



2019 RATES AND FEES STUDY UPDATE

VOLUME 1 OF 2

2020-2024 RATES

Prepared by Castle Rock Water
Business Solutions

Final Report

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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 2020 through 2024 study period for all four enterprise funds. The estimated 2020 total revenue requirements from rates are shown below.

2020 Total Revenue Requirements from Rates	
Water Fund	\$15.4 Million
Water Resources	\$9.1 Million
Wastewater	\$11.3 Million
Stormwater	\$3.3 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
- Ensure rate and fees for water and water resources are lower than the projected rates in the 2013 hybrid financial plan
- 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.

2019 Adopted Rates vs 2020 Proposed Rates by Fund

CRW's adopted rates for 2019 versus proposed rates for 2020 are listed in Tables 1 through 5. Given the financial plan and COS updates, CRW is proposing a 3% reduction in wastewater and no change to water, water resources and stormwater. Each account pays a fixed monthly water service charge, water resources charge and wastewater charge based on their individual meter size. 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
2019 Adopted vs 2020 Proposed Monthly Service Charges

Meter Size	2019 Adopted Monthly Charges	2020 Proposed Monthly Charges
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

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. 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 no change in the Tiers for 2020, except for an increase in the Bulk water rates to match up to the 2020 Tier rates.

Table 2
Water Fund
2020 Proposed Volumetric Rates by Tier

Irrigation Season (April 1 through October 31 Consumption)			
Customer Class	Tier 1 (AWMC)	Tier 2 (Outdoor)	Tier 3 (Excess)
Residential	\$2.82	\$5.74	\$8.56
Multi-Family	\$2.82	N/A	\$3.70
Multi-Family w/Irrigation	\$2.82	\$4.87	\$7.28
Commercial	\$2.82	N/A	\$3.94
Commercial w/Irrigation	\$2.82	\$4.93	\$7.37
Irrigation	N/A	\$7.86	\$11.78
Winter Season (November 1 through March 31 Consumption)			
Customer Class	Tier 1 (AWMC)	Tier 2 (Outdoor)	Tier 3 (Excess)
Residential	\$2.82	N/A	\$5.74
Multi-Family	\$2.82	N/A	\$3.70
Multi-Family w/Irrigation	\$2.82	N/A	\$4.87
Commercial	\$2.82	N/A	\$3.94
Commercial w/Irrigation	\$2.82	N/A	\$4.93
Irrigation	N/A	N/A	\$11.78
Bulk Water Customers			
Bulk Hydrant	\$7.86	N/A	N/A
Bulk Station	\$9.82	N/A	N/A

An additional surcharge of \$8.56 is added for any water usage over 40,000 gallons.

Table 3
Water Resources Fund
2019 Adopted vs 2020 Proposed
Monthly Service Charges

Meter Size	2019 Adopted Monthly Service Charges	2020 Proposed Monthly Service Charges
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
2019 Adopted vs 2020 Proposed
Monthly Service Charges and Volumetric Rate

Meter Size	2019 Adopted Monthly Service Charges	2020 Proposed Monthly Service Charges
5/8" x 3/4"	\$9.30	\$9.02
3/4"	\$9.30	\$9.02
1"	\$14.80	\$14.36
1.5"	\$21.46	\$20.82
2"	\$30.96	\$30.03
3"	\$51.72	\$50.17
4"	\$120.58	\$116.96
6"	\$190.48	\$184.77
Volumetric Rate – All Applicable Customers, Per Kgal	\$6.59	\$6.39

Table 5 Stormwater Fund 2019 Adopted vs 2020 Proposed Monthly Service Charge		
	2019 Adopted Monthly Service Charge	2020 Proposed Monthly Service Charge
All Customers, per Single Family Equivalent (SFE)	\$7.12	\$7.12
SFE Assignment		
Customer Class	Impervious Sq. Ft.	SFE
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 2020 Through 2024

Rates for the five year study period (2020-2024) 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 2020 through 2024.

Table 6 Proposed Rate Revenue Percentage Increases 2020-2024				
Year	Water	Water Resources	Wastewater	Stormwater
2020	0.0%	0.0%	(3.0%)	0.0%
2021	3.0%	3.0%	0.0%	0.0%
2022	3.5%	3.0%	0.0%	0.0%
2023	3.5%	3.0%	0.0%	3.0%
2024	3.5%	3.0%	0.0%	3.0%

Long-Term Financial Planning

Background

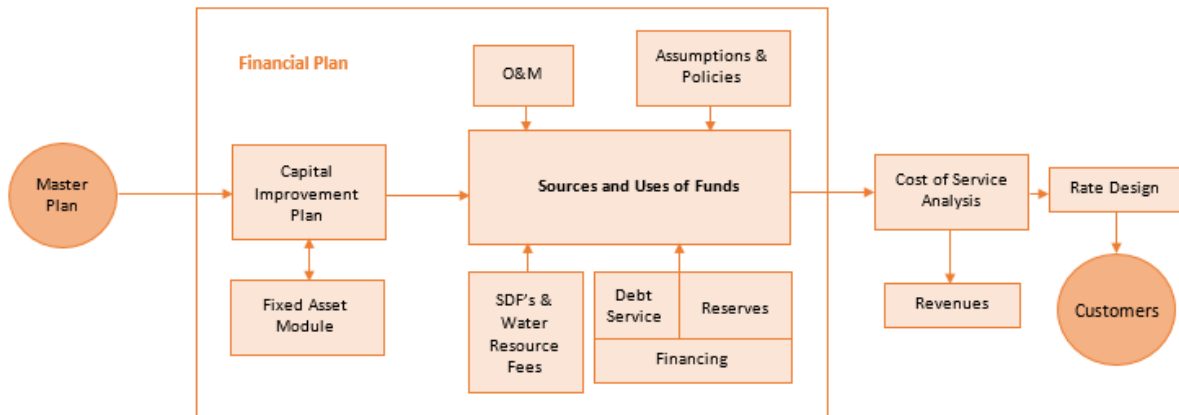
Castle Rock Water engaged Stantec Consulting Services Inc. (Stantec) to assist in updating the comprehensive utility-specific financial plans that examine revenues, expenditures, debt service requirements, cash flows, reserve requirements, fund balances and capital project costs for the study period. 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 for 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 charges), 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 2020. CRW's fiscal year is January 1, 2020 to December 31, 2020. 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 measurable 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. 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 and the additional 1,000 AF of renewable WISE water supply approved by Town Council in July of 2018.

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

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

	Water Fund		Water Resources Fund		Wastewater Fund		Stormwater Fund	
Year	SFEs	Percentage Growth	SFEs	Percentage Growth	SFEs	Percentage Growth	SFEs	Percentage Growth
2020	818	3.64%	818	3.64%	816	3.76%	1,108	3.05%
2021	838	3.60%	838	3.60%	805	3.58%	823	2.20%
2022	823	3.41%	823	3.41%	725	3.11%	823	2.15%
2023	823	3.30%	823	3.30%	715	2.98%	811	2.08%
2024	811	3.15%	811	3.15%	715	2.77%	811	2.04%

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 2020-2055. 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 the water fund.
- Rate Revenue Increases – Rate revenues are projected to increase each year based on Town growth and usage from 2021-2024.
- 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 – There are currently no Interfund loans, however a \$3.85M loan from wastewater is currently projected in 2020.
- 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 disconnection of service 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	FY2020	FY2021	FY2022	FY2023	FY2024
Other Charges for Service/Fees	\$898,260	\$898,260	\$898,260	\$898,260	\$898,260
Contributions and Donations	\$0	\$0	\$0	\$0	\$0
Fines and Forfeitures	\$356,700	\$356,700	\$356,700	\$356,700	\$356,700
IGA Revenues	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000
Miscellaneous Revenues	\$116,207	\$116,207	\$116,207	\$116,207	\$116,207
Interest Earnings	\$95,317	\$78,074	\$73,072	\$69,466	\$72,434
Total	\$1,816,484	\$1,799,241	\$1,794,239	\$1,790,633	\$1,793,601

- Fund Balances – The water fund was projected to have a reserve fund balance of approximately \$6.3 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 \$2.9 to \$3.3 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 \$4.8 million throughout the study period.

- Rate Revenue Stabilization Reserve – Based upon 10% of metered water sales; averaging approximately \$1.4 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 – CRW reviews FTE needs each year to determine how many new are projected over the budget period and includes these into the expense projections. The total projected FTEs for all four enterprise funds for the five year period is 17 new FTEs.
- Supplies – The supplies for the water fund are expected to remain consistent over the five year study period at about \$2.2 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 2020-2024 are expected to be \$35.2 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 \$9.9 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. There is a projected \$3.85M Interfund Loan from Wastewater in 2020 that would start repayment in 2023 if it is needed.
- Transfers Out – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$1.5 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 2020-2024.

