



# 2018 RATES AND FEES STUDY UPDATE

## VOLUME 1 OF 2

## 2019-2023 RATES

Prepared by Castle Rock Water  
Business Solutions

Final Report

August 28, 2018

# Table of Contents

<b>Executive Summary .....</b>	<b>6</b>
<b>Financial Management Plan .....</b>	<b>6</b>
<b>Cost-of Service Analysis.....</b>	<b>6</b>
<b>Revenue Requirements.....</b>	<b>6</b>
<b>Rates and Fees Analysis.....</b>	<b>7</b>
<b>2018 Adopted Rates vs 2019 Proposed Rates by Fund.....</b>	<b>7</b>
Table 1: Water Fund 2017 Adopted vs 2018 Proposed Monthly Service Charges .....	8
Table 2: Water Fund 2017 Adopted and 2018 Proposed Volumetric Rates by Tier .....	9
Table 3: Water Resources Fund 2017 Adopted vs 2018 Proposed Monthly Service Charges .....	10
Table 4: Wastewater Fund 2017 Adopted vs 2018 Proposed Monthly Service Charges .....	10
Table 5: Stormwater Fund 2017 Adopted vs 2018 Proposed Monthly Service Charges .....	11
<b>Proposed Rates for 2019 Through 2023 .....</b>	<b>11</b>
Table 6 Proposed Rate Revenue Percentage Increases 2018-2022.....	11
<b>Long-Term Financial Planning.....</b>	<b>12</b>
<b>Background.....</b>	<b>12</b>
<b>Financial Planning Overview .....</b>	<b>12</b>
Figure 1: Financial Planning Flowchart.....	13
<b>Capital Improvements.....</b>	<b>13</b>
<b>Operating Expenditures.....</b>	<b>13</b>
<b>Other Capital Funding Costs .....</b>	<b>13</b>
<b>Revenue Requirements.....</b>	<b>14</b>
<b>Calibration of Financial Plan.....</b>	<b>14</b>
<b>Assumptions Shared Across Funds.....</b>	<b>14</b>
Table 7: Projected SFEs and Percentage Growth by Fund .....	15
<b>Water Fund .....</b>	<b>15</b>
<b>Sources of Funds.....</b>	<b>15</b>
Table 8: Water Fund Other Revenues .....	16
<b>Uses of Funds.....</b>	<b>17</b>
<b>Service Charge Revenue Requirements.....</b>	<b>18</b>

Table 9 Water Fund Service charge Revenue Requirements.....	18
<b>Water Resources Fund.....</b>	<b>19</b>
<b>Sources of Funds.....</b>	<b>19</b>
Table 10 Water Resources Fund Other Revenues.....	20
<b>Uses of Funds.....</b>	<b>20</b>
<b>Service Charge Revenue Requirements.....</b>	<b>21</b>
Table 11 Resources Fund Service charge Revenue Requirements.....	21
<b>Wastewater Fund.....</b>	<b>22</b>
<b>Sources of Funds.....</b>	<b>22</b>
Table 12: Wastewater Fund Other Revenues.....	22
<b>Uses of Funds.....</b>	<b>23</b>
<b>Service Charge Revenue Requirements.....</b>	<b>24</b>
Table 13 Wastewater Fund Service charge Revenue Requirements .....	24
<b>Stormwater Fund.....</b>	<b>24</b>
<b>Sources of Funds.....</b>	<b>24</b>
Table 19: Stormwater Fund Other Revenues .....	25
<b>Uses of Funds.....</b>	<b>26</b>
<b>Service Charge Revenue Requirements.....</b>	<b>26</b>
Table 15 Stormwater Fund Service charge Revenue Requirements.....	27
<b>Water and Wastewater Cost-of-Service Analysis .....</b>	<b>27</b>
<b>Introduction.....</b>	<b>27</b>
<b>Cost-of-Service Methodology .....</b>	<b>27</b>
<b>Determination of Annual System Revenue Requirements.....</b>	<b>29</b>
<b>Determination of Service Charge Revenue Requirements .....</b>	<b>29</b>
<b>Analysis of Flows and Usage Characteristics .....</b>	<b>29</b>
<b>Customer Characteristics.....</b>	<b>30</b>
<b>Allocation Costs to Customer Classes .....</b>	<b>30</b>
Figure 3: Rate Setting Process.....	31
<b>Allocation of Costs to Functions.....</b>	<b>31</b>
<b>Allocation of Costs to Customer Characteristics .....</b>	<b>32</b>
<b>Distribution of Costs to Customer Classes .....</b>	<b>32</b>
<b>Capital Costs .....</b>	<b>33</b>
<b>Rate Design Development and Rate Calculation .....</b>	<b>33</b>

<b>Water Cost-of-Service Analysis Results.....</b>	<b>33</b>
<b>Estimated Water System Revenue Requirements.....</b>	<b>34</b>
Table 16: Water Fund 2018 Revenue Requirements .....	34
Table 17: Water Fund Customer Characteristics by Customer Class Projected 2018 .....	35
Table 18: Water Fund Customer Service Characteristics Projected 2018.....	36
Table 19: Water Fund Summary of Water Cost of Service by Customer Class Projected 2018 .....	36
<b>Wastewater Cost-of-Service Analysis Results.....</b>	<b>37</b>
<b>Estimated Wastewater System Revenue Requirements.....</b>	<b>37</b>
Table 20: Wastewater Fund 2018 Revenue Requirements .....	37
Table 21: Wastewater Fund Customer Characteristics by Customer Class Projected 2018.....	38
Table 22: Wastewater Fund Customer Service Characteristics Projected 2018.....	38
Table 23: Fund Cost of Service by Customer Class Projected 2018 .....	39
<b>Wastewater Monthly Service Charge.....</b>	<b>39</b>
<b>Rate Design.....</b>	<b>40</b>
<b>Introduction.....</b>	<b>40</b>
<b>Water System Rates .....</b>	<b>40</b>
<b>Water Budget Based Rate Structure.....</b>	<b>40</b>
<b>Water Usage Thresholds.....</b>	<b>40</b>
Table 24: Fund Irrigation Season (April 1 through October 31 Consumption).....	41
<b>Tiered Rates.....</b>	<b>42</b>
<b>Wastewater Monthly Service Charges.....</b>	<b>42</b>
<b>Water Resources Monthly Service Charge.....</b>	<b>43</b>
<b>Stormwater Monthly Service Charge.....</b>	<b>43</b>
<b>Summary.....</b>	<b>44</b>
<b>Proposed Rates for 2019 by Enterprise Fund.....</b>	<b>44</b>
Table 25: Water Fund Proposed 2018 Monthly Service Charge.....	44
Table 26: Water Fund Irrigation Season (April 1 through October 31 Consumption).....	45
Table 27: Water Resources Fund Proposed 2018 Monthly and Volumetric Service charge.....	46
Table 28: Wastewater Fund Proposed 2018 Monthly and Volumetric Rates .....	46
Table 29: Stormwater Fund Proposed 2018 Monthly Service Charges.....	47
<b>Appendix A.....</b>	<b>49</b>
<b>List of Acronyms .....</b>	<b>49</b>
<b>Appendix B.....</b>	<b>50</b>

Definitions.....	50
Appendix C.....	53
Customer Characteristics Analysis.....	53
Appendix D.....	54
Stantec Consulting Services Inc. Study Review Letter .....	54

# Executive Summary

On an annual basis, Castle Rock Water (CRW) conducts a comprehensive rates and fees study for water, water resources, wastewater, and stormwater funds.

## Project Purpose

The purpose of the rates and fees study is to calculate the cost-of-service (COS) based rates for each enterprise fund that meet CRW's financial goals while being defensible and promoting water conservation. The annual rates and fees study update ensures that any changes in revenue requirements are accounted for based on changes in customer characteristics and both operational and capital costs.

## Financial Management Plan

Starting in 2015, CRW prepared a Financial Management Plan (FMP) which has since been updated on an annual basis as part of this study. The FMP was completed to assist CRW in achieving the following goals:

1. To minimize future rates at or below the 2013 Hybrid Model levels
2. To minimize debt carrying costs at or below industry standards
3. To minimize risk by balancing fixed and variable revenues with expenses as appropriate
4. To keep costs at or under budget for capital and operational budgets each year by fund and to continuously strive towards more efficient operations
5. To keep our rates and fees competitive with surrounding communities
6. To keep adequate reserves and maintain fund balances between minimums and maximums
7. To keep our rates and fees affordable within various national affordability indices
8. To develop regional partnerships to provide economies of scale to reduce total costs of infrastructure to our customers
9. To be an industry leader in the application of financial management benchmarking ourselves against others locally and nationally

## Cost-of Service Analysis

### Revenue Requirements

A long term financial plan is prepared to project the revenues required for each of CRW's four enterprise funds. The long-term financial plan allows the integration of debt, accumulation/use of reserves, and other assumptions to forecast funding of CRW's water system operations and maintenance (O&M) expenses and capital improvements for each respective enterprise. For each enterprise fund, the financial plan calculates the annual service charge revenue requirements. The projection period developed for each enterprise financial plan was driven by the length of the capital improvement program (CIP) and ends in 2055.

Although the projection period extends to 2055, revenue requirements and capital improvement programs are presented in this report only for the 2019 through 2023 study period for all four enterprise funds. The estimated 2019 total revenue requirements from rates are shown below.

2019 Total Revenue Requirements from Rates	
Water Fund	\$14.0 Million
Water Resources	\$9.6 Million
Wastewater	\$10.8 Million
Stormwater	\$3.0 Million

## Rates and Fees Analysis

CRW updated COS rates for the water and wastewater enterprises, and monthly service charges for the water resources and stormwater enterprises, to meet the annual service charge revenue requirements. The rates and fees meet CRW's financial objectives while being defensible. The CRW's rates and fees goals as described in the FMP include:

- Keep the rates and fees competitive with surrounding communities
- Keep the rates and fees affordable within various national affordability indices

CRW's rates are based on the cost of providing services and CRW's comprehensive review of current customer characteristics. A summary of the customer characteristics analysis is presented in Appendix C.

## 2018 Adopted Rates vs 2019 Proposed Rates by Fund

CRW's adopted rates for 2018 versus proposed rates for 2019 are listed in Tables 1 through 5. Given the financial plan and COS updates, CRW is proposing a 3% increase in water resources' monthly charges for 2019, which will be reflected in the water fund's Tiers 2-3. CRW's water rate structure includes both a fixed monthly service charge by meter size and a volumetric charge based on tiered usage. Volumetric rates are stated per 1,000 gallons (Kgal).

**Table 1**  
**Water Fund**  
**2018 Adopted vs 2019 Proposed Monthly Service Charges**

<b>Meter Size</b>	<b>2018 Adopted Monthly Charges</b>	<b>2019 Proposed Monthly Charges</b>
5/8" x 3/4"	\$9.54	\$9.54
3/4"	\$9.54	\$9.54
1"	\$13.72	\$13.72
1.5"	\$18.78	\$18.78
2"	\$26.00	\$26.00
3"	\$41.78	\$41.78
4"	\$94.12	\$94.12
6"	\$147.26	\$147.26
Bulk Hydrant	\$18.78	\$18.78
Bulk Station	\$9.54	\$9.54

## **Tiered Rate Structure**

Each account pays a fixed monthly water service charge, water resources charge and wastewater charge based on their individual meter size.

The volumetric water rate structure consists of three increasing tiered rates:

- Tier 1 = AWMC or Average Winter Monthly Consumption = Base COS rate (Typically considered indoor use)
- Tier 2 = Outdoor Usage = Base plus extra capacity rates by customer class (Typically considered outdoor use)
- Tier 3 = Excess use rate to recover the remaining revenue requirements

Residential accounts are subject to a water conservation surcharge for usage greater than 40 kgal per month (Tier 4). This surcharge is intended to send a conservation price signal to customers with excessive usage. The revenue collected from this tier is then used to fund conservation rebate programs.

For the volumetric rates shown in Table 2 below there is a small increase in Tiers 2-3 to cover the 3% water resources rate increase needed for 2019.



**Table 2**  
**Water Fund**  
**2019 Proposed Volumetric Rates by Tier**

Irrigation Season (April 1 through October 31 Consumption)

<b>Customer Class</b>	<b>Tier 1 (AWMC)</b>	<b>Tier 2 (Outdoor)</b>	<b>Tier 3 (Excess)</b>	<b>Tier 4 (Surcharge)</b>
Residential	\$2.82	\$5.74	\$8.56	\$8.56
Multi-Family	\$2.82	N/A	\$3.70	N/A
Multi-Family w/Irrigation	\$2.82	\$4.87	\$7.28	N/A
Commercial	\$2.82	N/A	\$3.94	N/A
Commercial w/Irrigation	\$2.82	\$4.93	\$7.37	N/A
Irrigation	N/A	\$7.86	\$11.78	N/A

Winter Season (November 1 through March 31 Consumption)

<b>Customer Class</b>	<b>Tier 1 (AWMC)</b>	<b>Tier 2 (Outdoor)</b>	<b>Tier 3 (Excess)</b>	<b>Tier 4 (Surcharge)</b>
Residential	\$2.82	N/A	\$5.74	\$8.56
Multi-Family	\$2.82	N/A	\$3.70	N/A
Multi-Family w/Irrigation	\$2.82	N/A	\$4.87	N/A
Commercial	\$2.82	N/A	\$3.94	N/A
Commercial w/Irrigation	\$2.82	N/A	\$4.93	N/A
Irrigation	N/A	N/A	\$11.78	N/A

Bulk Water Customers

Bulk Hydrant	\$5.07	N/A	N/A	N/A
Bulk Station	\$9.48	N/A	N/A	N/A

**Table 3**  
**Water Resources Fund**  
**2018 Adopted vs 2019 Proposed**  
**Monthly Service Charges**

<b>Meter Size</b>	<b>2018 Adopted Monthly Service Charges</b>	<b>2019 Proposed Monthly Service Charges</b>
5/8" x 3/4"	\$17.52	\$17.52
3/4"	\$26.15	\$26.15
1"	\$99.11	\$99.11
1.5"	\$187.50	\$187.50
2"	\$313.54	\$313.54
3"	\$588.90	\$588.90
4"	\$1,502.32	\$1,502.32
6"	\$2,429.34	\$2,429.34
Bulk Hydrant	\$187.50	\$187.50
Bulk Station	\$26.15	\$26.15

**Table 4**  
**Wastewater Fund**  
**2018 Adopted vs 2019 Proposed**  
**Monthly Service Charges and Volumetric Rate**

<b>Meter Size</b>	<b>2018 Adopted Monthly Service Charges</b>	<b>2019 Proposed Monthly Service Charges</b>
5/8" x 3/4"	\$9.30	\$9.30
3/4"	\$9.30	\$9.30
1"	\$14.80	\$14.80
1.5"	\$21.46	\$21.46
2"	\$30.96	\$30.96
3"	\$51.72	\$51.72
4"	\$120.58	\$120.58
6"	\$190.48	\$190.48
<b>Volumetric Rate – All Applicable Customers, Per Kgal</b>	\$6.59	\$6.59

<b>Table 5</b> <b>Stormwater Fund</b> <b>2018 Adopted vs 2019 Proposed Monthly Service Charge</b>		
	<b>2018 Adopted Monthly Service Charge</b>	<b>2019 Proposed Monthly Service Charge</b>
All Customers, per Single Family Equivalent (SFE)	\$7.12	\$7.12
<b>SFE Assignment</b>		
<b>Customer Class</b>	<b>Impervious Sq. Ft.</b>	<b>SFE</b>
Single Family Attached & Detached Customers	3,255	1
Non-Single Family (Multi-Family & Commercial Customers)	Parcel size times 80% imperviousness divided by 3,255 impervious sq. ft. per SFE = # of SFE's	

## Proposed Rates for 2019 Through 2023

Rates for the five year study period (2019-2023) were projected using the cost of service model results for water and wastewater as well as the percentage rate revenue increases projected by the financial plan models for all four funds. Table 6 represents proposed rate revenue changes for 2019 through 2023. The 3% increase in water resources in 2019 will be included in the water fund tiers 2-3.

<b>Table 6</b> <b>Proposed Rate Revenue Percentage Increases</b> <b>2019-2023</b>				
<b>Year</b>	<b>Water</b>	<b>Water Resources</b>	<b>Wastewater</b>	<b>Stormwater</b>
2019	0%	3%	0%	0%
2020	0-3%	3%	0-3%	0-3%
2021	0-3%	3%	0-3%	0-3%
2022	0-3%	3%	0-3%	0-3%
2023	0-3%	3%	0-3%	0-3%

# **Long-Term Financial Planning**

## **Background**

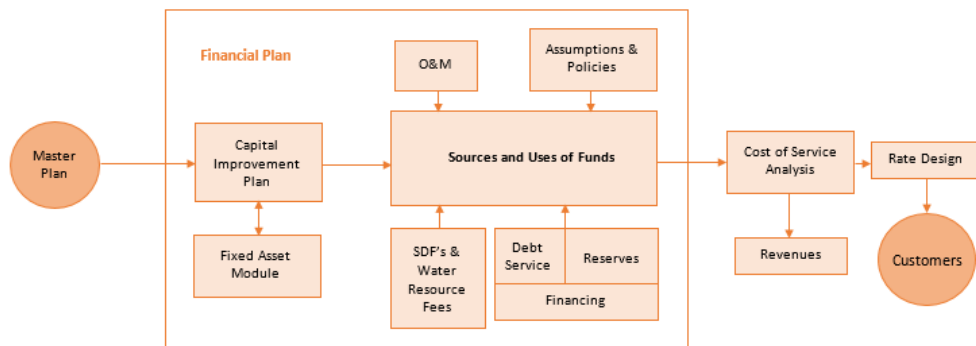
Castle Rock Water engaged Stantec Consulting Services, Inc. (Stantec) to assist in updating the comprehensive utility-specific financial plans that examine revenues, expenditures, debt service requirements, cash flows, reserve requirements, fund balances and capital project costs for the study period. The financial plan is used as the basis for projecting utility specific revenue requirements for the water, water resources, wastewater, and stormwater funds. Assumptions used in the development of the long term financial plans play a critical role in the results of this study. A full understanding of the modeling assumptions is therefore vitally important in qualifying study results. The following sections discuss both the planning assumptions and methods of calculating revenue requirements for the purpose of the study.

## **Financial Planning Overview**

The main function of the financial plan is to balance the sources and uses of funds. Sources of funds include revenues from water sales (or water resources charges, wastewater charges, stormwater fees), miscellaneous fee revenue, interest/investment earnings, use of cash reserves, debt proceeds and contributions (including grants, developer contributions, etc.). Uses of funds include expenditures for operating expenses, repairs and replacements, debt service, increases in reserves and cash-financed capital expenditures. CRW has an explicit financial goal to minimize risk by balancing fixed and variable revenues with expenses as appropriate. By identifying the planned uses of funds, CRW developed financial plans to balance the sources of funds while minimizing the impact on rates to the greatest extent possible.

The financial plan is a forward looking model, meaning that all values reported are for future periods. For the purposes of this study, the first year in the model is fiscal year 2019. CRW's fiscal year is January 1, 2019 to December 31, 2019. The model includes projections of sources and uses of funds throughout the study period. Figure 1 provides a visual overview of the financial planning process followed by CRW and reviewed by Stantec. In addition to forecast assumptions, historical revenues and expenses, existing and planned debt service, and the current CIP serve as the basis for revenue requirement projections. Each step of the financial planning process is described individually in greater detail in the following sections.

Figure 1: Financial Planning Flowchart



## Capital Improvements

Capital improvements are the planned investments in capital projects specific to each fund that are projected for the term of the corresponding utility's financial plan. Capital includes physical assets and infrastructure with a useful life greater than one year that meet all of CRW's established capitalization policy criteria. CRW also established a measureable goal to keep costs at or under budget for capital budgets each year by enterprise fund. Detailed CIPs were developed by CRW Engineers.

## Operating Expenditures

Operating expenditures are planned annually as part of the operating budget. The majority of operating costs are fixed as opposed to variable, meaning that increases or decreases in usage will have little effect on the total costs of operations. Similar to capital expenses, CRW also aims to keep costs at or under budget for operational budgets each year by fund and continuously strives towards more efficient operations.

## Other Capital Funding Costs

Planned capital expenditures include monies needed to fund the major infrastructure projects for each fund through the study period. Capital funding costs are cash expenditures that the respective fund will need to make in order to fund capital projects. These expenditures include the annual costs of debt service (principal and interest payments), the cost of cash-financing a given portion of the projects' costs and the cost of funding repair and replacement reserves. A critical assumption for the water, water resources, and stormwater funds during the study period is that no new debt will be issued. Interfund loan options from the water fund are being explored with the wastewater fund to finance the wastewater treatment plant expansion. The capital funding costs presented in this report include the impacts of the 3,500 acre-feet (AF) Hybrid renewable water supply option which Town Council approved in October 2012.

## Revenue Requirements

Revenue requirements define the total amount of income CRW must earn in order to operate on a day-to-day basis, conduct any necessary repairs and respond to the needs of growth in the system. Two major requirements are measured as revenue requirements:

1. The Total Revenue Requirements
2. The Revenues Required from Rates (Service Charge Revenue Requirements)

The revenue requirements of each enterprise fund include O&M costs, cash-financed capital improvements, debt service payments and funding of operations and capital reserves. The water fund requires additional funding of rate revenue stabilization reserves.

## Calibration of Financial Plan

There are five major tools one can utilize in optimizing the financial plan to meet revenue requirements while remaining aligned with CRW policies and objectives. These include:

1. Additional Income from Rate Revenue Increases
2. Proceeds from New Debt Issuance
3. Contributions from System Development Fees
4. The Use of Reserve Funds
5. Inter-Fund Loans

CRW has determined no new debt is expected to be issued for the water, water resources and stormwater funds in the near term, while an Interfund loan is being explored from the water fund to wastewater to fund the wastewater treatment plant expansion planned for 2019.

## Assumptions Shared Across Funds

Some of the assumptions and inputs used in the development of the long term financial plans are shared across all four enterprise funds.

Table 7 represents projected system growth for each of the four enterprise funds. These assumptions were developed using projections given from the Town's Development Services Department which are updated each year.

**Table 7**  
**Projected SFEs and Percentage Growth by Fund**

	<b>Water Fund</b>		<b>Water Resources Fund</b>		<b>Wastewater Fund</b>		<b>Stormwater Fund</b>	
<b>Year</b>	<b>SFEs</b>	<b>Percentage Growth</b>	<b>SFEs</b>	<b>Percentage Growth</b>	<b>SFEs</b>	<b>Percentage Growth</b>	<b>SFEs</b>	<b>Percentage Growth</b>
2019	849	3.94%	849	3.94%	738	3.57%	1,058	3.00%
2020	819	3.66%	819	3.66%	709	3.31%	714	1.99%
2021	927	4.00%	927	4.00%	815	3.68%	822	2.25%
2022	820	3.40%	820	3.40%	712	3.10%	715	1.91%
2023	820	3.29%	820	3.29%	712	3.01%	715	1.88%

The escalation factors used in this study are defined in Appendix B.

## Water Fund

The water fund financial plan projects the water fund's sources and uses of funds from 2019-2055. The water fund financial model developed for this study contains four sub-funds:

- Operating Reserve
- Capital Reserve
- Catastrophic Failure Reserve
- Rate Revenue Stabilization Reserve

### Sources of Funds

Sources of funds include all cash inflows to the water fund. These include service charge revenues, miscellaneous income, contributed cash-capital, and interest earnings. The assumptions for specific sources of funding are provided below. Detailed definitions are given in Appendix B.

- System Growth – Table 7 represents projected system growth for water.
- Rate Revenue Increases – Rate revenues are projected to increase each year based on Town growth and usage. Rate increases are not a factor for rate revenue increase for the water fund.
- System Development Fee (SDF) Revenues – SDFs are projected to increase each year based on growth in the Town. These are shown in more detail in Volume 2.

- Revenue Bonds – No new debt is planned for water in the study period.
- Inter-Fund Loans – The 2014 Inter-Fund loan from water to stormwater will be paid back in 2019. In 2019 it is planned to have the water fund loan wastewater \$5.5 million for the PCWRA wastewater treatment plant expansion.
- Other Revenues – For the study period, the water fund other revenues are presented in Table 8 below and include the following categories:
  - Other Charges for Service/Fees include costs for bulk hydrant backflow inspections, bulk hydrant meter calibrations, bulk hydrant meter repairs, bulk hydrant permit fees, disconnect/reconnect fees, curb stop variance fees, meter test fees, service transfer fees, etc.
  - Contributions and Donations include revenues from developer contributions.
  - Fines and Forfeitures include disconnection notice fees, late charges, lien administrative fees, lien filing fees, NSF charges and shut off fees.
  - Intergovernmental Agreement (IGA) Revenues include revenues received from various IGAs.
  - Miscellaneous Revenues include proceeds from sale of assets, reimbursements, sale of recycled materials, tower leases, water leases and vending machine commission.
  - Interest Earnings include interest received on balances in the bank assumed at 0.60%.

**Table 8**  
**Water Fund**  
**Other Revenues**

Other Revenues	FY2019	FY2020	FY2021	FY2022	FY2023
Other Charges for Service/Fees	\$581,286	\$598,725	\$616,686	\$635,187	\$654,243
Contributions and Donations	\$0	\$0	\$0	\$0	\$0
Fines and Forfeitures	\$357,700	\$368,431	\$379,484	\$390,868	\$402,595
IGA Revenues	\$2,650,000	\$360,500	\$371,315	\$382,454	\$393,928
Miscellaneous Revenues	\$106,049	\$109,230	\$112,507	\$115,883	\$119,359
Interest Earnings	\$116,102	\$94,386	\$91,823	\$104,351	\$120,493
<b>Total</b>	<b>\$3,811,137</b>	<b>\$1,531,272</b>	<b>\$1,571,815</b>	<b>\$1,628,744</b>	<b>\$1,690,618</b>

- Fund Balances – The water fund is projected to have a reserve fund balance of approximately \$6.1 million at the beginning of 2019, not including capital reserve funds. Each reserve has a minimum fund balance requirement to help mitigate financial risk, which is in line with the FMP goal to keep adequate reserves and maintain fund balances between minimums and maximums. The requirements by sub-funds are:
  - Operating Reserve – 60 days of O&M; increasing from approximately \$2.7 to \$3.1 million throughout the study period.



- Capital Reserve – Obligated reserves vary from year to year, depending on the Capital Improvement Plan. The fund maintains a minimum unobligated reserve balance of \$1.0 million throughout the study period.
- Catastrophic Failure Reserve – Approximately 2% of original fixed asset value, averaging \$4.3 million throughout the study period.
- Rate Revenue Stabilization Reserve – Based upon 10% of metered water sales; averaging approximately \$1.2 million in the study period. The 10% is consistent with the variance in rainfall from year to year.

The financial plan calls for maintaining the fund balance requirements presented above while subsequently using the net available capital reserve fund balance to offset short-term capital needs. The goal is to balance the need for rate increases and, if necessary, additional debt.

## Uses of Funds

Uses of funds include all expenditures, either operating or capital and any reserve requirement or increase in fund balance CRW plans to achieve. The major assumptions for uses of funds are as follows. Detailed definitions for each are located in Appendix B.

- Operating Expenses – For the water fund most operating costs are fixed; meaning not varying based on the volume of water sold; with the exception of energy, treatment chemicals and certain other supplies, which vary with production.
- Personnel Services – The water fund projects about 14 new FTEs throughout the study period.
- Supplies – The supplies for the water fund are expected to remain consistent over the five year study period at about \$2.0 million a year.
- Energy Costs – Over the 5 year study period these are expected to increase at a rate higher than inflation at approximately 6%.
- Capital Improvements – Total water system capital improvement costs from 2019-2023 are expected to be \$25.6 million in today's dollars. Only improvements that provide benefits to existing customers are included in revenue requirements. Improvements to serve growth are funded from SDFs.
- Capital Replacement and Rehabilitation – These are capital costs to replace existing capital assets. Total capital costs for existing customers over the five year study period are approximately \$5.8 million.
- Inter-Fund Loans – The water fund does not have an Inter-Fund loan balance that it is paying on at this time as an expense.
- Transfers Out – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$1.3 million over the five year period.
- PCWPF Water Treatment Charges – These are the charges that are transferred to and paid for by the Water Resources fund.
- Fund Balances – When fund balances are drawn down from initial balances, the use of those funds is a source of funding to cover water fund expenses. When it is building the fund balance it is a use of funds as cash is added to the water operating fund. These are projected to be kept at an acceptable level of working capital, which is a minimum of 60

days O&M in the operating reserve. This also conforms to the FMP goal to keep adequate reserves and maintain fund balances between minimums and maximums.

- Debt Service – The water fund currently has two outstanding revenue bond issues (2012 and 2015). The 2012 bond issue was a refinancing of 2003 and 2004 bonds and the 2015 bond issue was a refinancing of 2006 bonds. The water fund debt service amounts to approximately \$1.7 million annually through 2023 and then drops down to approximately \$700,000 through 2026.
- Debt Service Coverage – The debt service coverage ratio in the model is set to 1.2 times the total annual debt service amount, which is about \$2.0 million. This is a bond covenant requirement.

## Service Charge Revenue Requirements

The portion of annual system revenue requirements to be recovered through rates depends on a utility's financing policy and its other sources of income. To determine the amount of service charge revenue the water enterprise must generate annually, the total revenue requirements must be reduced by non-rate or other system revenues. Other system revenues are defined as all revenues except those derived from water rates. Table 9 represents the water fund service charge revenue requirements for 2019-2023.

**Table 9**  
**Water Fund**  
**Service Charge Revenue Requirements**

Other Revenues	FY2019	FY2020	FY2021	FY2022	FY2023
Operating and Maintenance	\$9,999,329	\$10,671,347	\$11,301,330	\$11,868,139	\$12,465,710
PCWPF Water Treatment Charges	\$1,494,442	\$1,640,248	\$1,707,903	\$1,754,363	\$1,805,118
Debt Service	\$1,752,251	\$1,734,394	\$1,741,190	\$1,740,010	\$1,741,270
Transfers Out	\$5,982,010	\$424,175	\$430,394	\$439,412	\$456,420
Cash Funded Capital	\$0	\$0	\$0	\$0	\$0
Minor Capital Outlay	\$547,482	\$647,482	\$629,482	\$632,000	\$732,000
Change in Fund Balance	(\$1,216,914)	\$982,521	\$2,737,358	\$2,649,624	\$2,423,521
<b>Total Expenditures</b>	<b>\$18,558,600</b>	<b>\$16,100,166</b>	<b>\$18,547,657</b>	<b>\$19,083,549</b>	<b>\$19,624,039</b>
Non-Rate Revenues	(\$3,811,137)	(\$1,531,272)	(\$1,571,815)	(\$1,628,744)	(\$1,690,618)
Transfers In	(\$767,625)	(\$82,500)	(\$1,915,833)	(\$1,888,333)	(\$1,860,833)
<b>Revenues Required from Rates</b>	<b>\$13,979,838</b>	<b>\$14,486,394</b>	<b>\$15,060,008</b>	<b>\$15,566,472</b>	<b>\$16,072,588</b>

## Water Resources Fund

The water resources fund financial plan projects the fund's sources and uses of funds from fiscal year 2019 through 2055. As noted previously, the results presented for the water resources fund include the impacts of the renewable water supply plan for the 3,500 AF Hybrid proposal authorized by Town Council in October 2012. The water resources fund financial model developed in this study has three sub-funds:

- Operating Reserve
- Capital Reserve
- Catastrophic Failure Reserve

The major assumptions for specific sources of funding are provided below.

### Sources of Funds

The sources of funds include all cash inflows to the operating funds. These include service charge revenues, miscellaneous income, contributed cash-capital, and interest earnings. The major assumptions for specific sources of funding are provided below and detailed definitions are given in Appendix B.

- System Growth – Table 7 represents the projected system growth for water resources.
- Rate Revenue Increases – There is a steady rate increase projected at 3% each year from 2019-2023.
- SDF Revenues – Please see Volume 2 for current projections.
- Revenue Bonds – During the 2019-2023 study period no new debt is planned.
- Inter-Fund Loans – There were no loans payable to the water resources fund.
- Other Revenues – For the study period the water resources fund other revenues are presented in Table 10 below.
  - PCWPF Reimbursement Revenue is a transfer in from the water fund for costs related to PCWPF.
  - Fines and Forfeitures include the lien administrative fee, the water surcharge and water violation revenues.
  - Miscellaneous Revenues includes lease interest, miscellaneous revenues and vending machine commission.
  - Interest Earnings include interest received on balances in the bank assumed at 0.60%.
  - Market Change is the net revenue impact of earnings or losses on our investments.

**Table 10**  
**Water Resources Fund**  
**Other Revenues**

<b>Other Revenues</b>	<b>FY2019</b>	<b>FY2020</b>	<b>FY2021</b>	<b>FY2022</b>	<b>FY2023</b>
Fines and Forfeitures	\$66,000	\$67,980	\$70,019	\$72,120	\$74,284
Miscellaneous Revenues	\$6,334,923	\$2,225,155	\$2,380,305	\$983,132	\$526,082
Interest Earnings	\$700,000	\$77,623	\$27,306	\$70,628	\$116,771
Market Change	(\$187,000)	(\$211,425)	(\$211,425)	(\$211,425)	(\$211,425)
<b>Total</b>	<b>\$6,913,923</b>	<b>\$2,159,333</b>	<b>\$2,266,205</b>	<b>\$914,455</b>	<b>\$505,711</b>

- **Fund Balances** – The water resources fund was projected to have a reserve of approximately \$2.95 million at the beginning of 2019, not including capital reserve funds. Each of the sub-funds in the water resources financial plan has a minimum balance requirement to help mitigate financial risk, which is in line with the FMP goal to keep adequate reserves and maintain fund balances between minimums and maximums. The requirements by sub-fund are:
  - Operating Reserve – 60 days of O&M; increasing from approximately \$1.9 million to \$2.3 million in the study period.
  - Capital Reserve – Obligated reserves vary from year to year; depending on the CIP. The fund maintains a minimum unobligated reserve of \$500,000 throughout the study period.
  - Catastrophic Failure Reserve – Approximately 2% of original fixed asset value averaging about \$2.1 million in the study period.

The financial plan calls for maintaining the balances above and using net available capital reserve fund balance to offset short-term capital needs.

## Uses of Funds

Uses of funds include all the same components as listed above in the water fund. The major assumptions for uses of funds are shown below. For detailed definitions see Appendix B.

