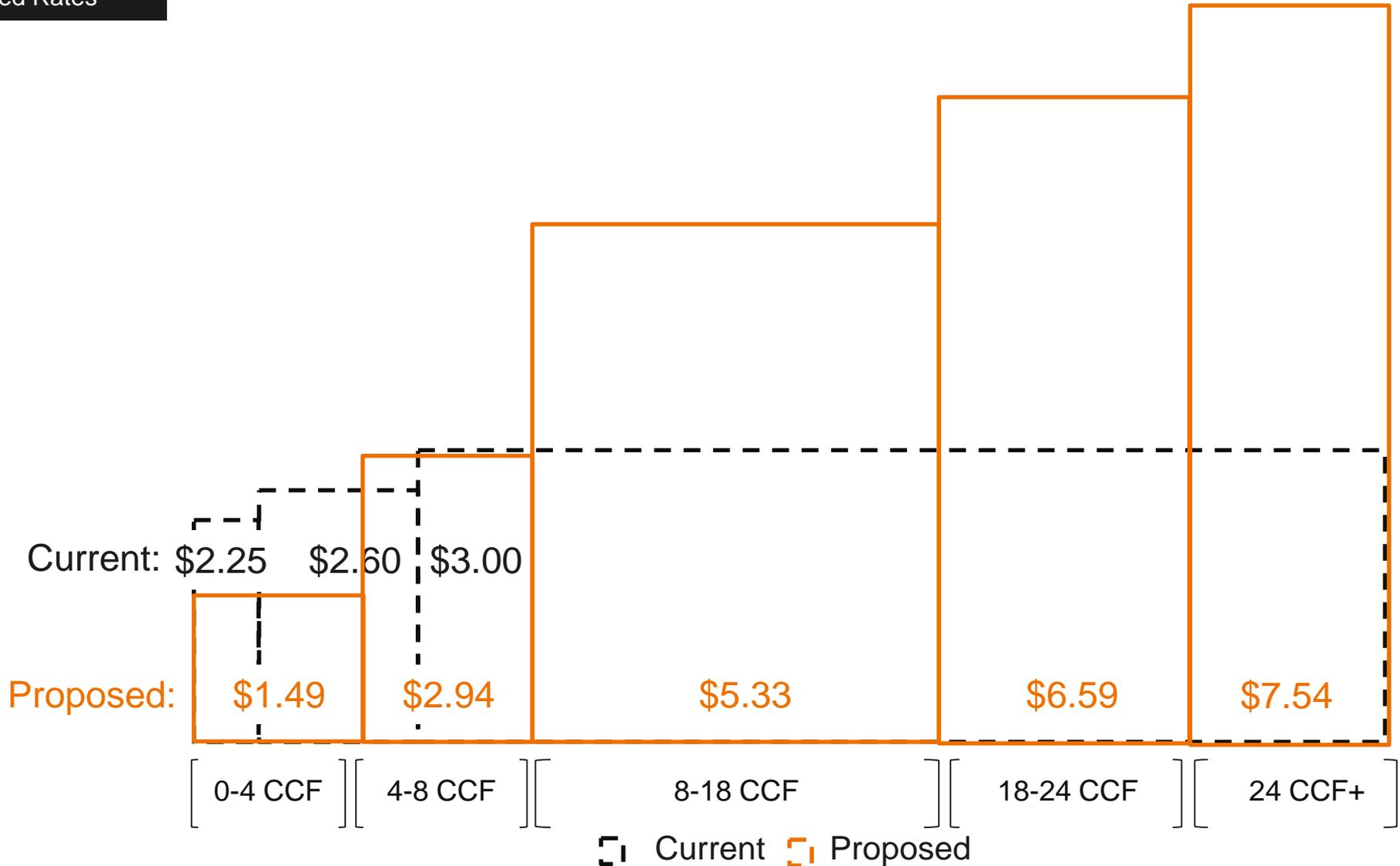


Single family tiered rate calculations



Comparison to existing rates

Single Family
Tiered Rates



Non-single family volumetric charges

Uniform Rate Per CCF

Current Rate Structure

Tier 1 (0-2 CCF): \$2.25

Tier 2 (2-6 CCF): \$2.60