Table 9
Water Fund
Service Charge Revenue Requirements

Revenue Requirements	FY2020	FY2021	FY2022	FY2023	FY2024
Operating and Maintenance	\$11,470,585	\$12,091,989	\$12,610,866	\$13,160,265	\$13,411,823
PCWPF Water Treatment Charges	\$2,354,640	\$2,552,192	\$2,664,011	\$2,762,764	\$2,849,177
Debt Service	\$1,733,994	\$1,740,790	\$1,739,610	\$1,740,870	\$683,500
Transfers Out	\$709,167	\$454,908	\$518,014	\$1,394,244	\$1,223,865
Cash Funded Capital	\$2,710,638	\$3,748,200	\$1,437,284	\$3,442,230	\$1,082,014
Minor Capital Outlay	\$134,982	\$29,482	\$32,000	\$32,000	\$32,000
Required Reserves/(Use of Reserves)	\$1,921,527	(\$2,434,294)	\$332,967	(\$1,994,975)	\$2,517,739
Total Revenue Requirements	\$21,035,534	\$18,193,266	\$19,334,752	\$20,537,398	\$21,800,119
Non-Rate Revenues	(\$1,816,484)	(\$1,799,241)	(\$1,794,239)	(\$1,790,633)	(\$1,793,601)
Transfers In	(\$3,850,000)	\$0	\$0	\$0	\$0
Revenues Required from Rates	\$15,369,04	\$16,394,025	\$17,540,513	\$18,746,765	\$20,006,518

Water Resources Fund

The water resources fund financial plan projects the fund's sources and uses of funds from fiscal year 2020 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 and the 1,000 AF WISE renewable supply approved by Town Council in July of 2018. 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 2021-2024.
- SDF Revenues – Please see Volume 2 for current projections.
- Revenue Bonds – During the 2020-2024 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

Other Revenues	FY2020	FY2021	FY2022	FY2023	FY2024
Fines and Forfeitures	\$90,500	\$90,500	\$90,500	\$90,500	\$90,500
Miscellaneous Revenues	\$2,227,939	\$2,227,939	\$2,227,939	\$2,227,939	\$2,227,939
Interest Earnings	\$747,325	\$114,237	\$121,202	\$156,054	\$179,834
Total	\$3,065,764	\$2,432,676	\$2,439,641	\$2,474,493	\$2,498,273

- **Fund Balances** – The water resources fund was projected to have a reserve of approximately \$2.6 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 \$2.5 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 \$4.4 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** – CRW reviews FTE needs each year to determine how many new are projected over the budget period and includes these into the expense projections. The total projected FTEs for all four enterprise funds for the five year period is 17 new FTEs.
- **Supplies** – For the water resources fund supplies are projected to be approximately \$655,000 per year over the five year study period.
- **Capital Improvements** – Total water resources system capital improvement costs from 2020-2024 are expected to be \$76.6 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 \$2.4 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 \$4.0 million per year from 2020 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 \$4.5 million.

Service Charge Revenue Requirements

Table 11 represents the water resources fund service charge revenue requirements for the study period 2020 through 2024.

Table 11
Water Resources Fund
Service Charge Revenue Requirements

Revenue Requirements	FY2020	FY2021	FY2022	FY2023	FY2024
Operating and Maintenance	\$9,452,929	\$11,032,957	\$12,722,458	\$13,287,334	\$13,637,250
Debt Service	\$3,728,975	\$3,741,975	\$3,766,750	\$3,793,950	\$3,819,950
Transfers Out	\$917,779	\$544,676	\$192,269	\$216,754	\$287,860
Cash Funded Capital	\$0	\$0	\$0	\$0	\$0
Minor Capital Outlay	\$133,500	\$17,000	\$17,000	\$17,000	\$17,000
Required Reserves/(Use of Reserves)	\$1,307,519	\$443,099	(\$100,898)	\$147,522	\$569,831
Total Revenue Requirements	\$15,540,702	\$15,779,707	\$16,597,579	\$17,462,560	\$18,331,891
Non-Rate Revenues	(\$3,065,764)	(\$2,432,676)	(\$2,439,641)	(\$2,474,493)	(\$2,498,273)
Transfers In	(\$3,336,419)	(\$3,160,868)	(\$2,920,280)	(\$3,043,518)	(\$3,201,037)
Revenues Required from Rates	\$9,138,519	\$10,186,163	\$11,237,658	\$11,944,549	\$12,632,581

Wastewater Fund

The wastewater fund financial plan projects the fund's source and uses of funds from 2020 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 2020 to 2024, but a 3% reduction is planned in 2020.
- SDF Revenues – Please see Volume 2 for current projections.
- Revenue Bonds – During 2020-2024 no new debt options are being reviewed.
- Inter-Fund Loans – In 2023 the water fund will start repayment of the 2020 Interfund loan.
- 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	FY2020	FY2021	FY2022	FY2023	FY2024
Contributions and Donations	\$29,510	\$29,510	\$29,510	\$29,510	\$29,510
Fines and Forfeitures	\$100	\$100	\$100	\$100	\$100
Miscellaneous Revenues	\$3,040	\$3,040	\$3,040	\$3,040	\$3,040
Interest Earnings	\$41,646	\$38,448	\$62,179	\$90,907	\$125,822
Total	\$74,296	\$71,098	\$94,829	\$123,557	\$158,472

- **Fund Balances** – The wastewater fund was projected to have a reserve of approximately \$2.8 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 \$2.1 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 \$2.0 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** – CRW reviews FTE needs each year to determine how many new are projected over the budget period and includes these into the expense projections. The total projected FTEs for all enterprise funds for the five year period is 17 new FTEs.
- **Energy Costs** – Over the 5 year study period these average a 6% increase.
- **Capital Improvements** – Total wastewater system capital improvement costs from 2020-2024 are expected to be \$26.8 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 \$900,000.
- **Inter-Fund Loans** – In 2020 the fund anticipates giving a \$3.85 million Interfund loan to the water fund, which will be paid back starting in 2024 over a six year period at an interest rate of 2.14%.
- **Transfers Out** – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$725,000 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 2020 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 2020 through 2024.

Table 13 Wastewater Fund Service Charge Revenue Requirements					
Revenue Requirements	FY2020	FY2021	FY2022	FY2023	FY2024
Operating and Maintenance	\$5,869,497	\$6,161,009	\$6,432,122	\$6,716,784	\$6,824,927
Debt Service	\$631,356	\$333,600	\$332,040	\$331,380	\$0
Transfers Out	\$3,795,750	\$177,244	\$182,004	\$215,204	\$170,505
Cash Funded Capital	\$3,916,191	\$2,071,340	\$285,698	\$620,531	\$0
Minor Capital Outlay	\$147,500	\$56,000	\$56,000	\$56,000	\$56,000
Required Reserves/(Use of Reserves)	(\$2,986,168)	\$2,972,689	\$4,868,321	\$4,600,362	\$5,878,889
Total Revenue Requirements	\$11,374,126	\$11,771,882	\$12,156,185	\$12,540,261	\$12,930,321
Non-Rate Revenues	(\$74,296)	(\$71,098)	(\$94,829)	(\$123,557)	(\$158,472)
Transfers In	\$0	\$0	\$0	\$0	\$0
Revenues Required from Rates	\$11,299,830	\$11,700,784	\$12,061,356	\$12,416,704	\$12,771,850

Stormwater Fund

The stormwater fund financial plan projects the fund's source and uses of funds from 2020 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 2020 to 2022. Small increases at 3% are projected for 2023 and 2024.
- System Development Fee (SDF) Revenues - Please see Volume 2 for current projections.
- Revenue Bonds – During 2020-2024 the option of new debt is being explored for \$10M to be received in 2020.
- 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 (now called TESC) Fees include TESC inspection fees and TESC 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 14
Stormwater Fund
Other Revenues

Other Revenues	FY2020	FY2021	FY2022	FY2023	FY2024
TESC Fees	\$339,000	\$339,000	\$339,000	\$339,000	\$339,000
Other Fees	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
Developer Contributions	\$252,315	\$252,315	\$252,315	\$252,315	\$252,315
Fines and Forfeitures	\$150	\$150	\$150	\$150	\$150
Miscellaneous Revenues	\$15,640	\$15,640	\$15,640	\$15,640	\$15,640
Interest Earnings	\$42,230	\$48,458	\$31,395	\$18,335	\$1,699
Market Change	\$0	\$0	\$0	\$0	\$0
Total	\$694,335	\$700,563	\$683,500	\$670,440	\$653,804

- Fund Balances – The stormwater fund was projected to have a reserve of approximately \$2.3 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 approximately \$995,000 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 \$1.6 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 – CRW reviews FTE needs each year to determine how many new are projected over the budget period and includes these in the expense projections. The total projected FTEs for all four enterprise funds for the five year period is 17 new FTEs.
- Supplies – The supplies for the stormwater fund are expected to remain consistent over the five year study period at about \$118,000 a year.
- Energy Costs – Over the 5 year study period these are expected to increase at a rate higher than inflation at about 6%.
- Capital Improvements – Total stormwater system capital improvement costs from 2020-2024 are expected to be \$29.96 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 \$550,000.
- Transfers Out – These include the costs for the vehicle replacement fund which is transferred to the fleet department and is about \$695,000 over the five year study period.
- Inter-Fund Loans – There are no outstanding Interfund loans.
- 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 possible 10 year debt repayment of the new 2020 debt for \$10M will average \$1.2M a year during the study period.