- **Operating Costs** – For the water resources fund most operating costs are fixed.
- **Personnel Services** – The water resources fund projects about 14 new FTEs throughout the study period.
- **Supplies** – For the water resources fund supplies are projected to be approximately \$410,000 per year over the five year study period.
- **Capital Improvements** – Total water resources system capital improvement costs from 2019-2023 are expected to be \$95.7 million in today's dollars. Only improvements that

provide benefits to existing customers are included in revenue requirements. Improvements to serve growth are funded from SDFs.

- Capital Replacement and Rehabilitation – These are capital costs to replace existing capital assets. Total capital costs for existing customers over the five year study period are approximately \$2.5 million.
- Inter-Fund Loans – The fund does not have an inter-fund loan balance at this time.
- Transfers Out – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$25,500 over the five year period.
- Fund Balances – For the study, it is assumed that the fund balances will not drop below the requirements presented in the above section.
- Debt Service – The fund currently has the 2016 revenue bonds which refunded the 2008 Certificates of Participation (COPs). The existing debt service amounts to an average of \$4.5 million per year from 2019 to 2034.
- Debt Service Coverage – The debt service coverage ratio in the model is set to 1.2 times the total annual debt service amount, which is about \$5.4 million.

## Service Charge Revenue Requirements

Table 11 represents the water resources fund service charge revenue requirements for the study period 2019 through 2023.

**Table 11**  
**Water Resources Fund**  
**Service Charge Revenue Requirements**

Other Revenues	FY2019	FY2020	FY2021	FY2022	FY2023
Operating and Maintenance	\$8,906,724	\$9,379,631	\$10,015,220	\$10,512,472	\$10,538,834
Debt Service	\$4,288,247	\$4,315,247	\$4,328,247	\$4,353,022	\$4,380,222
Transfers Out	\$75,917	\$72,649	\$75,013	\$77,460	\$69,294
Cash Funded Capital	\$0	\$9,065,009	\$0	\$0	\$0
Minor Capital Outlay	\$16,889	\$16,999	\$13,451	\$13,887	\$13,900
Change in Fund Balance	\$4,795,636	(\$8,723,349)	\$603,725	(\$507,275)	(\$158,277)
<b>Total Expenditures</b>	<b>\$18,083,413</b>	<b>\$14,126,186</b>	<b>\$15,035,656</b>	<b>\$14,449,566</b>	<b>\$14,843,974</b>
Non-Rate Revenues	(\$6,913,923)	(\$2,159,333)	(\$2,266,205)	(\$914,455)	(\$505,711)
PCWPF Reimbursement	(\$1,561,982)	(\$1,707,788)	(\$1,777,807)	(\$1,826,714)	(\$1,869,303)
<b>Revenues Required from Rates</b>	<b>\$9,607,507</b>	<b>\$10,259,066</b>	<b>\$10,991,644</b>	<b>\$11,708,397</b>	<b>\$12,468,959</b>

## Wastewater Fund

The wastewater fund financial plan projects the fund's source and uses of funds from 2019 through 2055. The three sub-funds include:

- Operating Reserve
- Capital Reserve
- Catastrophic Failure Reserve

### Sources of Funds

The sources of funds include all cash inflows to the operating funds. These include service charge revenues, miscellaneous income, contributed cash-capital, and interest earnings. The major assumptions for specific sources of funding are provided below and detailed definitions are given in Appendix B.

- System Growth – Table 7 represents the projected system growth for wastewater.
- Rate Revenue Increases – There are no rate revenue increases planned for 2019 to 2023.
- SDF Revenues – Please see Volume 2 for current projections.
- Revenue Bonds – During 2019-2023 no new debt options are being reviewed.
- Inter-Fund Loans – In 2019 a loan from the water fund for \$5.5 million is anticipated to cover the wastewater treatment plant expansion.
- Other Revenues - For the study period, the wastewater fund other revenues are presented in Table 12 below.
  - Contributions and Donations include developer contributions expected.
  - Fines and Forfeitures include lien administrative fees.
  - Miscellaneous Revenues include reimbursements, vending machine commissions and other miscellaneous revenues.
  - Interest Earnings include interest received on balances in the bank assumed at 0.60%.

**Table 12**  
**Wastewater Fund**  
**Other Revenues**

Other Revenues	FY2019	FY2020	FY2021	FY2022	FY2023
Contributions and Donations	\$29,510	\$30,395	\$31,307	\$32,246	\$33,214
Fines and Forfeitures	\$100	\$103	\$106	\$109	\$113
Miscellaneous Revenues	\$2,840	\$2,925	\$3,013	\$3,103	\$3,196
Interest Earnings	\$50,842	\$43,807	\$65,063	\$91,899	\$119,477
<b>Total</b>	<b>\$83,292</b>	<b>\$77,230</b>	<b>\$99,490</b>	<b>\$127,358</b>	<b>\$156,000</b>

- **Fund Balances** – The wastewater fund was projected to have a reserve of approximately \$5.3 million at the beginning of 2019, not including capital reserve funds. Each of the sub-funds in the financial plan have a minimum balance requirement to help mitigate financial risk, which is in line with the FMP goal to keep adequate reserves and maintain fund balances between minimums and maximums. The requirements by sub-fund are:
  - Operating Reserve – 60 days of O&M; averaging \$2.0 million in the study period.
  - Capital Reserve – Obligated reserves vary from year to year; depending on the CIP. The fund maintains a minimum unobligated reserve of \$1.0 million throughout the study period.
  - Catastrophic Failure Reserve – Approximately 2% of original fixed asset value averaging about \$1.9 million in the study period.

The financial plan calls for maintaining these balances above and using net available capital reserve fund balance to offset short-term capital needs.

## Uses of Funds

Uses of funds include all the same components as listed above in the water fund. The major assumptions for uses of funds are shown below. For detailed definitions see Appendix B.

- **Operating Costs** – For the wastewater fund most operating costs are fixed.
- **Personnel Services** – The wastewater fund projects about 11 new FTEs throughout the study period.
- **Energy Costs** – Over the 5 year study period these average a 0.60% increase.
- **Capital Improvements** – Total wastewater system capital improvement costs from 2019-2023 are expected to be \$29.2 million in today's dollars. Only improvements that provide benefits to existing customers are included in revenue requirements. Improvements to serve growth are funded from SDFs.
- **Capital Replacement and Rehabilitation** – These are capital costs to replace existing capital assets. Total capital costs for existing customers over the five year study period are approximately \$1.4 million.
- **Inter-Fund Loans** – In 2019 the fund anticipates receiving a \$5.5 million Interfund loan from the water fund for the treatment plant expansion, which will be paid back between 2019 and 2023.
- **Transfers Out** – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$587,563 over the five year study period.
- **Fund Balances** – For the study, it is assumed that the fund balances will not drop below the requirements presented in the above section.
- **Debt Service** – The fund currently has the 2012 revenue bond, which is a refinancing of a 2004 revenue bond series. The principal and interest payments equal approximately \$333,000 annually from 2019 through 2023.
- **Debt Service Coverage** – The debt service coverage ratio in the model is set to 1.2 times the total annual debt service amount, which is about \$400,000. This is a bond requirement.



## Service Charge Revenue Requirements

Table 13 represents the wastewater fund service charge revenue requirements for the study period 2019 through 2023.

<b>Table 13</b> <b>Wastewater Fund</b> <b>Service Charge Revenue Requirements</b>					
<b>Other Revenues</b>	<b>FY2019</b>	<b>FY2020</b>	<b>FY2021</b>	<b>FY2022</b>	<b>FY2023</b>
Operating and Maintenance	\$5,319,781	\$5,520,732	\$5,813,476	\$6,073,986	\$6,345,066
Debt Service	\$335,274	\$331,356	\$333,660	\$332,040	\$331,380
Transfers Out	\$215,001	\$181,182	\$183,811	\$186,125	\$188,552
Cash Funded Capital	\$6,578,603	\$1,395,769	\$0	\$0	\$0
Minor Capital Outlay	\$61,999	\$61,999	\$57,999	\$57,999	\$57,999
Change in Fund Balance	(\$1,670,362)	\$3,695,458	\$5,225,013	\$5,344,968	\$5,453,822
<b>Total Expenditures</b>	<b>\$10,840,296</b>	<b>\$11,186,496</b>	<b>\$11,613,959</b>	<b>\$11,995,117</b>	<b>\$12,376,819</b>
Non-Rate Revenues	(\$83,292)	(\$77,230)	(\$99,490)	(\$127,358)	(\$156,000)
Transfers In	\$0	\$0	\$0	\$0	\$0
<b>Revenues Required from Rates</b>	<b>\$10,757,004</b>	<b>\$11,109,266</b>	<b>\$11,514,470</b>	<b>\$11,867,760</b>	<b>\$12,220,819</b>

## Stormwater Fund

The stormwater fund financial plan projects the fund's source and uses of funds from 2019 through 2055. The three sub-funds include:

- Operating Reserve
- Capital Reserve
- Catastrophic Failure Reserve

## Sources of Funds

The sources of funds include all cash inflows to the operating funds. These include service charge revenues, miscellaneous income, contributed cash-capital, and interest earnings. The major assumptions for specific sources of funding are provided below and definitions are given in Appendix B.

- System Growth – Table 7 represents the projected system growth for stormwater.



- Rate Revenue Increases – There are no rate revenue increases planned for 2019 to 2023.
- System Development Fee (SDF) Revenues - Please see Volume 2 for current projections.
- Revenue Bonds – During 2019-2023 no new debt is planned.
- Inter-Fund Loans – There were no loans payable to the fund.
- Other Revenues – For the study period, the stormwater fund other revenues are presented in Table 19 below.
  - DESC/GESC Fees include DESC inspection fees, GESC inspection fees, and GESC plan check fees.
  - Other Fees include inspection fees, stormwater capital charge and stormwater charges.
  - Developer Contributions include contributions from developers.
  - Fines and Forfeitures include the lien administrative fee.
  - Miscellaneous Revenues include vending machine commissions and other miscellaneous revenues.
  - Interest Earnings include interest received on balances in the bank assumed at 0.60%.
  - Market Change is the net revenue impact of earnings or losses on our investments.

**Table 19**  
**Stormwater Fund**  
**Other Revenues**

Other Revenues	FY2019	FY2020	FY2021	FY2022	FY2023
DESC/GESC Fees	\$369,000	\$380,070	\$391,472	\$403,216	\$415,313
Other Fees	\$35,400	\$36,462	\$37,556	\$38,683	\$39,843
Developer Contributions	\$2,315	\$2,384	\$2,456	\$2,530	\$2,606
Fines and Forfeitures	\$150	\$155	\$159	\$164	\$169
Miscellaneous Revenues	\$45,550	\$46,917	\$48,324	\$49,774	\$51,267
Interest Earnings	\$35,697	\$24,580	\$24,006	\$28,224	\$31,313
Market Change	\$150	\$155	\$159	\$164	\$169
<b>Total</b>	<b>\$488,262</b>	<b>\$490,722</b>	<b>\$504,132</b>	<b>\$522,754</b>	<b>\$540,679</b>

- Fund Balances – The stormwater fund was projected to have a reserve of approximately \$804,944 at the beginning of 2019, not including capital reserve funds. Each of the sub-funds in the financial plan have a minimum balance requirement to help mitigate financial risk, which is in line with the FMP goal to keep adequate reserves and maintain fund balances between minimums and maximums. The requirements by sub-fund are:

- Operating Reserve – 60 days of O&M; increasing from approximately \$910,000 in the study period.
- Capital Reserve – Obligated reserves vary from year to year; depending on the CIP. The fund maintains a minimum unobligated reserve of \$500,000 throughout the study period.
- Catastrophic Failure Reserve – Approximately 2% of original fixed asset value averaging about \$1.4 million in the study period.

The financial plan calls for maintaining these balances above and using net available capital reserve fund balance to offset short-term capital needs.

## Uses of Funds

Uses of funds include all the same components as listed above in the water fund. The major assumptions for uses of funds are shown below. For detailed definitions see Appendix B.

- Operating Costs – For the stormwater fund most operating costs are fixed.
- Personnel Services – The stormwater fund projects about 6 new FTEs throughout the study period.
- Supplies – The supplies for the stormwater fund are expected to remain consistent over the five year study period at about \$81,400 a year.
- Energy Costs – Over the 5 year study period these are expected to increase at a rate higher than inflation at about 8%.
- Capital Improvements – Total stormwater system capital improvement costs from 2019-2023 are expected to be \$15.1 million in today's dollars. Only improvements that provide benefits to existing customers are included in revenue requirements. Improvements to serve growth are funded from SDFs.
- Capital Replacement and Rehabilitation – These are capital costs to replace existing capital assets. Total capital costs for existing customers over the five year study period are approximately \$1.1 million.
- Transfers Out – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$580,000 over the five year study period.
- Inter-Fund Loans – The 2014 inter-fund loan to stormwater from water is scheduled to be repaid in 2019, see Transfers Out in Table 15.
- Fund Balances – For the study, it is assumed that the fund balances will not drop below the requirements presented in the above section.
- Debt Service – The stormwater fund does not have existing debt service and the financial plan does not assume new debt issues.

## Service Charge Revenue Requirements

Table 15 represents the stormwater fund service charge revenue requirements for the study period 2019 through 2023.

**Table 15**  
**Stormwater Fund**  
**Service Charge Revenue Requirements**

<b>Other Revenues</b>	<b>FY2019</b>	<b>FY2020</b>	<b>FY2021</b>	<b>FY2022</b>	<b>FY2023</b>
Operating and Maintenance	\$2,452,847	\$2,579,367	\$2,691,268	\$2,813,509	\$2,948,040
Transfers Out	\$904,916	\$160,431	\$162,051	\$166,806	\$171,461
Cash Funded Capital	\$0	\$0	\$0	\$0	\$0
Minor Capital Outlay	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Change in Fund Balance	\$166,984	\$848,063	\$817,779	\$770,143	\$709,620
<b>Total Expenditures</b>	<b>\$3,529,747</b>	<b>\$3,592,860</b>	<b>\$3,676,098</b>	<b>\$3,755,458</b>	<b>\$3,834,121</b>
Non-Rate Revenues	(\$488,262)	(\$490,722)	(\$504,132)	(\$522,754)	(\$540,679)
Transfers In	(\$50,257)	(\$46,293)	(\$47,913)	(\$49,590)	(\$51,326)
<b>Revenues Required from Rates</b>	<b>\$2,991,228</b>	<b>\$3,055,845</b>	<b>\$3,124,053</b>	<b>\$3,183,114</b>	<b>\$3,242,116</b>

# Water and Wastewater Cost-of-Service Analysis

## Introduction

Part of the study includes updating the water and wastewater cost-of-service (COS) analysis to implement the rate revenue requirements determined in the financial plans. The results of the COS analysis are monthly service charges and volumetric rates by customer class that equitably distribute the ongoing water and wastewater costs across customer classes.

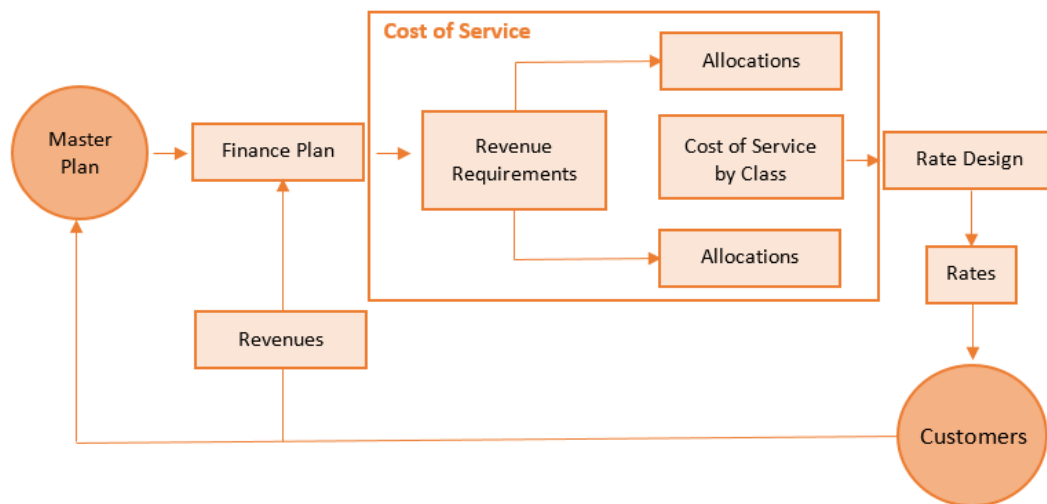
## Cost-of-Service Methodology

The basic philosophy behind a COS methodology is that utilities should be self-sustaining enterprises that are adequately financed with rates that are based on sound engineering and economic principles. In addition, rates should be equitable and proportionate to the costs of providing service to a given type of customer. The guidelines of water ratemaking are established by the American Water Works Association (AWWA) in the Manual M1. The guidelines for wastewater ratemaking are established by the Water Environment Federation (WEF) in the Manual of Practice No. 27.

Figure 2 illustrates the flow of information involved in developing COS rates. More specifically, the steps required to develop COS rates include:

- Determination of the systems' annual revenue requirements (i.e., costs)
- Determination of service charge revenue requirements
- Analysis of customer demands and characteristics
- Allocation of service charge revenue requirements by type of customer classes

• Design of rates Figure 2: Cost-of-Service Process



The COS process utilizes information generated in the financial plan, as discussed above in the water and wastewater sections. The CIP is a particularly critical component of the financial plan because the way in which the utility plans to meet its capital costs has major implications on the level of rates that customers pay. One key function of the financial plan is to give management a tool to evaluate the impact of the costs of capital projects on service charges, debt, fund balances, etc. A major result of the financial plan is the annual service charge revenue requirements: the amount of revenue the utility must earn from the assessment of water and wastewater rates in order to meet all of its financial needs and obligations. The COS analysis allocates service charge revenue requirements among CRW's customer classes to determine the cost of service by class.

The financial plan attempts to balance cash sources and uses through 2055; however, the analysis focuses on the water and wastewater system revenue requirements for a single test year with two projected years. The main goal was to determine rates for recommendation in 2019. Revenue requirements for 2019 through 2023 were obtained from the financial plans developed for CRW.

The steps of the COS process area as follows.

## **Determination of Annual System Revenue Requirements**

Revenue requirements are total operating and capital costs of the system for a single year to be recovered from all available revenue sources. Under a cash-need approach followed by most governmental-type entities, total revenue requirements typically equal:

- O&M Expenses
- Debt Service
- Cash-Funded Capital Expenditures
- Transfers to Reserves

## **Determination of Service Charge Revenue Requirements**

The portion of annual system revenue requirements to be recovered through rates depends on a utility's financing policy and its other sources of income. To determine the amount of revenue that rates must generate annually, the total revenue requirements must be reduced by non-rate revenue or other system revenue. Other system revenues are defined as all revenues except those derived from water and wastewater rates.

## **Analysis of Flows and Usage Characteristics**

Analyzing annual consumption and flows in the system and other usage characteristics begins with a review of the individual customer classes. CRW currently provides water services to seven customer classes:

- Residential
- Multifamily (with irrigation)
- Multifamily Indoor Use Only
- Commercial (with irrigation)
- Commercial Indoor Use Only
- Irrigation
- Bulk Water

CRW currently provides wastewater to five customer classes:

- Residential
- Multifamily (with irrigation)
- Multifamily Indoor Use Only
- Commercial (with irrigation)
- Commercial Indoor Use Only

The commercial class includes such customers as schools, churches and the non-irrigation accounts. The irrigation class includes all irrigation-only accounts.

To equitably allocate the service charge revenue requirements of the system, an analysis of each customer class' consumption and flow characteristics is necessary. Characteristics such

as annual and monthly consumption in millions of gallons, AWMC, average summer monthly consumption and the number of customers by meter size and customer class are analyzed.

## **Customer Characteristics**

CRW's customer characteristics that are analyzed in the study include the following for the water system. These are further defined in Appendix C.

- Base Water Demand
- Maximum Day Extra Capacity
- Maximum Hour Extra Capacity
- Meters and Services
- Number of Customers

For wastewater the analyzed customer characteristics are shown below and are further defined in Appendix C.

- Flow Demand
- Biochemical Oxygen Demand (BOD)
- Total Suspended Solids (TSS)
- Meters and Services
- Number of Customers

The percentage of each customer class' share of each characteristic above forms the basis for allocating costs of service to each customer class.

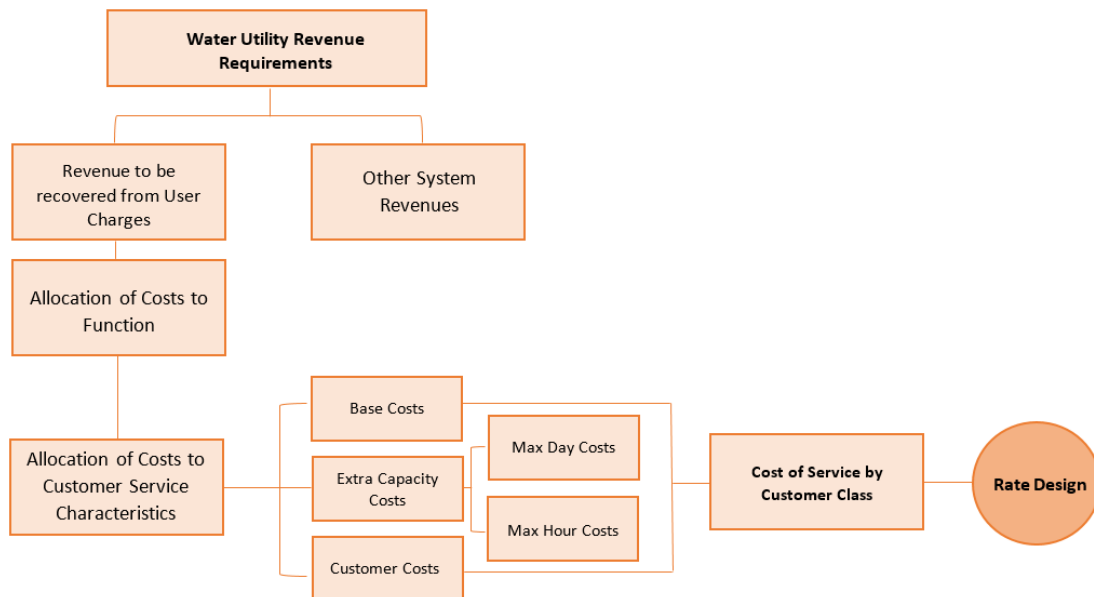
## **Allocation Costs to Customer Classes**

Equitably allocating the water and wastewater systems' service charge revenue requirements to the customer classes involves a multi-step process. Beginning with the O&M costs, the following steps were completed:

- Allocate costs to functions (called unit process in the wastewater system)
- Allocate costs by functions to customer characteristics
- Allocate costs to customer classes based on each class' proportion of the customer characteristics

Figure 3 illustrates how the separate cost allocation steps fit into the overall process of setting rates for the water system.

Figure 3: Rate Setting Process



## Allocation of Costs to Functions

A water or wastewater utility's O&M expenditures may be reported according to a chart of accounts that identifies the system functions. Alternatively, the expenses may follow the divisions of the utility such as management, distribution, storage, treatment, billing, etc. The functions need to be identified and costs separated accordingly. The first cost allocation step determines the percentage of each O&M line item to be allocated to one or more of the system's functions. Functionalizing costs in this manner enhances the accuracy and equity of the system cost allocation to the customer classes. The O&M expenditures for the water system were allocated to the following system functions based on fixed asset allocations and direction from CRW Staff:

- Source of Supply
- Treatment
- Pumping
- Transmission
- Distribution
- Storage
- Buildings/Improvements
- Administration
- Tools/Equipment
- Power and Chemicals
- Meters and Services
- Customers and Accounts

The O&M expenditures for the wastewater system were allocated to the following unit processes based on fixed asset allocations and direction from CRW Staff:

- Treatment by Others
- Collection
- Interceptor
- Lift Station
- Administration
- Customer and Accounts
- Meters and Services

## **Allocation of Costs to Customer Characteristics**

The assignment of costs to customer characteristics varies with the allocation methodology used. In the method of COS allocation used, costs are typically assigned to the following customer characteristics for water, which are defined in Appendix B.

- Base
- Maximum Day Extra Capacity
- Maximum Hour Extra Capacity
- Customer
- Meter and Services

In the method of cost allocation followed, costs are typically assigned to the following customer characteristics for wastewater, which are also defined in Appendix B.

- Flow
- BOD
- TSS
- Number of Customers
- Demand

## **Distribution of Costs to Customer Classes**

The projections of customer class consumption and their respective usage characteristics are calculated in this step. Each class listed above in the report for water and wastewater contributes a different proportion of total annual usage.

For the water utility, base costs are allocated to each class in proportion to its total annual consumption. Costs related to max day and max hour extra capacity are allocated to each class in proportion to the class' estimated peaking factors of each class' extra capacity demands relative to the total extra capacity demands. Peaking factors by class were determined by analyzing monthly consumption data and system peaking factors.



Customer costs typically are allocated based on the proportion of the number of customers of each class. Meters and service costs are allocated according to the proportion of equivalent meters.

For the wastewater utility, flow costs are allocated to each class in proportion to total annual usage (calculated using the AWMC). Costs related to BOD and TSS are allocated to each class in proportion to the class' estimated strengths based on typical domestic strength factors.

Customer costs are allocated based on the proportion of customers; meters and services costs are allocated according to the proportion of equivalent meters. The proportion of equivalent meters by customer class is also used to allocate demand costs.

## **Capital Costs**

Under the cash basis approach to calculating revenue requirements, capital costs consist of non-debt funded capital expenditures (capital outlays), debt service and transfers to reserve funds. It is important to note that capital costs for improvements to serve new growth are not included in these costs. Unlike O&M costs where each line item is allocated to the water system functions, capital costs under this approach are allocated to customer classes based on the allocation of fixed assets net of accumulated depreciation and contributions. To generate capital cost allocation percentages used under the cash basis approach, each fixed asset line item is allocated according to the following four steps:

1. Allocate net fixed assets used to serve customers to functions (called unit processes in the wastewater fund).
2. Allocate assets by functions to customer characteristics.
3. Allocate assets to customer classes based on each class' proportion of the customer characteristics.
4. Distribute the capital costs to each class of customers based on each class' proportionate use of the allocated assets.

## **Rate Design Development and Rate Calculation**

The last step in the COS analysis is the actual design of the water and wastewater rate structures and calculation of the rates by customer class. Several types of rate structures have been used historically and are currently in use throughout the industry. The most important concern is to ensure the rate structure recovers the cost of service and meets CRW's objectives identified by the community.

## **Water Cost-of-Service Analysis Results**

The steps described above to conduct the water COS analysis were followed. The results presented in this section summarize the cost of service for each of the water system's customer classes for 2019.

## Estimated Water System Revenue Requirements

The first two steps of the analysis determine the revenue requirements and service charge revenue requirements or revenues to be recovered from the calculated water rates. Based on the O&M and capital budget and financial planning assumptions, Table 16 represents the water fund revenue requirements for 2019.

<b>Table 16</b> <b>Water Fund</b> <b>2019 Revenue Requirements</b>	
<b>Description</b>	<b>2019</b>
<b>O&amp;M Expenses:</b>	
Admin	\$1,302,391
Capital Projects	\$858,711
Customer Billing	\$234,351
Meter Services	\$1,239,540
Meters Retrofit / AMI	\$1,000,000
Engineering	\$454,903
Mapping	\$86,843
Field Services	\$1,022,107
Facility Maintenance	\$618,483
Water Plant Operations	\$3,702,523
SCADA	\$439,537
Reg & Water Compliance	\$87,422
PCWPF Water Treatment Charges	\$1,494,442
Transfers Out	\$5,982,010
<b>Subtotal O&amp;M</b>	<b>\$18,523,263</b>
Less :Transfers	(\$7,476,452)
Less: Minor Capital	(\$547,482)
<b>Total O&amp;M</b>	<b>\$10,499,329</b>
<b>Capital Expenses</b>	
Transfer to Capital Fund	\$7,476,452
Debt Service	\$1,752,251
Cash Funded Capital	\$0
Minor Capital Outlay	\$547,482
<b>Subtotal Capital</b>	<b>\$9,776,185</b>
<b>Total Revenue Requirements</b>	<b>\$20,275,514</b>
Less: O&M Related Non-Rate Revenue	(\$581,286)
Less: Capital Related Non-Rate Revenue	(\$5,714,390)
<b>Service Charge Revenue Requirement</b>	<b>\$13,979,838</b>

After subtracting non-rate revenues and calculating the service charge revenue requirements for 2019 the amount to recover is approximately \$13.9 million.

Customer characteristics are estimated for 2019 based on consumption for the most recent twelve months ending December 2017 from CRW's billing records, peaking factors calculated by CRW, plus the projected minimum additional flow by customer class. Minimum additional flow per class is calculated based on a representative customer's annualized AWMC multiplied by projected growth. Table 17 summarizes the projected customer characteristics that calculate the equivalent meters used for the study as well as the consumption patterns used. Table 18 shows the percentages allocated to each customer characteristic from the COS model that is projected for 2019 for each customer class.

<b>Table 17</b> <b>Water Fund</b> <b>Customer Characteristics by Customer Class (2019 Projected)</b>					
<b>Customer Class</b>	<b>Base Consumption (Kgal)</b>	<b>Max Day Extra Capacity (MGD)</b>	<b>Max Hour Extra Capacity (MGD)</b>	<b>Customers</b>	<b>Equivalent Meter</b>
Residential	1,587,084	6.30	8.52	20,166	20,232
Multifamily w/ Irrigation	86,447	0.23	0.37	112	951
Commercial w/ Irrigation	123,067	0.34	0.54	279	1,461
Bulk	52,318	0.17	0.33	105	105
Irrigation	301,134	2.19	2.40	489	3,007
Multifamily Indoor Use Only	95,684	0.08	0.28	377	1,860
Commercial Indoor Use Only	138,919	0.17	0.44	374	2,174
<b>Total</b>	<b>2,384,652</b>	<b>9.48</b>	<b>12.88</b>	<b>21,902</b>	<b>29,791</b>

**Table 18**  
**Water Fund**  
**Customer Characteristics (2019 Projected)**

Customer Class	Base	Max Day	Max Hour	Customer	Meter
Residential	66.55%	66.49%	66.18%	92.07%	67.91%
Multifamily w/ Irrigation	3.63%	2.42%	2.89%	0.51%	3.19%
Commercial w/ Irrigation	5.16%	3.56%	4.19%	1.27%	4.90%
Bulk	2.19%	1.81%	2.56%	0.48%	0.35%
Irrigation	12.63%	23.06%	18.64%	2.23%	10.09%
Multifamily Indoor Use Only	4.01%	0.86%	2.14%	1.72%	6.25%
Commercial Indoor Use Only	5.83%	1.81%	3.40%	1.71%	7.30%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

The service charge revenue requirements reported in Table 16 of \$13.9 million are allocated first among functions, then to customer characteristics and finally to each customer class based on the percentages presented in Table 18 above. These results are the cost of service by customer characteristics and class shown in Table 19 below.

**Table 19**  
**Water Fund**  
**Water Cost of Service by Customer Class (2019 Projected)**

Customer Class	Base	Max Day	Max Hour	Customer	Meter	Total
Residential	\$3,614,850	\$2,249,015	\$652,696	\$2,342,993	\$1,110,325	<b>\$9,969,879</b>
Multifamily w/ Irrigation	\$196,898	\$81,950	\$28,478	\$13,013	\$52,197	<b>\$372,534</b>
Commercial w/ Irrigation	\$280,305	\$120,272	\$41,316	\$32,416	\$80,176	<b>\$554,484</b>
Bulk	\$119,163	\$61,356	\$25,248	\$12,199	\$5,762	<b>\$223,729</b>
Irrigation	\$685,883	\$779,884	\$183,869	\$56,815	\$165,042	<b>\$1,871,492</b>
Multifamily Indoor Use Only	\$217,937	\$28,989	\$21,081	\$43,802	\$102,104	<b>\$413,912</b>
Commercial Indoor Use Only	\$316,410	\$61,094	\$33,521	\$43,453	\$119,329	<b>\$573,807</b>
<b>Total</b>	<b>\$5,431,445</b>	<b>\$3,382,559</b>	<b>\$986,208</b>	<b>\$2,544,691</b>	<b>\$1,634,934</b>	<b>\$13,979,838</b>

## Wastewater Cost-of-Service Analysis Results

This section represents the cost of service by customer class for the wastewater system.

### Estimated Wastewater System Revenue Requirements

Test year revenue requirements and service charge revenue requirements, or revenues to be recovered from the calculated wastewater rates, are presented in Table 20. The study projects that the wastewater system needs to recover approximately \$10.8 million from wastewater customers in 2019.

<b>Table 20</b> <b>Wastewater Fund</b> <b>2019 Revenue Requirements</b>	
<b>Description</b>	<b>2019</b>
O&M Expenses	
Admin	\$769,744
Capital Projects	\$55,508
Customer Billing	\$230,673
Engineering	\$266,182
Mapping	\$71,681
Field Services	\$806,103
Facility Maintenance	\$443,137
Plant Operations	\$2,530,000
SCADA	\$208,752
Transfers Out	\$215,001
<b>Subtotal O&amp;M</b>	<b>\$5,596,781</b>
Less :Transfers	(\$215,001)
Less: Minor Capital	(\$61,999)
<b>Total O&amp;M</b>	<b>\$5,319,781</b>
Capital Expenses	
Transfer to Capital Fund	\$215,001
Debt Service	\$335,274
Cash Funded Capital	\$6,578,603
Minor Capital Outlay	\$61,999
<b>Subtotal Capital</b>	<b>\$7,190,877</b>
<b>Total Revenue Requirements</b>	<b>\$12,510,658</b>
Less: O&M Related Non-Rate Revenue	(\$83,292)
Less: Capital Related Non-Rate Revenue	(\$1,670,362)
<b>Service Charge Revenue Requirement</b>	<b>\$10,757,004</b>

Customer characteristics are estimated for 2019 based on January 2017 to December 2017 data from CRW's billing records and assumed residential strength factors plus the projected minimum additional flow by customer class for wastewater customers. The 2018 cost of service model does not currently incorporate differences between waste strength (i.e. BOD and TSS); therefore, no differences in concentrations are used. Minimum additional flow per class is calculated based on a representative customer's annualized AWMC and projected growth. Table 21 summarizes the projected customer characteristics that calculate the equivalent meters used for the study as well as the consumption patterns used. Table 22 shows the percentages allocated to each customer characteristic from the COS model that is projected for 2019 for each customer class.