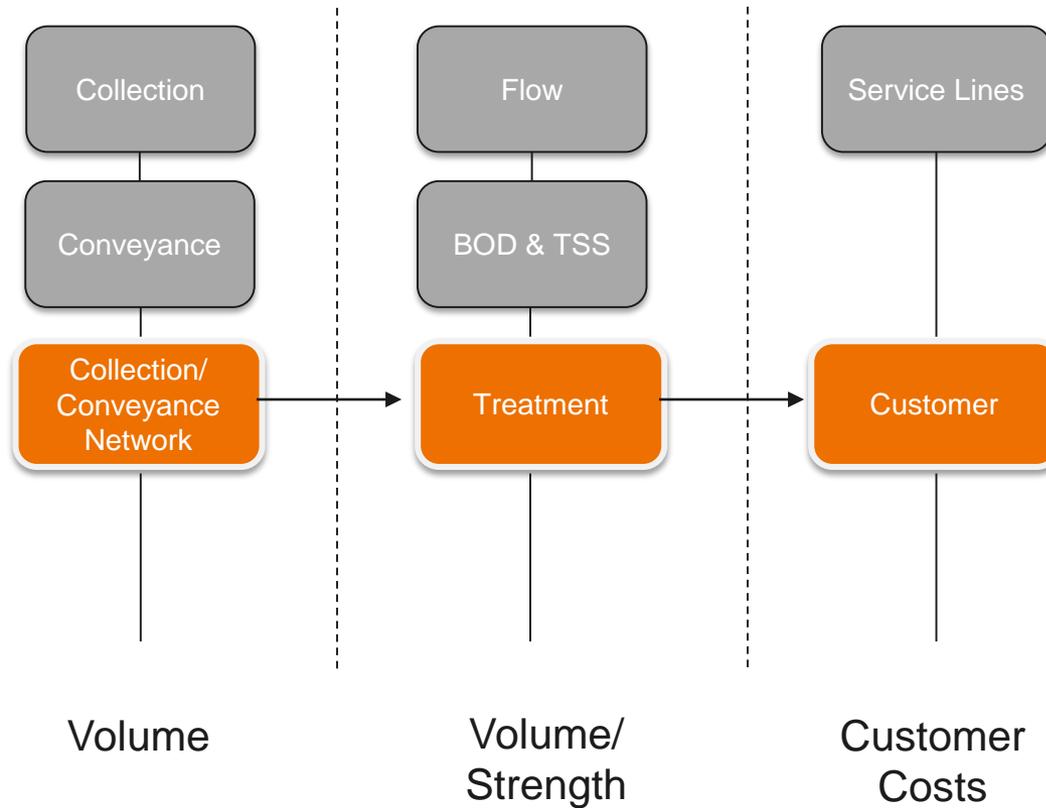
Tier 3 (>6 CCF): \$3.00

(irrigation billed at Tier 3 rate)



Sewer Utility System

Started with a "By the Book" process



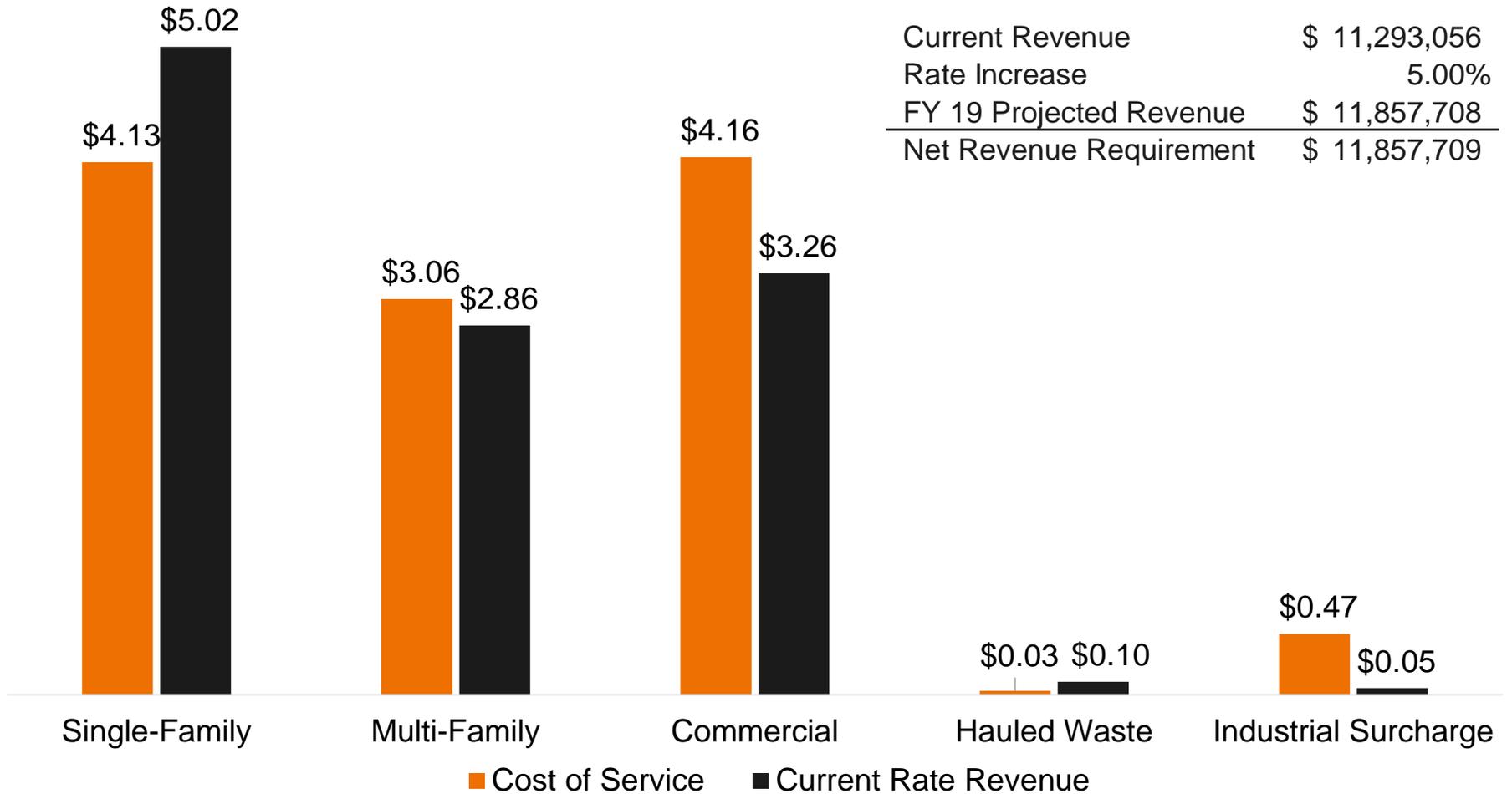
Function costs (\$ in millions) & units of service