Service Charge Revenue Requirements

Table 15 represents the stormwater fund service charge revenue requirements for the study period 2020 through 2024.

Table 15 Stormwater Fund Service Charge Revenue Requirements					
Other Revenues	FY2020	FY2021	FY2022	FY2023	FY2024
Operating and Maintenance	\$2,644,891	\$2,880,901	\$2,993,655	\$3,111,396	\$3,220,881
Debt Service	\$1,154,341	\$1,155,375	\$1,157,250	\$1,158,500	\$1,154,125
Transfers Out	\$231,308	\$162,224	\$200,471	\$213,251	\$193,734
Cash Funded Capital	\$0	\$0	\$0	\$479,810	\$2,908,644
Minor Capital Outlay	\$102,500	\$10,000	\$10,000	\$10,000	\$10,000
Required Reserves/(Use of Reserves)	(\$149,145)	(\$145,951)	(\$243,463)	(\$691,559)	(\$3,038,577)
Total Revenue Requirements	\$3,983,895	\$4,062,550	\$4,117,913	\$4,281,397	\$4,448,807
Non-Rate Revenues	(\$694,335)	(\$700,563)	(\$683,500)	(\$670,440)	(\$653,804)
Transfers In	(\$95,608)	(\$26,524)	(\$61,138)	(\$70,683)	(\$51,129)
Revenues Required from Rates	\$3,193,952	\$3,335,463	\$3,373,275	\$3,540,274	\$3,743,874

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.

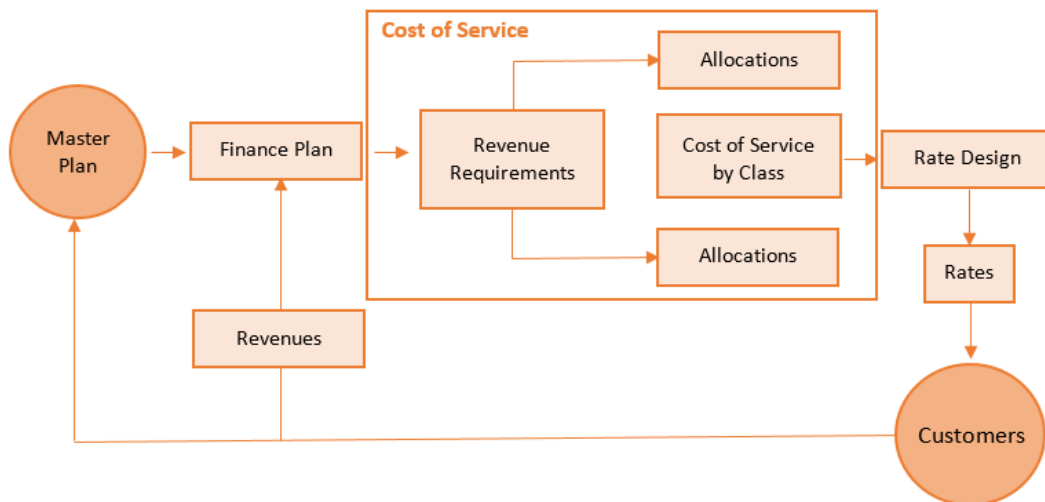
Cost-of-Service Methodology

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 class
- 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 COS 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 2020. Revenue requirements for 2020 through 2024 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 defined in Appendix B and analyzed further in the Customer Characteristics Analysis 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 defined in Appendix B and analyzed further in the Customer Characteristics Analysis in Appendix C.

- Flow Demand
- 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

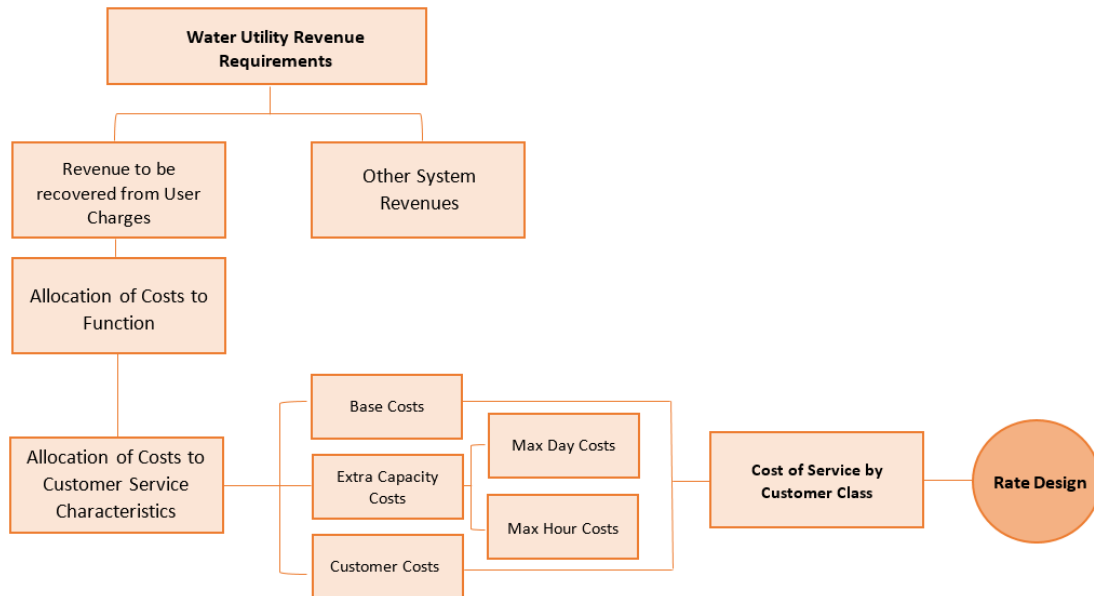
Equitably allocating the water and wastewater systems' service charge revenue requirements to the customer classes involves a multi-step process. Beginning with the O&M costs, the following steps were completed:

- 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 and analyzed further in the Customer Characteristics Analysis in Appendix C.

- 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 characteristics for wastewater, which are also defined in Appendix B and analyzed further in the Customer Characteristics Analysis in Appendix C.

- Flow
- 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 flow are allocated to each class in proportion to the class' estimated flow based on typical domestic flow.

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 2018.

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 2020.

Table 16 Water Fund 2020 Revenue Requirements	
Description	2020
O&M Expenses:	
Admin	\$1,450,224
Capital Projects	\$901,993
Customer Billing	\$326,944
Meter Services	\$1,301,629
Meters Retrofit / AMI	\$0
Engineering	\$541,094
Mapping	\$131,061
Field Services	\$1,130,997
Facility Maintenance	\$836,192
Water Plant Operations	\$4,178,795
SCADA	\$610,458
Reg & Water Compliance	\$196,181
PCWPF Water Treatment Charges	\$2,354,640
Transfers Out	\$709,167
Subtotal O&M	\$14,669,374
Less :Transfers	(\$3,063,807)
Less: Minor Capital	(\$134,982)
Total O&M	\$11,470,585
Capital Expenses	
Transfer to Capital Fund	\$3,063,807
Debt Service	\$1,733,994
Cash Funded Capital	\$2,710,638

Minor Capital Outlay	\$134,982
Subtotal Capital	\$7,643,421
Total Revenue Requirements	\$19,114,006
Less: O&M Related Non-Rate Revenue	(\$898,260)
Less: Capital Related Non-Rate Revenue	(\$2,846,697)
Service Charge Revenue Requirement	\$15,369,049

After subtracting non-rate revenues and calculating the service charge revenue requirements for 2020 the amount to recover is approximately \$15.4 million.

Customer characteristics are estimated for 2020 based on consumption for the most recent twelve months ending December 2018 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 2020 for each customer class.