**Table 21**  
**Wastewater Fund**  
**Customer Characteristics by Customer Class (2019 Projected)**

<b>Customer Class</b>	<b>Flow (kgal)</b>	<b>BOD (Pounds)</b>	<b>TSS (Pounds)</b>	<b># of Customers</b>	<b>Equivalent Meter</b>
Residential	738,148	2,346,901	2,537,856	20,011	20,076
Commercial w/ Irrigation	76,900	244,499	264,393	276	1,544
Commercial Indoor Use Only	106,862	339,762	367,407	355	2,111
Multifamily w/ Irrigation	62,300	198,079	214,196	112	962
Multifamily Indoor Use Only	91,268	290,180	313,791	377	2,001
<b>Total</b>	<b>1,075,478</b>	<b>3,419,422</b>	<b>3,697,642</b>	<b>21,131</b>	<b>26,693</b>

**Table 22**  
**Wastewater Fund**  
**Customer Characteristics (2019 Projected)**

<b>Customer Class</b>	<b>Flow (kgal)</b>	<b>BOD (Pounds)</b>	<b>TSS (Pounds)</b>	<b>Customers</b>	<b>Equivalent Meter</b>
Residential	68.63%	68.63%	68.63%	94.70%	75.21%
Commercial w/ Irrigation	7.15%	7.15%	7.15%	1.31%	5.78%
Commercial Indoor Use Only	9.94%	9.94%	9.94%	1.68%	7.91%
Multifamily w/ Irrigation	5.79%	5.79%	5.79%	0.53%	3.60%
Multifamily Indoor Use Only	8.49%	8.49%	8.49%	1.78%	7.50%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

The service charge revenue requirements reported in Table 20 of \$10.8 million are allocated first among functions, then to customer characteristics and finally to each customer class based on the percentages presented in Table 22 above. These results are the cost of service by customer characteristics and class shown in Table 23 below.

<b>Table 23</b> <b>Wastewater Fund</b> <b>Cost of Service by Customer Class (2019 Projected)</b>					
<b>Customer Class</b>	<b>Flow (kgal)</b>	<b>BOD (Pounds)</b>	<b>TSS (Pounds)</b>	<b>Customers</b>	<b>Total</b>
Residential	\$5,252,812	\$734,140	\$408,164	\$1,363,066	<b>\$7,758,182</b>
Commercial w/ Irrigation	\$547,236	\$76,482	\$42,522	\$18,800	<b>\$685,041</b>
Commercial Indoor Use Only	\$760,452	\$106,282	\$59,090	\$24,181	<b>\$950,005</b>
Multifamily w/ Irrigation	\$443,340	\$61,962	\$34,449	\$7,629	<b>\$547,379</b>
Multifamily Indoor Use Only	\$649,478	\$90,772	\$50,467	\$25,680	<b>\$816,397</b>
<b>Total</b>	<b>\$7,653,318</b>	<b>\$1,069,637</b>	<b>\$594,693</b>	<b>\$1,439,355</b>	<b>\$10,757,004</b>

## Wastewater Monthly Service Charge

An important rate design feature that directly affects the rate results is the policy decision to include 20 percent of annual capital costs in the monthly service charge. By doing this, revenue stability is increased and all customers are required to pay a portion of debt service and other capital expenses strictly on an equivalent water meter basis rather than on a wastewater volume basis. This also reduces the volumetric rate and recovers a portion of the PCWRA debt service costs from users who require more capacity in the wastewater system. The demand charge component on the monthly service charge recovers the 20 percent of annual wastewater system capital costs not including the capital costs needed to serve new growth.

Water meter size is closely related to the amount of water a customer can potentially use and therefore discharge into the wastewater system. Accounts with larger meter sizes potentially use more capacity in the system (potential demand). With this rate design feature, accounts with larger meters pay a higher proportionate share of the capital costs as part of the monthly service charge.

# **Rate Design**

## **Introduction**

Once the cost of service by class was determined, the water and wastewater COS based rates were developed based on the existing rate structure. The water rate structure is a water budget based rate structure based on tiered usage. The wastewater fund follows a uniform rate structure, with a monthly service charge that varies by meter size. This section presents the results of the rate development for water, water resources, wastewater, and stormwater enterprise funds.

## **Water System Rates**

### **Water Budget Based Rate Structure**

A water budget based rate structure identifies a monthly budgeted amount of water by individual account that varies for each customer by AWMC for indoor use and landscaped area and historical evapotranspiration rates (ET). Irrigation requirements per square foot of landscaped area depend on ET for the area of Castle Rock and historical precipitation.

The irrigation season is defined as the months of March through October. Total inches of water allowed per square foot of landscaped area for the Town averages approximately 30 inches. The total water allowance is based on 80 percent of the 7 year average of historical ET for the year. This value is adequate because ET demands are based on the maximum requirements for bluegrass and creates the irrigation allowance.

For non-irrigation or winter months, an irrigation allowance is not included in an account's water budget. Instead, an account's historical average winter monthly consumption (AWMC) provides actual data on the account's winter water usage during November, December, January and February. The water budget for an account during November through February will be equal to the account's AWMC for the year.

### **Water Usage Thresholds**

The water budget based rate structure consists of three consumption tiers. Table 24 represents the tier threshold by customer class for the irrigation and winter season.



**Table 24**  
**Water Fund**  
**Water Usage Thresholds**

Irrigation Season (April 1 through October 31 Consumption)			
Customer Class	Tier 1	Tier 2	Tier 3
Residential	AWMC	Budget	Excess
Multifamily Indoor Use Only	AWMC	N/A	Excess
Multifamily	AWMC	Budget	Excess
Commercial Indoor Use Only	AWMC	N/A	Excess
Commercial	AWMC	Budget	Excess
Irrigation	N/A	Budget	Excess
Winter Season (November 1 through March 31 Consumption)			
Customer Class	Tier 1	Tier 2	Tier 3
Residential	AWMC	N/A	Excess
Multifamily Indoor Use Only	AWMC	N/A	Excess
Multifamily	AWMC	N/A	Excess
Commercial Indoor Use Only	AWMC	N/A	Excess
Commercial	AWMC	N/A	Excess
Irrigation	N/A	N/A	Excess

Explanations of the specific tiered rates follow. Bulk water accounts are not subject to a water budget based rate structure and are not discussed in this section.

### Description of Thresholds

For residential, multifamily and commercial accounts with meters providing both indoor and outdoor irrigation water, the rate structure includes three usage tiers with increasing rates per tier billed in thousand gallons (Kgal).

Tier 1 includes all usage up to an individual account's AWMC. This represents the base amount of consumption an individual account requires for basic indoor use. Average AWMC for residential customers is 5,000 gallons per month. AWMC for multifamily and commercial accounts varies according to meter size and type of commercial account.

Tier 2, or irrigation budget, includes usage above an account's AWMC and includes its monthly irrigation allowance. The threshold will vary by month during the irrigation months. An account's landscaped area in square feet (up to a maximum of 7,000 square feet) and the monthly irrigation requirements (ET) will determine the monthly irrigation allowance.

Tier 3, or excess tier, includes all usage greater than an account's AWMC plus irrigation allowance during a month. The goal of this tier is to target users who may be using water inefficiently.

## **Tiered Rates**

The actual rates calculated for consumption tiers in the water budget rate structure recommended here are tied to the results of the COS analysis. Each account pays a fixed monthly service charge and a volumetric charge. A monthly water resources charge per single family equivalent (SFEs, varying by meter) is added to an account's bill. The water resources charge is discussed below.

The water rate structure consists of three increasing tiered rates:

- Tier 1 – Base COS Rate
- Tier 2 – Base plus Extra Capacity Rates by Customer Class
- Tier 3 – Excess Use Rate to Recover CRW's Remaining Revenue Requirements

The rate per 1,000 gallons for Tier 1 equals the cost to CRW of providing one unit of water to its customers on an average use basis. It differs from the average COS rate because it does not include any peaking related costs. This rate is the same for all customer classes and provides an incentive for customers to maintain low water use.

The rate for Tier 2 was intended to represent the cost of providing base and peaking related water demands to CRW's customers. It includes the costs of maximum day and maximum hour costs of delivering water during the peak irrigation periods. This rate varies by customer class due to differences in peaking characteristics among the classes. Irrigation requirements cause peaking on the system; therefore the water used within a customer's irrigation budget is charged at the peaking rate.

Finally, the rate for Tier 3 recovers revenues for usage above each customer's Tier 2 budget. The rate is higher than Tier 2 to encourage customers to stay within their Tier 2 budgets.

Residential accounts are subject to a water conservation surcharge for usage greater than 40,000 gallons per month (Tier 4). This surcharge intends to send a conservation price signal to customers with excessive usage.

## **Wastewater Monthly Service Charges**

CRW currently charges wastewater customers a fixed monthly service charge that consists of a customer charge and a demand charge, plus a uniform volumetric rate for wastewater flow. An account's flow is estimated using its AWMC. The proposed 2019 wastewater rates consist of a monthly charge that includes the demand charge by meter size, plus a uniform volumetric rate for all customers as shown in Table 28 below.

## **Water Resources Monthly Service Charge**

CRW currently assesses all water resources customers a fixed monthly service charge per SFE. The charge calculated per SFE for 2019 is presented in Table 27 below.

## **Stormwater Monthly Service Charge**

This year's study update used assumptions established during the 2010 study and reviewed periodically for determining the stormwater monthly service charge. This year's study update used assumptions revised during the review. For single family residential units, the percent imperviousness was determined based on the following assumptions:

1. Density of 3 units per acre from the water design criteria section of the Town of Castle Rock – Public Works Regulations – February 12, 1999
2. Typical two story homes
3. Average home size of 2,100 sq. ft. from Douglas County Assessor data

Using these assumptions and data from the Urban Drainage and Flood Control District (UDFCD) Criteria Manual, a single family residential account's percent imperviousness was estimated to be 33 percent.

The Town's Geographical Information System (GIS) data indicates the average lot size of a single family home in the Town is 9,864 sq. ft., Applying 33 percent imperviousness to this lot size results in an impervious area of 3,255 sq. ft. per SFE. The assumption of one SFE used in this study is 3,255 sq. ft.

The service charge is also calculated based on a percent imperviousness for non-residential accounts during this 2018 study update. The average percent imperviousness for multifamily and other non-residential properties was assumed to be 80 percent, unless otherwise indicated in CRW's billing system data based on an actual survey of the property. SFEs were calculated based on the percent imperviousness of each property multiplied by its parcel size.

# Summary

CRW has completed the 2018 Rates and Fees Study update, including financial planning, COS rate studies and rate design. The purpose of the study is to provide an update for water, water resources, wastewater and stormwater fund rates designed to meet CRW policies and objectives during the years 2019 through 2023. The findings are based on a thorough review of the information provided.

## Proposed Rates for 2019 by Enterprise Fund

Rates for the five-year study period (2019-2023) were projected using the percentage rate revenue increases projected by the financial plan. The 2019 proposed rates are shown in the following tables by enterprise fund.

Table 25 Water Fund Proposed 2019 Monthly Service Charges	
Meter Size	Monthly Charges
5/8" x 3/4"	\$9.54
3/4"	\$9.54
1"	\$13.72
1.5"	\$18.78
2"	\$26.00
3"	\$41.78
4"	\$94.12
6"	\$147.26
Bulk Hydrant	\$18.78
Bulk Station	\$9.54

**Table 26**  
**Water Fund**  
**Proposed 2019 Volumetric Rates by Tier**

Irrigation Season (April 1 through October 31 Consumption)				
<b>Customer Class</b>	<b>Tier 1 (AWMC)</b>	<b>Tier 2 (Outdoor)</b>	<b>Tier 3 (Excess)</b>	<b>Tier 4 (Surcharge)</b>
Residential	\$2.82	\$5.74	\$8.56	\$8.56
Multifamily Indoor Use Only	\$2.82	N/A	\$3.70	N/A
Multifamily	\$2.82	\$4.87	\$7.28	N/A
Commercial Indoor Use Only	\$2.82	N/A	\$3.94	N/A
Commercial	\$2.82	\$4.93	\$7.37	N/A
Irrigation	N/A	\$7.86	\$11.78	N/A
Winter Season (November 1 through March 31 Consumption)				
<b>Customer Class</b>	<b>Tier 1 (AWMC)</b>	<b>Tier 2 (Outdoor)</b>	<b>Tier 3 (Excess)</b>	<b>Tier 4 (Surcharge)</b>
Residential	\$2.82	N/A	\$5.74	\$8.56
Multifamily Indoor Use Only	\$2.82	N/A	\$3.70	N/A
Multifamily	\$2.82	N/A	\$4.87	N/A
Commercial Indoor Use Only	\$2.82	N/A	\$3.94	N/A
Commercial	\$2.82	N/A	\$4.93	N/A
Irrigation	N/A	N/A	\$11.78	N/A
Bulk Water Customers				
Bulk Hydrant	\$5.07	N/A	N/A	N/A
Bulk Station	\$9.48	N/A	N/A	N/A

**Table 27**  
**Water Resources Fund**  
**Proposed 2019 Monthly Service Charges**

<b>Meter Size</b>	<b>Monthly Charges</b>
5/8" x 3/4"	\$17.52
3/4"	\$26.15
1"	\$99.11
1.5"	\$187.50
2"	\$313.54
3"	\$588.90
4"	\$1,502.32
6"	\$2,429.34
Bulk Hydrant	\$187.50
Bulk Station	\$26.15

**Table 28**  
**Wastewater Fund**  
**Proposed 2019 Monthly Service Charges and Volumetric Rate**

<b>Meter Size</b>	<b>Monthly Charges</b>
5/8" x 3/4"	\$9.30
3/4"	\$9.30
1"	\$14.80
1.5"	\$21.46
2"	\$30.96
3"	\$51.72
4"	\$120.58
6"	\$190.48
Volumetric Rate - All Applicable Customers, Per Kgal	\$6.59

**Table 29**  
**Stormwater Fund**  
**Proposed 2019 Monthly Service Charge**

<b>Monthly Stormwater Fee</b>		
All Customers, per SFE		\$7.12
<b>SFE Assignment</b>		
<b>Customer Class</b>	<b>Impervious Sq. Ft.</b>	<b>SFE</b>
Single Family Attached & Detached	3,255	1
Non-Single Family (Multifamily & Commercial)	Parcel size time 80% imperviousness divided by 3,255 impervious sq. ft. per SFE = # of SFEs	

## Recommendations

As part of the 2018 Rates and Fees Study, Stantec Consulting Services, Inc. recommends CRW do the following:

- **FINANCIAL PLANNING RECOMMENDATIONS**
  - As mentioned in 2017, consider revising debt service coverage targets to reflect a management target greater than the minimum level required by bond covenants. Positive benefits of this approach include improved bond ratings if needed in the future as well as mitigated risk of falling below required debt service coverage levels.
  - Use the FAMS tool to forecast future revenues and expenses to maintain forecasting assumptions and historical records in a single location for evaluation and updates with each update to the FAMS model.
  - Similar to the stormwater fund analysis, add a detailed review of CIPs in the other fund models to ensure growth-related projects are funded using SDF revenues.
  - Specifically identify key performance indicators (KPIs) to track and establish goals for future rate periods.
- **COST-OF-SERVICE AND RATE RECOMMENDATIONS**
  - Continue to monitor the actual revenues collected by customer class for water and wastewater compared to class costs of service calculated in the COS models. If there are differences and it is desired to move toward revenue recovery based on class costs of service, adjust volume rates for all classes over a series of years to achieve the appropriate balance.
  - Revisit the consolidation of water and water resources fund expenditures, revenues, and fund balances for a single water fund and rates. The two funds share PCWPF treatment expenses and assets for one water system. Continued practice of recovering water resources rate revenue increases from

water tiered rates presents revenue tracking issues. Separate water resources SDFs could still be charged to recovery capacity costs of CRW's long-term water resources plan.

- Continue updating the CIM model to optimize its usefulness as a tool to evaluate future scenarios such as the effect of changing ET requirements for types of landscapes versus grass, rate changes to achieve additional water use reductions, and impact on revenues of overall reductions in use.
- Identify a target year, such as 2020, to conduct a more thorough review of water cost-of-service tiered rates by considering the beginning rates calculated in the COS model and evaluating the rates in the CIM.

Please see Appendix D for study review letter from Stantec Consulting Services Inc.

For a copy of the supporting data analysis, please contact Castle Rock Water at 720-733-6000.



# Appendix A

## List of Acronyms

The following provides a list of acronyms used throughout the report and its meaning:

- AF: Acre Feet
- AWMC: Average Winter Monthly Consumption
- BOD: Biochemical Oxygen Demand
- CIP Capital Improvement Program
- COP: Certificates of Participation
- COS: Cost of Service
- ET: Evapotranspiration Rates
- FMP: Financial Management Plan
- FY: Fiscal Year
- GPM: Gallons Per Minute
- GIS: Geographical Information System
- Kgal: Thousand (1,000) Gallons
- O&M: Operations and Maintenance
- PCWRA: Plum Creek Water Reclamation Authority
- SDF: System Development Fee
- SFE: Single Family Equivalent
- Sq. Ft.: Square Feet
- TSS: Total Suspended Solids

# Appendix B

## Definitions

The following are definitions used in this study:

- 2013 Hybrid Model – The water resources strategic plan set in 2013 as to how rates would be projected in order to achieve the long term water goals for CRW.
- System Growth – The projected growth within the Town that is used to project the increased number of SFEs per year for each fund.
- Escalation Factors – As part of the projections of O&M costs for the study period, CRW has provided a 5 year O&M budget. CRW's budget planning documents are used for the O&M projections within the 5 year budget period. After this period, costs were escalated at 3.0 percent, which is the best estimate based on the average Engineering News Record (ENR) index for the five year period 2013-2017 for the Denver area.
- Rate Revenue Increases – System revenues are derived primarily from service charges or rates. Revenue is a function of price and the current financial plans calculate the increases needed.
- System Development Fee (SDF) Revenues – SDFs are one time charges to new connections to the system that are intended to recover investments in capacity to serve new customers. SDF revenue is directly related to the SFE and growth assumptions. SDF revenues are used to fund the growth related CIP and are presented in Volume 2.
- Revenue Bonds – Current and projected debt for the funds.
- Inter-Fund Loans – Loans borrowed between funds and paid back with interest.
- Other Revenues – This source of funds includes non-rate related revenues, miscellaneous revenues, fines, leases, intergovernmental agreements and interest earning. Interest earning are calculated based on the average operating fund balance with an assumed interest rate of approximately 0.60 percent.
- Fund Balances – The balances needed to be kept in different reserves for each fund. There are minimums per fund. These can include the operating fund, the capital reserve fund, the catastrophic failure reserve fund, and the rate revenue stabilization reserve fund.
- Operating Expenses – Represents the basic costs of operating the system. Projection of O&M expenses varies depending on the degree of fixed versus variable costs for each budgeted line item. Most of the costs are fixed and do not escalate with increased demand on the system. Meanwhile, variable costs escalate both with increased system use and the expected inflation rate. CRW staff have made a reasonable effort to separate the two for projection purposes. O&M expenses during the rate period were provided by CRW. The goal is to keep costs at or under budget for capital and operational budgets each year by fund and to continuously strive towards more efficient operations.
- Personnel Services – These are one of the most important cost drivers in operating expenses. Additional staff needed over the next five years are included in the 5 year financial planning document.

- **Energy Costs** – These are a major component in plant operations and an important cost driver in variable operating expenses. Over the next 5 years, energy costs are expected to increase at a rate higher than inflation at approximately 5%.
- **Capital Improvements** – Capital improvement projections are provided by year for the study. Capital improvement costs were provided by CRW for years 2019-2055. These are reviewed and updated annually.
- **Debt Service** – The debt service sub-fund currently carries debt service obligations of each fund. As stated in the FMP, CRW aims to minimize debt carrying costs at or below industry standards.
- **Debt Service Coverage** – Outstanding revenue bonds require operating revenues to be 1.2 times the total annual debt service amount.
- **Base Water Demand** - the average annual water consumption in thousand gallons for each customer class. This was obtained from the 2018 Customer Characteristics Analysis using the billing data for twelve months ending December 2017.
- **Maximum Day and Maximum Hours Extra Capacity Demands** - Water demands that exceed average levels of water usage by system customers. Maximum day and hour extra capacity demands are calculated by applying the class peaking factors to the base demand, which average 2.5 for peak day and 4.4 for peak hour.
- **Meters and Services** – the total number of equivalent meters. These are derived by applying the average actual usage meter equivalency schedule to the number of meters of each size by class.
- **Number of Customers** – equals the projected total number of customers by customer class.
- **Flow Demand** represents the quantity discharged from customers directly to the wastewater system. Since, wastewater discharge is not metered, wastewater flows are measured by the average winter monthly consumption (AWMC) of each customer. AWMC was provided by the 2018 Customer Characteristics Analysis, which summarized the billing data for January 2017 to December 2017.
- **Pollutant Strength** including BOD and TSS - represents total pounds of loadings expected from each customer class. Pounds of loadings by customer class are calculated assuming domestic strength concentrations and volume of flow for each customer class.
- **Base Costs** – These vary with water consumption under average demand conditions. They are the costs that would be incurred if water consumption occurred evenly from day to day and hour to hour, and the system did not require investment in additional capacity to meet peak requirements.
- **Maximum Day and Maximum Hours Extra Capacity Costs (Extra Capacity Demands)** – The costs incurred to meet water demands that exceed average levels of water usage by system customers. Extra capacity costs are incurred because of water usage variations and peak demands imposed on a water system. Such demands are directly related to customer water consumption characteristics and fire-flow demands. Extra capacity costs are typically divided into costs incurred to meet maximum day and maximum hour water demands of system customers.

- Customer Related Costs – Those costs incurred to serve customers, regardless of water demands or wastewater flows. Customer costs vary with the number of customers. Examples of these costs include administration and billing costs.
- Meter and Services Costs – These vary with the size of the meter and/or service used to serve the customer. Examples of meter and service costs include meter replacement and maintenance costs.
- Flow Costs – These vary with the hydraulic flow of sanitary sewage. The relative strength of sewage does not affect flow costs. Typically, flow costs include the cost of operating lift stations and the capital costs for assets that are designed based on hydraulic flow requirements.
- Pollutant Strength Costs – Include BOD and TSS, represent costs incurred to treat wastewater of various qualities. As the wastewater treatment processes are the responsibility of PCWRA and the wastewater fund does not charge for strength characteristics, the single unit process allocated to the strength characteristics is Treatment by Others.
- Demand Related Costs – Those capital related costs that are to be recovered on an equivalent water meter basis. In this COS analysis, 20 percent of the wastewater system's capital costs are recovered in this manner. The demand related cost represents a portion of the cost of capacity in PCWRA's system.

# **Appendix C**

## **Customer Characteristics Analysis**



# CUSTOMER CHARACTERISTICS ANALYSIS

## 2018 RATES AND FEES STUDY

PREPARED BY:

CASTLE ROCK WATER  
BUSINESS SOLUTIONS TEAM

August 21, 2018

# TABLE OF CONTENTS

<i>EXECUTIVE SUMMARY</i> .....	8
<i>WATER ENTERPRISE FUND</i> .....	9
<b>NUMBER OF ACCOUNTS BY METER SIZE &amp; CUSTOMER CLASS</b> .....	9
TABLE 1: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2017) .....	9
CHART 1: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019 .....	10
CHART 2: NON-RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019 .....	11
<b>2013-2017ACTUAL GROWTH VERSUS PROJECTED GROWTH 2018-2019</b> .....	12
CHART 3: RESIDENTIAL ACTUAL VS PROJECTED GROWTH.....	12
CHART 4: MULTIFAMILY ACTUAL VS PROJECTED GROWTH .....	13
CHART 5: COMMERCIAL ACTUAL VS PROJECTED GROWTH .....	13
CHART 6: All CUSTOMER CLASSES ACTUAL VS PROJECTED GROWTH.....	14
<b>3 YEAR AVERAGE CONSUMPTION DATA BY CUSTOMER CLASS</b> .....	14
TABLE 2: 3 YEAR AVG MONTHLY CONSUMPTION BY CUSTOMER CLASS & METER SIZE (2015-2017) .....	15
TABLE 2A: 3 YEAR AVG MONTHLY CONSUMPTION RESIDENTIAL ONLY METER SIZES (2015-2017) .....	15

CHART 7: 3 YEAR AVG MONTHLY CONSUMPTION ALL RESIDENTIAL ACCOUNTS .....	16
CHART 8: 3 YEAR AVG MONTHLY CONSUMPTION FOR ALL NON-RESIDENTIAL ACCOUNTS.....	17
CHART 9: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE ¾" to 3" ALL CUSTOMER CLASSES .....	18
CHART 10: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE – 4" and 6" .....	19
<b>3 YEAR AVERAGE CONSUMPTION WITH &amp; WITHOUT IRRIGATION.....</b>	<b>19</b>
TABLE 3: 3 YEAR AVERAGE MONTHLY CONSUMPTION BY METER SIZE ALL CUSTOMER CLASSES (2015-2017) .....	19
CHART 11: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE ¾" ALL CUSTOMER CLASSES .....	20
CHART 12: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 1" ALL CUSTOMER CLASSES .....	21
CHART 13: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 1.5" ALL CUSTOMER CLASSES .....	21
CHART 14: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 2" ALL CUSTOMER CLASSES .....	22
CHART 15: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 3" ALL CUSTOMER CLASSES .....	22
CHART 16: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 4" ALL CUSTOMER CLASSES .....	23
CHART 17: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 6" ALL CUSTOMER CLASSES .....	23



<b>EQUIVALENCY FACTORS .....</b>	<b>24</b>
TABLE 4: 2018 STUDY ACTUAL USE EQUIVALENCY FACTORS (BASED ON 3 YEAR AVG. 2015-2017) .....	24
CHART 18: EQUIVALENCY FACTORS 2018 STUDY COMPARED TO THE 2017 STUDY	25
<b>REPRESENTATIVE CUSTOMER BY CUSTOMER CLASS .....</b>	<b>25</b>
TABLE 5: REPRESENTATIVE CUSTOMER BY CLASS 2017 BILLING DATA .....	26
<b>CONSUMPTION BY TIER .....</b>	<b>26</b>
TABLE 6: BILLED USAGE BY CUSTOMER CLASS BY TIER JANUARY 2017-DECEMBER 2017 .....	27
TABLE 7: BILLED USAGE BY SEASON BY CUSTOMER CLASS BY TIER JANUARY 2017- DECEMBER 2017.....	27
CHART 19: COMMERCIAL CUSTOMER CLASS ANNUAL BILLED USAGE BY TIER 2012-2017 .....	28
CHART 20: MULTIFAMILY CUSTOMER CLASS 2012-2017 ANNUAL BILLED USAGE BY TIER .....	29
CHART 21: IRRIGATION CUSTOMER CLASS 2012-2017 ANNUAL BILLED USAGE BY TIER .....	29
CHART 22: RESIDENTIAL CUSTOMER CLASS 2012-2017 ANNUAL BILLED USAGE BY TIERS 1-3 .....	30
CHART 23: RESIDENTIAL CUSTOMER CLASS 2012-2017 ANNUAL BILLED USAGE IN TIER 4 ONLY.....	30
CHART 24: TIER 4 THRESHOLD COMPARISON.....	31
TABLE 8: TIER 3 CUSTOMER USAGE.....	32

TABLE 9: TIER 3 AVERAGE CONSUMPTION.....	32
TABLE 10: ANNUAL CONSUMPTION AND REVENUES BY TIER.....	32
<b>5/8" ACCOUNTS - .67 SFE.....</b>	<b>32</b>
CHART 25: .67 SFE ACCOUNTS CONSUMPTION BY YEAR.....	33
<b>IRRIGATION USAGE BASED ON WATERING SCHEDULES.....</b>	<b>33</b>
CHART 26: RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE .....	34
CHART 27: NON-RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE .....	35
<b>WATER WISER CUSTOMERS .....</b>	<b>35</b>
TABLE 11: BEFORE AND AFTER WATER WISER AVERAGE USAGE .....	36
<b>NON-RESIDENTIAL IRRIGATION BUDGETS.....</b>	<b>36</b>
TABLE 12: NON-RESIDENTIAL ACCOUNTS .....	37
TABLE 13: KENTUCKY BLUE GRASS BUDGET VERSUS HYBRID BUDGET .....	37
TABLE 14: ACCOUNT BUDGET DIFFERENCES .....	37
<b>IMPACT OF IRRIGATED AREAS (Square Feet) .....</b>	<b>37</b>
CHART 28: RESIDENTIAL ACCOUNTS BY IRRIGATED AREA.....	38
CHART 29: RESIDENTIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA .....	38
CHART 30: COMMERCIAL ACCOUNTS BY IRRIGATED AREA .....	39
CHART 31: COMMERCIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA .....	39

CHART 32: All HOA's AVERAGE MONTHLY CONSUMPTION.....	40
CHART 33: SELECT HOA's AVERAGE MONTHLY CONSUMPTION .....	41
<b>MONTHLY CONSUMPTION BY SUBDIVISION.....</b>	<b>42</b>
CHART 34: MEADOWS AVERAGE MONTHLY CONSUMPTION .....	42
CHART 35: MEADOWS RESIDENTIAL ACCOUNTS BY IRRIGATED AREA.....	42
CHART 36: FOUNDERS AVERAGE MONTHLY CONSUMPTION.....	43
CHART 37: FOUNDERS RESIDENTIAL ACCOUNTS BY IRRIGATED AREA .....	43
CHART 38: PLUM CREEK AVERAGE MONTHLY CONSUMPTION .....	44
CHART 39: PLUM CREEK RESIDENTIAL ACCOUNTS BY IRRIGATED AREA.....	44
<b>BULK WATER ACCOUNTS .....</b>	<b>45</b>
CHART 40: BULK HYDRANT AND STATION ACCOUNTS 2012-2017 .....	45
CHART 41: BULK HYDRANT USAGE 2012-2017.....	46
CHART 42: BULK STATION USAGE 2012-2017 .....	46
<b>TOWN ACCOUNT CONSUMPTION .....</b>	<b>47</b>
CHART 43: TOWN CONSUMPTION BY YEAR .....	47
TABLE 15: TOWN CONSUMPTION BY YEAR AND DEPARTMENT (kgal) .....	47
<b>WASTEWATER ENTERPRISE FUND .....</b>	<b>48</b>
<b>NUMBER OF ACCOUNTS BY METER SIZE &amp; CUSTOMER CLASS .....</b>	<b>48</b>
TABLE 16: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2017) .....	48
CHART 44: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019 .....	49
CHART 45: NON-RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019 .....	49

<b>WATER RESOURCES ENTERPRISE FUND .....</b>	<b>50</b>
<b>NUMBER OF ACCOUNTS BY METER SIZE &amp; CUSTOMER CLASS .....</b>	<b>50</b>
TABLE 17: ACCOUNTS BY METER SIZE AND CUSTOMER CLASS (FY2017).....	51
CHART 46: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019 .....	51
CHART 47: NON-RESIDENTIAL 2011-PROJECTED 2019 .....	52
<b>STORMWATER ENTERPRISE FUND .....</b>	<b>53</b>
TABLE 18: STORMWATER SFE'S (JAN 17-DEC 17) .....	53
CHART 48: SFE'S 2011-PROJECTED 2019.....	53

## *EXECUTIVE SUMMARY*

As a part of the annual Rates and Fees Study, Castle Rock Water conducts an in-depth analysis of accounts in service to determine customer characteristics and consumption patterns. We start off looking at the most current billing data for FY2017. From there, we break down the number of accounts by meter size and customer class. The Town's Development Services Department provides the number of accounts by customer class that are forecasted for FY2018 and FY2019.

Consumption data by customer class and meter size is then analyzed over a 3 year period to obtain an average, taking into consideration weather patterns and rainfall variances by year. The most current 3 year average (2015-2017) is then compared to the 3 year averages calculated in past years, going back as far as 2012. Average consumption is also analyzed down to the level of consumption in the winter months (without irrigation) and summer months (with irrigation).

This 3 year average consumption is then used to calculate a meter equivalency factor. The Town implemented an actual use meter equivalency schedule for assessing monthly service charges for water, wastewater, and water resources in 2010. Analysis of three years of water consumption by meter size serves as the basis for the actual use equivalencies. Equivalency factors are calculated by establishing the average use for all  $\frac{3}{4}$ " meters as the base unit and then dividing the average use for larger meter sizes by the average use for the  $\frac{3}{4}$ " meters.

Customer data for the last three years (2015-2017) is then analyzed to determine an average representative customer by customer class. One customer per class from the data sample that best represents the customers in that customer class is then selected. This data is then used to represent the comparison of adopted rates versus proposed rates on a typical customer's annual bill.

Billed usage by tier from 2012-2017 by customer class is analyzed to see if customers are staying within their budgeted tiers. The purpose of this data analysis is also to see if customers are conserving water and avoiding Tier 3 - excessive and Tier 4 - surcharge (over 40,000 gallons per month).

As part of this study, we also took a closer look at the customers with a .67 SFE to see if their consumption patterns were meeting the intent of the program, to use a 3<sup>rd</sup> less water than an average  $\frac{3}{4}$ " residential customer. Additional information such as .67 SFE accounts by irrigated area also help to understand the larger irrigated accounts that typically consume larger amounts of water and may not be meeting the intent of the program.

This year's study includes a new analysis section for analyzing Tier 2-4 consumption, Kentucky Blue grass budget analysis, water wiser customer usage, irrigation season schedule analysis, Town account usage, bulk water usage, and actual growth compared to projected growth.

Like the water fund, we also chart the number of accounts from the latest 2017 billing data plus growth projections for customers who are being provided water resources and wastewater services. Stormwater Single Family Equivalents (SFE's) are also calculated using the latest 2017 billing data plus growth projections.

Much of the information contained in this analysis is used in the rate making process. Key inputs and how they are used in the financial rate making model will be identified in the individual sections of this report.

## **WATER ENTERPRISE FUND**

### **NUMBER OF ACCOUNTS BY METER SIZE & CUSTOMER CLASS**

Table 1 below shows the number of accounts by meter size and customer class using 12 months of billing data (Jan17-Dec17). This shows that 20,472 customers were receiving water service during this capture period. The FY2016 accounts based on 12 months of billing data (Jan16-Dec16) showed 19,593 customers were receiving water service. There are 879 more accounts in FY2017 than FY2016. The number of accounts by meter size are key inputs into the system development fees model. These are then converted into Single Family Equivalents (SFE's) which are used to determine existing versus new system capacities and are used in the calculations within the cost of service models.