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

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	1,830	728,061	1,136,242	1,590,739
Non-Residential	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 (\$M)



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

Proposed sewer rate structure

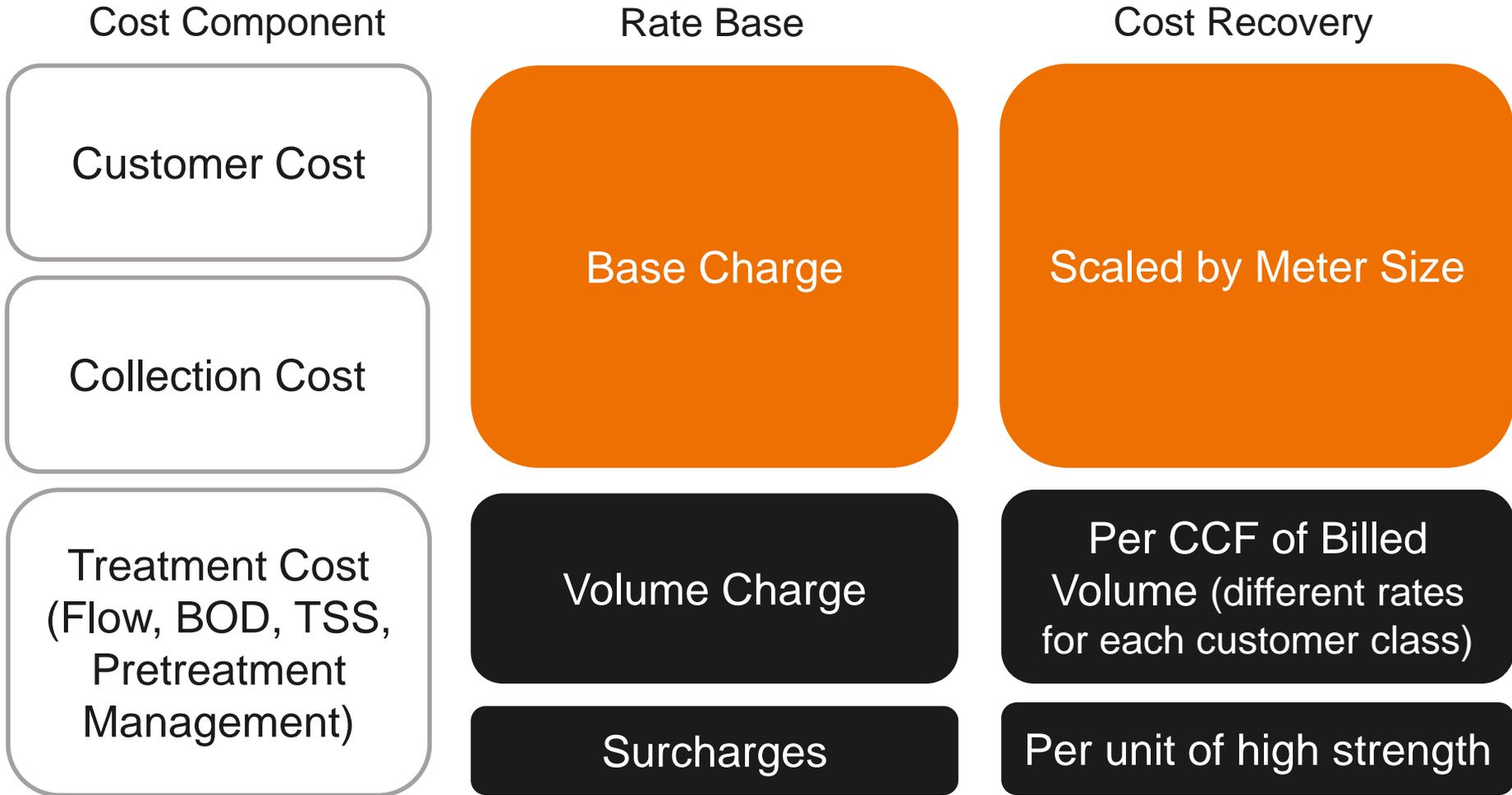
Single Family

- Base charge (“Readiness-to-Serve”)
- Volumetric charge
 - Uniform rate based on cost of service
- Backup surcharge (Now \$0.30)
 - Does not apply to private drives

Multi-Family, Non-Residential

- Base charge (“Readiness-to-Serve”)
- Volumetric charge
 - Uniform rate unique to each class based on cost of service
- Backup surcharge (Now \$0.30)
 - Does not apply to private drives, including manufactured home parks

Basis of proposed sewer rate structure



Sewer fixed charges – all customers

Meter Size	Number of Meters	Max. Flow Rate (gpm)	Equiv. Factor	Current Base Rate	Proposed Base Rate
5/8"	921	20	1.0	\$ 9.60	\$ 6.23
3/4"*	9,156	30	1.5	9.80	9.35
1"	10,372	50	2.5	10.00	15.58
1.5"	921	100	5.0	15.00	31.15
2"	532	160	8.0	25.00	49.84
3"	164	350	17.5	30.00	109.03
4"	39	600	30.0	30.00	186.90
6"	16	1,350	67.5	30.00	420.53
8"	3	1,600	80.0	30.00	498.40
10"	2	4,200	210.0	30.00	1,308.30

*All single family customers would be billed the 3/4" base rate.