Table 17
Water Fund
Customer Characteristics by Customer Class (2020 Projected)

Customer Class	Base Consumption (Kgal)	Max Day Extra Capacity (MGD)	Max Hour Extra Capacity (MGD)	Customers	Equivalent Meter
Residential	1,598,066	6.35	8.58	20,745	20,815
Multifamily w/ Irrigation	79,146	0.21	0.34	112	998
Commercial w/ Irrigation	116,000	0.32	0.51	278	1,541
Bulk	89,166	0.29	0.56	100	100
Irrigation	318,307	2.31	2.54	513	3,432
Multifamily Indoor Use Only	91,691	0.08	0.26	351	2,146
Commercial Indoor Use Only	138,419	0.17	0.44	376	2,442
Total	2,430,795	9.73	13.23	22,475	31,475

Table 18
Water Fund
Customer Characteristics (2020 Projected)

Customer Class	Base	Max Day	Max Hour	Customer	Meter
Residential	65.74%	65.25%	64.86%	92.30%	66.13%
Multifamily w/ Irrigation	3.26%	2.16%	2.57%	0.50%	3.17%
Commercial w/ Irrigation	4.77%	3.27%	3.84%	1.24%	4.90%
Bulk	3.67%	3.01%	4.25%	0.44%	0.32%
Irrigation	13.09%	23.75%	19.18%	2.28%	10.90%
Multifamily Indoor Use Only	3.77%	0.80%	1.99%	1.56%	6.82%
Commercial Indoor Use Only	5.69%	1.75%	3.30%	1.67%	7.76%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

The service charge revenue requirements reported in Table 16 of \$15.4 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 (2020 Projected)

Customer Class	Base	Max Day	Max Hour	Customer	Meter	Total
Residential	\$4,061,738	\$2,714,665	\$716,754	\$2,551,985	\$767,587	\$10,812,729
Multifamily w/ Irrigation	\$201,161	\$89,940	\$28,435	\$13,778	\$36,798	\$370,111
Commercial w/ Irrigation	\$294,833	\$135,898	\$42,472	\$34,199	\$56,833	\$564,233
Bulk	\$226,629	\$125,353	\$46,930	\$12,302	\$3,688	\$414,901
Irrigation	\$809,027	\$988,201	\$211,962	\$63,108	\$126,540	\$2,198,838
Multifamily Indoor Use Only	\$233,048	\$33,300	\$22,031	\$43,179	\$79,147	\$410,704
Commercial Indoor Use Only	\$351,815	\$72,973	\$36,426	\$46,254	\$90,065	\$597,533
Total	\$6,178,250	\$4,160,329	\$1,105,009	\$2,764,804	\$1,160,657	\$15,369,049

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 \$11.3 million from wastewater customers in 2020.

Table 20 Wastewater Fund 2020 Revenue Requirements	
Description	2020
O&M Expenses	
Admin	\$905,641
Capital Projects	\$66,014
Customer Billing	\$324,654
Engineering	\$339,723
Mapping	\$127,461
Field Services	\$909,030
Facility Maintenance	\$511,437
Plant Operations	\$2,631,200
SCADA	\$201,838
Transfers Out	\$3,795,750
Subtotal O&M	\$9,812,747
Less :Transfers	(\$3,795,750)
Less: Minor Capital	(\$147,500)
Total O&M	\$5,869,497
Capital Expenses	
Transfer to Capital Fund	\$3,795,750
Debt Service	\$631,356
Cash Funded Capital	\$3,916,191
Minor Capital Outlay	\$147,500
Subtotal Capital	\$8,490,797
Total Revenue Requirements	\$14,360,294
Less: O&M Related Non-Rate Revenue	(\$74,296)
Less: Capital Related Non-Rate Revenue	(\$2,986,168)
Service Charge Revenue Requirement	\$11,299,830

Customer characteristics are estimated for 2020 based on January 2018 to December 2018 data from CRW's billing records and assumed residential strength factors plus the projected minimum additional flow by customer class for wastewater customers. The 2019 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 2020 for each customer class.

Table 21
Wastewater Fund
Customer Characteristics by Customer Class (2020 Projected)

Customer Class	Flow (Kgal)	BOD (Pounds)	TSS (Pounds)	# of Customers	Equivalent Meter
Residential	806,480	2,564,159	2,772,791	20,588	20,655
Commercial w/ Irrigation	75,800	241,002	260,611	271	1,511
Commercial Indoor Use Only	119,857	381,079	412,086	362	2,273
Multifamily w/ Irrigation	60,400	192,038	207,664	112	998
Multifamily Indoor Use Only	90,900	289,012	312,527	351	2,146
Total	1,153,437	3,667,290	3,965,678	21,684	27,584

Table 22
Wastewater Fund
Customer Characteristics (2020 Projected)

Customer Class	Flow (Kgal)	BOD (Pounds)	TSS (Pounds)	Customers	Equivalent Meter
Residential	69.92%	69.92%	69.92%	94.95%	74.88%
Commercial w/ Irrigation	6.57%	6.57%	6.57%	1.25%	5.48%
Commercial Indoor Use Only	10.39%	10.39%	10.39%	1.67%	8.24%
Multifamily w/ Irrigation	5.24%	5.24%	5.24%	0.52%	3.62%
Multifamily Indoor Use Only	7.88%	7.88%	7.88%	1.62%	7.78%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

The service charge revenue requirements reported in Table 20 of \$11.3 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.

Table 23
Wastewater Fund
Cost of Service by Customer Class (2020 Projected)

Customer Class	Flow (Kgal)	BOD (Pounds)	TSS (Pounds)	Customers	Total
Residential	\$5,578,386	\$730,521	\$406,152	\$1,610,157	\$8,325,216
Commercial w/ Irrigation	\$524,305	\$68,661	\$38,174	\$21,195	\$652,334
Commercial Indoor Use Only	\$829,046	\$108,568	\$60,361	\$28,311	\$1,026,287
Multifamily w/ Irrigation	\$417,784	\$54,711	\$30,418	\$8,759	\$511,673
Multifamily Indoor Use Only	\$628,751	\$82,338	\$45,778	\$27,451	\$784,319
Total	\$7,978,273	\$1,044,799	\$580,883	\$1,695,874	\$11,299,830

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 for the months of November through February.

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. This surcharge intends to send a conservation price signal to customers with excessive usage. The water rates are shown in Tables 25 and 26 below.

Water Resources Monthly Service Charge

CRW currently assesses all water resources customers a fixed monthly service charge per SFE. Table 27 below shows the proposed 2020 fixed monthly service charge per SFE by meter size.

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 revised assumptions. 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 2019 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.

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 2020 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.

Summary

CRW has completed the 2019 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 2020 through 2024. The findings are based on a thorough review of the information provided.

Proposed Rates for 2020 by Enterprise Fund

Rates for the five-year study period (2020-2024) were projected using the percentage rate revenue increases projected by the financial plan. The 2020 proposed rates are shown in the following tables by enterprise fund.

Table 25 Water Fund Proposed 2020 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 2020 Volumetric Rates by Tier			
Irrigation Season (April 1 through October 31 Consumption)			
Customer Class	Tier 1 (AWMC)	Tier 2 (Outdoor)	Tier 3 (Excess)
Residential	\$2.82	\$5.74	\$8.56
Multifamily Indoor Use Only	\$2.82	N/A	\$3.70
Multifamily	\$2.82	\$4.87	\$7.28
Commercial Indoor Use Only	\$2.82	N/A	\$3.94
Commercial	\$2.82	\$4.93	\$7.37
Irrigation	N/A	\$7.86	\$11.78
Winter Season (November 1 through March 31 Consumption)			
Customer Class	Tier 1 (AWMC)	Tier 2 (Outdoor)	Tier 3 (Excess)
Residential	\$2.82	N/A	\$5.74
Multifamily Indoor Use Only	\$2.82	N/A	\$3.70
Multifamily	\$2.82	N/A	\$4.87
Commercial Indoor Use Only	\$2.82	N/A	\$3.94
Commercial	\$2.82	N/A	\$4.93
Irrigation	N/A	N/A	\$11.78
Bulk Water Customers			
Bulk Hydrant	\$7.86	N/A	N/A
Bulk Station	\$9.82	N/A	N/A

An additional surcharge of \$8.56 is added for any water usage over 40,000 gallons.

Table 27
Water Resources Fund
Proposed 2020 Monthly Service Charges

Meter Size	Monthly Charges
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 2020 Monthly Service Charges and Volumetric Rate

Meter Size	Monthly Charges
5/8" x 3/4"	\$9.02
3/4"	\$9.02
1"	\$14.36
1.5"	\$20.82
2"	\$30.03
3"	\$50.17
4"	\$116.96
6"	\$184.77
Volumetric Rate - All Applicable Customers, Per Kgal	\$6.39

Table 29
Stormwater Fund
Proposed 2020 Monthly Service Charge

Monthly Stormwater Fee		
All Customers, per SFE		\$7.12
SFE Assignment		
Customer Class	Impervious Sq. Ft.	SFE
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 2019 Rates and Fees Study, Stantec Consulting Services, Inc. recommends CRW do the following:

- **FINANCIAL PLANNING RECOMMENDATIONS**
 - As mentioned in 2018, 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 balance projected rate revenue needs with revenue requirements for at least 10 years to ensure each fund meets financial targets such as minimum reserves each year and properly plans for future capital expenditures. Maintaining a longer-term forecast of rates prepares CRW for expenditures outside the five-year plan presented in this report. This practice will provide insight into rate adjustments that may be needed earlier to avoid large increases beyond the Study period.
 - Consider adjusting the CIP execution percentage on the FAMS panel to assist with expenditure forecasting that more closely matches the actual amount of projects completed versus budgeted.
 - Closely monitor the stormwater fund revenues in the event the proposed debt issuance requires debt service coverage obligations.
 - Establish accounts in each fund to transparently track SDF revenues and expenditures separately from operating revenues and expenses. Provide more specific funding rules for CIPs in models to ensure growth-related projects are funded using SDF revenues.
 - Consider establishing a maximum or cap on the amount in the Catastrophic Failure Reserve. As completed projects are placed in service, the amount reserved in this fund will grow, potentially beyond a level necessary to address

a catastrophic failure. The cap can be determined based on total days cash on hand of all CRW's fund combined, or set equal to the estimated cost of the most critical asset in each system, or based on another appropriate target.