**TABLE 1: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2017)**

Meter Size	Residential	Multifamily	Commercial	Bulk	Irrigation	MultiFamily Indoor Use Only	Commercial Indoor Use Only	Total
5/8"	908	-	-	-	23	3	6	940
3/4"	17,938	14	128	82	131	99	117	18,509
1"	20	25	69	-	99	80	85	378
1.5"	-	55	50	-	128	100	71	404
2"	-	15	25	-	81	41	44	206
3"	-	2	5	-	7	-	14	28
4"	-	1	-	-	2	-	2	5
6"	-	-	2	-	-	-	-	2
<b>Total</b>	<b>18,866</b>	<b>112</b>	<b>279</b>	<b>82</b>	<b>471</b>	<b>323</b>	<b>339</b>	<b>20,472</b>

Chart 1 below shows the growth in residential accounts from 2011-2017 and the projected growth for FY2018 and FY2019. The projected growth for FY2018 and FY2019 remains strong at 900 permits forecasted for 2018 and 700 for 2019. The growth projections are provided by the Town's Development Services Department. Since 2013, the average number of accounts that have been added per year is approximately 800.

CHART 1: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019

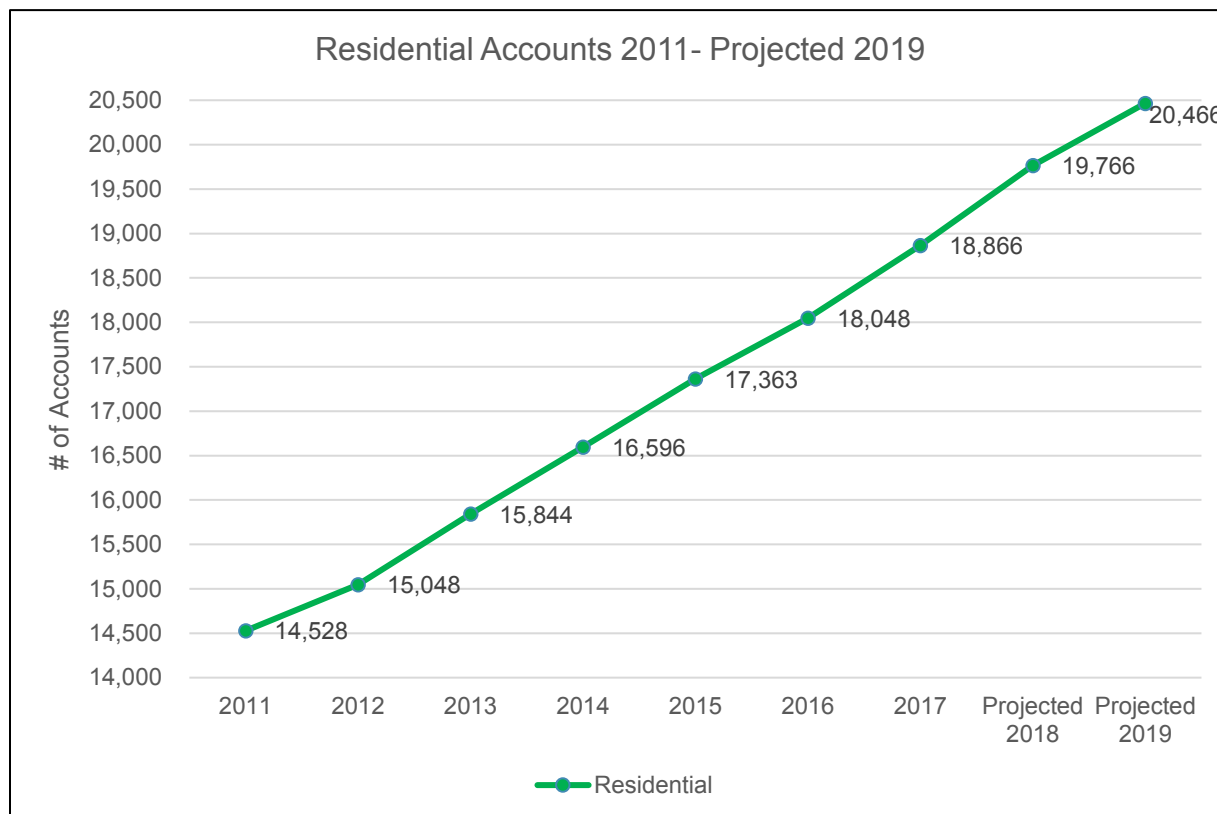
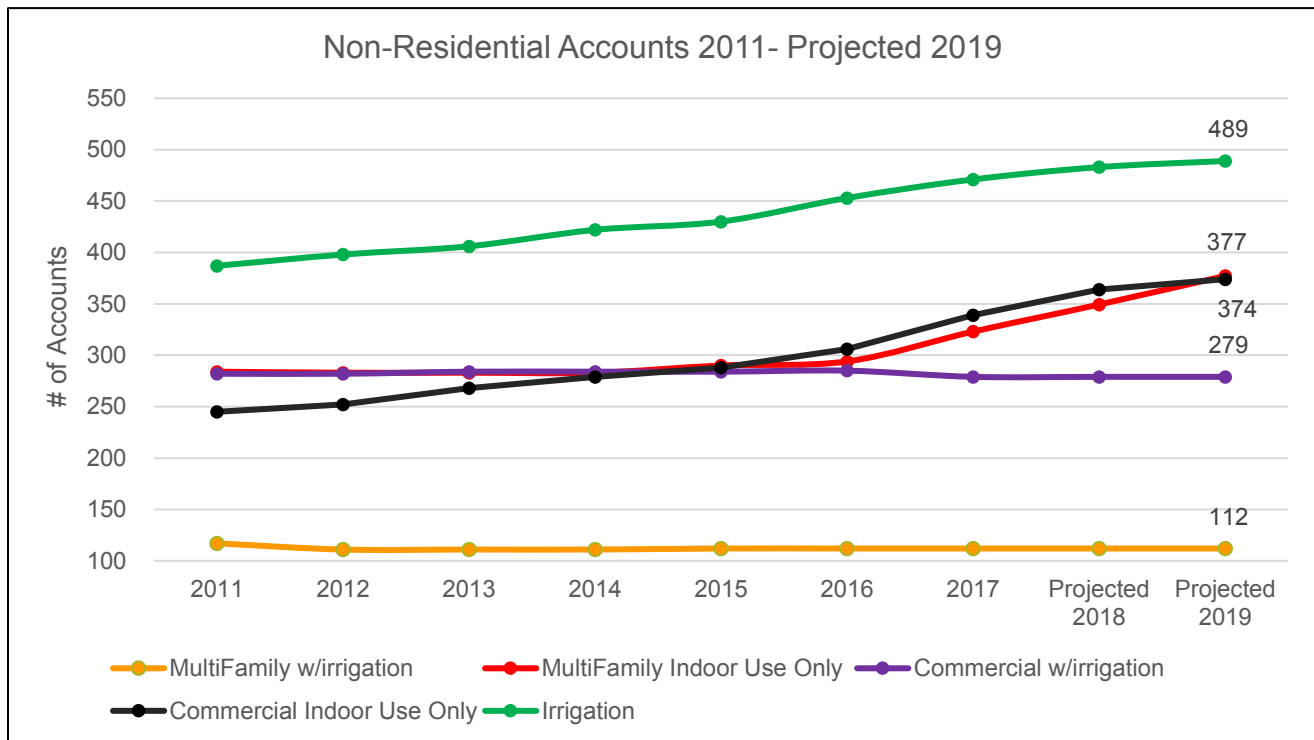


Chart 2 shows the number of non-residential accounts from 2011-2017. Although multi-family indoor use only has remained flat over the last several years, growth projections for this type of account indicate a significant increase in FY2018 and FY2019. A significant increase in commercial indoor use only is also projected for FY2018 and FY2019.

CHART 2: NON-RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019



Castle Rock Water projects FY2019 water accounts by using FY2017 billing data plus the projected growth for FY2018 and FY2019. The FY2019 water accounts are projected to equal 22,097, (20,466 for residential and 1,631 for non-residential). Growth is projected for the following customer classes:

**2018 Projected Accounts by Customer Class:**

45	Residential (.67 SFE)
855	Residential (1 SFE)
26	Multi-Family
25	Commercial
12	Irrigation
963	Total

**2019 Projected Accounts by Customer Class:**

35	Residential (.67 SFE)
665	Residential (1 SFE)
28	Multi-Family
10	Commercial
6	Irrigation
744	Total



Total growth of 963 accounts is projected for FY2018 and 744 for FY2019 for a total of 1,707 projected for the water fund thru FY2019.

### **2013-2017 ACTUAL GROWTH VERSUS PROJECTED GROWTH 2018-2019**

CRW has seen significant growth over the last several years. The projections received each year from Development Services are important components to the rates models and revenue projections when looking at needed rate increases. When looking at future projections it is also important to look at how closely the past projections have compared to the actual results each year. The charts below show the actual growth for 2013-2017 versus projected growth for 2018-2019 for residential, multifamily, commercial and all customer classes combined.

CHART 3: RESIDENTIAL  
ACTUAL VS PROJECTED GROWTH

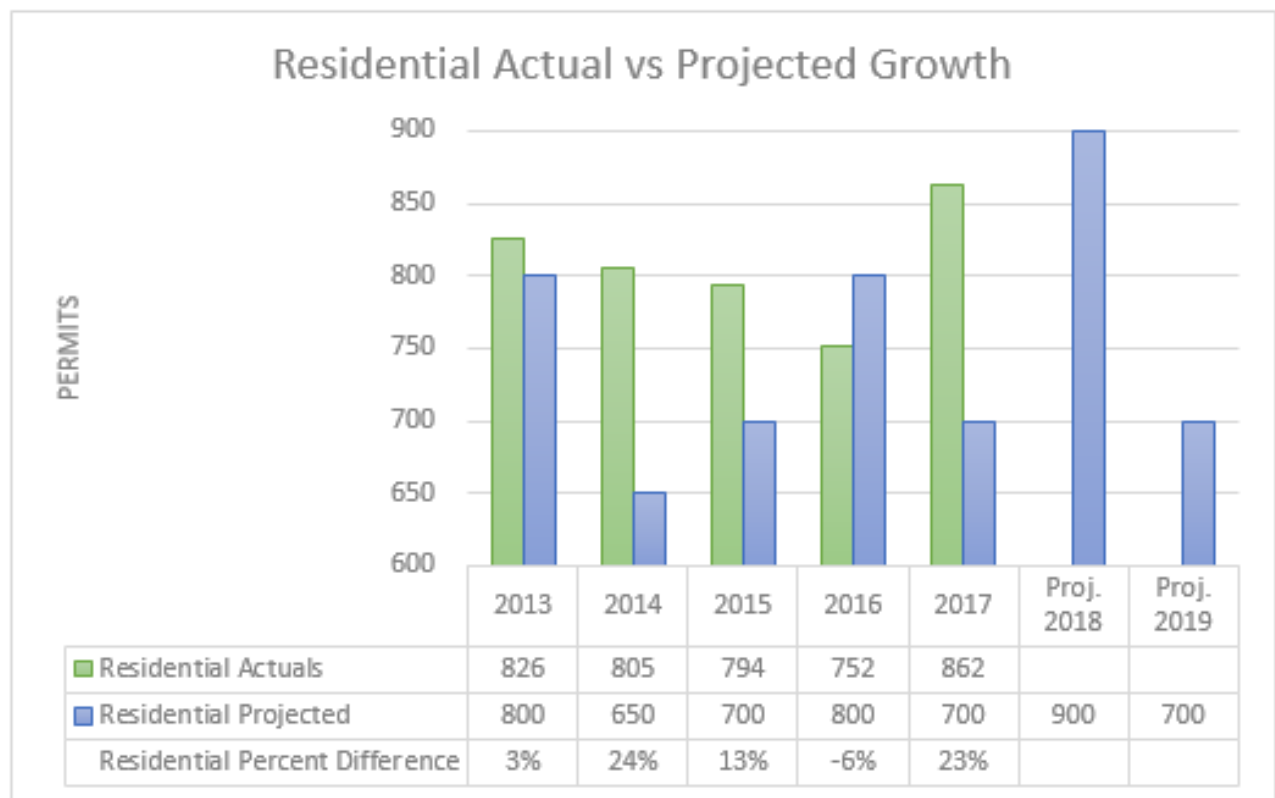


CHART 4: MULTIFAMILY  
ACTUAL VS PROJECTED GROWTH

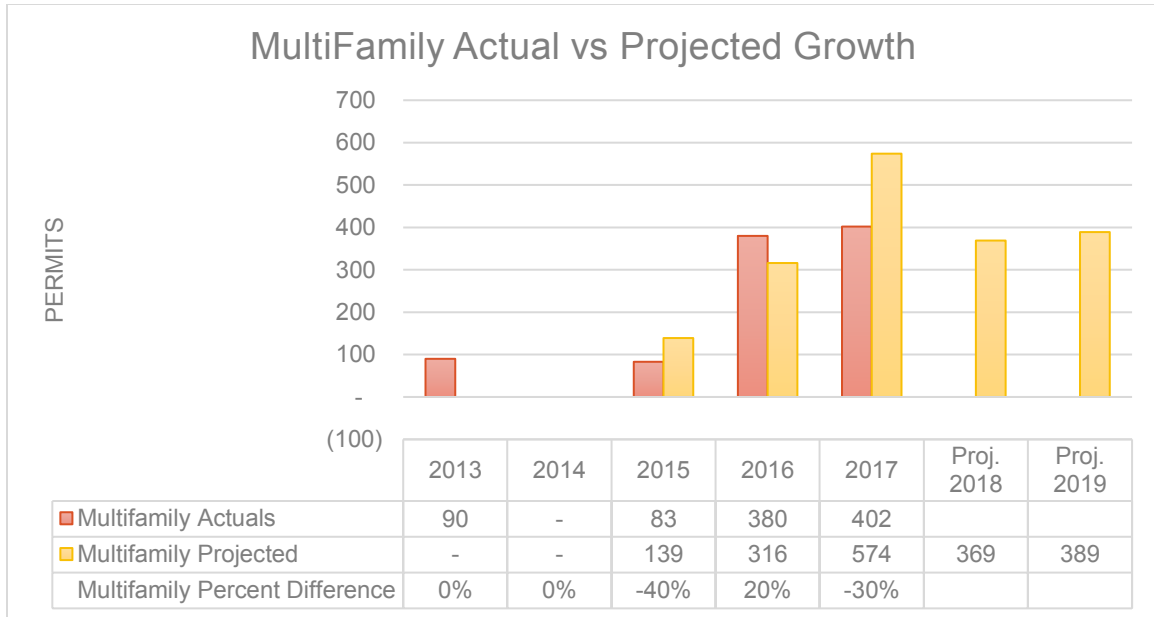


CHART 5: COMMERCIAL  
ACTUAL VS PROJECTED GROWTH

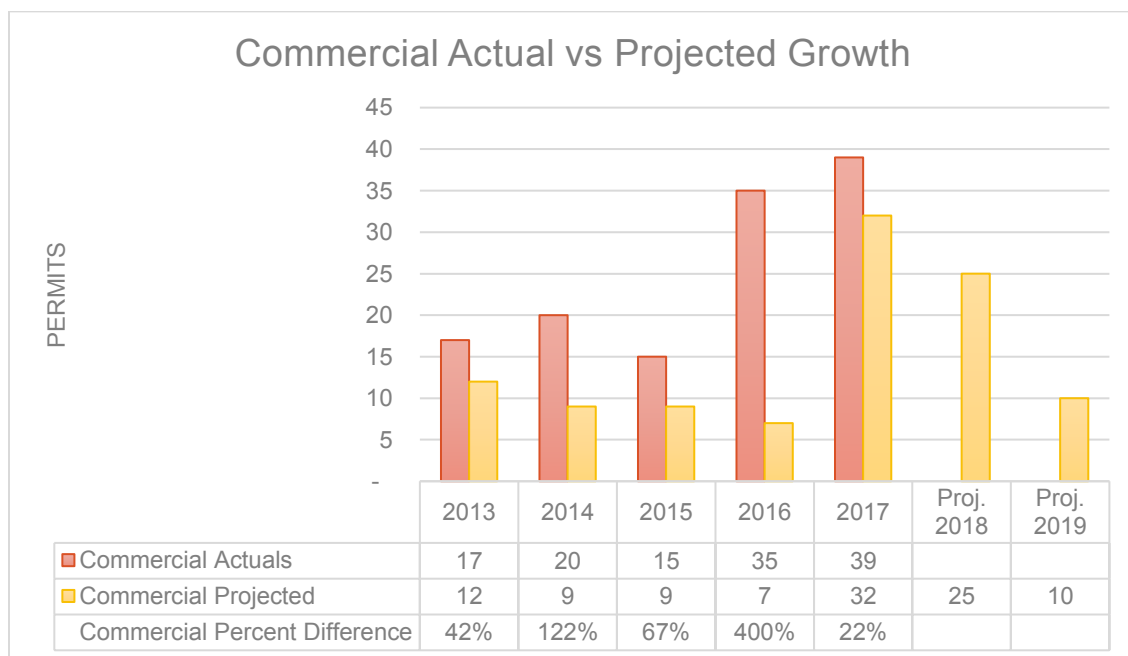
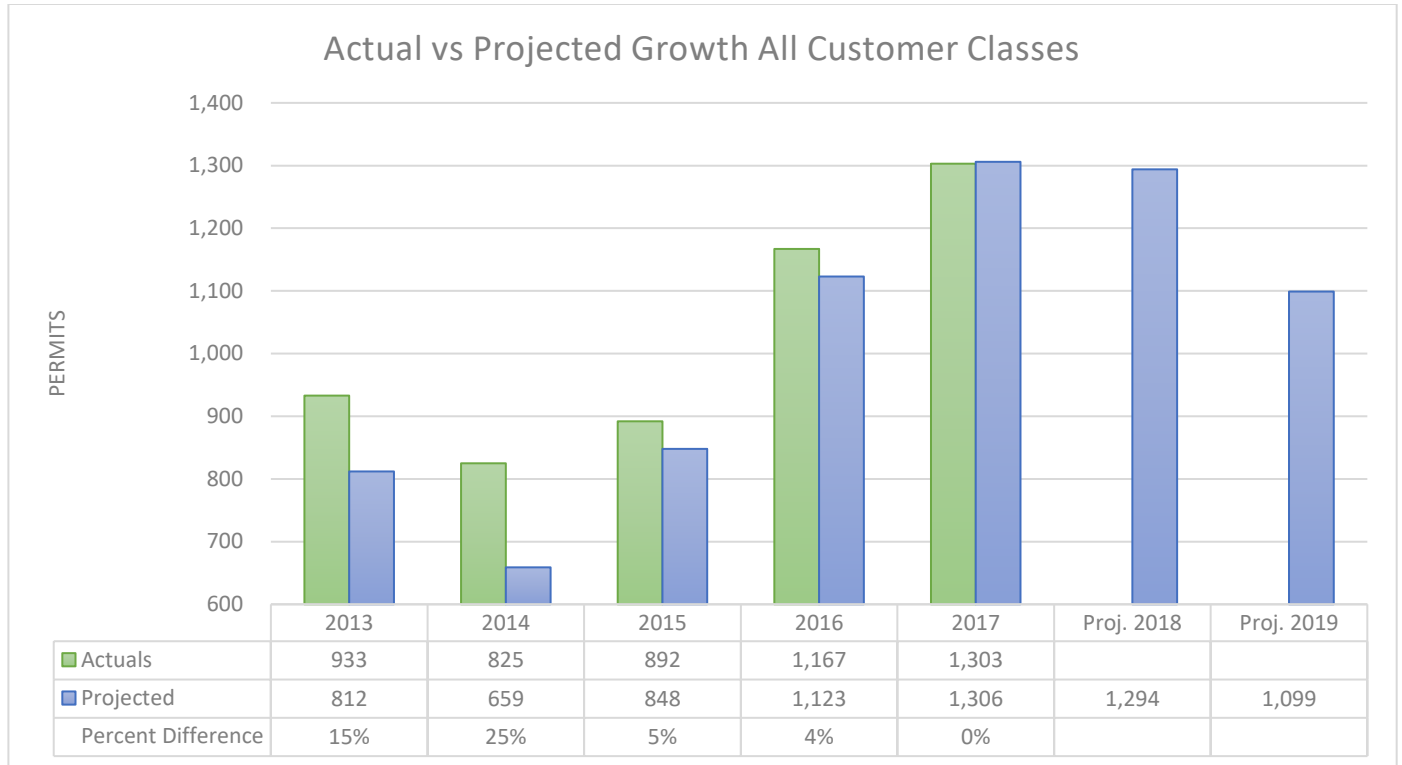


CHART 6: All CUSTOMER CLASSES  
ACTUAL VS PROJECTED GROWTH



### **3 YEAR AVERAGE CONSUMPTION DATA BY CUSTOMER CLASS**

Table 2 shows the 3 year average monthly consumption by meter size and customer class for 2015-2017 billing data. Table 2A shows the breakdown of the residential meter sizes shown in Table 2 and their individual applicable 3 year averages. Chart 7 shows the 3 year average monthly consumption for all residential meter sizes, including 5/8" through 1". Although the number of 1" residential meters is very small at 20 accounts, the impact to the overall average is significant.

TABLE 2: 3 YEAR AVG MONTHLY CONSUMPTION  
BY CUSTOMER CLASS & METER SIZE (2015-2017)

Meter Size	Residential	Multifamily	Commercial	Irrigation	MultiFamily Indoor Use Only	Commercial Indoor Use Only
5/8"	5.37	-	-	37.06	3.86	2.21
3/4"	7.48	20.78	9.40	31.75	3.21	8.24
1"	17.86	33.69	30.27	68.04	13.55	31.14
1.5"	-	71.87	60.14	138.59	43.71	43.11
2"	-	91.45	69.12	76.21	76.58	69.62
3"	-	319.67	163.15	466.42	-	86.53
4"	-	394.08	-	619.57	-	1,311.81
6"	-	-	752.97	-	-	-

TABLE 2A: 3 YEAR AVG MONTHLY CONSUMPTION  
RESIDENTIAL ONLY METER SIZES (2015-2017)

Residential Accounts					
Meter Size	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017
5/8"	5.35	6.19	5.70	5.44	5.37
3/4"	7.21	7.73	7.30	7.30	7.48
1"	11.42	13.14	14.17	21.26	17.86
Average	7.99	9.02	9.06	11.33	10.24
Weighted Average	7.12	7.66	7.23	7.23	7.39

CHART 7: 3 YEAR AVG MONTHLY CONSUMPTION  
ALL RESIDENTIAL ACCOUNTS

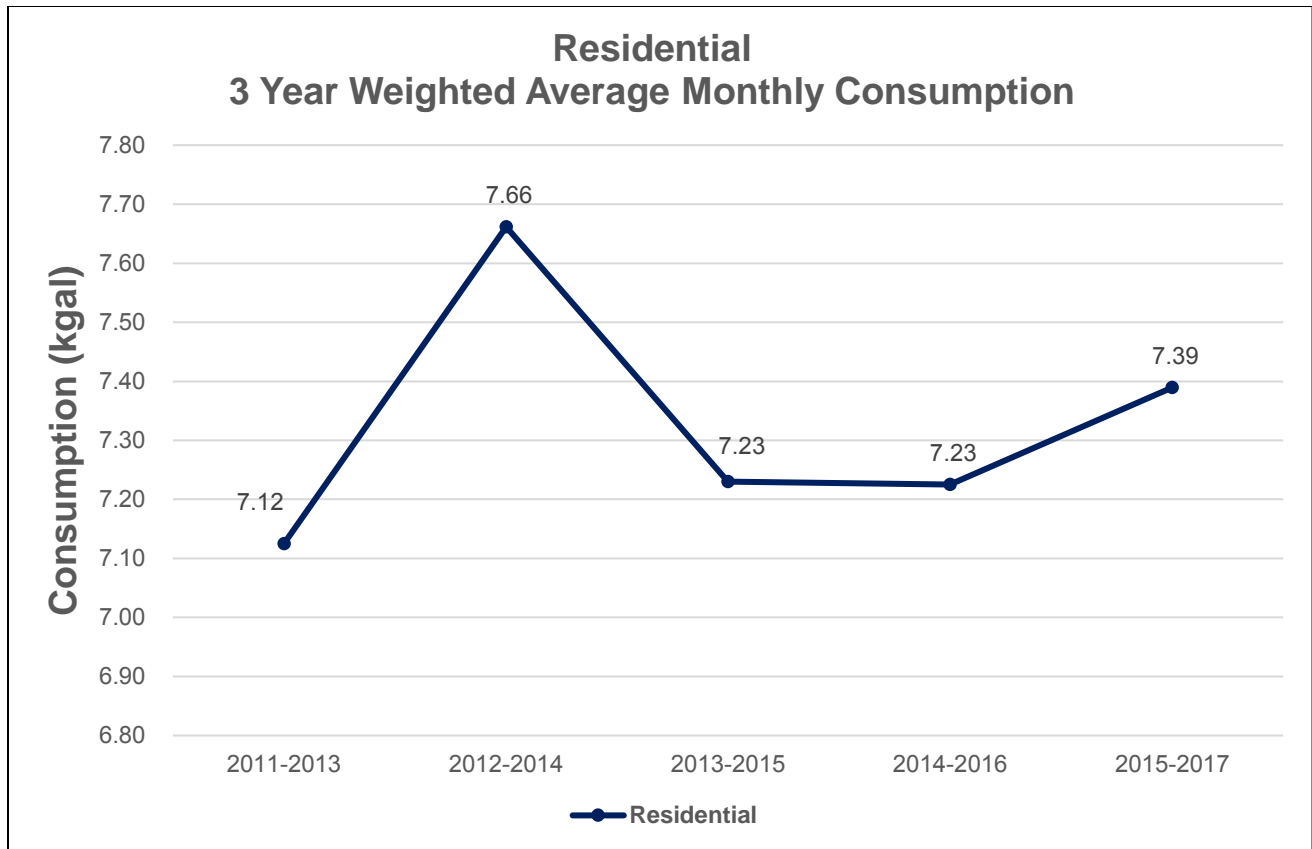
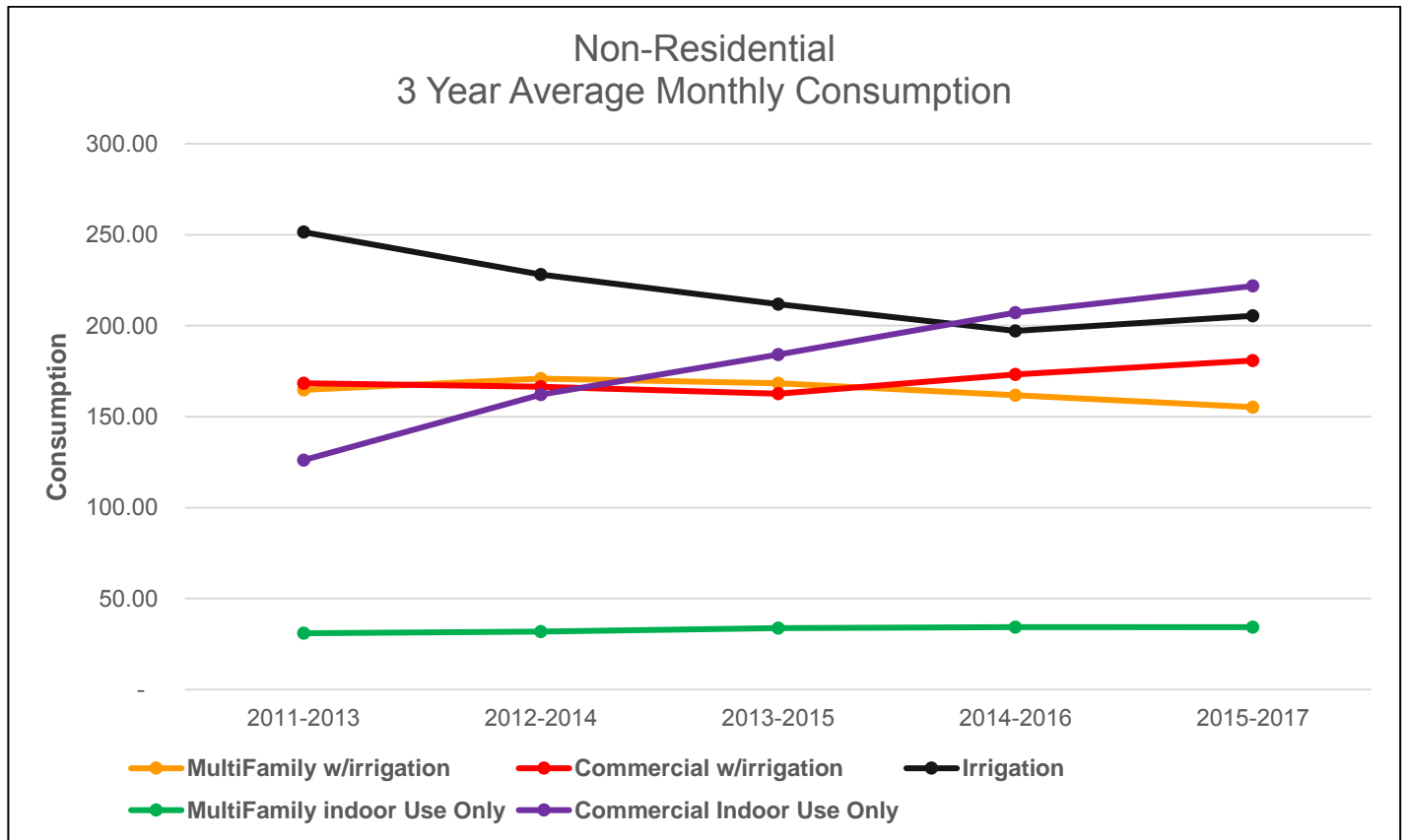


CHART 8: 3 YEAR AVG MONTHLY  
CONSUMPTION FOR ALL NON-RESIDENTIAL  
ACCOUNTS



The 3 year average monthly consumption shown above in Chart 8 is for all non-residential meter sizes combined. While multifamily and commercial with irrigation accounts are fairly steady, irrigation usage is slightly trending down, which is a good sign. Commercial Indoor Use Only is increasing primarily as a result of the increase in commercial indoor accounts with meters in the 1" to 3" range. Commercial indoor accounts increased by 51 from FY2015 to FY2017 due to the development within Castle Rock.

Chart 9 shows that the 3 year average intervals for comparison have stayed flat for the 3/4" and a slight decrease for the 1" meters. The 1.5", 2" and 3" meters have shown a slight increase from the 2014-2016 three year average compared to the 2015-2017 three year average.

CHART 9: 3 YEAR AVG MONTHLY  
CONSUMPTION BY METER SIZE ¾" to 3"  
ALL CUSTOMER CLASSES

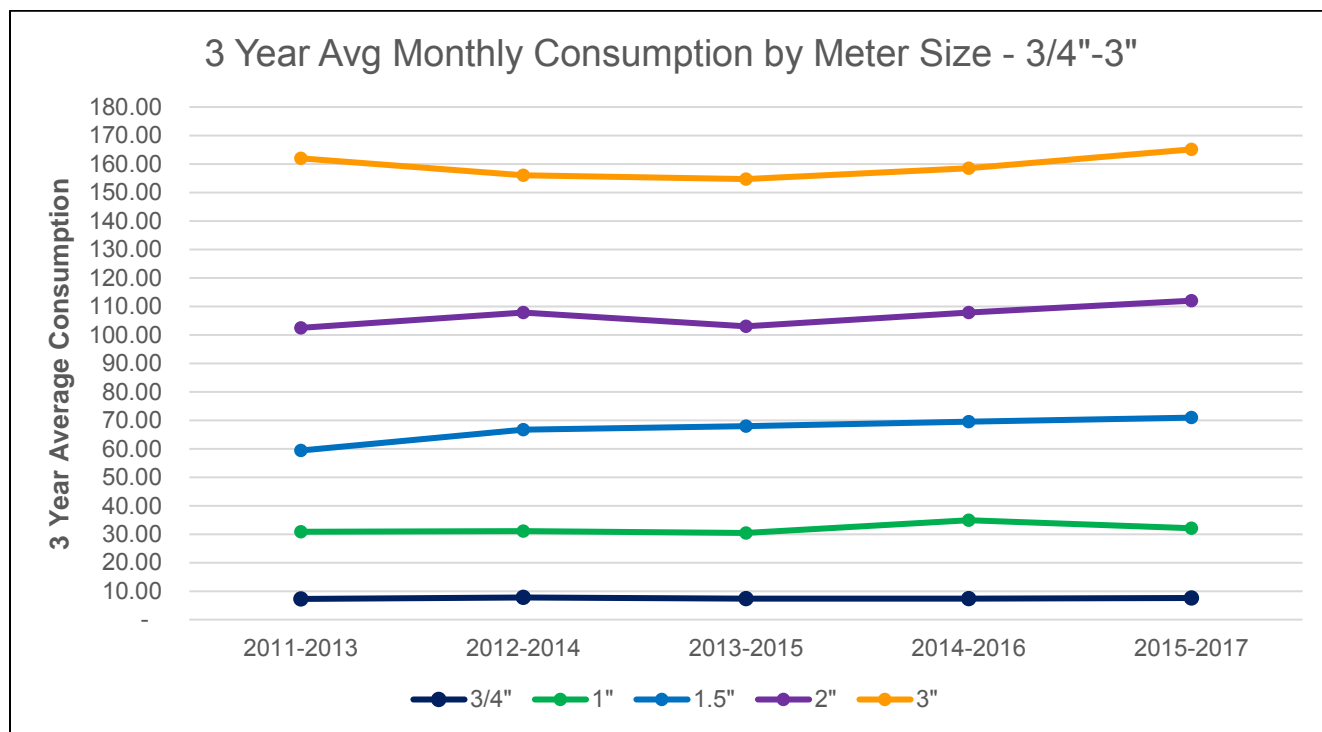
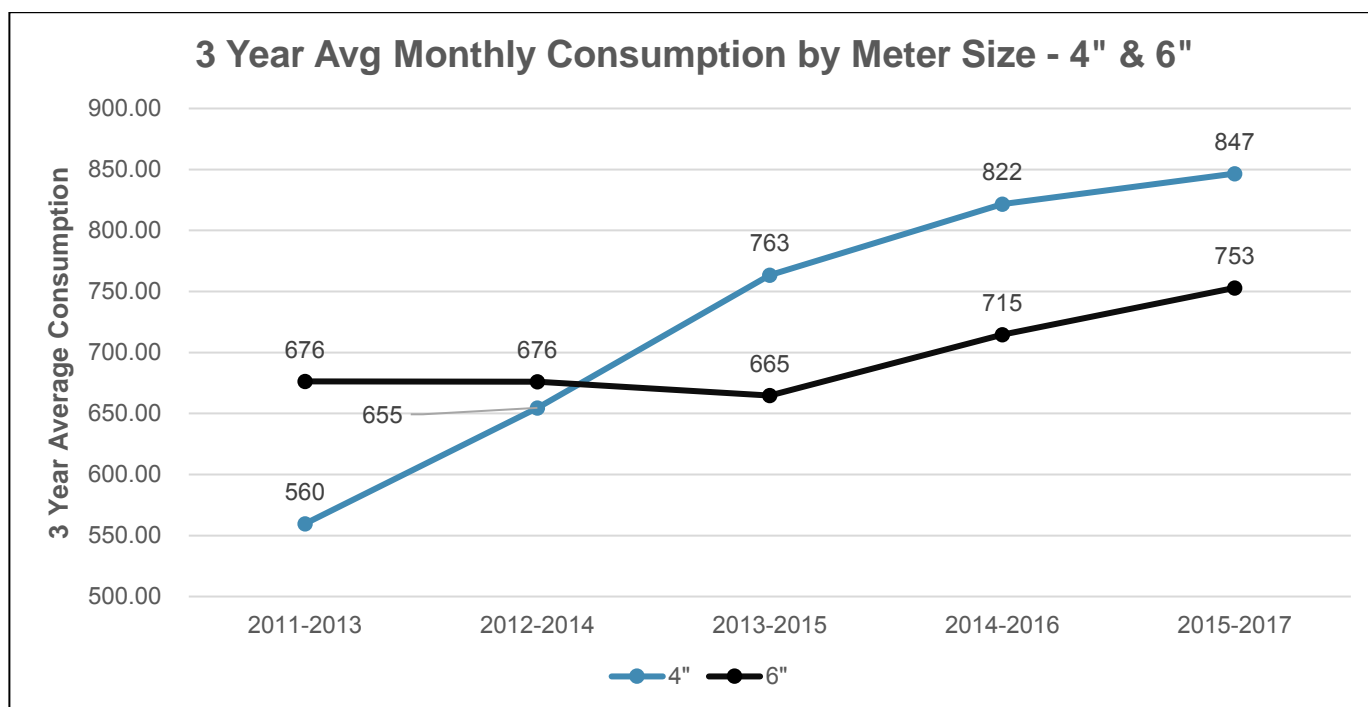


Chart 10 below indicates that the average consumption for the two 6" meters in service is trending upwards after a downward spike in the prior three year average (2013-2015). We currently have five 4" meters in service, four active meters and one redundant meter for medical purposes. The increase in the 2013 and forward consumption pattern is a result of the 4" medical facility meter that was installed in 2013.