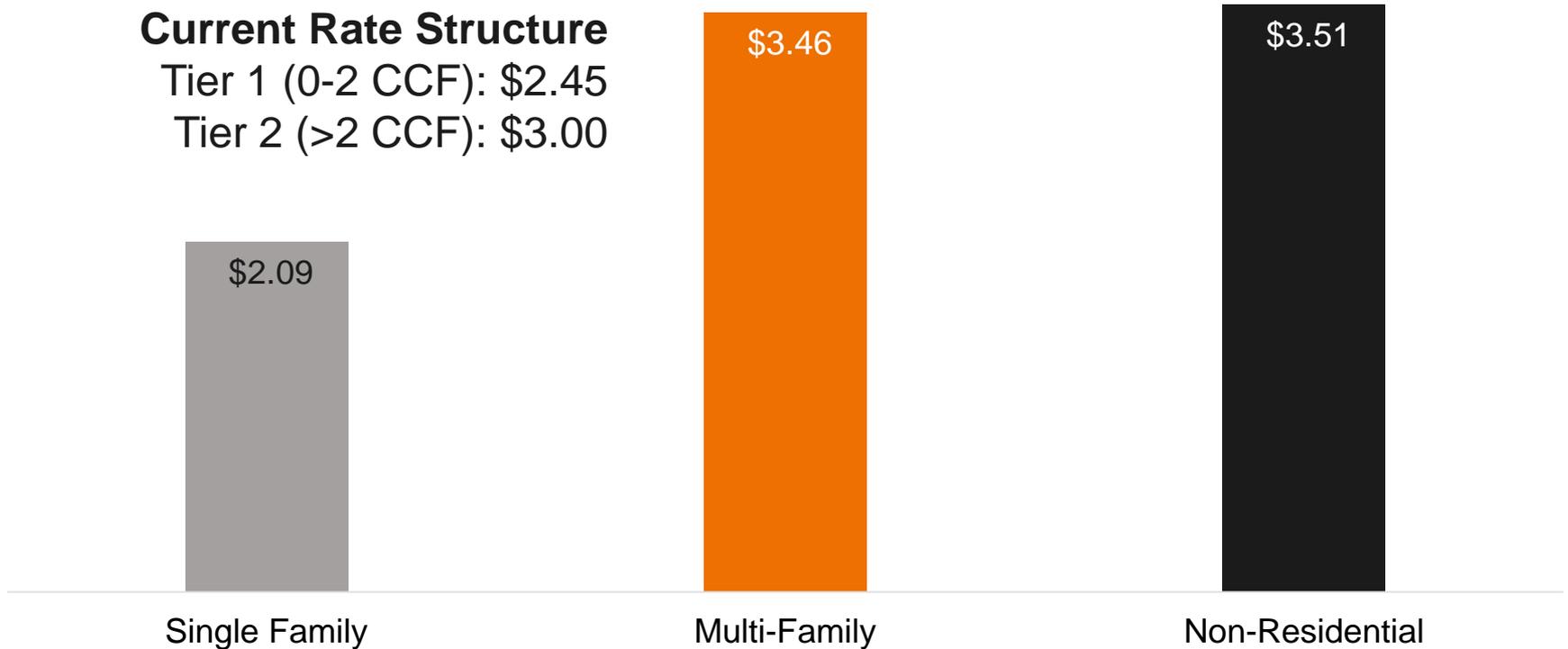
Sewer volumetric charges

Uniform Rate Per CCF

Current Rate Structure

Tier 1 (0-2 CCF): \$2.45

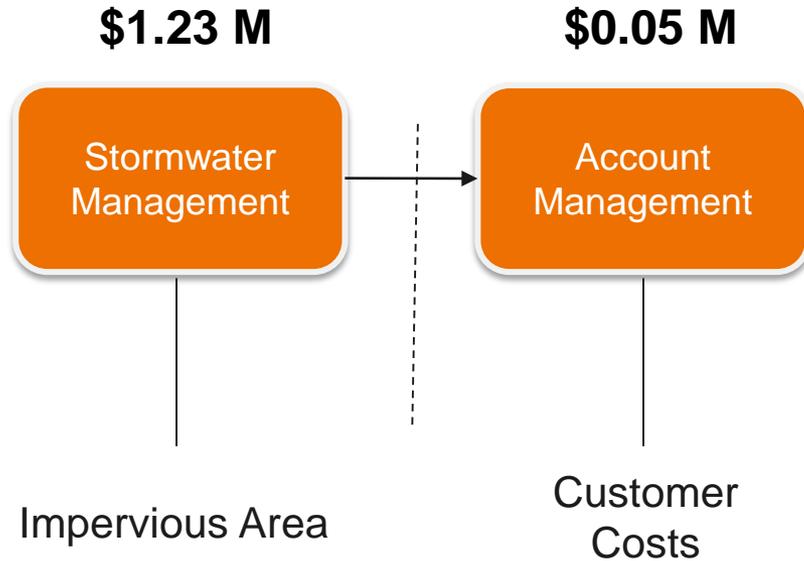
Tier 2 (>2 CCF): \$3.00



All single family and some non-residential customers' volume is based on winter average water use.