- Specifically identify key performance indicators (KPIs) to track and establish goals for future rate periods.
- Add the calculation of affordability metrics such as the affordability ratio at the 20th income percentile (AR20) and hours worked at minimum wage (HM) as affordability KPIs. As affordability of water and wastewater service becomes more important to CRW, new measures of affordability such as the AR20 and HM will indicate the impact of rate adjustments on CRW's most vulnerable customers. These ratios were calculated for the first time during the 2019 Rates and Fees Study and indicated the proposed rates for 2020 are within affordable thresholds. Continuing to monitor affordability of water and wastewater service will further CRW's goal "To keep our rates and fees affordable within various national affordability indices."

- **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.
- Evaluate wastewater rate revenue collection and expenditures during 2020 to ensure reduced rates are recovering sufficient revenues.
- If adjustments to water volume rates are desired, use the CIM model 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.
- Consider evaluating the effects of a more detailed review of water cost-of-service tiered rates by using the beginning rates calculated in the COS model and adjusting 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 3.13 percent, which is the best estimate based on the average Engineering News Record (ENR) index for the five year period 2013-2018 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 6%.
- **Capital Improvements** – Capital improvement projections are provided by year for the study. Capital improvement costs were provided by CRW for years 2020-2055. 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 2019 Customer Characteristics Analysis using the billing data for twelve months ending December 2018.
- **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 2019 Customer Characteristics Analysis, which summarized the billing data for January 2018 to December 2018.
- **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

2019 RATES AND FEES STUDY

PREPARED BY:

CASTLE ROCK WATER
BUSINESS SOLUTIONS TEAM

September 2019

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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 by looking at the most current billing data for FY2018. From there, we break down the number of accounts by meter size and customer class. We then compare the number of actual permits for the last several years to the number of projected permits in that same year. The Town's Development Services Department provides the number of accounts by customer class for past actuals as well as the forecasted amounts for FY2019 and FY2020.

An average consumption based on the most current three years (2016-2018) by account, meter size, customer class and winter versus summer season is calculated. This average three-year period serves as a comparison to previous three-year periods going back as far as 2012. This takes into consideration weather patterns and rainfall variances from year to year.

These individual three-year average consumption calculations provide the basis for meter equivalency factors. Starting in 2010 the Town implemented meter equivalency factors in assessing the monthly service charges for water, wastewater, and water resources. The average consumption for all $\frac{3}{4}$ " meters serves as the base unit with the average consumption for all larger size meters divided into this base unit to get an equivalency factor by meter size and customer class.

Customer data for the last three years (2016-2018) then determines an average representative customer for each customer class. One customer from each customer class then represents the class average and their consumption patterns calculate a typical customer's annual bill.

Billed usage by tier from 2012-2018 by customer class is analyzed to see if customers are staying within their budgeted tiered rate structure. The purpose of this data analysis is also to see if customers over time are conserving water and avoiding Tier 3 – excessive and surcharge (over 40,000 gallons per month).

We also look at the customers with a .67 SFE to see if their consumption patterns are meeting the intent of the program, to use a 3rd less water than an average $\frac{3}{4}$ " residential customer's usage. Additional information such as .67 SFE accounts by irrigated area also help us to understand the larger irrigated accounts that typically consume larger amounts of water and may or may not be meeting the intent of the program.

Other areas within the study include consumption patterns based on watering schedules, consumption patterns based on water wiser designations, customer classes consumption based on irrigated areas, consumption patterns for customers designated as HOA's, bulk water accounts consumption and Town accounts consumption patterns over time.

Like the water fund, we also chart the number of accounts from the latest 2018 billing data plus growth projections for customers who are receiving water resources and wastewater services. Stormwater Single Family Equivalents (SFE's) is the unit of measure for the stormwater fund unlike accounts is the unit of measure in the other enterprise funds.

Key information found in this report integrates into the development of rates and fees.

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 (Jan18-Dec18). This shows that 21,647 customers were receiving water service during this capture period. The FY2017 accounts based on 12 months of billing data (Jan17-Dec17) showed 20,472 customers were receiving water service. There are 1,175 more accounts in FY2018 than FY2017. The number of accounts by meter size are key inputs into the system development fees model. The number of accounts then convert into Single Family Equivalents (SFE's) which determine existing versus new system capacities and then used in the calculations within the cost of service models.

TABLE 1: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2018)

Meter Size	Residential	Multifamily	Commercial	Bulk	Irrigation	MultiFamily	Commercial	Total
						Indoor Use Only	Indoor Use Only	
5/8"	1,194	-	-	-	23	4	7	1,228
3/4"	18,728	14	127	96	152	101	120	19,338
1"	23	25	69	-	103	94	91	405
1.5"	-	55	50	-	137	109	81	432
2"	-	15	25	-	81	41	45	207
3"	-	2	5	-	7	2	14	30
4"	-	1	-	-	2	-	2	5
6"	-	-	2	-	-	-	-	2
Total	19,945	112	278	96	505	351	360	21,647

Chart 1 below shows the growth in residential accounts from 2011-2018 and the projected growth for FY2019 and FY2020. The projected growth for FY2019 and FY2020 remains strong at 800 permits forecasted for 2019 and 750 for 2020. The Town's Development Services Department provides the projected growth in accounts by customer class. Since 2013, the average number of accounts added per year is approximately 850.