CHART 10: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE – 4" and 6"



### 3 YEAR AVERAGE CONSUMPTION WITH & WITHOUT IRRIGATION

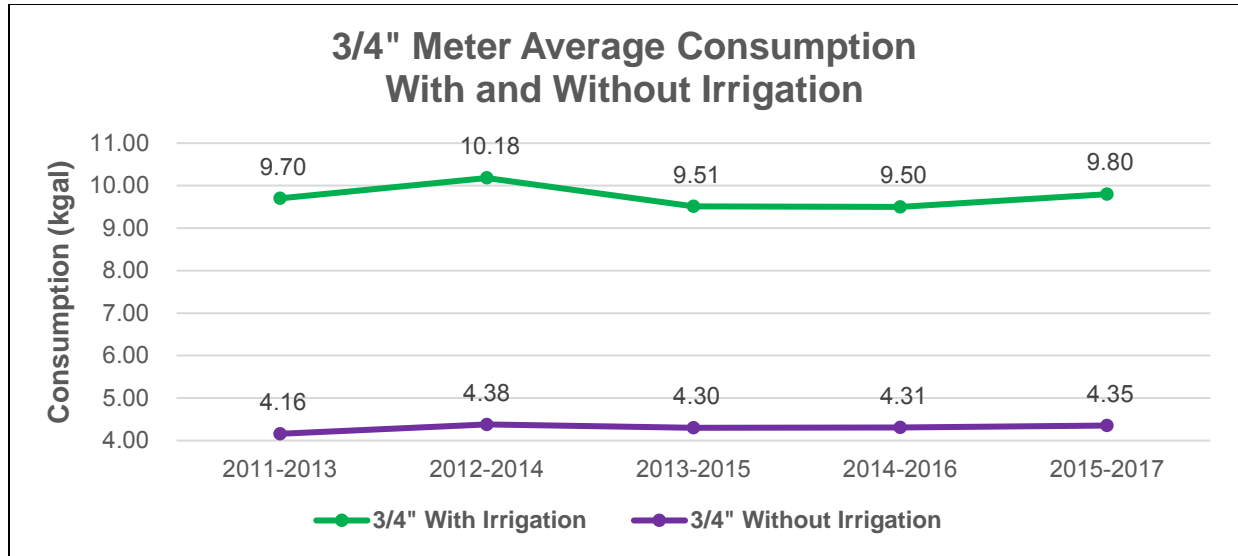
The data in Table 3 shows the average monthly consumption by meter size for all customer classes combined. This shows that the monthly consumption in many cases almost doubles between the summer “with irrigation” and the winter “without irrigation” seasons.

TABLE 3: 3 YEAR AVERAGE MONTHLY CONSUMPTION BY METER SIZE  
ALL CUSTOMER CLASSES (2015-2017)

Meter Size	With Irrigation	Without Irrigation
5/8"	7.47	3.43
3/4"	9.80	4.35
1"	39.05	19.70
1.5"	85.22	43.09
2"	134.78	62.97
3"	204.22	99.72
4"	842.70	852.33
6"	886.90	565.47



CHART 11: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE ¾"  
ALL CUSTOMER CLASSES



While analyzing the 3 year average consumption data CRW determined that they wanted to relook at the methodology that was used in these figures. In the past these averages were calculated based on taking an average of each individual account for the three year time period and then taking an average of these amounts to get the final numbers. For this rate study and going forward it was determined that the averages would be more accurate if they would be based on only taking the total consumption per account based on the number of periods of usage in the study, thus eliminating one average calculation. All of the years have been recalculated and restated using this new methodology.

CHART 12: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 1"  
ALL CUSTOMER CLASSES

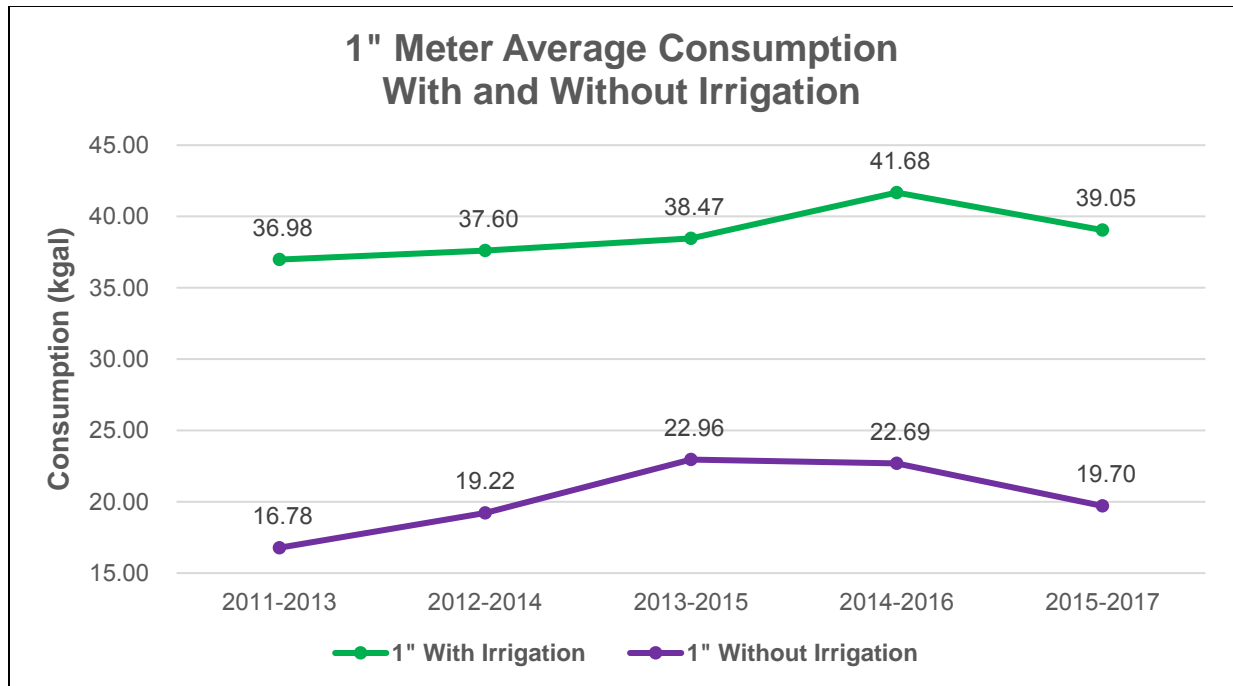


CHART 13: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 1.5"  
ALL CUSTOMER CLASSES

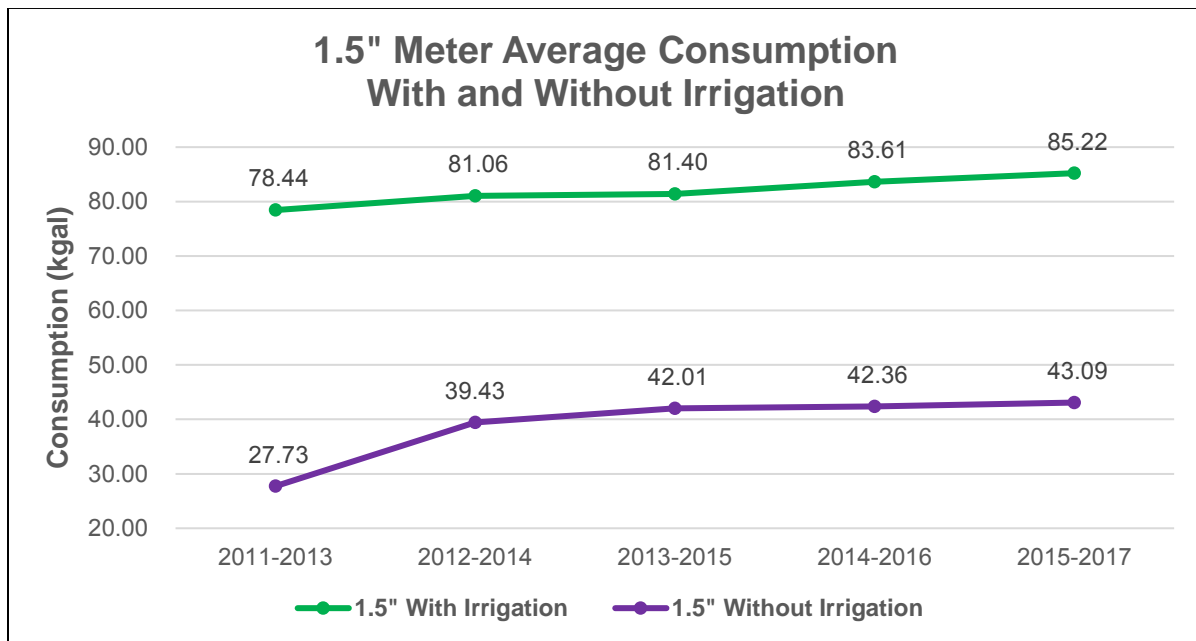


CHART 14: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 2"  
ALL CUSTOMER CLASSES

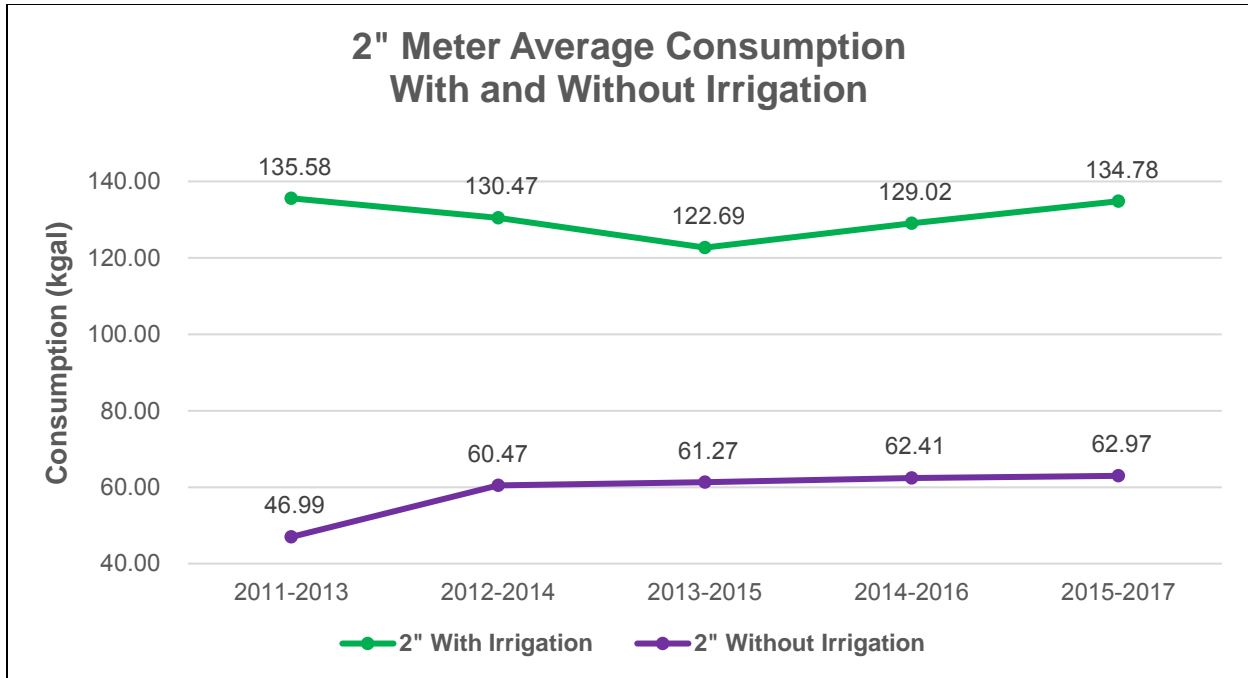


CHART 15: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 3"  
ALL CUSTOMER CLASSES

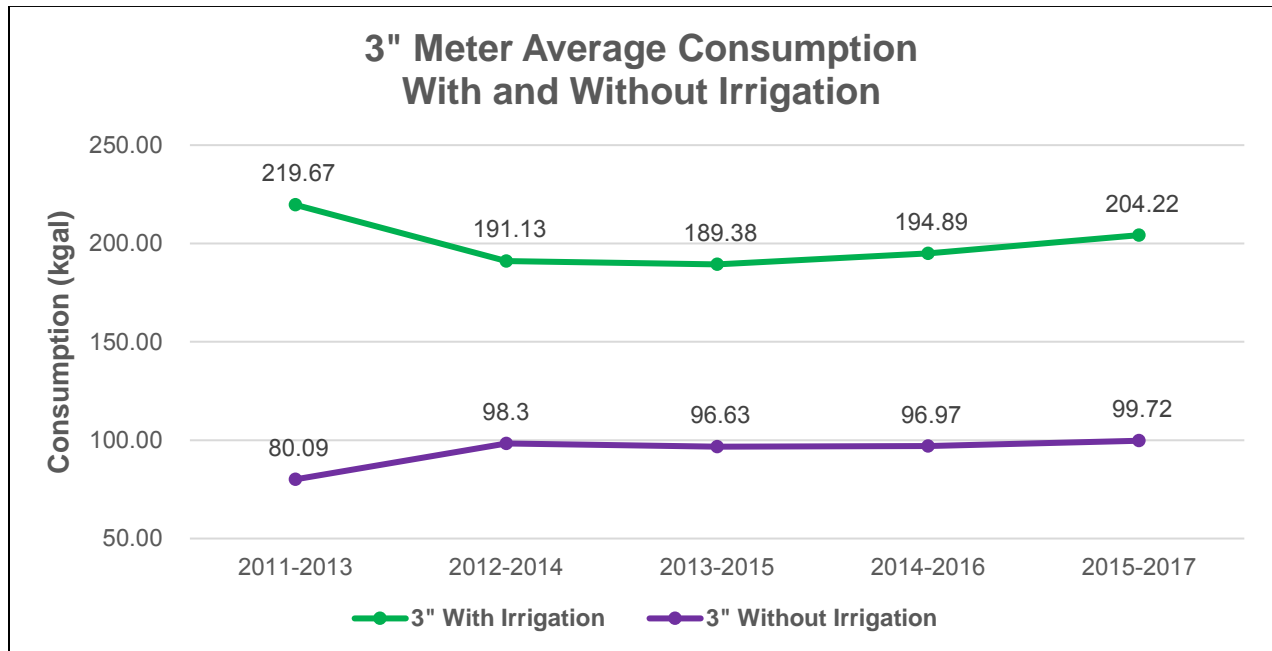


CHART 16: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 4"  
ALL CUSTOMER CLASSES

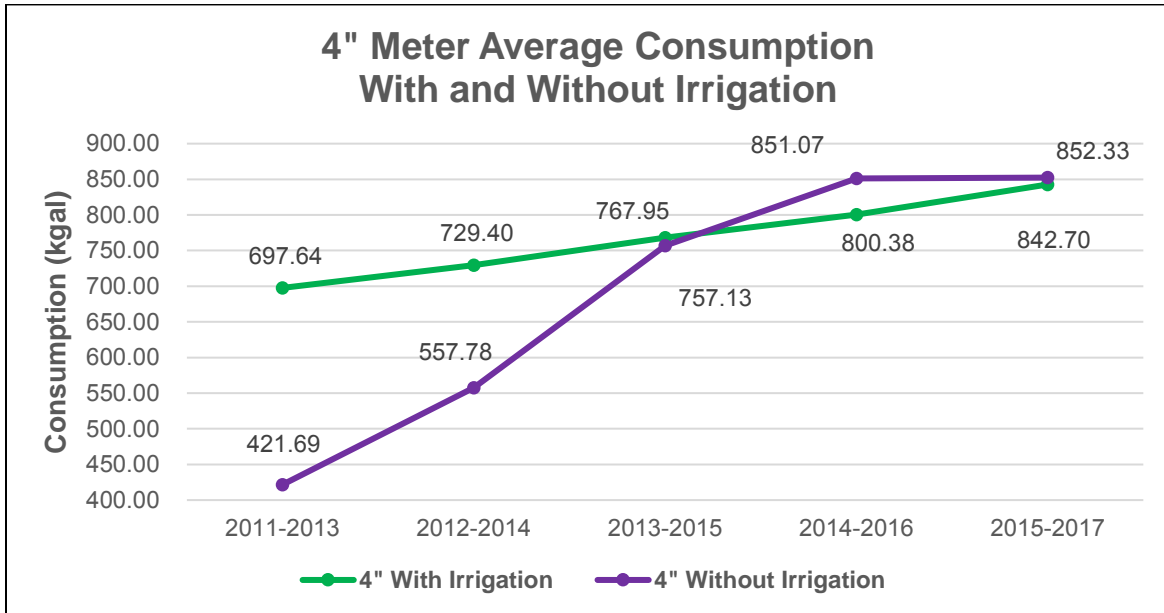
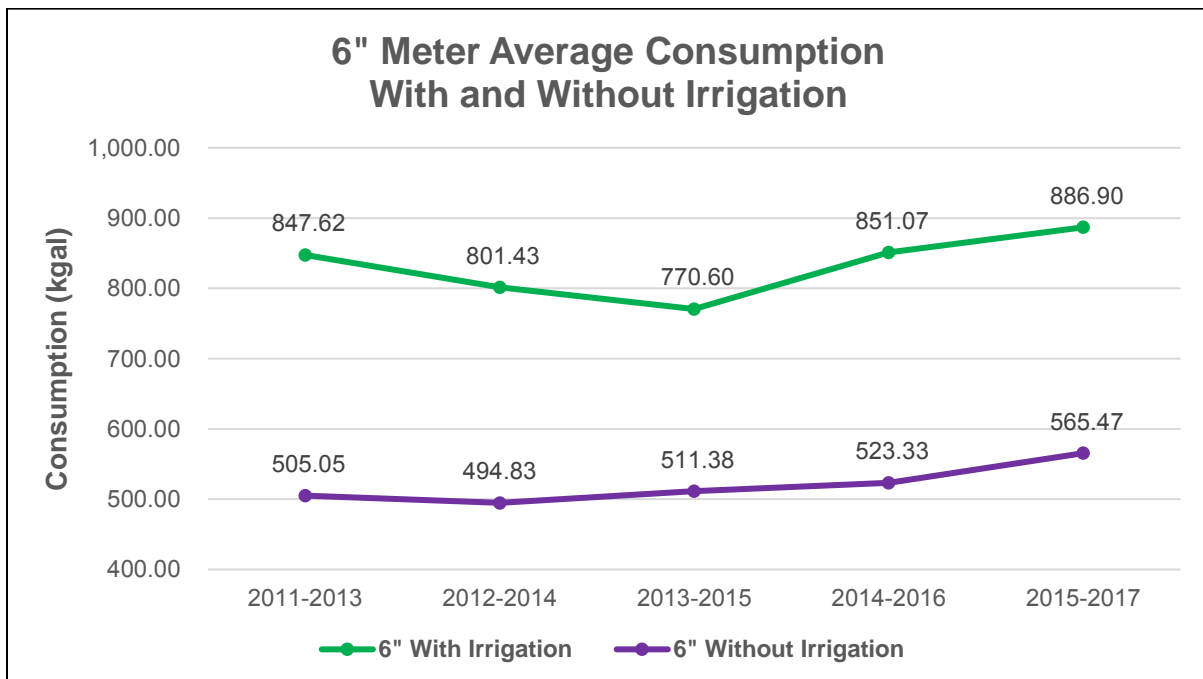


CHART 17: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 6"  
ALL CUSTOMER CLASSES



## EQUIVALENCY FACTORS

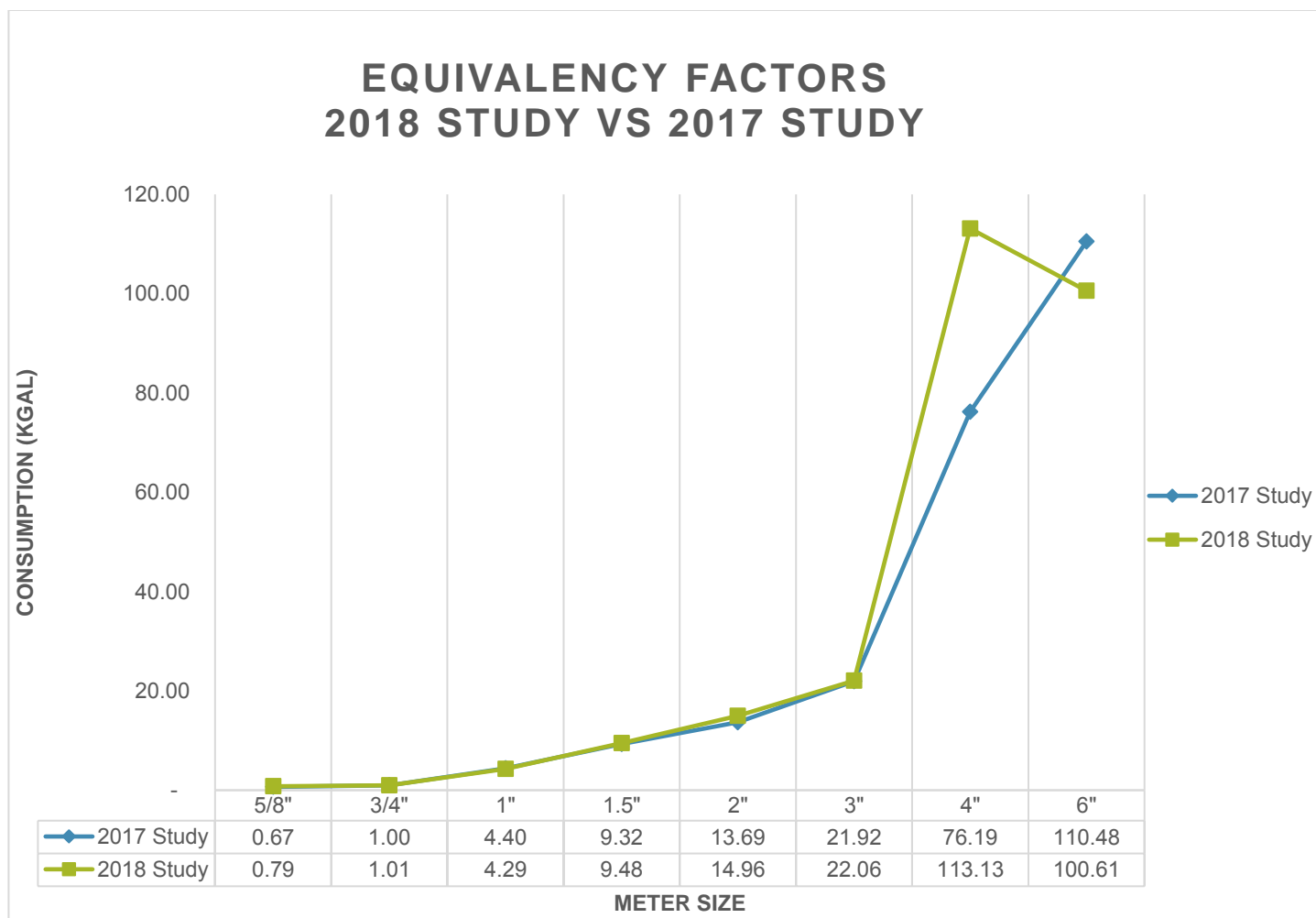
There are two different types of equivalency factors. The first is the hydraulic capacity method which is based on the relative capacity of different meter sizes and meter types utilized to deliver water. These can also be based on the relative potential demands of different customers. Based on the characteristic hydraulic demands, a single family meter size of ¾" is designated as the base for one SFE. The maximum flow rate of water through the meter in gallons per minute (gpm) becomes the unit of comparison. The maximum flow rate demanded by new customers is compared to the base demand in order to determine the equivalency ratio. For example, if the base single family residential customer requires 30 gpm and a commercial customer requires 200 gpm, the equivalency ratio equals 6.67 (200/30). The second method is the actual use equivalency factor, which is based on the relative average monthly water usage of CRW's customers.

Table 4 calculates equivalency factors by customer class and meter size based on a ¾" single family residential customer. This is what is used to calculate Single Family Equivalents (SFE) in the system development fees model and is used to allocate the meter related costs recovered in the cost of service model by meter size. It takes the number of accounts times the actual use equivalency factors to come up with the existing SFE's.

**TABLE 4: 2018 STUDY ACTUAL USE EQUIVALENCY  
FACTORS (BASED ON 3 YEAR AVG. 2015-2017)**

<b>Meter Size</b>	<b>Residential</b>	<b>Multifamily</b>	<b>Commercial</b>	<b>Irrigation</b>	<b>MultiFamily Indoor Use Only</b>	<b>Commercial Indoor Use Only</b>	<b>Equivalency Factor</b>
5/8"	0.72	-	-	4.95	0.52	0.30	0.79
3/4"	1.00	2.78	1.26	4.24	0.43	1.10	1.01
1"	2.39	4.50	4.05	9.09	1.81	4.16	4.29
1.5"	-	9.60	8.04	18.52	5.84	5.76	9.48
2"	-	12.22	9.24	10.18	10.23	9.30	10.08
3"	-	42.71	21.80	62.32	-	11.56	22.06
4"	-	52.66	-	82.78	-	175.28	113.13
6"	-	-	100.61	-	-	-	100.61

CHART 18: EQUIVALENCY FACTORS 2018 STUDY  
COMPARED TO THE 2017 STUDY



### REPRESENTATIVE CUSTOMER BY CUSTOMER CLASS

Customer data for the last three years 2015-2017 was analyzed to determine an average representative customer by customer class that is used to represent the comparison of adopted rates versus proposed rates on a customers' typical annual bill. The process included the following steps:

- Calculate the average consumption, total consumption, and consumption for irrigation season and winter season based on the most recent billing data (Jan17-Dec17).
- Select the most common meter size within each customer class and associated average consumption based on customer class and meter size.

- Select one customer per class from the data sample with both irrigation and winter period consumption to be a representative customer for each customer class.
- Customers with atypical consumption have been removed from the calculation as they skew the average calculation for a representative customer by class.

Results of the representative customer analysis are shown in Table 5. Average Winter Monthly Consumption (AWMC) is calculated for each customer by averaging water consumption in the months of November-February. This represents the amount of water for indoor use (Tier 1) and the amount of wastewater treated each month. The AWMC is reset annually on the April statement. For new customers, until an individual AWMC is established, the customer class average is assigned for water and a \$36/SFE monthly fee is charged for wastewater. During this study period, for single-family residential customers, the average AWMC is 5,000 gallons (water available at Tier 1) and the monthly wastewater charge is \$36/SFE. Irrigation does not typically have winter consumption, however as shown below there is a small amount that is consumed due to leaks, winterization late or early in the season.

**TABLE 5: REPRESENTATIVE CUSTOMER BY CLASS  
2017 BILLING DATA**

Customer Class	Meter Size	Total Consumption (kgal)	Average Monthly Consumption (Jan-Dec 2017) (kgal)	Average Winter Monthly Consumption (kgal)	Average Irrigation Monthly Consumption (kgal)
Residential	3/4"	88.04	7.66	4.36	9.97
Multifamily (with irrigation)	1.5"	915.44	71.87	50.20	87.35
Commercial (with irrigation)	3/4"	114.43	9.67	6.97	11.48
Irrigation	3/4"	351.41	29.86	9.59	31.02
Multifamily Indoor Use Only	3/4"	116.08	3.13	3.14	3.13
Commercial Indoor Use Only	3/4"	79.31	8.34	7.72	8.77

### **CONSUMPTION BY TIER**

To compare the total water usage by tier over time, the following tables were prepared from data captured for the years 2012-2017. The comparison shows overall changes in customers' consumption patterns and will be used to evaluate the composition of rate revenue by tier for current and future studies. Billed usage is shown by customer class and tier. Revenues from billed usage in Tier 4 are directed to water conservation programs accounted for separately in the Water Resources Fund.