Stormwater Utility System

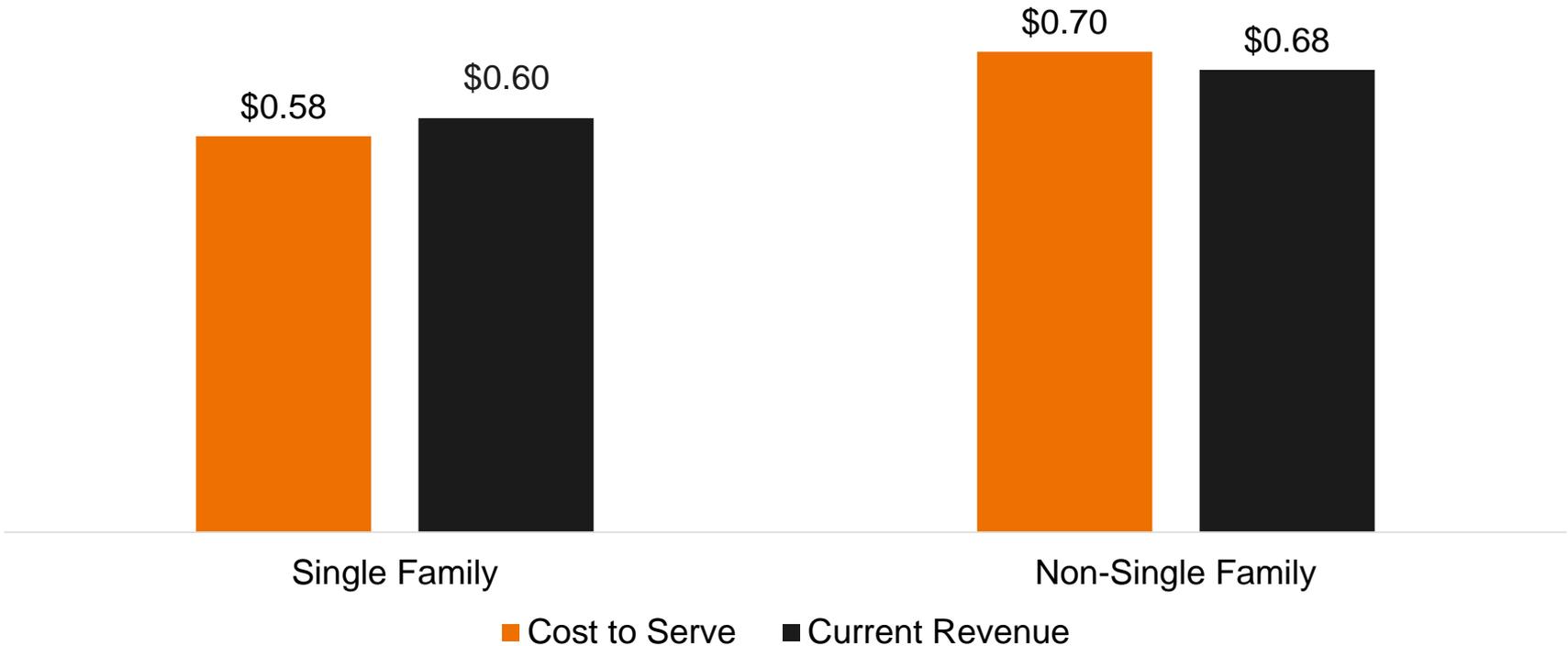
Cost Allocation Process



	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
Single Family	91M	19,030
Non-Single Family	118M	2,583

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

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



Proposed stormwater rate structure

Single Family

- Charge based on size (ranges of Assessed Square Footage)
- Unannexed surcharge will no longer be applied

Non-Single Family

- Charge based on impervious area (\$/1,000 sq. ft.)
- Unannexed surcharge will no longer be applied

Current vs. proposed rates



Bringing it Together & Remaining Schedule

Customer bill impacts

Bill Impacts



City of Bismarck - Utility Bill
 601 S 26th St / PO Box 5555
 Bismarck ND 58506-5555
 For questions call 701-355-1732 Opt 1

Billing Date: 08/20/2018

Meter #	Previous Reading	Present Reading	Reading Date
53480966	393	410	08/14/2018