CHART 1: RESIDENTIAL WATER ACCOUNTS

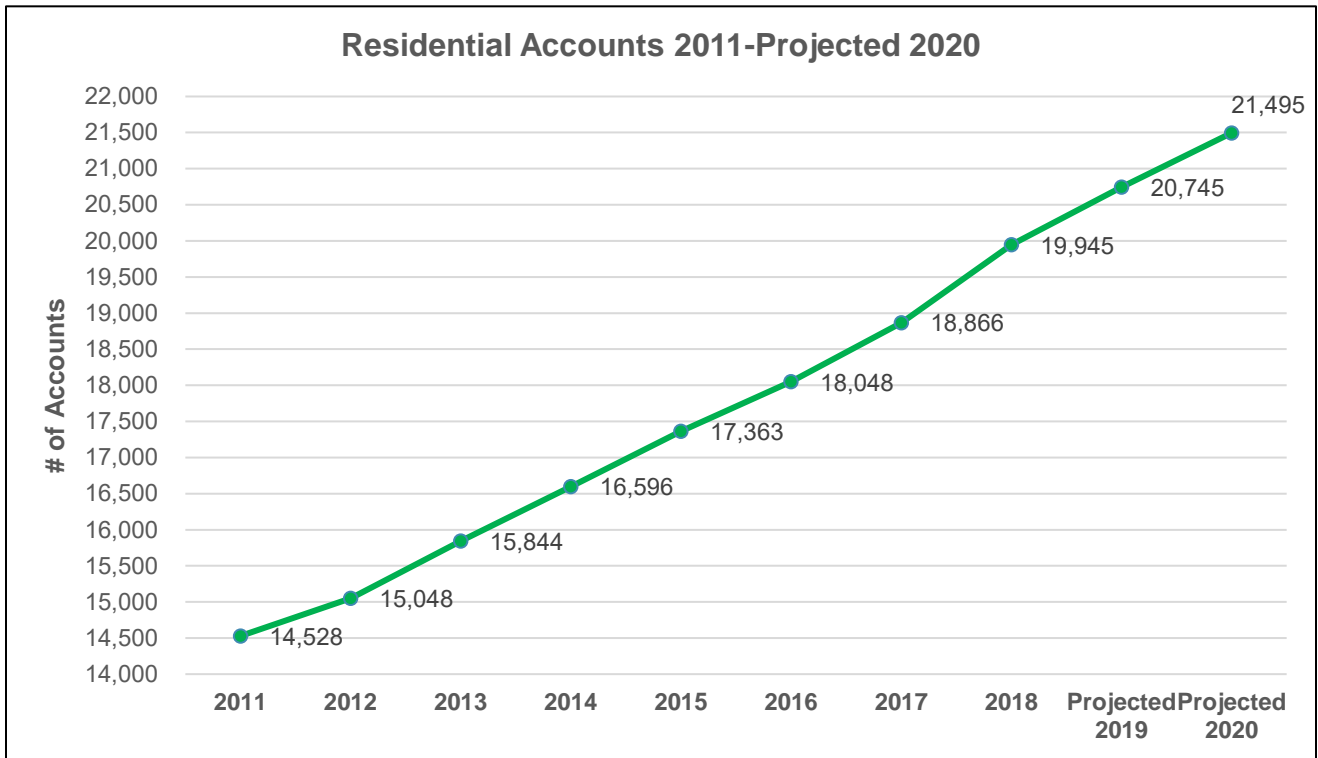
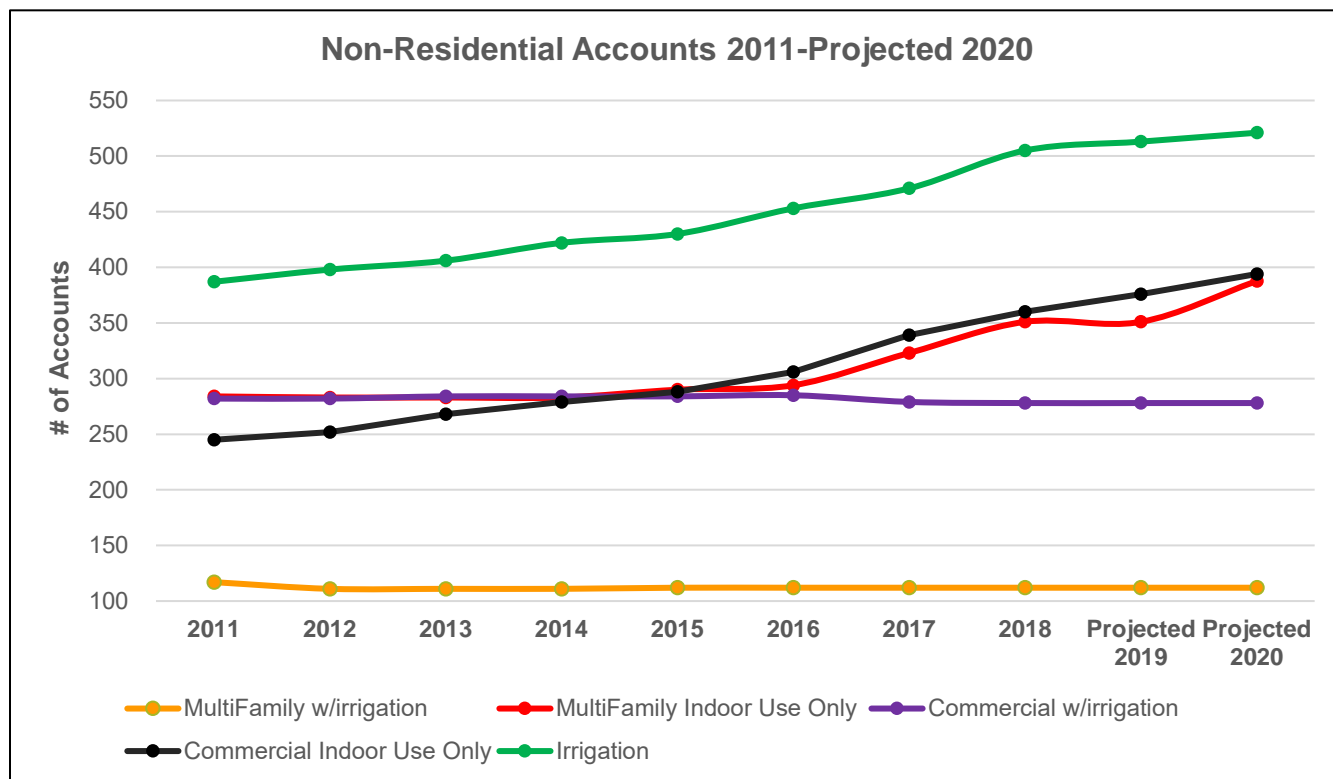


Chart 2 shows the number of non-residential accounts from 2011-2018. Over the last two years, we have started to see multifamily indoor use only actual accounts increasing with growth projections for this type of account increasing even further in FY2019 and FY2020. We are also seeing this trend in commercial indoor use only and irrigation customer classes due to new development.

CHART 2: NON-RESIDENTIAL WATER ACCOUNTS



Castle Rock Water projects FY2020 water accounts by using FY2018 billing data plus the projected growth for FY2019 and FY2020. The FY2020 water accounts are projected to equal 23,188, (21,495 for residential and 1,693 for non-residential). Growth projections are as follows by customer class:

2019 Projected Accounts by Customer Class:

48	Residential (.67 SFE)
752	Residential (1 SFE)
16	Commercial
8	Irrigation
824	Total

2020 Projected Accounts by Customer Class:

45	Residential (.67 SFE)
705	Residential (1 SFE)
37	Multi-Family
18	Commercial
8	Irrigation
813	Total

Projections are for 824 accounts for FY2019 and 813 accounts for FY2020 for a total increase thru FY2020 of 1,637.

2013-2018 ACTUAL GROWTH VERSUS PROJECTED GROWTH

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 or fee 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. Charts 3-6 below show the actual number of permits compared to the projected number of permits during the same year. Charts 3-5 break out residential, multi-family and commercial whereas Chart 6 is all customer classes combined. Multi-family permits shown in Chart 4 usually are master metered serving multiple units. For example projections for 2020 shows 513 permits for multifamily in Chart 5 which equates to 37 new water service accounts shown in Chart 2 above. Based on historical trends, the average number of units per master metered accounts is 14.