TABLE 6: BILLED USAGE BY CUSTOMER CLASS  
BY TIER JANUARY 2017-DECEMBER 2017

Class	Tier 1	Tier 2	Tier 3	Total	Tier 4
Commercial	104,081	-	41,431	145,512	-
Commercial w/ Irrigation	76,358	31,030	22,385	129,773	-
MultiFamily	86,229	-	13,557	99,786	-
MultiFamily w/ Irrigation	58,995	20,022	12,141	91,158	-
Residential	893,970	621,406	125,093	1,640,469	11,913
<b>Total Kgals</b>	<b>1,219,633</b>	<b>945,308</b>	<b>258,573</b>	<b>2,423,514</b>	<b>11,913</b>
Block % of Total	50%	39%	11%	100%	

TABLE 7: BILLED USAGE BY SEASON BY CUSTOMER CLASS  
BY TIER JANUARY 2017-DECEMBER 2017

Winter Season					
Class	Tier 1	Tier 2	Tier 3	Total	Tier 4
Commercial	42,903	-	11,546	54,449	-
Commercial w/ Irrigation	30,510	-	5,253	35,763	-
MultiFamily	35,458	-	4,404	39,862	-
MultiFamily w/ Irrigation	23,443	-	2,941	26,384	-
Residential	340,821	-	44,562	385,383	502
<b>Total Kgals</b>	<b>473,135</b>	<b>-</b>	<b>72,440</b>	<b>545,575</b>	<b>502</b>
Block % of Total	87%	0%	13%	100%	

Irrigation Season					
Class	Tier 1	Tier 2	Tier 3	Total	Tier 4
Commercial	61,178	-	29,885	91,063	-
Commercial w/ Irrigation	45,848	31,030	17,132	94,010	-
MultiFamily	50,771	-	9,153	59,924	-
MultiFamily w/ Irrigation	35,552	20,022	9,200	64,774	-
Residential	553,149	621,406	80,531	1,255,086	11,411
<b>Total Kgals</b>	<b>746,498</b>	<b>945,308</b>	<b>186,133</b>	<b>1,877,939</b>	<b>11,411</b>
Block % of Total	40%	50%	10%	100%	



CHART 19: COMMERCIAL CUSTOMER CLASS  
ANNUAL BILLED USAGE BY TIER 2012-2017

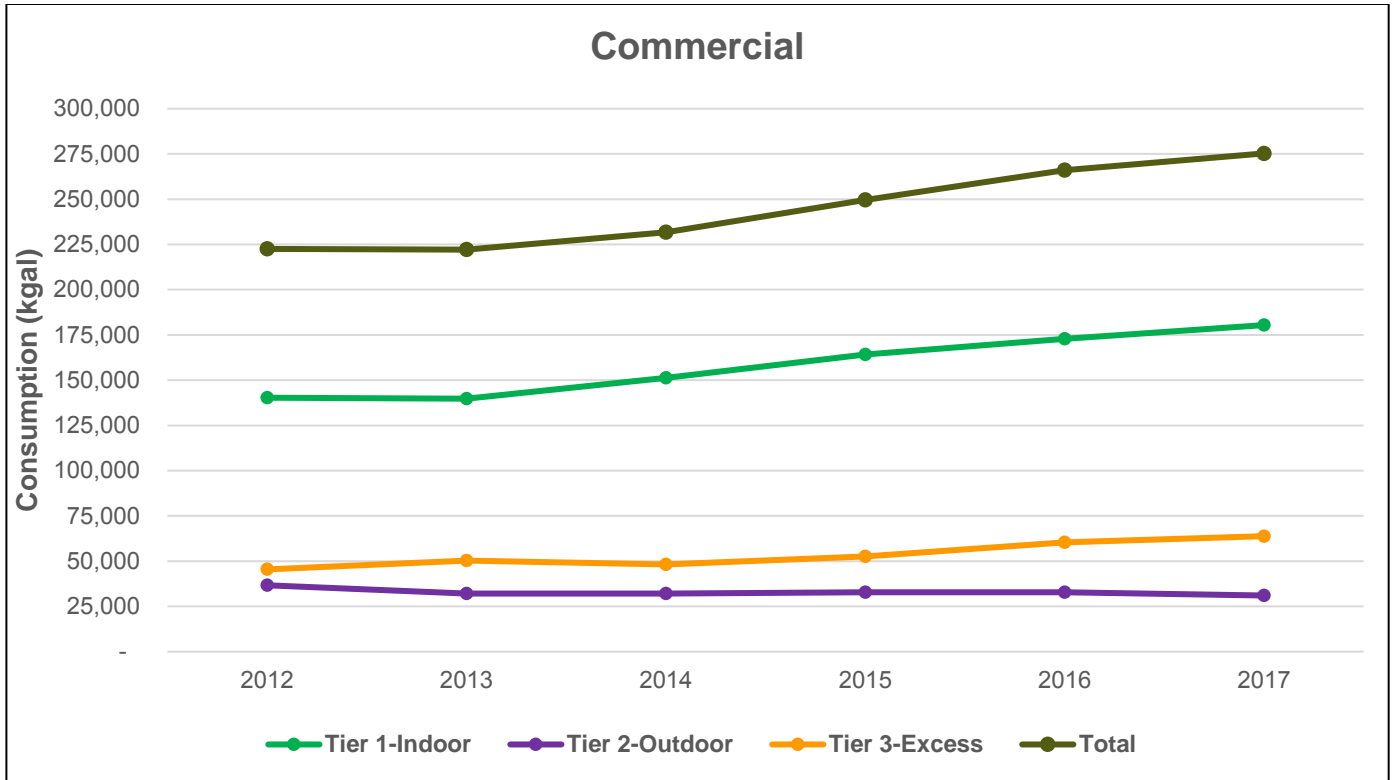


CHART 20: MULTIFAMILY CUSTOMER CLASS  
2012-2017 ANNUAL BILLED USAGE BY TIER

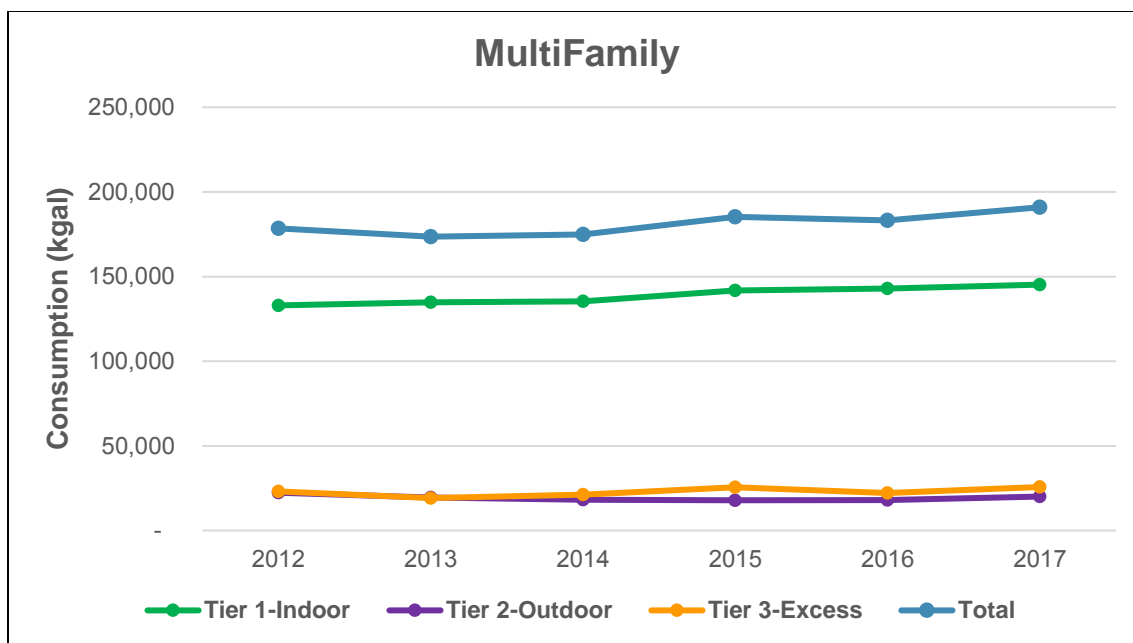


CHART 21: IRRIGATION CUSTOMER CLASS  
2012-2017 ANNUAL BILLED USAGE BY TIER

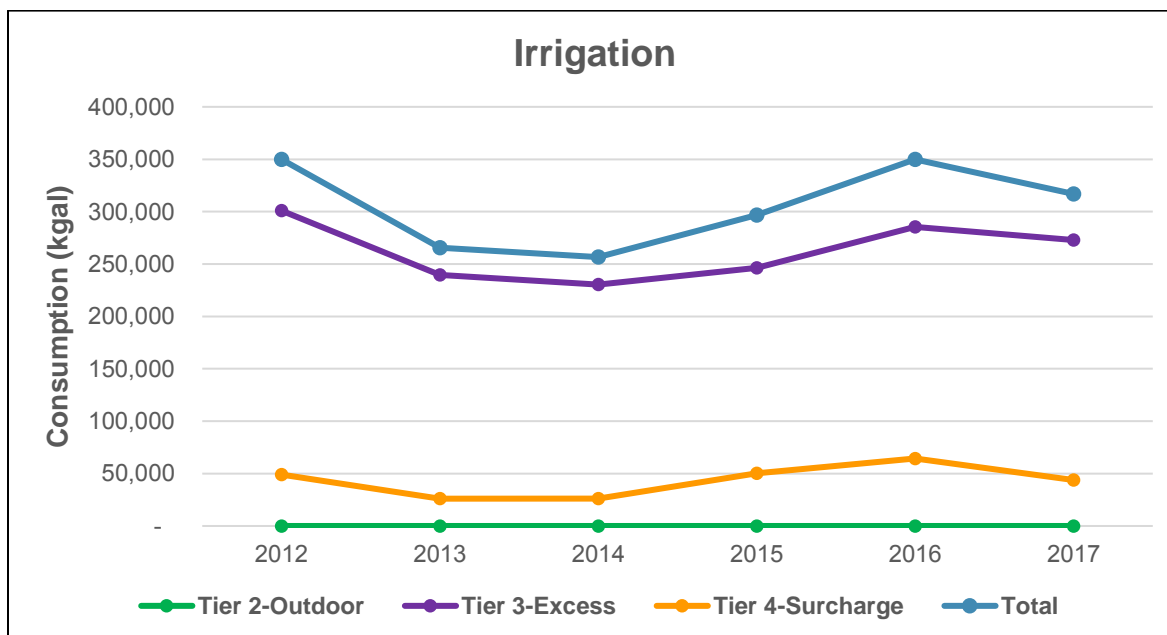


CHART 22: RESIDENTIAL CUSTOMER CLASS  
2012-2017 ANNUAL BILLED USAGE BY TIERS 1-3

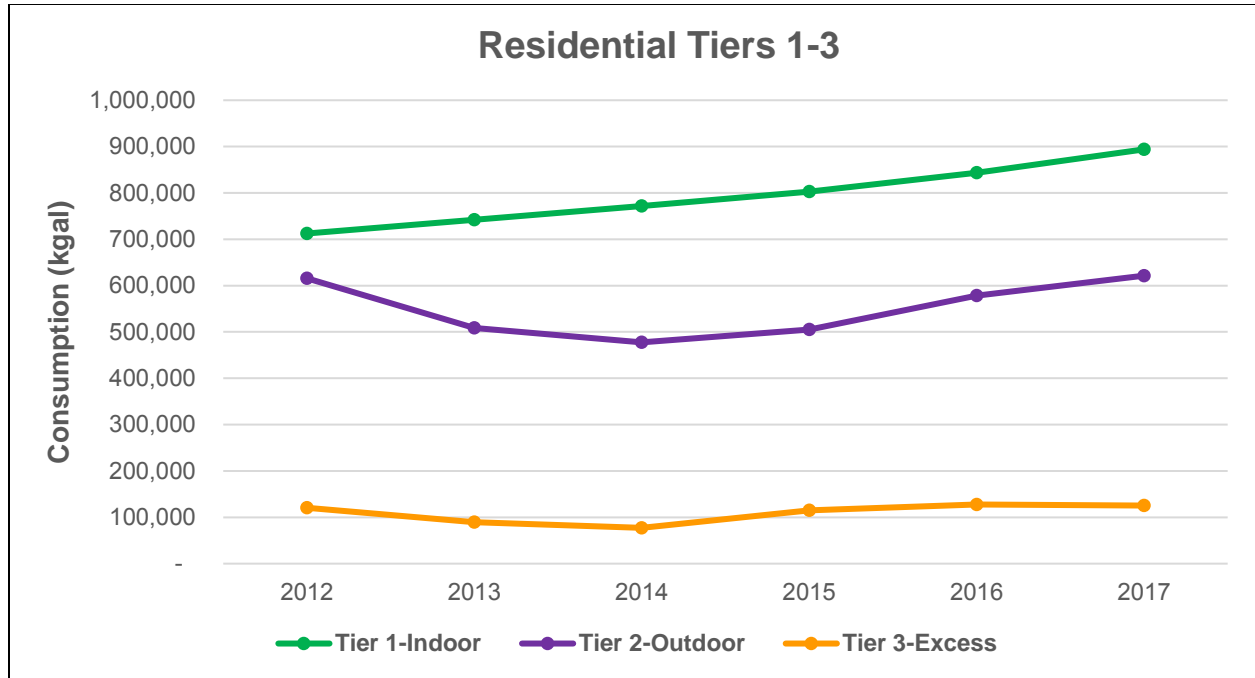
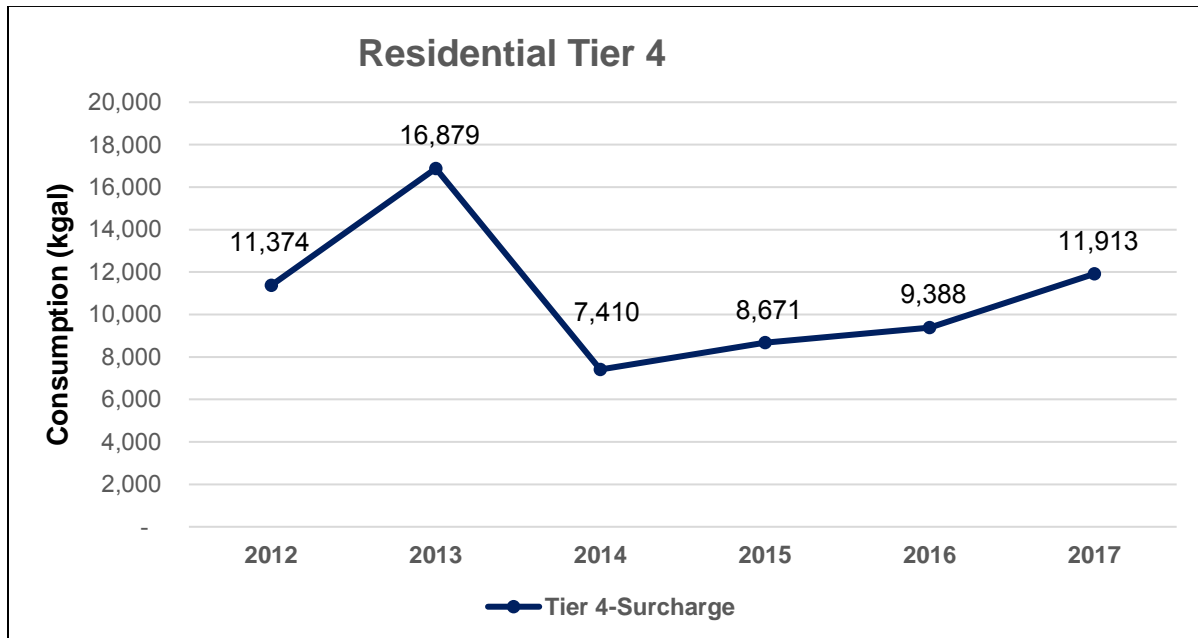


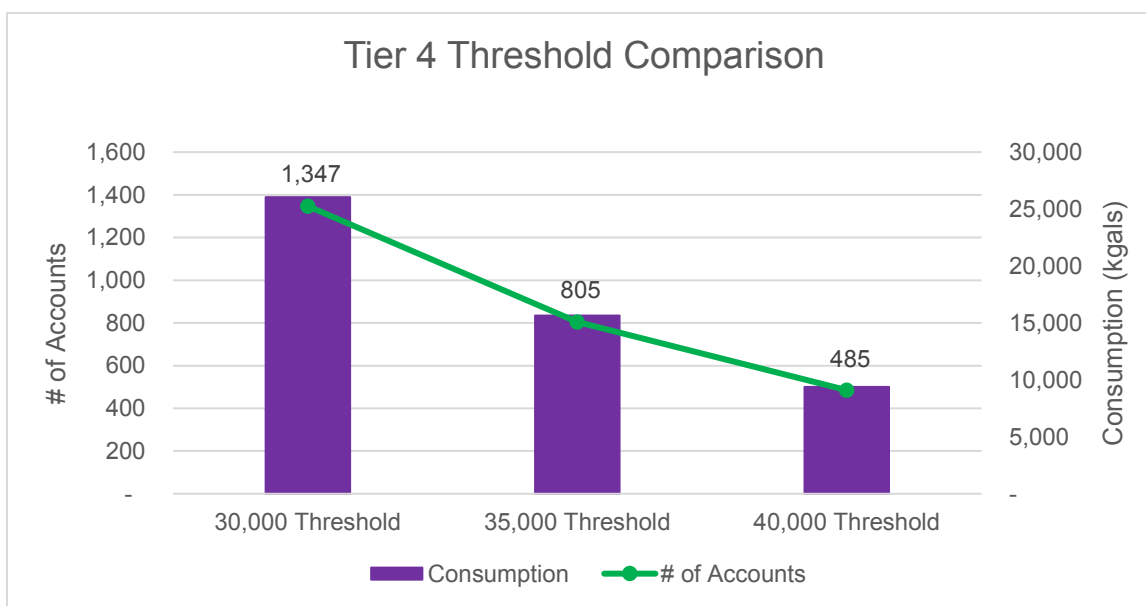
CHART 23: RESIDENTIAL CUSTOMER CLASS  
2012-2017 ANNUAL BILLED USAGE IN TIER 4 ONLY



Charts 19-23 show that growth is resulting in consistent annual increases in total indoor use for commercial, multi-family and residential. The good news is that irrigation and Tier 2 and Tier 3 water use are staying fairly level across all customer classes. Tier 4 usage is almost non-existent at this point. Castle Rock Water analyzed the impact on accounts if the Tier 4 was reduced to a cap of 30,000 gallons or 35,000 gallons rather than 40,000 gallons that is currently in place.

The analysis showed that in 2016 there were 485 residential customers who were at or over the 40,000 gallons per month threshold at least once during the January 2016-December 2016 capture period. We then took the same data and lowered the threshold to 35,000 gallons which then impacted 805 residential customers. The same data was then used to lower the threshold to 30,000 gallons, which impacted approximately 1,347 customers. In conclusion, the reduction of the 40k gallon surcharge threshold to 30k only impacted approximately 7.5% of the residential customers and accounted for 2.7% of the total residential consumption. Most of the consumption that is charged in Tier 4 surcharge is the result of a leak, which then based upon Castle Rock Water's leak policy, if the leak is found and repaired is credited to the customer's account. Below is a chart showing this impact.

CHART 24: TIER 4 THRESHOLD COMPARISON



The analysis also looked at the Tier 3 usage to show how many customers used Tier 3 only once or twice in the year versus how many used Tier 3 consistently throughout the year. The data shows that during irrigation season 65% of the customers only hit Tier 3 once or twice and 84% of the customers only hit Tier 3 once or twice in the winter season.

TABLE 8: TIER 3 CUSTOMER USAGE

Tier 3	# Users	# Users 1 or 2 Month	# Users 3 or More Months	% of Users 1 or 2 Months	% of Users 3 or More Months
Residential-IRR	6,227	4,027	2,200	65%	35%
Residential-WIN	10,913	9,129	1,784	84%	16%
<b>Total</b>	<b>17,140</b>	<b>13,156</b>	<b>3,984</b>	<b>77%</b>	<b>23%</b>

The average consumption for these customers was 4.11 kgals in the irrigation season and 2.12 kgals in the winter season.

TABLE 9: TIER 3 AVERAGE CONSUMPTION

Tier 3	Avg Consumption	Avg Consumption 1 or 2 Months	Avg Consumption 3 or More Months
Residential-IRR	5.11	4.11	6.92
Residential-WIN	2.21	2.12	2.64
<b>Total</b>	<b>7.32</b>	<b>6.23</b>	<b>9.56</b>

For consistent Tier 3 customers, the irrigation consumption averaged 6.92 kgals and 2.64 kgals for the winter season. Overall 8% of the annual consumption and 14% of the annual revenues were captured in Tier 3.

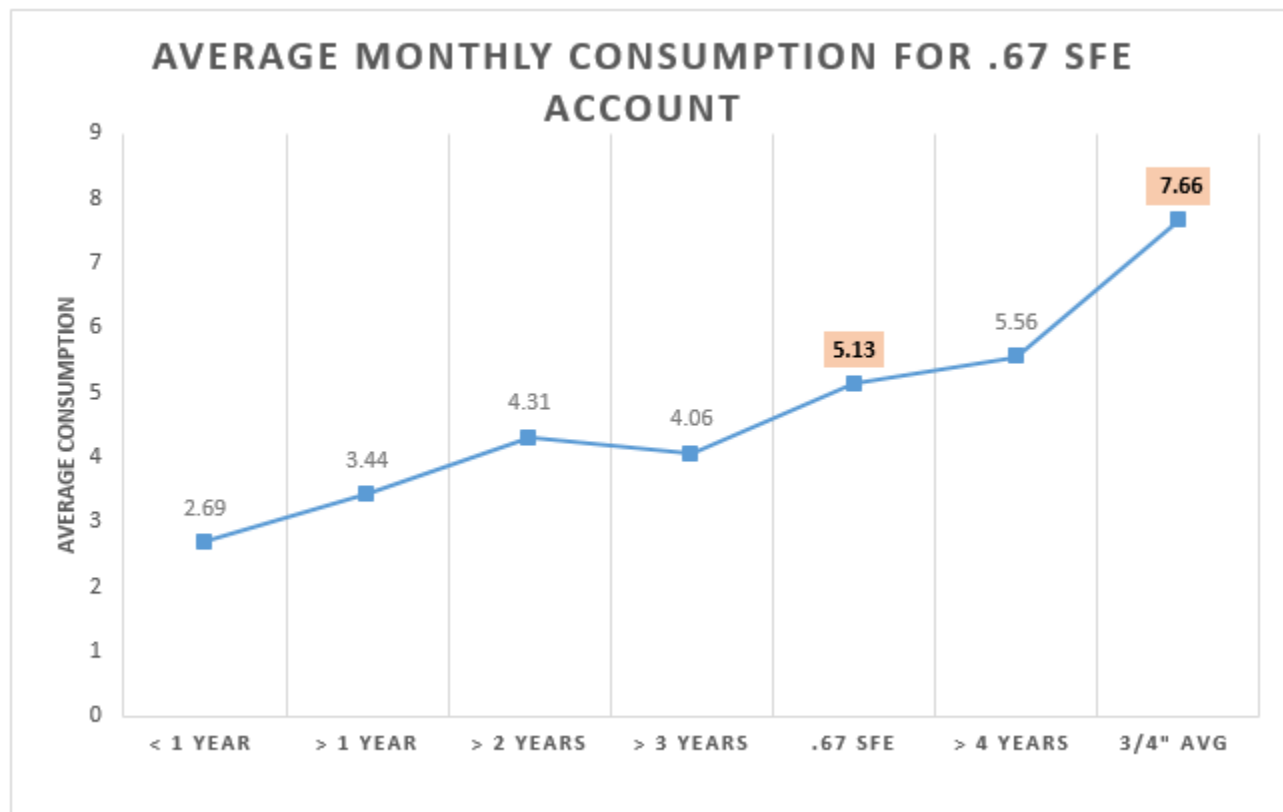
TABLE 10: ANNUAL CONSUMPTION AND REVENUES BY TIER

Residential Tier	Consumption		Revenues	
Tier 1	843,282	54%	\$ 2,319,023	36%
Tier 2	578,084	37%	\$ 3,115,861	49%
Tier 3	127,662	8%	\$ 912,143	14%
Tier 4	9,388	1%	\$ 75,855	1%
<b>Total</b>	<b>1,558,416</b>	<b>100%</b>	<b>\$ 6,422,882</b>	<b>100%</b>

### 5/8" ACCOUNTS - .67 SFE

Castle Rock Water evaluated these accounts to determine performance relative to the goal of 67% of average residential use. Chart 25 shows mixed results. More detailed evaluation showed that certain homebuilders were not meeting the intent, while others were. Administrative changes were made to the approval process which should increase performance of these accounts over time. The 7.66 is the average monthly consumption for a 3/4" residential account or 1 SFE, whereas the 5.13 is the monthly consumption that a .67 SFE account should be using.

CHART 25: .67 SFE ACCOUNTS CONSUMPTION BY YEAR



### **IRRIGATION USAGE BASED ON WATERING SCHEDULES**

Each Irrigation season Castle Rock Water puts out a residential watering schedule. This schedule assigns a circle, diamond or square to each resident based on the last digit of their address. New for 2018 is a watering schedule for the non-residential customers which assigns watering days based on being on the east or west side of I-25. Given the importance of the watering schedules, CRW has tracked the usage of customers by year by schedule.

Below are charts that show the residential and non-residential irrigation season water use from 2012 to 2017 based on the assigned symbols. For residential customers circle and diamond customers have very similar usage for all the years, where the square customers have slightly higher usage than the other two sets of customers. One reason for this is the number of customers for each schedule. Square has the most at 7,327 customers, circle is second with 5,870 customers and diamond has the least with 5,671 customers based on the 2017 billing data.

With the non-residential customers, the west side appears to be smaller or have less usage each year than the east side customers. The east side has more customers at 990 than the west side at 553 customers based on the 2017 billing data. Overall this information can help us to track water

consumption patterns for each customer group and can help CRW to determine if the schedule breakouts need to be reevaluated in the future or if the water usage patterns are adequate.

CHART 26: RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE

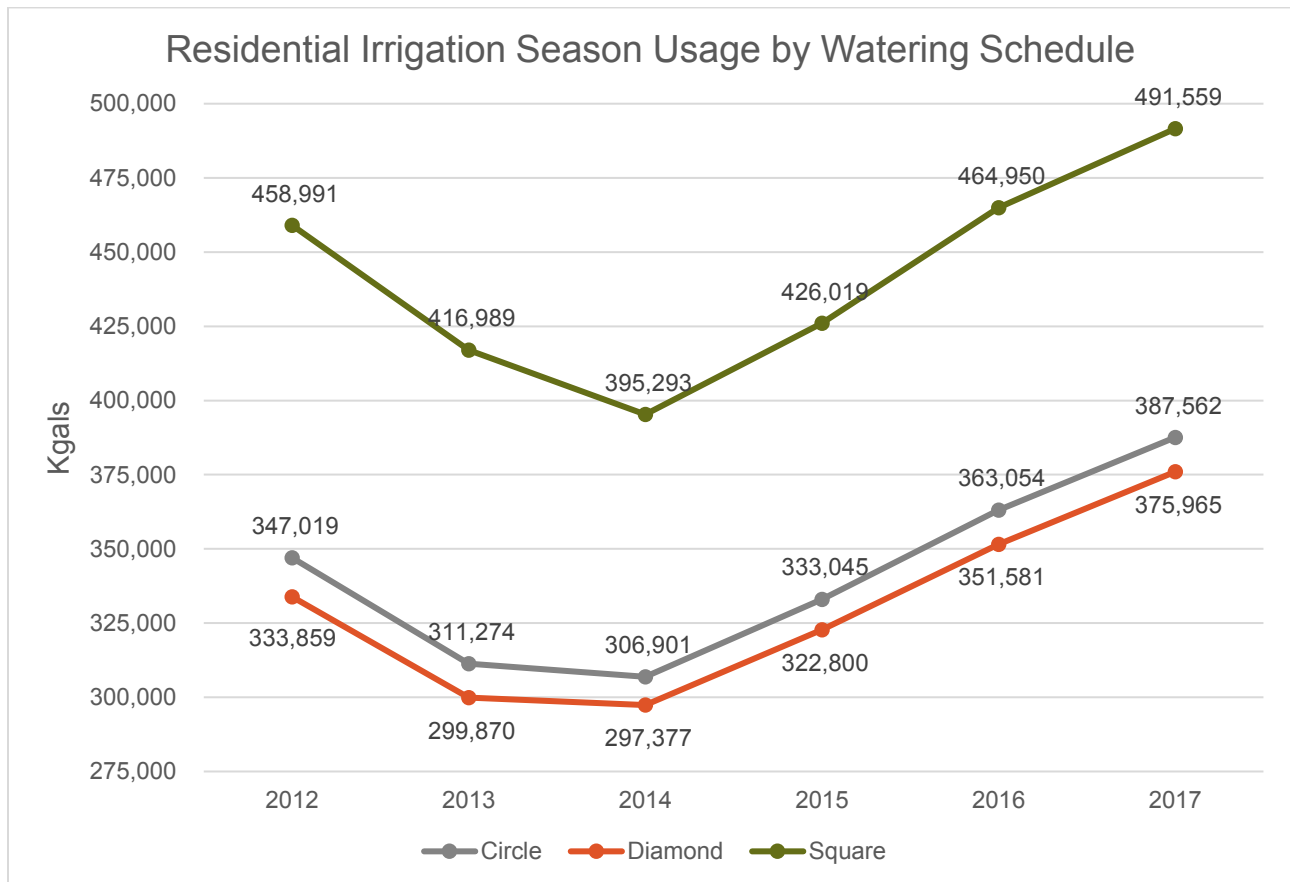
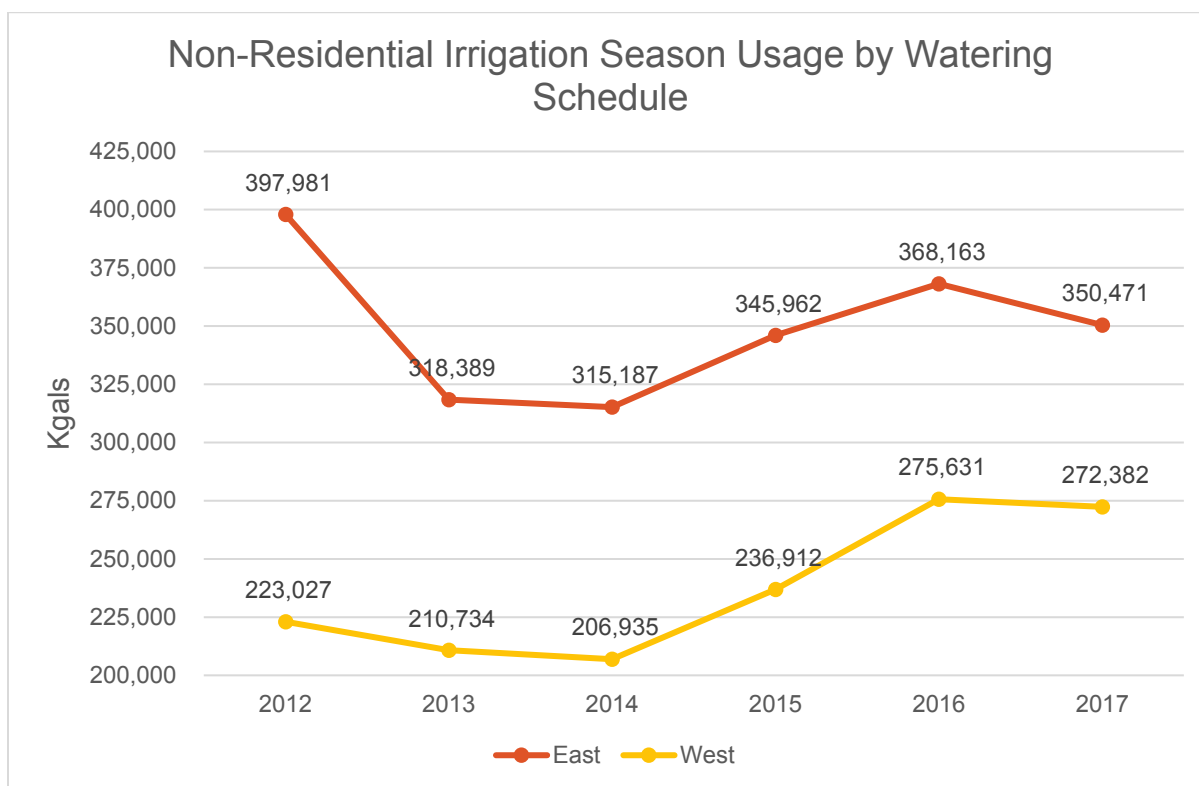


CHART 27: NON-RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE



### WATER WISER CUSTOMERS

Each year CRW offers Water Wiser classes for customers. The purpose of the class is to help educate customers about watering more efficiently. It also helps to educate on water conservation and more efficient landscaping ideas. As a water wiser customer you are allowed to water any day versus following the every third day watering schedule. However, residential customers must still water between the hours of 8:00 p.m. and 8:00 a.m.

In order to see the success of the program, CRW completed some analysis on the water wiser accounts consumption patterns before and after taking the class. In order to analyze these customers, CRW looked at three different data sets. These three customer sets were customers who had water usage for 12 months before they obtained their water wiser status and 12 months of usage after they became a water wiser. The other two data sets were for customers with 24 months and 36 months of data before and after completing the water wiser program. The table below shows the before and after water wiser average usage.



**TABLE 11: BEFORE AND AFTER WATER WISER  
AVERAGE USAGE**

<b># of Months Before and After Water Wiser</b>	<b>Average Usage Before Water Wiser Class</b>	<b>Average Usage After Water Wiser Class</b>	<b>% of Customers to Decrease Usage After Water Wiser Class</b>
36 Months	9.9	8.3	73%
24 Months	9.0	8.2	66%
12 Months	8.6	8.2	60%

The chart shows that overall the average consumption has been decreasing for customers after taking the water wiser class. In general when looking at the individual accounts for the 36 months of data 73% of people have decreased their average usage, which means that 27% of users still have increased their average usage despite attending a water wiser workshop. This data shows that as we add more months the data is improving. At 12 months of usage it shows that only 60% of users decreased their usage and at 24 months this increased to 66%. From this data there is still some improvements that can be made for 27% of the water wiser customers.

### **NON-RESIDENTIAL IRRIGATION BUDGETS**

Castle Rock Water looked at non-residential irrigation accounts to determine if these accounts fell within the landscaping guidelines for using a hybrid grass versus a Kentucky blue grass. It was discovered that 498 out of the total 876 accounts were started from 2004 to 2017, which means that the landscaping for the customers property was designed to and installed to meet a water budget significantly lower than the standard. CRW determined the impact of lowering the budgets based on the hybrid grass requirements versus the higher budgets that are in place currently for Kentucky blue grass. The impact is a loss of revenue of \$119,553 in Tier 3 in the last year alone.

As shown in Table 14 below, out of the 498 accounts needing a budget adjustment 308 or 62% of them would be affected by a higher annual bill during irrigation season. For the commercial with irrigation customers 72 or 42% will have a budget adjustment. The individual account difference ranges from \$62 to \$388 annually for the top 25 affected customers. For the irrigation customers 214 or 70% would have budgets adjusted and would result in an annual impact between \$1,047 up to \$6,211 for the top 25 affected individuals. Lastly, with the multifamily with irrigation customers 22 or 54% are impacted and these individual impacts range from \$2 to \$1,212 annually.

TABLE 12: NON-RESIDENTIAL ACCOUNTS

Customer Class	# Accounts 2004-2017	# Accounts Before 2004
Commercial with Irrigation	152	132
Irrigation	305	176
MultiFamily with Irrigation	41	70
<b>Total</b>	<b>498</b>	<b>378</b>

TABLE 13: KENTUCKY BLUE GRASS BUDGET VERSUS HYBRID BUDGET

Customer Class	Total Irrigation Budget - Kentucky Blue Grass (kgal)- Based on 30 inches	Total Irrigation Budget - Hybrid Grass (kgal)-Based on 19 inches	Difference in Budgets
Commercial with Irrigation	25,890	16,387	9,503
Irrigation	373,371	233,742	139,629
MultiFamily with Irrigation	10,713	6,755	3,958
<b>Total</b>	<b>409,974</b>	<b>256,884</b>	<b>153,090</b>

TABLE 14: ACCOUNT BUDGET DIFFERENCES

Customer Class	Total Irrigation Budget - Kentucky Blue Grass (kgal)- Based on 30 inches	Total Irrigation Budget - Hybrid Grass (kgal)-Based on 19 inches	Total 30 Inch vs. 19 Inch Budget Difference (kgal)	Actual 2017 Water Consumption (kgal)-Tiers 2-3	Billmaster Total Consumption Charges	Hybrid Total Charges	Difference in Total Charges	# of Accounts 2004-2017 with Differences in Charges	# Accounts 2004- 2017 With No Changes
Commercial with Irrigation	25,890	16,387	9,503	13,229	76,157	\$ 80,766	\$ 4,609	72	80
Irrigation	373,371	233,742	139,629	182,948	1,478,130	\$ 1,583,990	\$ 105,860	214	91
MultiFamily with Irrigation	10,713	6,755	3,958	9,739	52,468	\$ 61,552	\$ 9,084	22	19
<b>Total</b>	<b>409,974</b>	<b>256,884</b>	<b>153,090</b>	<b>205,916</b>	<b>1,606,756</b>	<b>\$ 1,726,308</b>	<b>\$ 119,553</b>	<b>308</b>	<b>190</b>

### IMPACT OF IRRIGATED AREAS (SQUARE FEET)

Chart 28 shows the number of residential accounts by irrigated area. Chart 29 shows the average monthly consumption by irrigated area. As you would expect the more irrigated area the more the average consumption is used per month. Chart 30 shows total usage by irrigated area for commercial accounts. Chart 31 shows average monthly consumption for commercial accounts by irrigated area.