Total Usage: 17 Units
 1 Unit = 100 cubic ft = 748 gals

~~~~NOTEWORTHY NEWS~~~~

**Rate Study Information**

The City of Bismarck is conducting an ongoing water, sewer, and stormwater rate study. Public questions, input, and concerns are welcome at [bispublicwks@bismarcknd.gov](mailto:bispublicwks@bismarcknd.gov)

No Garbage/Recycle Pick-up September 3<sup>rd</sup>. All pick-up will be delayed by 1 day.

City ordinance requires that all property shall be mowed by June 1st, July 1st, August 1st, and, if necessary, mowed again by September 1st each year to comply with the ordinance. The ordinance requires that tall grass and weeds 8 inches high be controlled.

**Help us balance our summer water use**

Even numbered homes and businesses should water on Monday, Wednesday, and Friday.

Odd numbered homes and businesses should water on Tuesday, Thursday, and Saturday.

To pay online or sign up for automatic payment:  
<https://ipn.paymentus.com/epd/stde/bsmu> or  
 Make a payment by phone call 701-355-1732, Option 6  
 Please do not staple, tape or fold your mailed payments.

|                                   |                  |               |
|-----------------------------------|------------------|---------------|
| Water Charge                      | 17 Units Reg Use | 55.40         |
| Demand Charge.....                |                  | 0.00          |
| Sewage Charge....                 | 8 Units Used     | 33.35         |
| Garbage Charge.....               |                  | 13.00         |
| Recycling Charge.....             |                  | 4.23          |
| Container Charge.....             |                  | 0.00          |
| Street Light / Signal Maintenance |                  | 7.50          |
| Storm Sewer Maintenance.....      |                  | 4.35          |
| Service Line Repair Charge.....   |                  | 2.00          |
| Other Charges .....               |                  | 0.00          |
| Credit.....                       |                  | 0.00          |
| Late Fee (1 1/2 %).....           |                  | 0.00          |
| Current Month Total.....          |                  | 119.83        |
| Prev Bal.....                     |                  | 116.83        |