CHART 3: RESIDENTIAL GROWTH

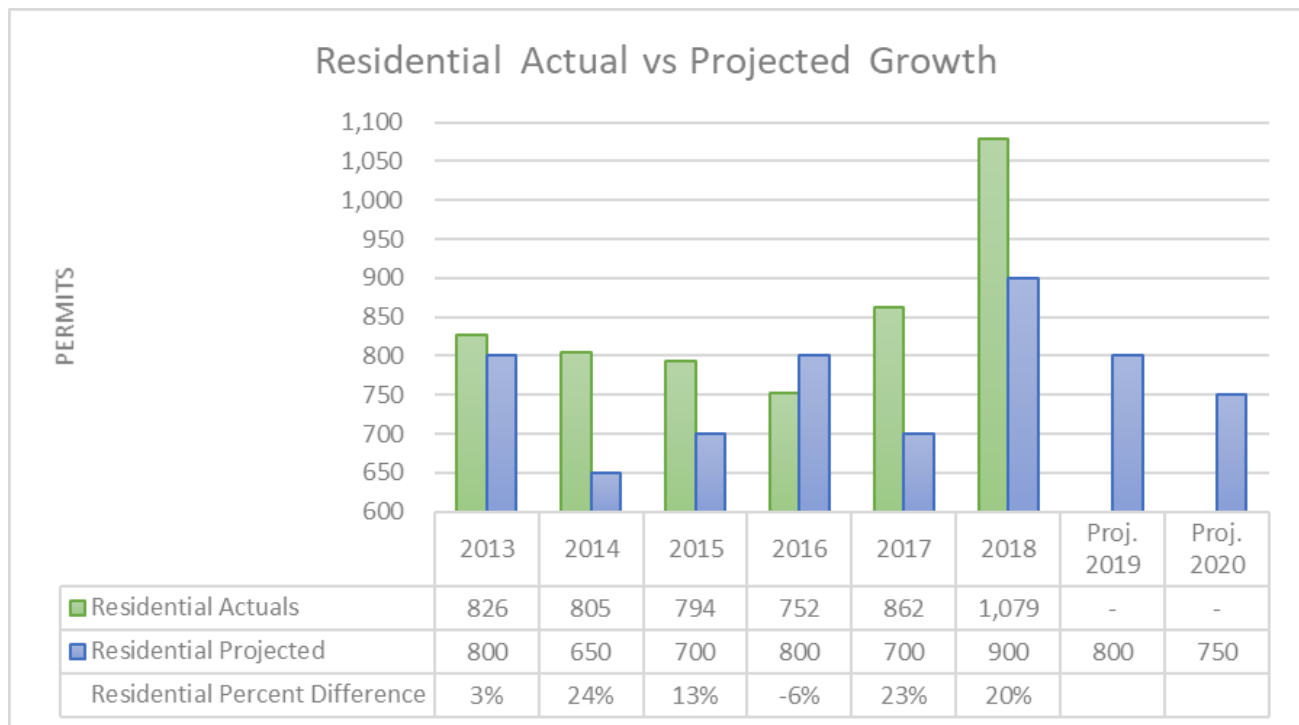


CHART 4: MULTIFAMILY GROWTH

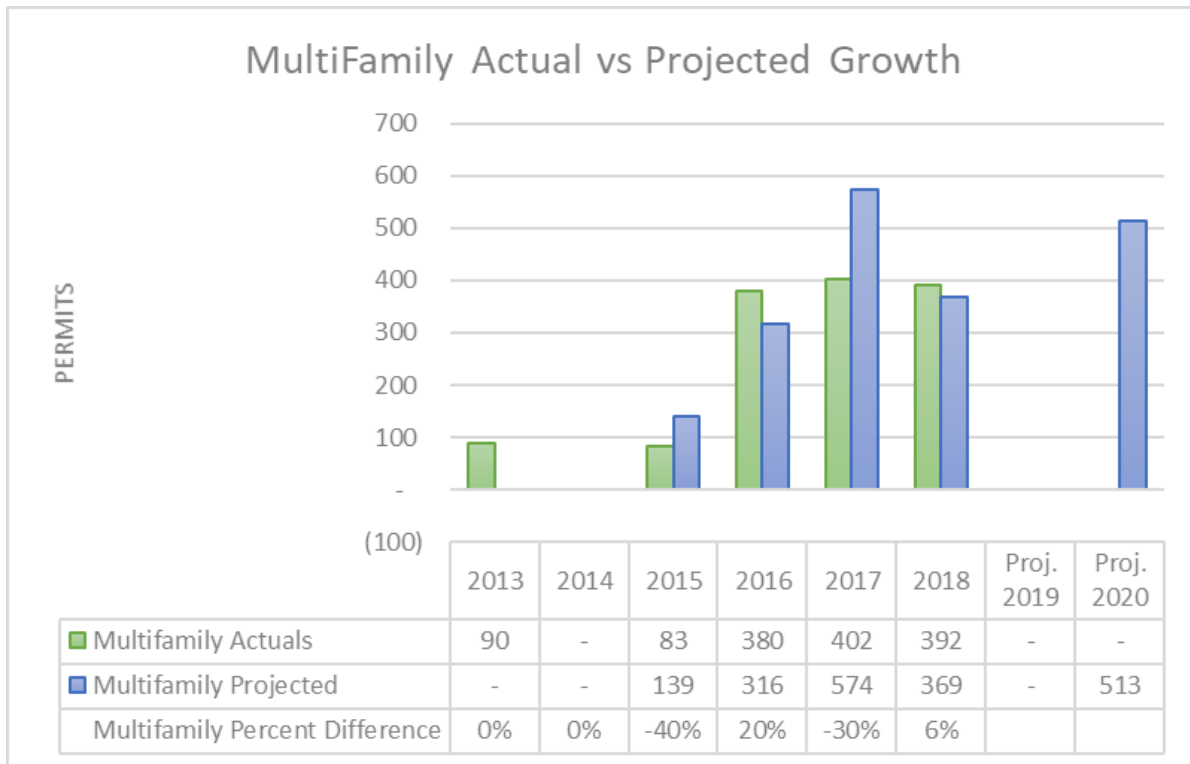
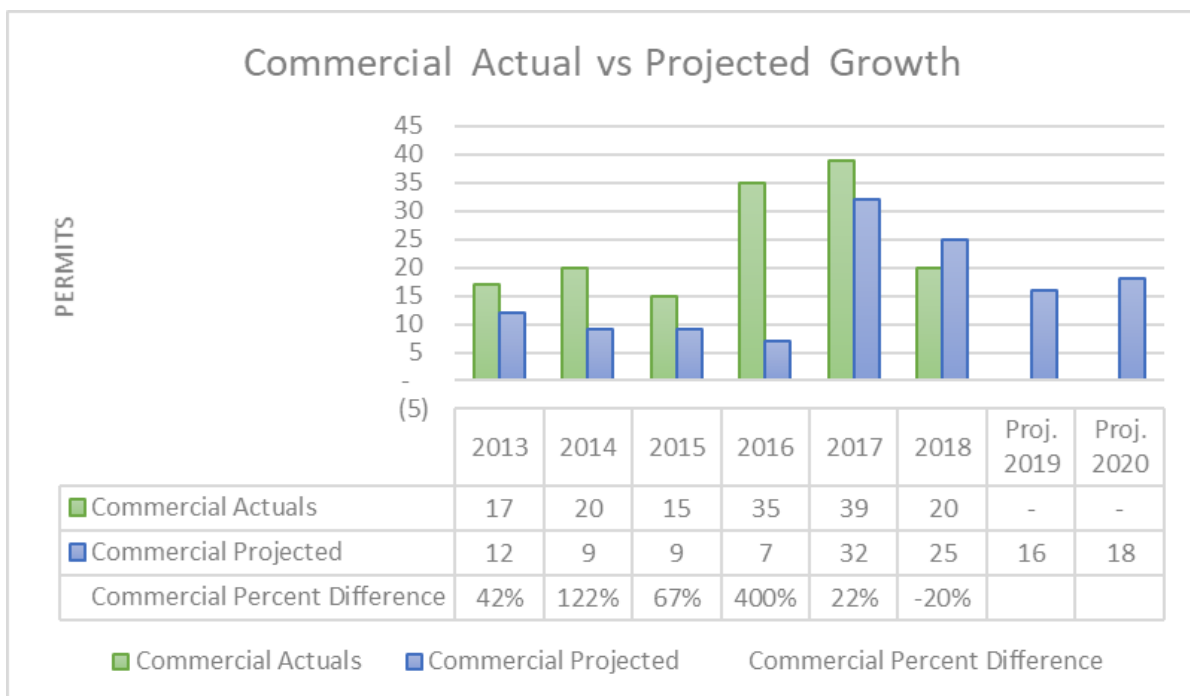
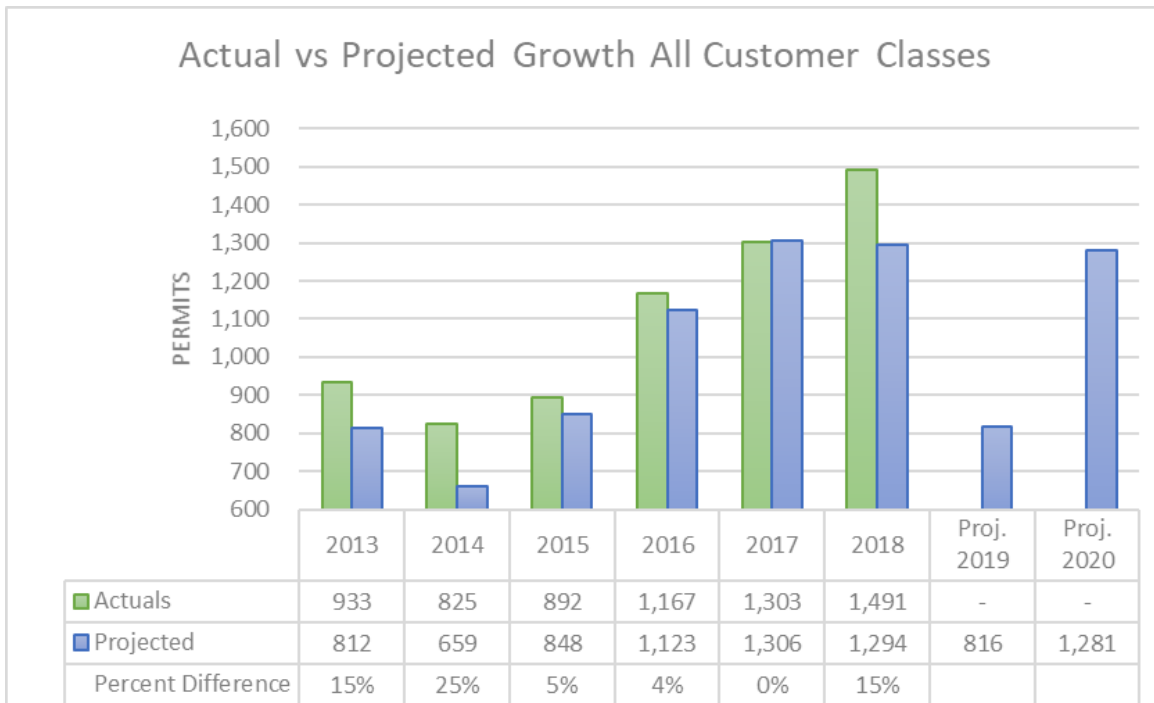


CHART 5: COMMERCIAL GROWTH



**CHART 6: All CUSTOMER CLASSES COMBINED
GROWTH**



3 YEAR AVERAGE CONSUMPTION BY CUSTOMER CLASS

Table 2 shows the 3-year average monthly consumption by meter size and customer class for 2016-2018 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 19 accounts, the impact to the overall weighted average is significant.