CHART 28: RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

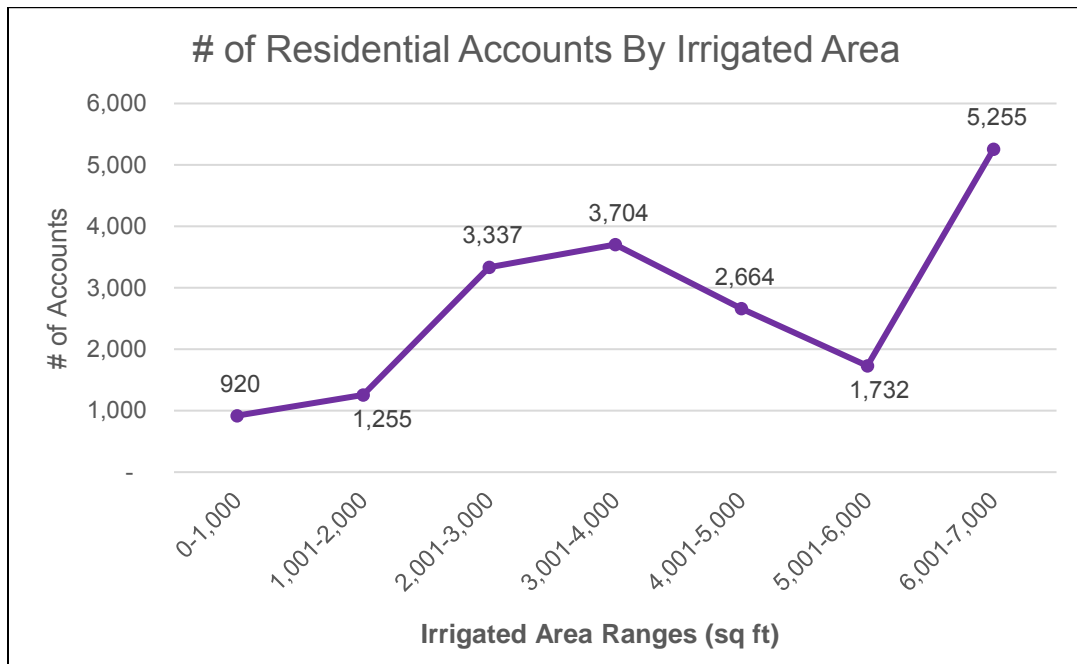


CHART 29: RESIDENTIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA

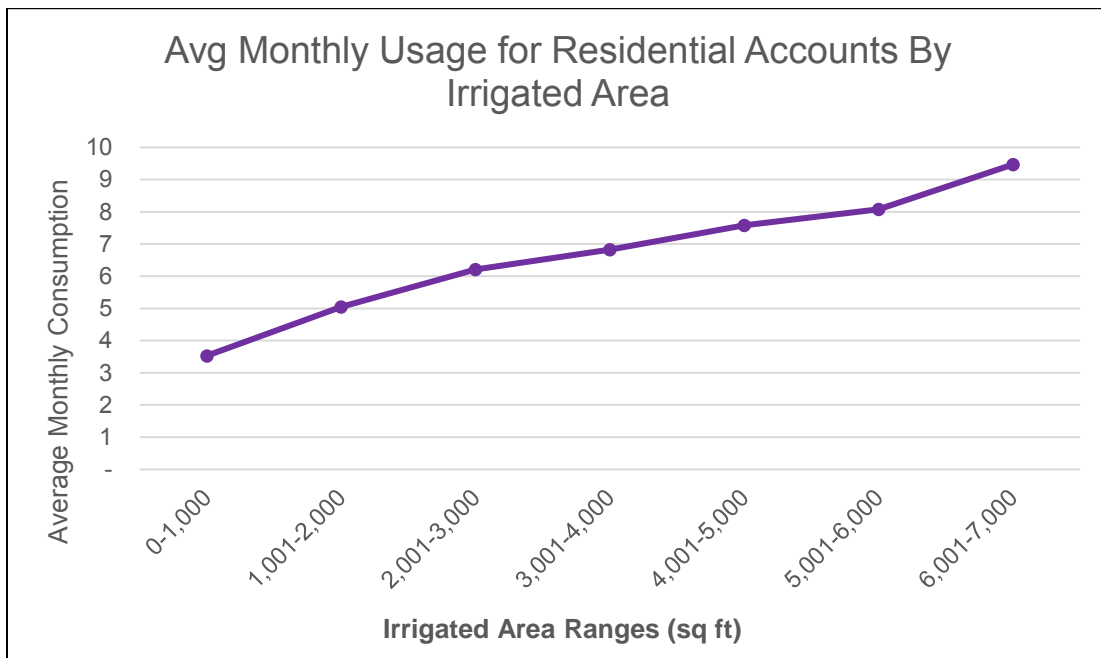


CHART 30: COMMERCIAL ACCOUNTS BY IRRIGATED AREA

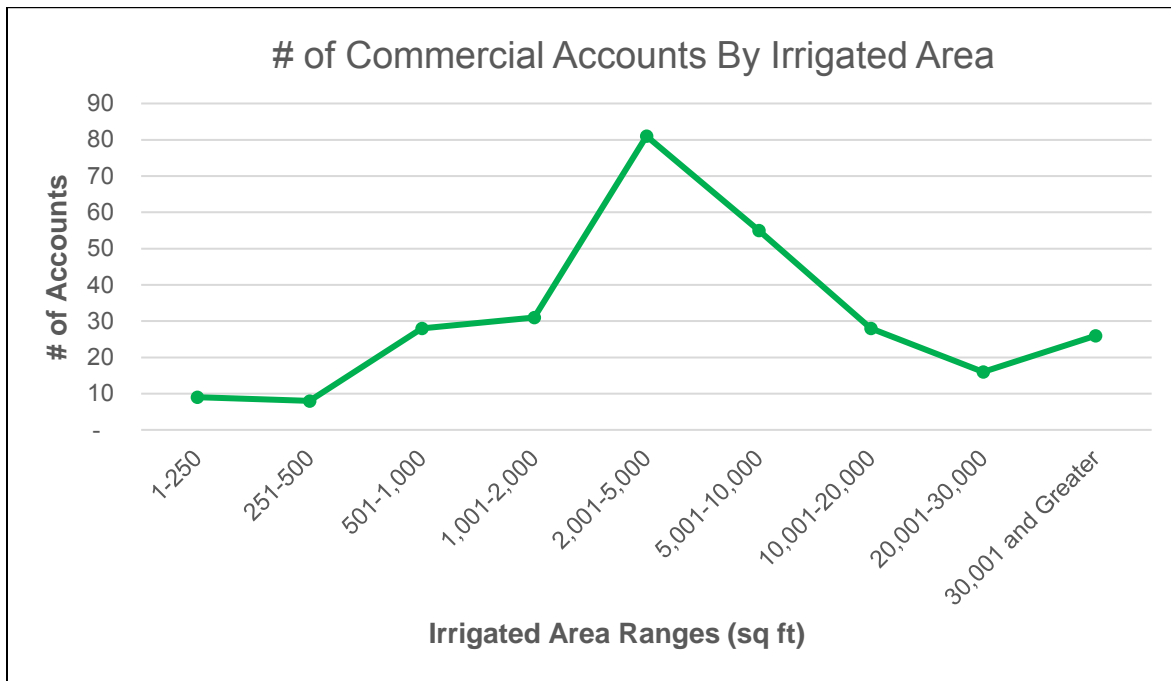


CHART 31: COMMERCIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA

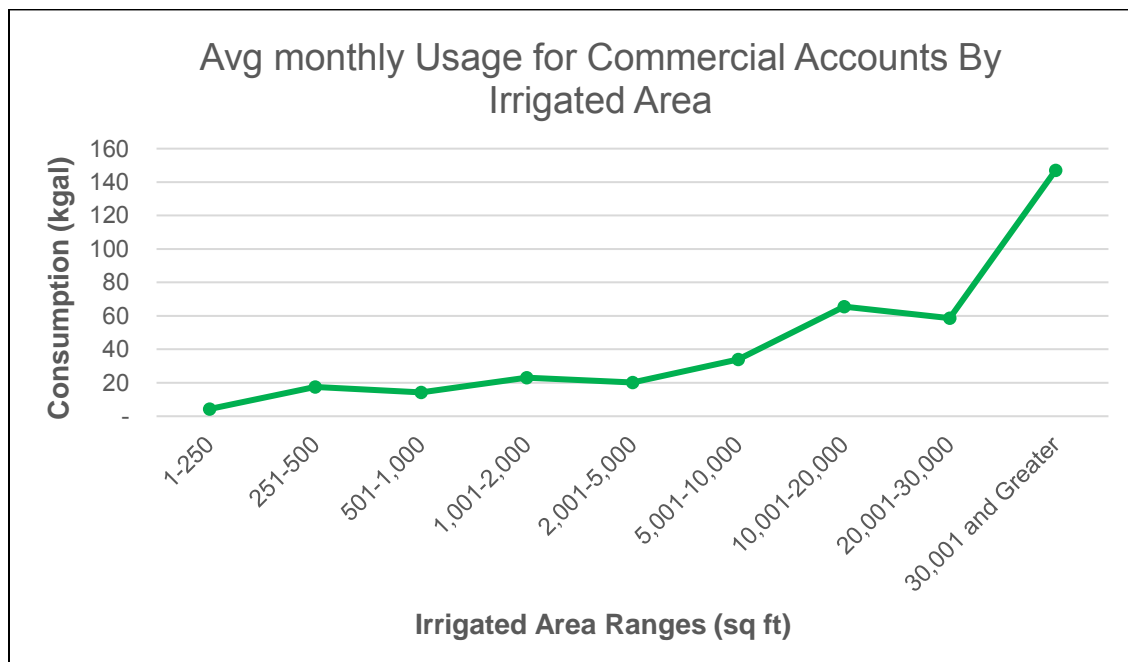


Chart 32 shows the average monthly consumption for all HOA accounts combined.

CHART 32: All HOA’s AVERAGE MONTHLY CONSUMPTION

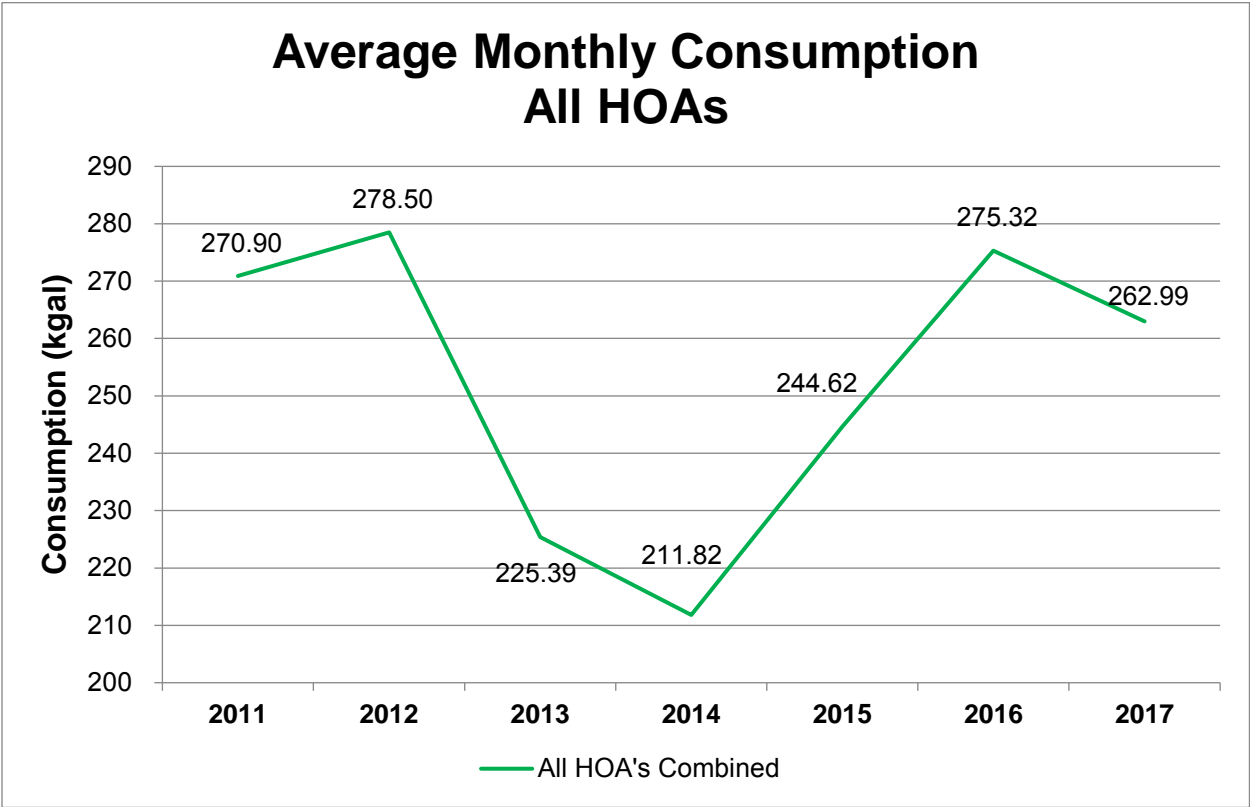
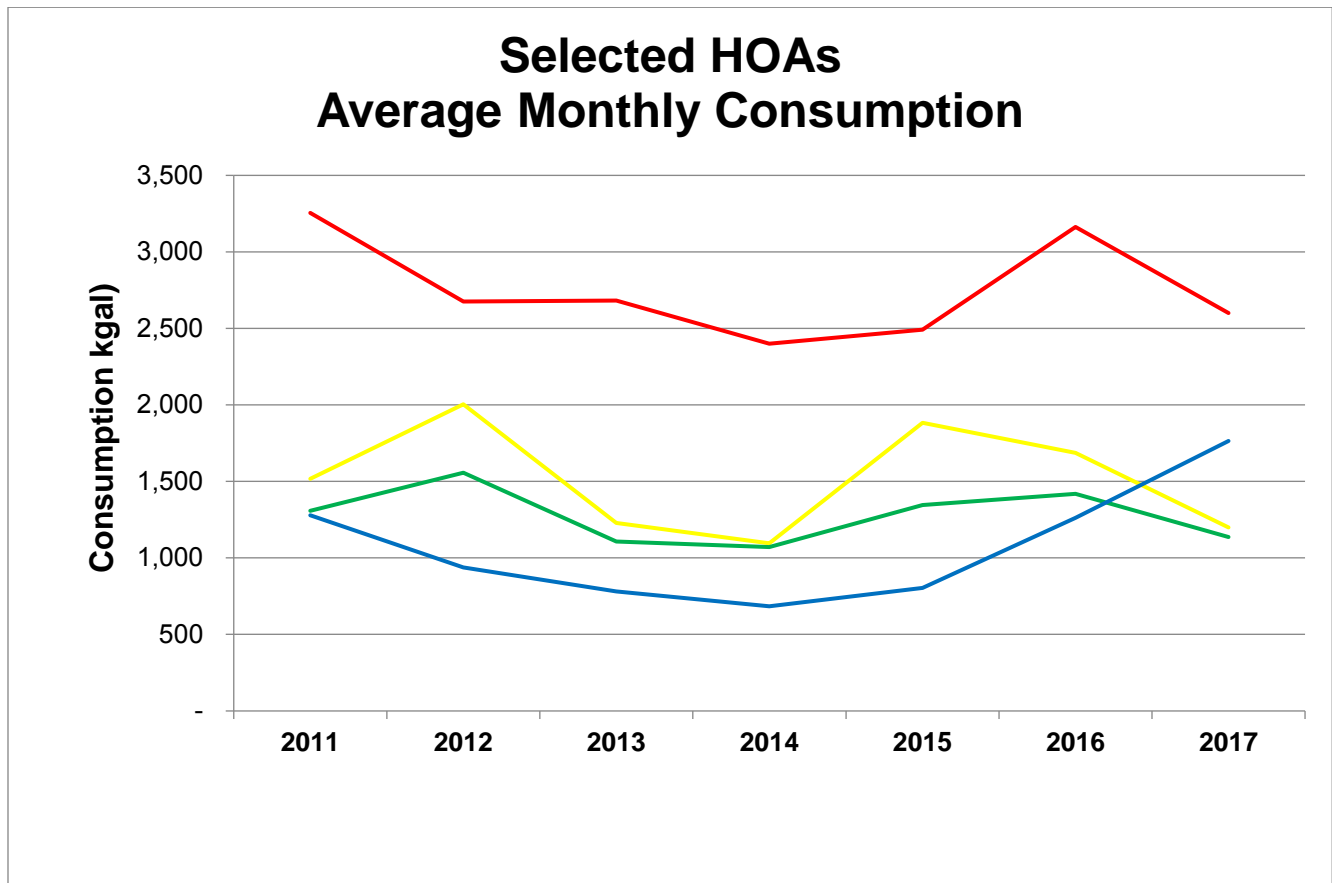


Chart 33 shows four HOA’s that were selected at random to show the average monthly consumption patterns for these user types.

CHART 33: SELECT HOA's AVERAGE MONTHLY CONSUMPTION



## MONTHLY CONSUMPTION BY SUBDIVISION

CHART 34: MEADOWS AVERAGE MONTHLY CONSUMPTION

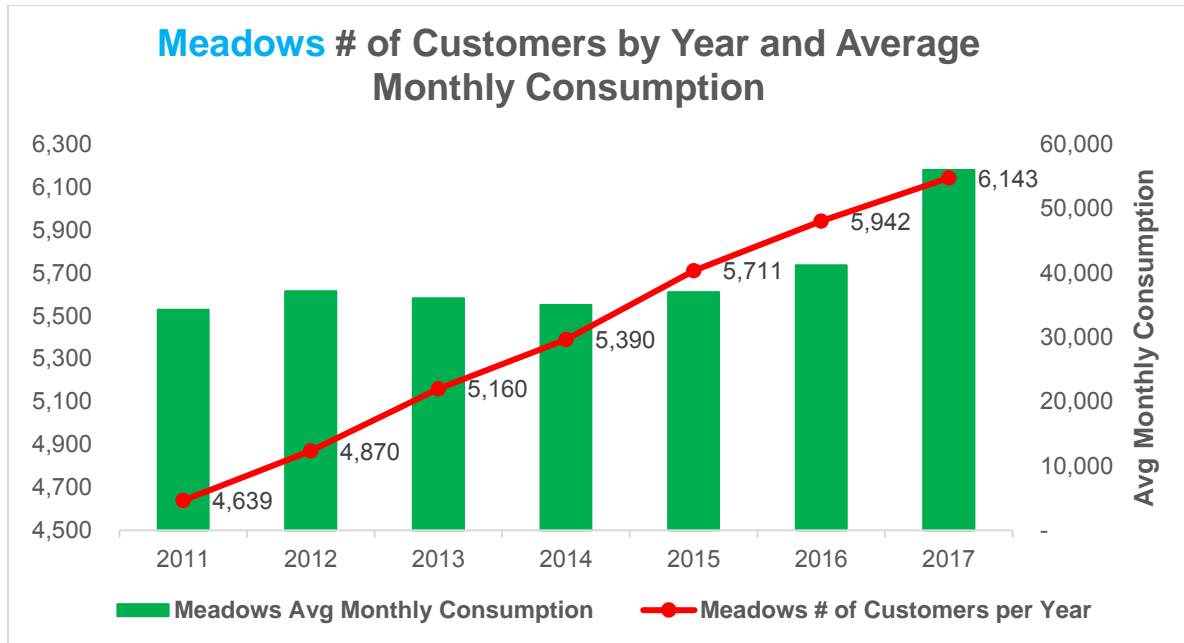


CHART 35: MEADOWS RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

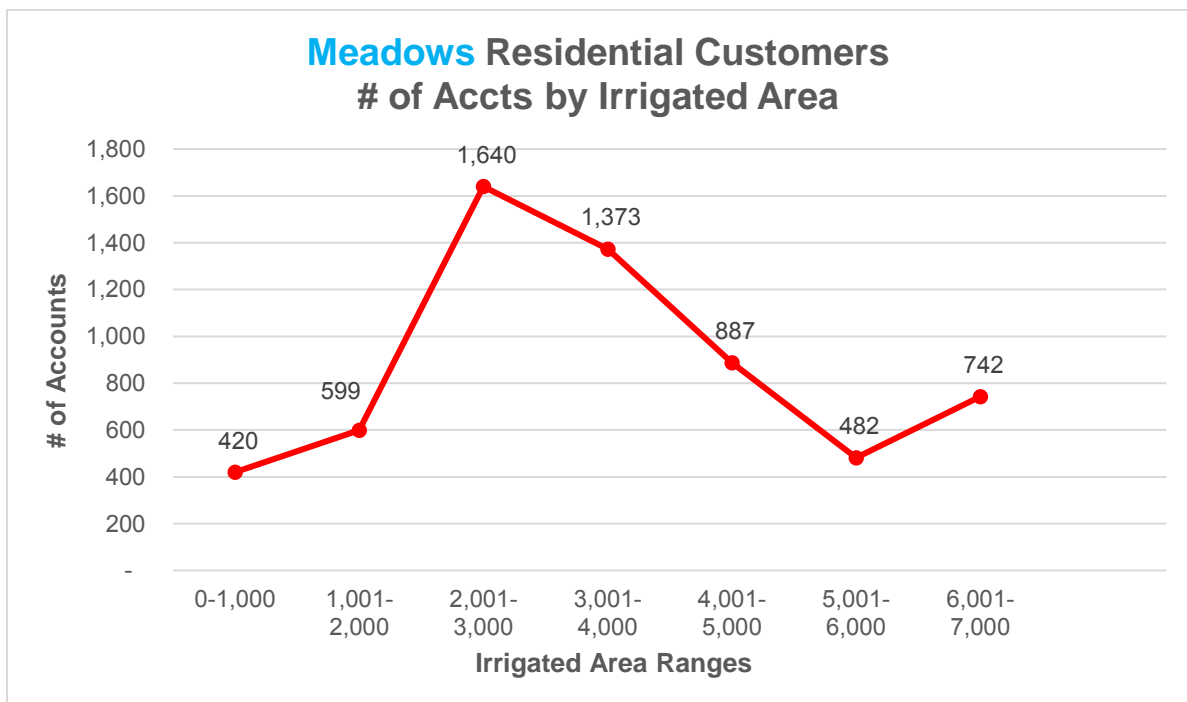


CHART 36: FOUNDERS AVERAGE MONTHLY CONSUMPTION

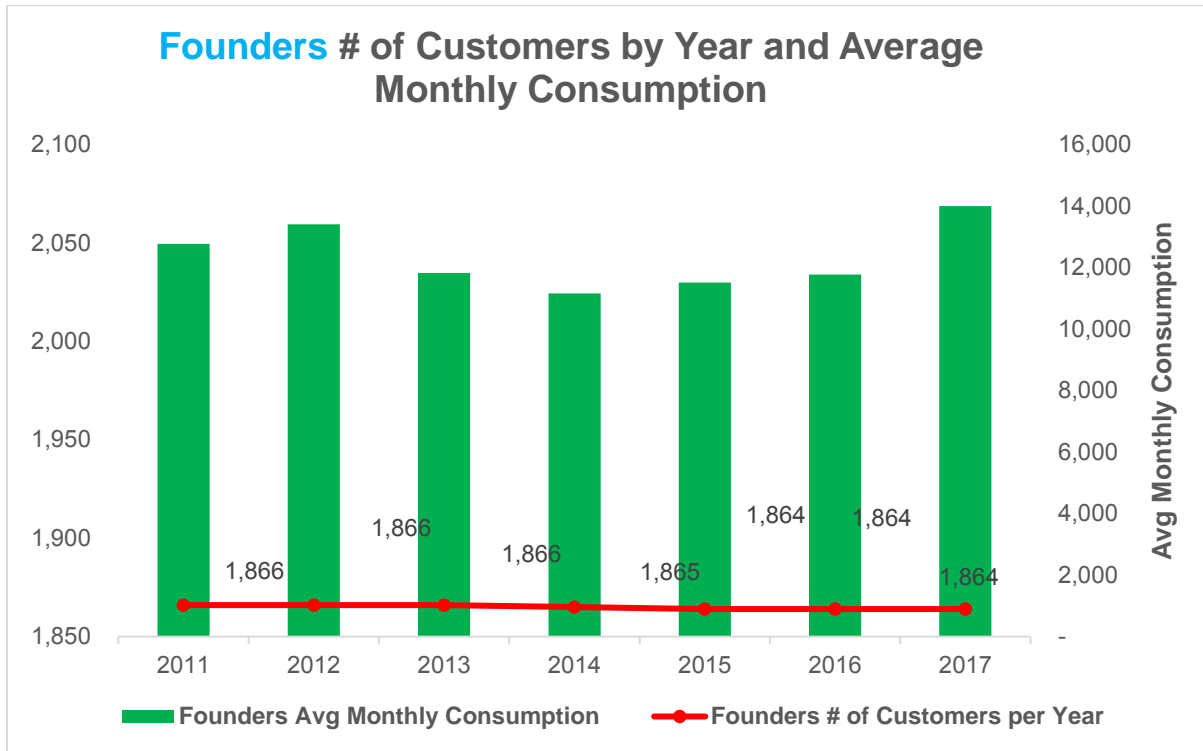


CHART 37: FOUNDERS RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

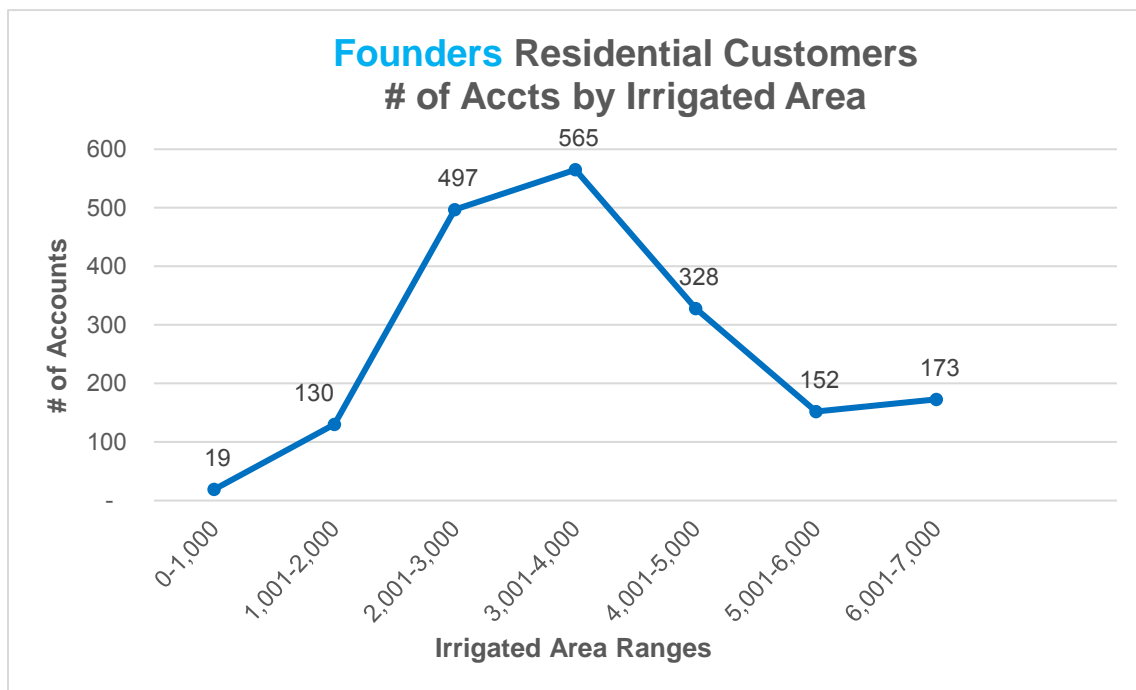




CHART 38: PLUM CREEK AVERAGE MONTHLY CONSUMPTION

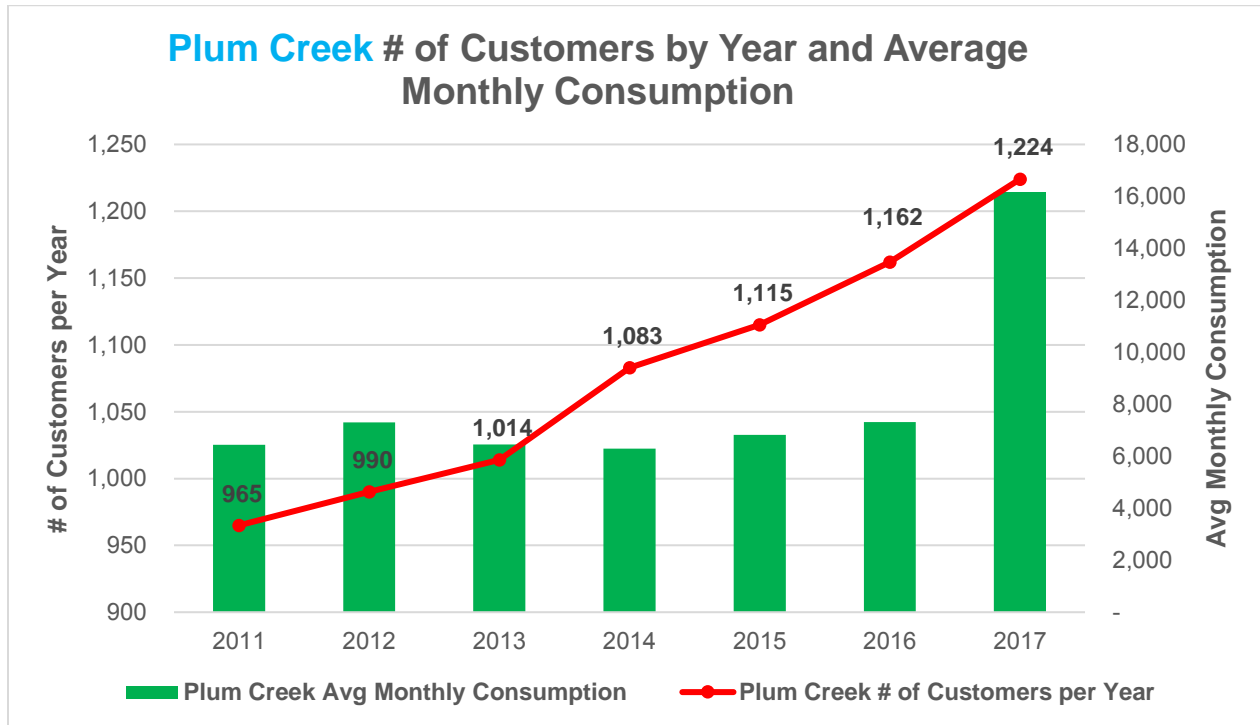
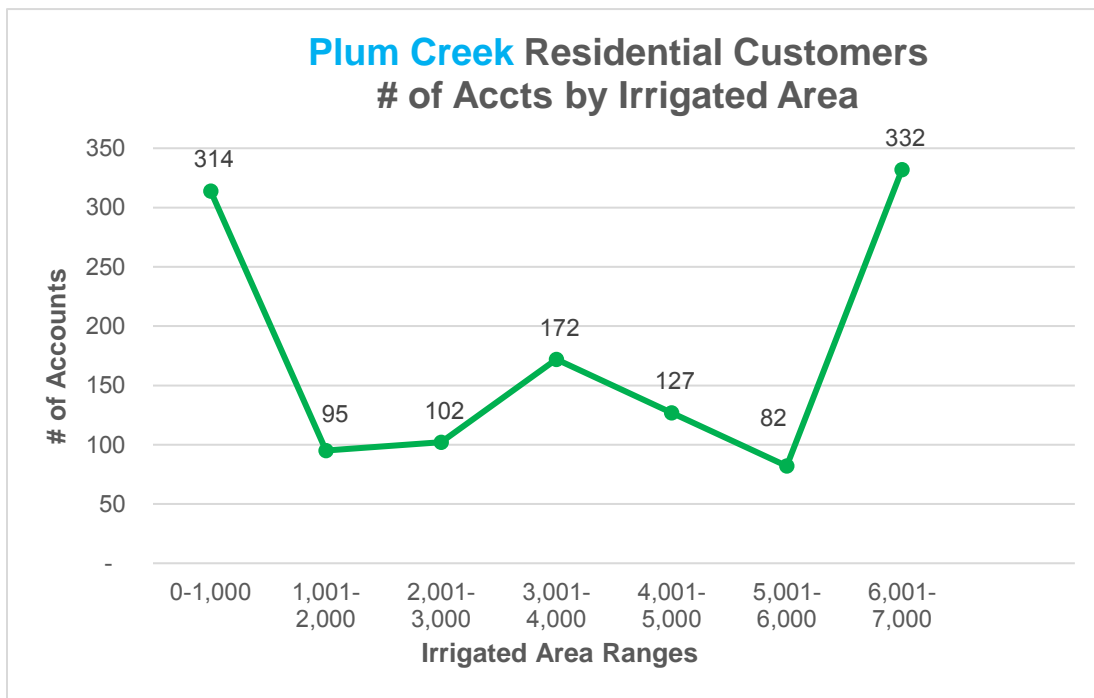


CHART 39: PLUM CREEK RESIDENTIAL ACCOUNTS BY IRRIGATED AREA



## **BULK WATER ACCOUNTS**

CRW has both bulk hydrant accounts and bulk station accounts. CRW tracks the number of accounts and annual usage for these account types each year. The charts below show the bulk hydrant and bulk station accounts and usage from 2012 to 2017. These accounts vary from year to year based on the need and demand of the customers using the program.