| Payments.....                     |                  | -116.83       |
| <b>Total Amount Due</b>           |                  | <b>119.83</b> |

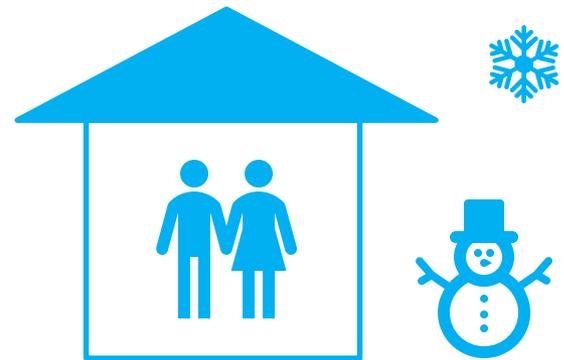
AUTOMATIC PAY ACCOUNT

# Bill Impacts: Single Family Customers

Customer with water, sewer, and stormwater service  
Two person household with indoor-only use  
4 CCF per month



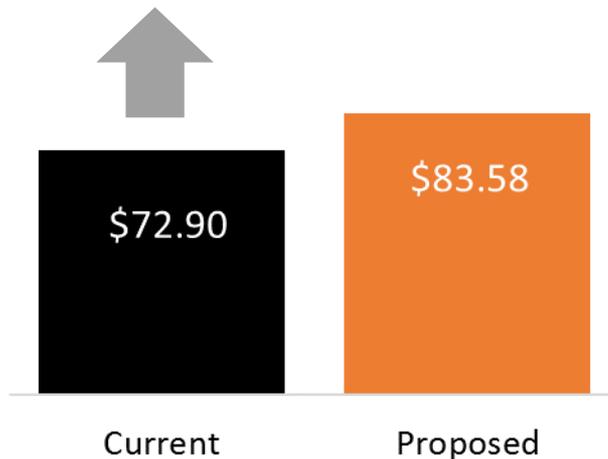
\$ Change: \$(3.86)  
% Change: -8.8%



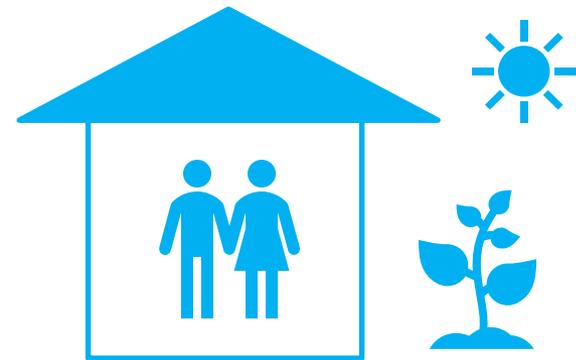
- 3/4" Meter
- 4 CCF water use
- 4 CCF sewer use
- <8,000 ASF

# Bill Impacts: Single Family Customers

Customer with water, sewer, and stormwater service  
Two person household with indoor and outdoor use  
14 CCF per month



\$ Change: \$10.68  
% Change: 14.7%



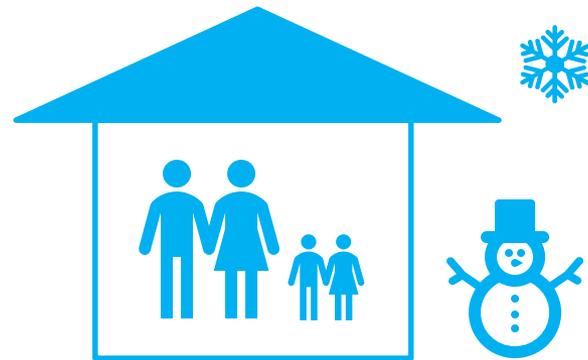
- 3/4" Meter
- 14 CCF water use
- 4 CCF sewer use
- <8,000 ASF

# Bill Impacts: Single Family Customers

Customer with water, sewer, and stormwater service  
Four person household with indoor-only use  
8 CCF per month



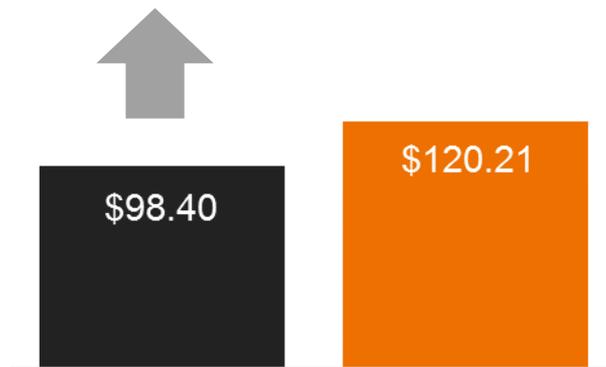
\$ Change: \$(1.49)  
% Change: -2.2%



- 1" Meter
- 8 CCF water use
- 8 CCF sewer use
- 8,000-16,000 ASF

# Bill Impacts: Single Family Customers

Customer with water, sewer, and stormwater service  
Four person household with indoor and outdoor use  
18 CCF per month

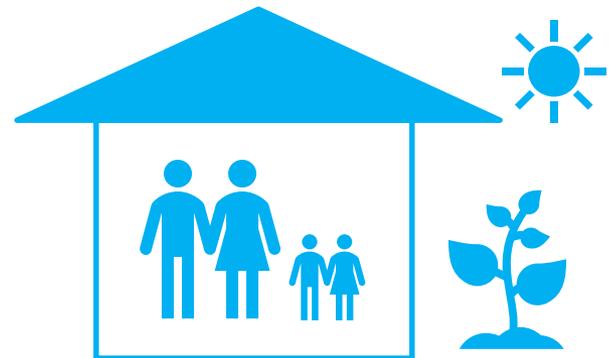


Current

Proposed

\$ Change: \$21.81

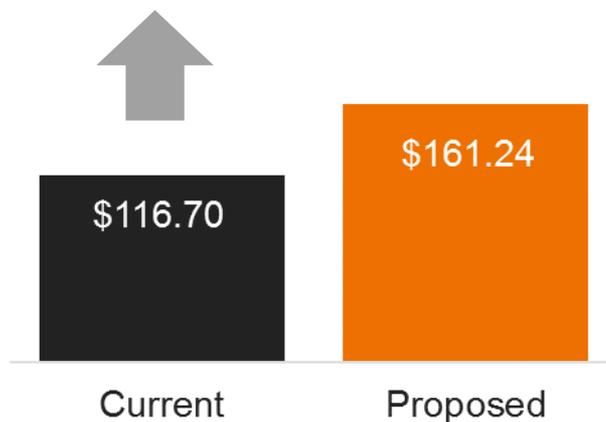
% Change: 22.2%



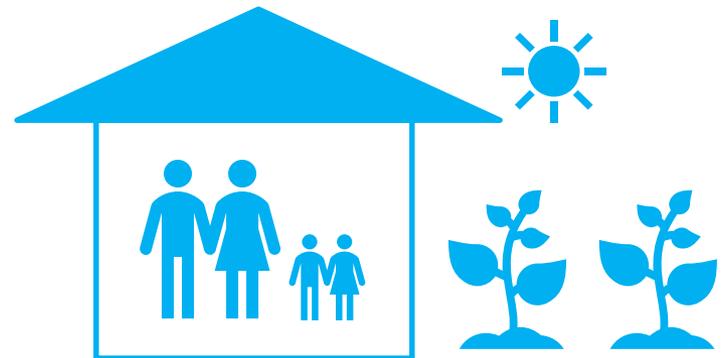
- 1" Meter
- 18 CCF water use
- 8 CCF sewer use
- 8,000-16,000 ASF

# Bill Impacts: Single Family Customers

Customer with water, sewer, and stormwater service  
Four person household with indoor and outdoor use  
24 CCF per month



\$ Change: \$44.54  
% Change: 38.2%



- 1" Meter
- 24 CCF water use
- 8 CCF sewer use
- >16,000 ASF

## Bill Impacts: Multi-Family Customers

| Customer Type          | Water Use | Sewer Use | Current Bill | Proposed Bill | \$ Change | % Change |   |
|------------------------|-----------|-----------|--------------|---------------|-----------|----------|---|
| Apartment              | 432       | 432       | \$ 3,112     | \$ 2,562      | \$ (551)  | -17.7%   | ↓ |
| Manufactured Home Park | 4,255     | 2,711     | 22,419       | 16,723        | (5,696)   | -25.4%   | ↓ |