CHART 40: BULK HYDRANT AND STATION ACCOUNTS 2012-2017

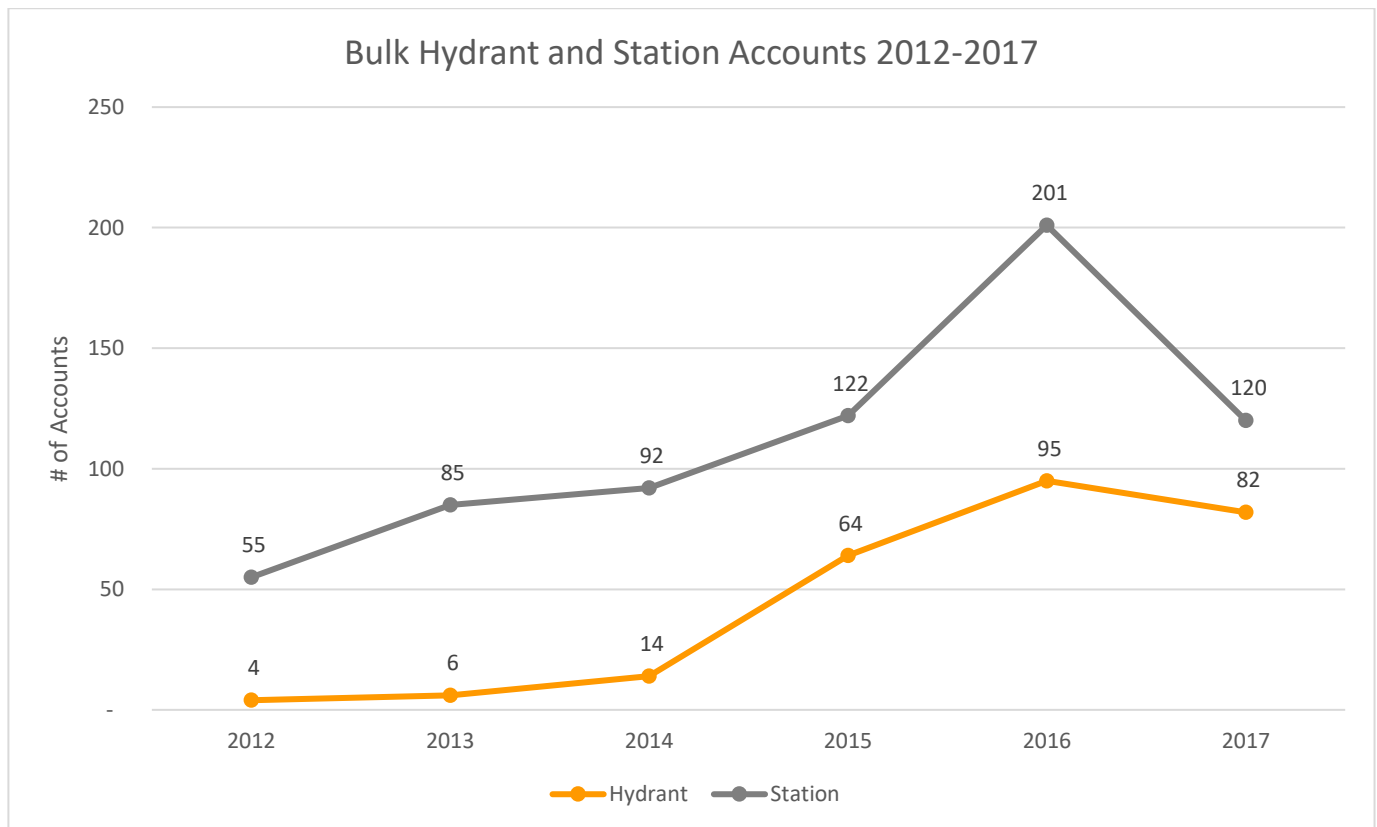


CHART 41: BULK HYDRANT USAGE 2012-2017

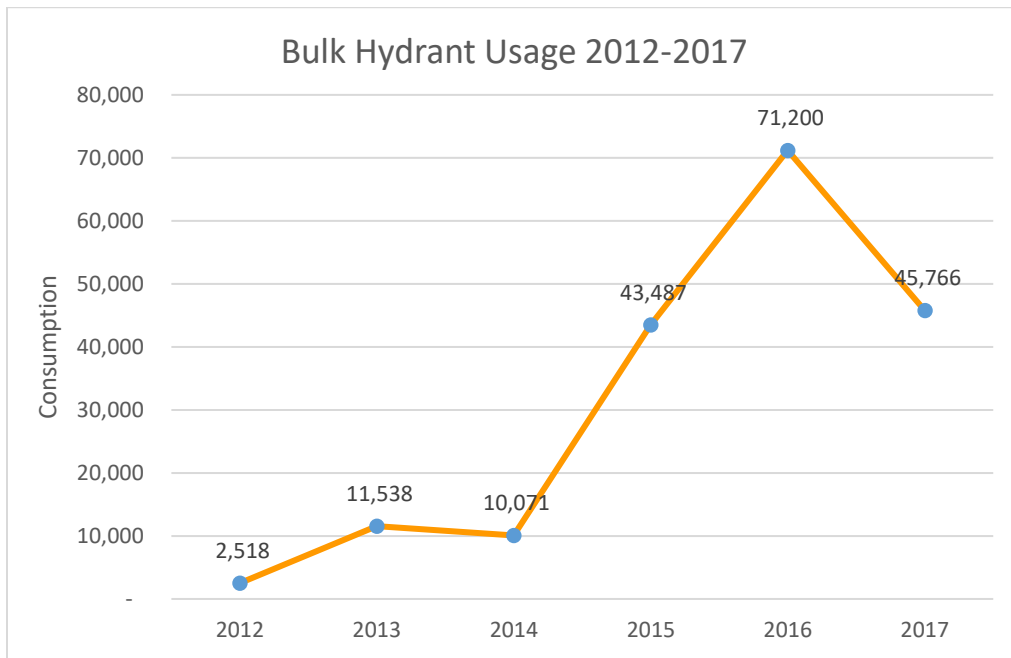
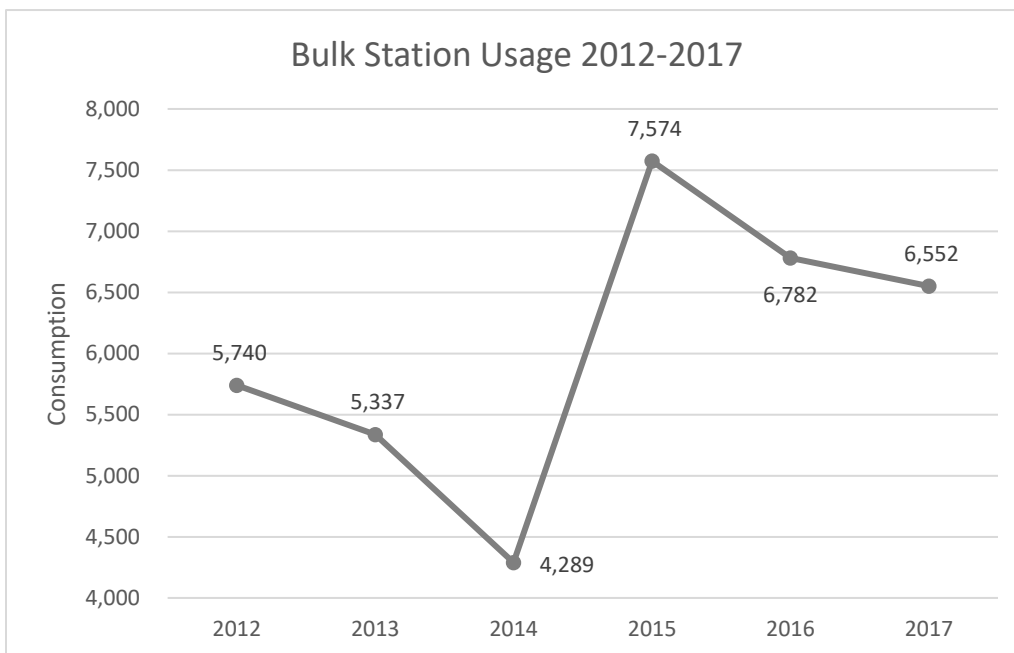


CHART 42: BULK STATION USAGE 2012-2017



## TOWN ACCOUNT CONSUMPTION

Below is a chart showing overall town consumption from 2012 to 2017. From 2016 to 2017 consumption dropped significantly, due to better usage management and stricter watering restrictions.

CHART 43: TOWN CONSUMPTION BY YEAR

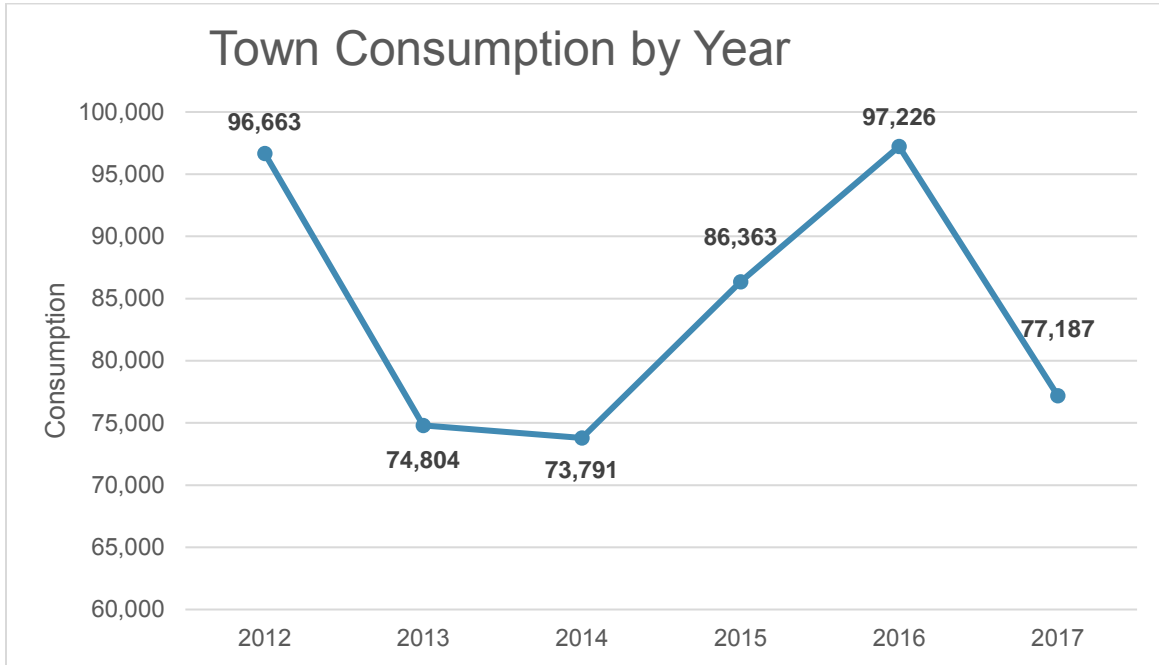


TABLE 15: TOWN CONSUMPTION BY YEAR AND DEPARTMENT (kgal)

Department	2012	2013	2014	2015	2016	2017
CRW	918	1,087	2,078	2,238	1,544	693
Facility Maintenance	0	0	0	0	0	22
Fire	937	1,209	1,164	1,274	1,117	861
Golf Course	365	342	340	379	385	325
Parks	85,461	63,324	63,467	75,079	87,041	66,867
Police	340	258	326	340	231	210
Rec Center	7,431	7,243	5,299	5,308	5,586	6,246
Service Centers	1,051	698	830	898	789	771
Streets	0	0	0	0	0	416
TownHall	160	147	154	165	172	172
Treatment Plants	0	496	133	682	361	604
<b>Total Consumption</b>	<b>96,663</b>	<b>74,804</b>	<b>73,791</b>	<b>86,363</b>	<b>97,226</b>	<b>77,187</b>

## WASTEWATER ENTERPRISE FUND

### **NUMBER OF ACCOUNTS BY METER SIZE & CUSTOMER CLASS**

Table 16 shows the number of accounts by meter size and customer class using 12 months of billing data (Jan17-Dec17). This shows that 19,742 customers were receiving wastewater service during this capture period. The FY2016 accounts based on 12 months of billing data (Jan16-Dec16) shows that 18,866 accounts were receiving wastewater service. There are 876 more accounts in FY2017 than FY2016.

There are approximately 648 less customers receiving wastewater service than water service due to irrigation customers who don't have wastewater and a few customers who have their own septic thus not utilizing the Town's wastewater services.

TABLE 16: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2017)

Meter Size	Residential	Multifamily	Commercial	MultiFamily	Commercial	Total
				Indoor Use Only	Indoor Use Only	
5/8"	908	-	-	3	6	917
3/4"	17,784	14	129	99	106	18,132
1"	19	25	67	80	80	271
1.5"	-	55	48	100	71	274
2"	-	15	25	41	43	124
3"	-	2	5	-	13	20
4"	-	1	-	-	1	2
6"	-	-	2	-	-	2
<b>Total</b>	<b>18,711</b>	<b>112</b>	<b>276</b>	<b>323</b>	<b>320</b>	<b>19,742</b>

CHART 44: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019

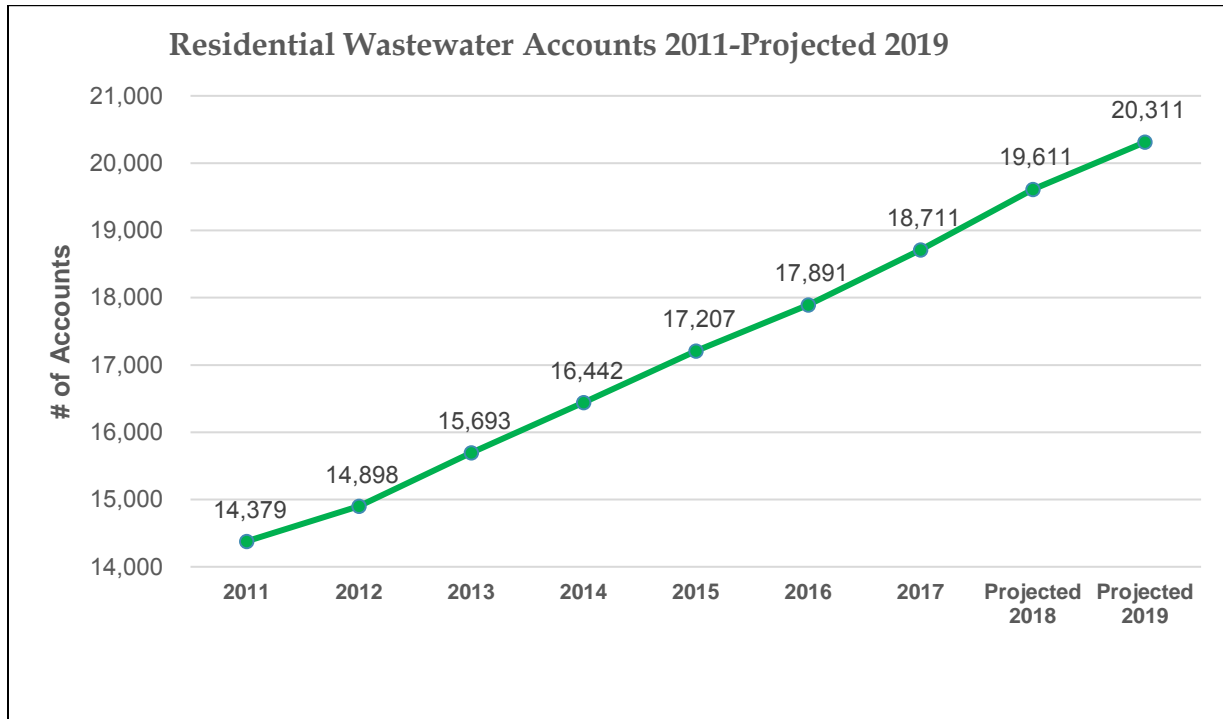
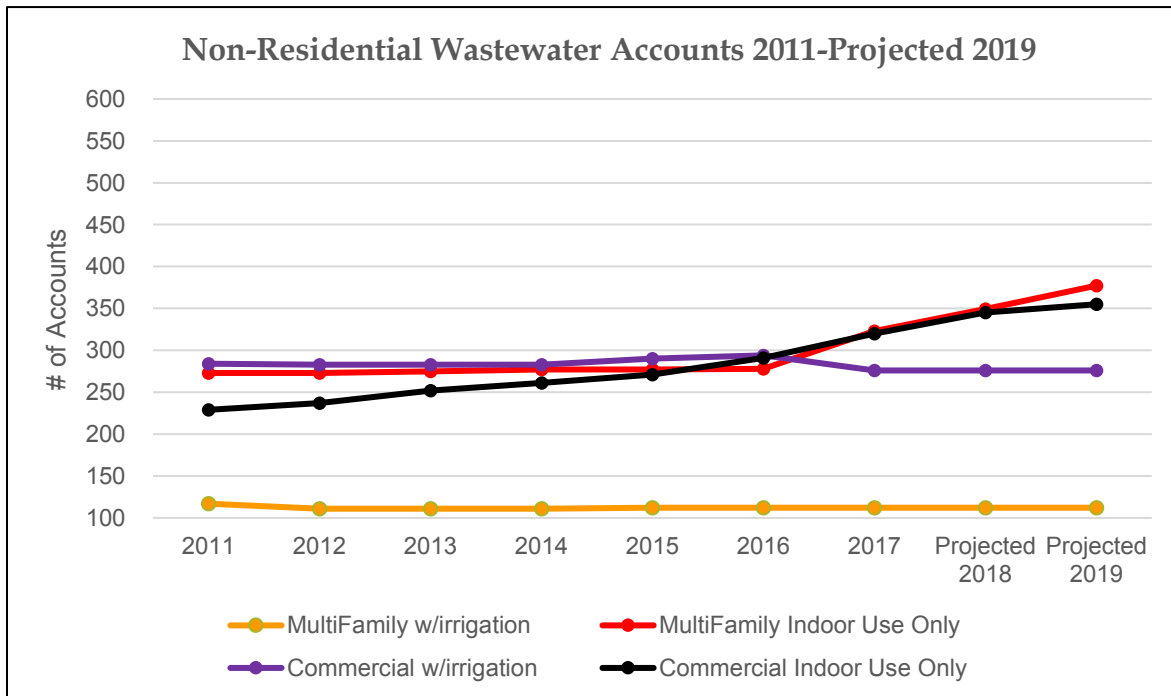


CHART 45: NON-RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019



Castle Rock Water projects FY2019 wastewater accounts by using 2017 billing data plus projected growth for FY2018 and FY2019. The FY2019 wastewater accounts are projected to equal 21,431 (20,311 for residential and 1,120 for non-residential). Growth is projected for the following classes:

**2018 Projected Accounts by Customer Class:**

45	Residential (.67 SFE)
855	Residential (1 SFE)
26	Multi-Family
25	Commercial
951	Total

**2019 Projected Accounts by Customer Class:**

35	Residential (.67 SFE)
665	Residential (1 SFE)
28	Multi-Family
10	Commercial
738	Total

Total growth of 951 accounts is projected for FY2018 and 738 for FY2019 for a total of 1,689 projected for the wastewater fund thru FY2019.

## ***WATER RESOURCES ENTERPRISE FUND***

### **NUMBER OF ACCOUNTS BY METER SIZE & CUSTOMER CLASS**

Table 17 shows the number of accounts by meter size and customer class using 12 months of billing data (Jan17-Dec17). This shows 20,379 accounts being served by the water resources enterprise fund. The FY2016 accounts based on 12 months of billing data (Jan16-Dec16) showed 19,579 water resources accounts. There are 800 more accounts in FY2017 than in FY2016.

TABLE 17: ACCOUNTS BY METER SIZE AND CUSTOMER CLASS (FY2017)

Meter Size	Residential	Multifamily	Commercial	Bulk	Irrigation	MultiFamily Indoor Use Only	Commercial Indoor Use Only	Total
5/8"	907	-	-	-	23	3	6	939
3/4"	17,941	14	132	82	131	99	113	18,512
1"	20	25	69	-	99	80	84	377
1.5"	-	55	50	-	123	100	71	399
2"	-	15	25	-	76	41	44	201
3"	-	2	5	-	6	-	14	27
4"	-	1	-	-	2	-	1	4
6"	-	-	2	-	-	-	-	2
<b>Total</b>	<b>18,868</b>	<b>112</b>	<b>283</b>	<b>82</b>	<b>460</b>	<b>323</b>	<b>333</b>	<b>20,461</b>

CHART 46: RESIDENTIAL ACCOUNTS 2011-PROJECTED 2019

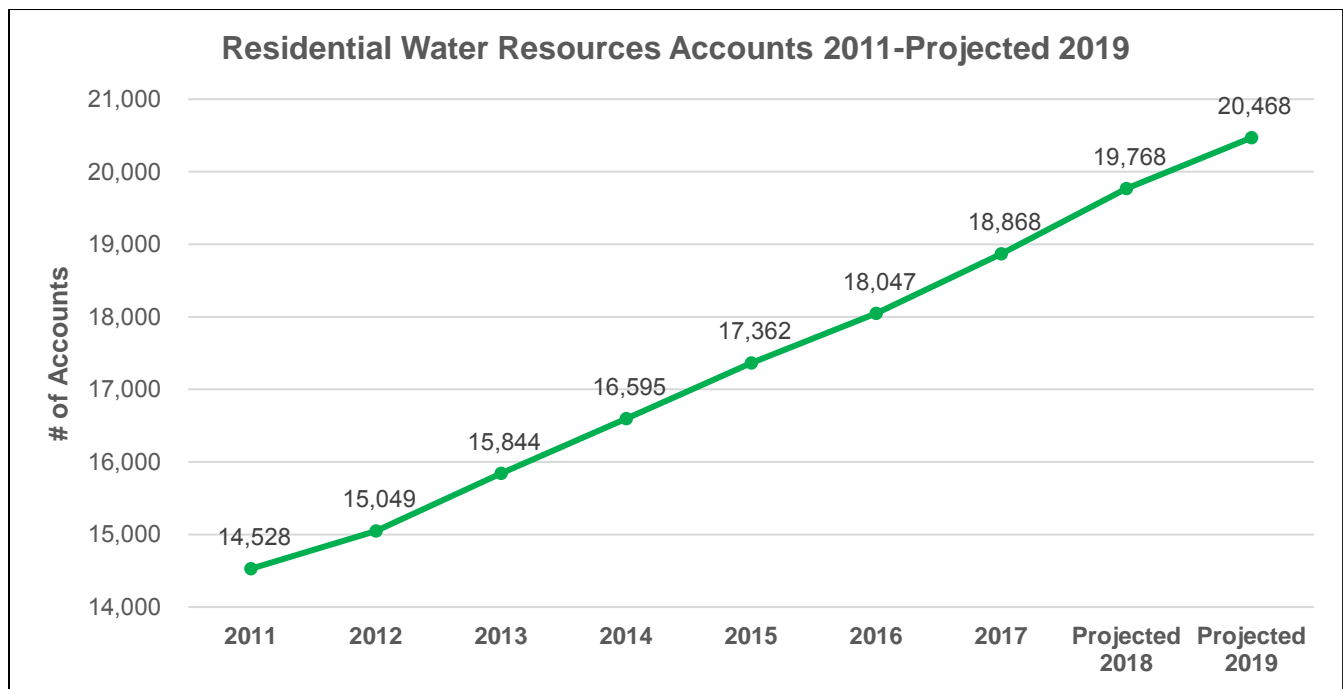
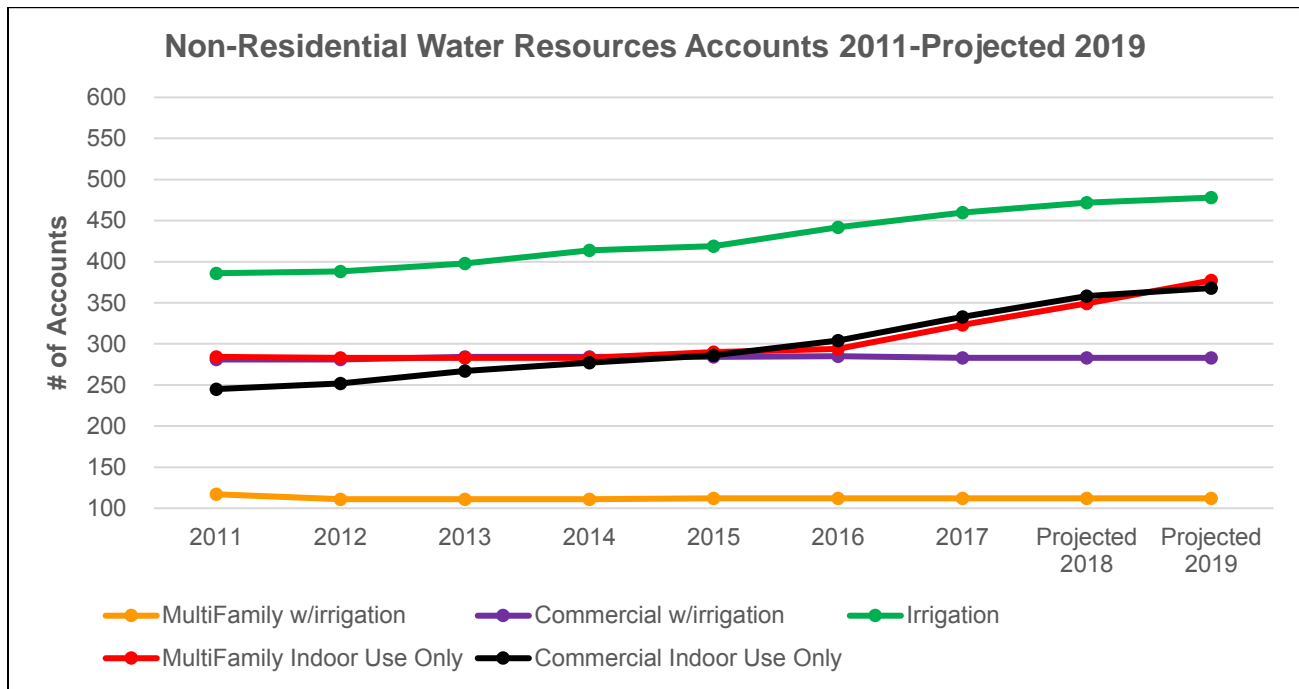




CHART 47: NON-RESIDENTIAL 2011-PROJECTED 2019



Castle Rock Water projects FY2019 water resources accounts by using 2017 billing data plus projected growth for FY2018 and FY2019. The FY2019 water resources accounts are projected to equal 22,086 (20,468 for residential and 1,618 for non-residential). Growth is projected for the following classes:

**2018 Projected Accounts by Customer Class:**

45 Residential (.67 SFE)  
 855 Residential (1 SFE)  
 26 Multi-Family  
 25 Commercial  
 12 Irrigation  
 963 Total

**2019 Projected Accounts by Customer Class:**

35 Residential (.67 SFE)  
 665 Residential (1 SFE)  
 28 Multi-Family  
 10 Commercial  
 6 Irrigation  
 744 Total

Total growth of 963 accounts is projected for FY2018 and 744 for FY2019 for a total of 1,707 projected for the water resources fund thru FY2019.

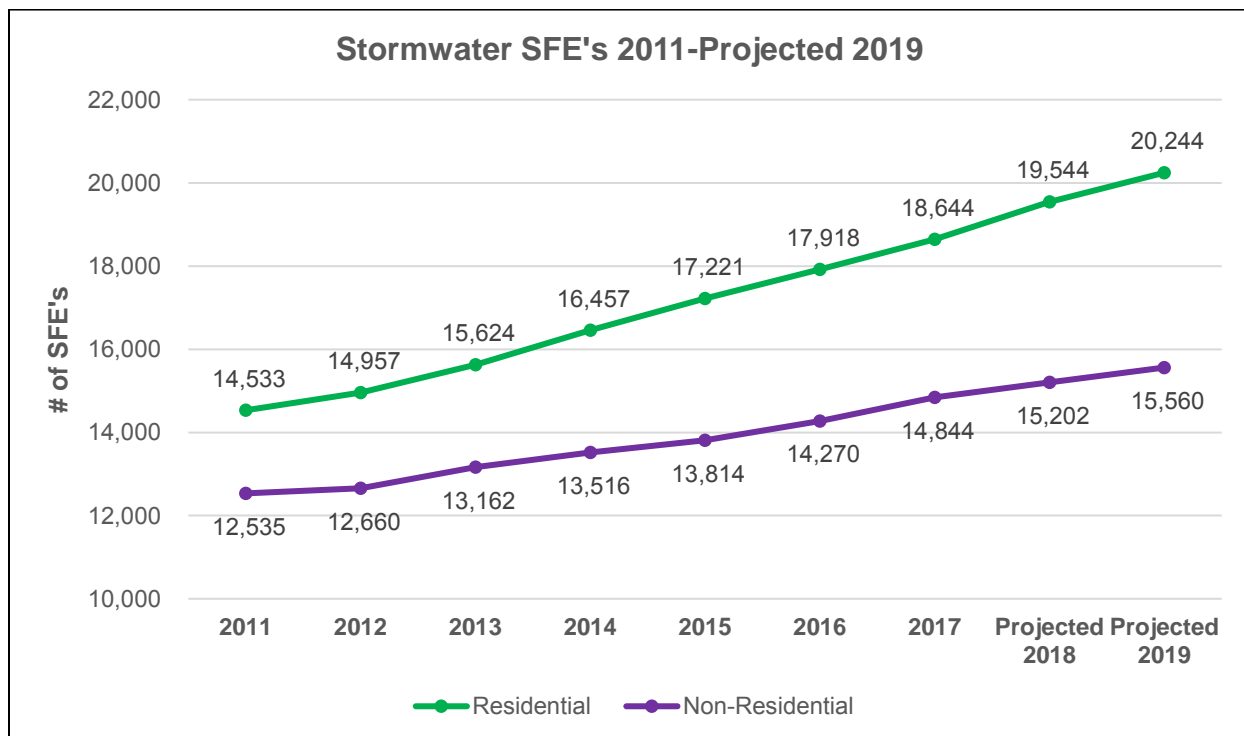
## ***STORMWATER ENTERPRISE FUND***

Table 18 shows stormwater average monthly SFEs based on 12 months of billing data (Jan17-Dec17). This shows that 33,488 SFE's were receiving stormwater services during this capture period. The FY2016 billing data (Jan16-Dec16) showed 32,188 SFE's receiving stormwater services. There are 1,300 more SFE's in FY2017 than FY2016.

TABLE 18: STORMWATER SFE'S (JAN 17-DEC 17)

<b>Total Monthly SFE's</b>	
<b>Residential</b>	<b>18,644</b>
<b>Non-Residential</b>	<b>14,844</b>
<b>Stormwater SFE's</b>	<b>33,488</b>

CHART 48: SFE'S 2011-PROJECTED 2019



Castle Rock Water shows FY2019 projected stormwater SFE's based on 12 months of billing data (Jan17-Dec17) plus projected growth for FY2018 and FY2019. The FY2019 stormwater SFE's are projected to equal 35,804 (20,244 for residential and 15,560 for non-residential). Growth is projected for the following classes:

**2018 Projected Accounts (SFE's)**

900	Residential
126	Detached in Cherry Creek Basin
774	Detached in Plum Creek Basin
358	Commercial in the Plum Creek Basin
1,258	Total

**2019 Projected Accounts (SFE's)**

700	Residential
98	Detached in Cherry Creek Basin
602	Detached in Plum Creek Basin
358	Commercial in the Plum Creek Basin
1,058	Total

Total growth of 1,258 SFEs are projected for the stormwater fund in FY2018 and 1,058 for FY2019.

## **Appendix D**

### **Stantec Consulting Services Inc. Study Review Letter**



Stantec Consulting Services Inc.  
370 Interlocken Boulevard Suite 300, Broomfield CO 80021-8012

August 20, 2018

**Attention: Anne Glassman, Business Solutions Manager**

Castle Rock Water  
175 Kellogg Ct.  
Castle Rock, CO 80109

Dear Anne,

**Reference: Stantec Financial Review Services for Castle Rock Water's 2018 Rates and Fees Study, Volume 1 of 2, 2019 – 2023 Rates**

As part of the 2018 Rates and Fees Study, Stantec Consulting Services Inc. (Stantec) was engaged by Castle Rock Water (CRW) as a third-party reviewer of CRW's methodology and findings. In preparing review comments and recommendations, Stantec has relied on the information and data presented by CRW without independent verification. The intent of our review was to provide an outside perspective of CRW's work products and models, as well as financial policies, based on our experience and best practices in the industry.

CRW's continued efforts to optimize capital project funding while maintaining reserves, meeting targets, and minimizing rate increases are in line with industry best practices. Additionally, by funding growth-related capital projects with impact and development fee revenue, CRW is making efforts to ensure "growth pays for growth," and is adhering to the industry standard of allocating costs to beneficiary parties.

Following a cost-of-service based approach to establishing rates is recommended by the American Water Works Association (AWWA) and Water Environment Federation (WEF). While CRW updates the cost-of-service models for water and wastewater annually, Stantec recommends that CRW identify a specific future test year, such as 2020, to conduct a more thorough review of costs of service by class. A comparison of class costs of service with actual revenues collected by customer class will indicate whether adjustments to rates for certain customer classes may be needed to better align rates with costs of service.

In reviewing annual revenue requirements for CRW's water and water resources funds, it may be more equitable for CRW's customers to re-allocate the PCWPF treatment expenses to the water fund. Consolidating funds remain a recommendation; however, without the ability to do so, CRW could better align monthly rates and charges with the appropriate costs and alleviate pressure on water resources fixed charges if treatment costs are recovered through the water fund and volumetric rates. This would also allow more transparent tracking of costs recovered through rates.

For further insight into CRW's financial standing relative to industry standards, the water, water resources, stormwater, and wastewater financial planning models contain a Key Performance Indicators (KPI) worksheet. The KPI worksheet forecasts and compares financial performance against ratings agency standards, internal targets, or industry benchmarks. Metrics evaluated include but are not limited to: outstanding debt to operating revenues, total debt service coverage, service affordability, and days cash on

August 20, 2018  
Anne Glassman, Business Solutions Manager  
Page 2 of 2

**Reference:** Stantec Financial Review Services for Castle Rock Water's 2018 Rates and Fees Study, Volume 1 of 2, 2019 – 2023 Rates

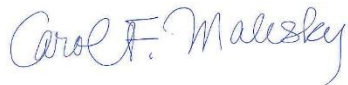
hand. Stantec recommends reviewing which metrics CRW considers important for tracking purposes and ensuring review of these KPIs are included in the annual rates and fees study process.

As mentioned in the past, CRW's water budget-based rate structure, while in place since 2009/2010, is still considered an innovative approach in the industry for addressing water conservation. CRW remains one of the few utilities in Colorado to have successfully implemented such a structure. Stantec recommends CRW continue to update the Conservation Impact Model (CIM) developed to evaluate the water budget-based rates for future adjustments in rates and address possible refinements to its water conservation goals.

Stantec's specific recommendations for CRW's rates are found in the Summary of the Volume 1 of 2 2019 – 2023 Rates Report.

We enjoyed the opportunity to work with you and your staff on this study. Please contact me at (330) 271-9125 if you have any questions.

Regards,

A handwritten signature in blue ink that reads "Carol F. Malesky". The signature is written in a cursive, flowing style.

**Carol Malesky**  
Principal Financial Consultant

Phone: 330-271-9125  
carol.malesky@stantec.com