| Retirement Home        | 372       | 372       | 2,509        | 2,365         | (144)     | -5.7%    | ↓ |

Bills shown include water, sewer, and stormwater service charges.

Key drivers: Proposed rates no longer include per dwelling unit base charges or stormwater unannexed surcharge.

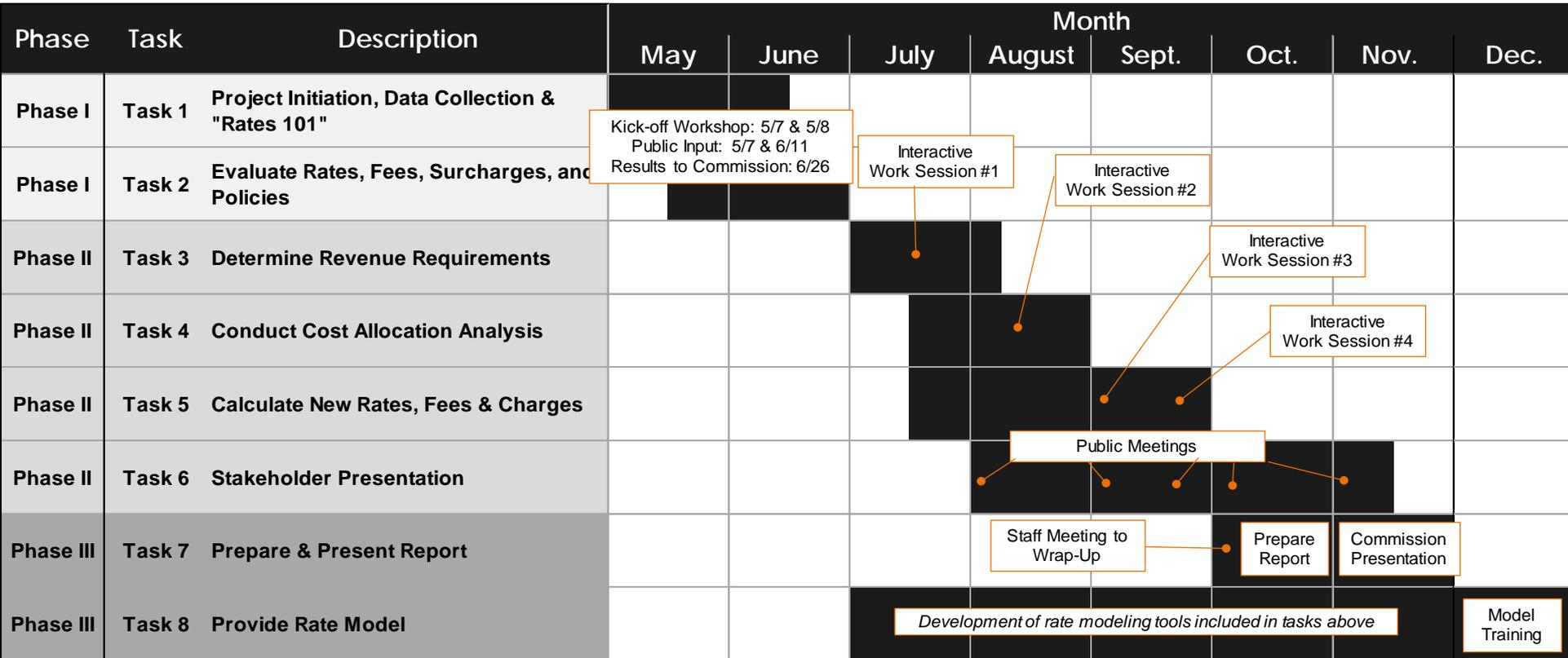
# Bill Impacts: Non-Residential Customers

Summary

| Customer Type                 | Meter | Water | Sewer | Current | Proposed | \$ Chg | % Chg  |   |
|-------------------------------|-------|-------|-------|---------|----------|--------|--------|---|
| Church                        | 1.5"  | 26    | 22    | \$ 203  | \$ 213   | \$ 10  | 4.8%   | ↑ |
| School                        | 3"    | 211   | 69    | 951     | 866      | (85)   | -8.9%  | ↓ |
| Bank                          | 1.5"  | 31    | 4     | 154     | 150      | -4     | -3.2%  | ↓ |
| Restaurant                    | 2"    | 185   | 185   | 1,220   | 1,130    | (90)   | -7.4%  | ↓ |
| Small office                  | 1"    | 6     | 3     | 46      | 59       | 13     | 28.4%  | ↑ |
| Large office                  | 3"    | 183   | 183   | 1,345   | 1,343    | -2     | -0.1%  | ↓ |
| Gas station                   | 1"    | 13    | 13    | 104     | 113      | 9      | 8.7%   | ↑ |
| Retail                        | ¾"    | 27    | 27    | 190     | 178      | (12)   | -6.4%  | ↓ |
| Laundromat                    | 2"    | 185   | 185   | 1,160   | 1,074    | (86)   | -7.4%  | ↓ |
| Car wash                      | 2"    | 226   | 226   | 1,451   | 1,331    | (120)  | -8.2%  | ↓ |
| Big box store                 | 3"    | 267   | 267   | 2,242   | 2,149    | (93)   | -4.2%  | ↓ |
| Hotel                         | 4"    | 1,309 | 1,309 | 7,946   | 7,254    | (691)  | -8.7%  | ↓ |
| Hospital                      | 6"    | 914   | 914   | 5,665   | 5,651    | -14    | -0.2%  | ↓ |
| Public park (irrigation only) | 1.5"  | 51    | N/A   | 158     | 334      | 176    | 111.4% | ↑ |
| State Capitol (w/ irrigation) | Mult. | 1,358 | 545   | 8,266   | 9,961    | 1,695  | 20.5%  | ↑ |

# Full schedule and remaining activities

Project Timeline



**Focus of next meeting: Capital expansion costs and miscellaneous fees**

Additional Questions, Answers & Bill Calcs