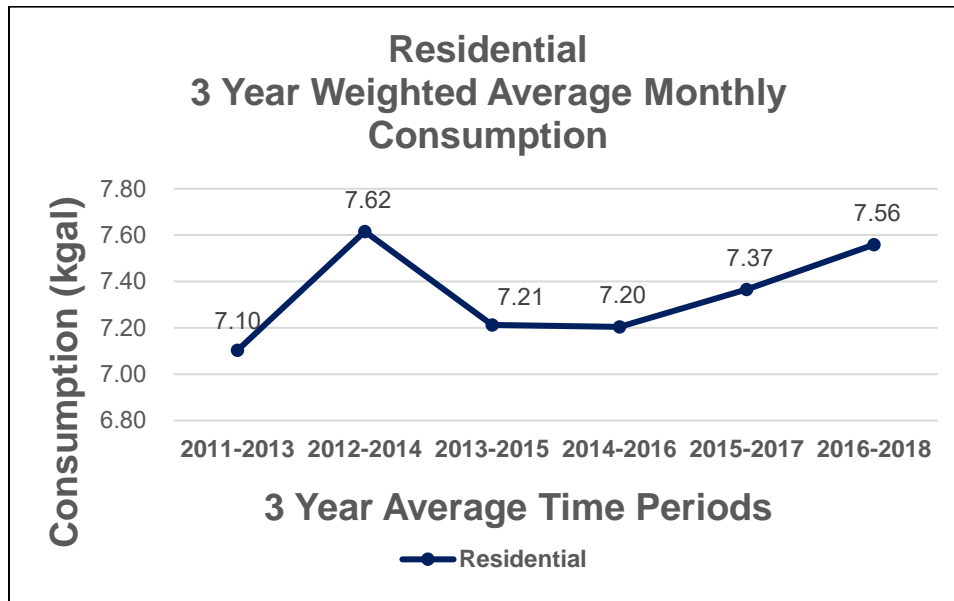
**TABLE 2: 3 YEAR AVG MONTHLY CONSUMPTION
BY CUSTOMER CLASS & METER SIZE (2016-2018)**

Meter Size	Residential	Multifamily	Commercial	Irrigation	MultiFamily Indoor Use Only	Commercial Indoor Use Only
5/8"	5.44	-	-	37.24	3.13	2.36
3/4"	7.68	20.61	9.32	31.41	3.09	8.93
1"	18.69	31.60	31.38	70.74	13.59	25.15
1.5"	-	70.73	61.27	140.71	43.16	45.27
2"	-	99.91	67.03	220.88	72.91	72.19
3"	-	321.17	171.64	439.36	9.00	92.34
4"	-	334.62	-	602.99	-	1,327.78
6"	-	-	745.36	-	-	-

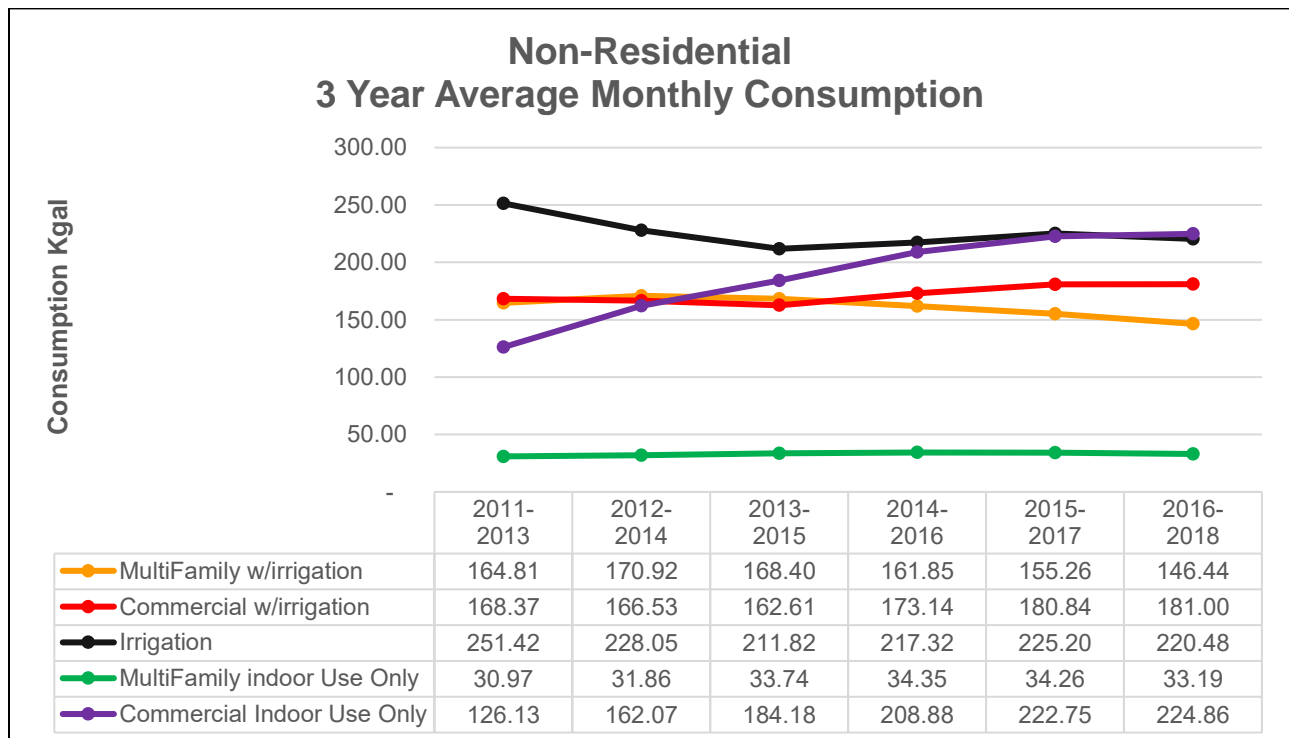
**TABLE 2A: 3 YEAR AVG MONTHLY
CONSUMPTION RESIDENTIAL METER SIZES
(2016-2018)**

Residential Accounts						
Meter Size	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
5/8"	5.35	6.19	5.70	5.44	5.37	5.44
3/4"	7.21	7.70	7.30	7.30	7.48	7.68
1"	11.42	13.14	14.17	21.26	17.86	18.69
Average	7.99	9.01	9.06	11.33	10.24	10.60
Weighted Average	7.10	7.62	7.21	7.20	7.37	7.56

**CHART 7: 3 YEAR AVG MONTHLY
CONSUMPTION-ALL RESIDENTIAL ACCOUNTS**



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



The 3-year average monthly consumption shown above in Chart 8 is for all non-residential meter sizes combined by customer class. While all customer classes have stayed relatively flat, commercial indoor use only accounts have been increasing year over year. We start to see the increase in average consumption in this customer class with the addition of the 4" meter installed in 2013 at the hospital.

In Chart 9 below the 3-year average monthly consumption for the 3/4" to 3" size of meters for all customer classes have remained virtually flat over the comparison periods.

CHART 9: 3 YEAR AVG MONTHLY CONSUMPTION BY METER SIZE 3/4" to 3" ALL CUSTOMER CLASSES

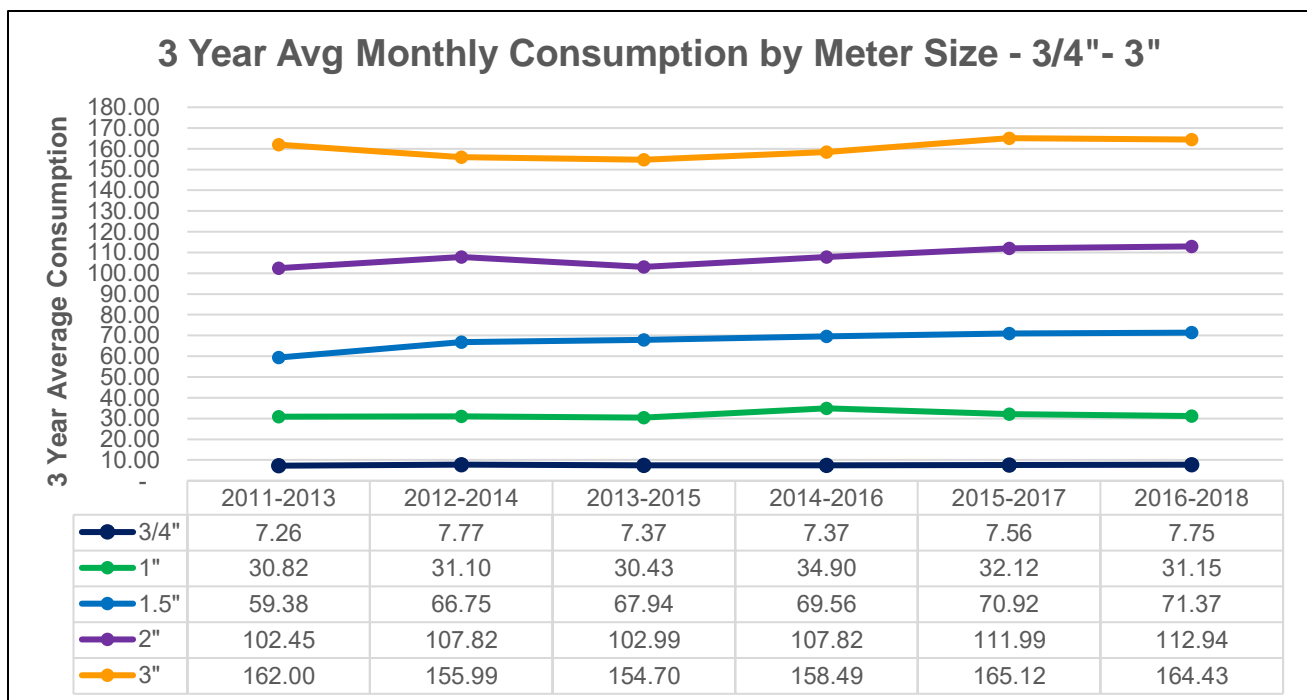
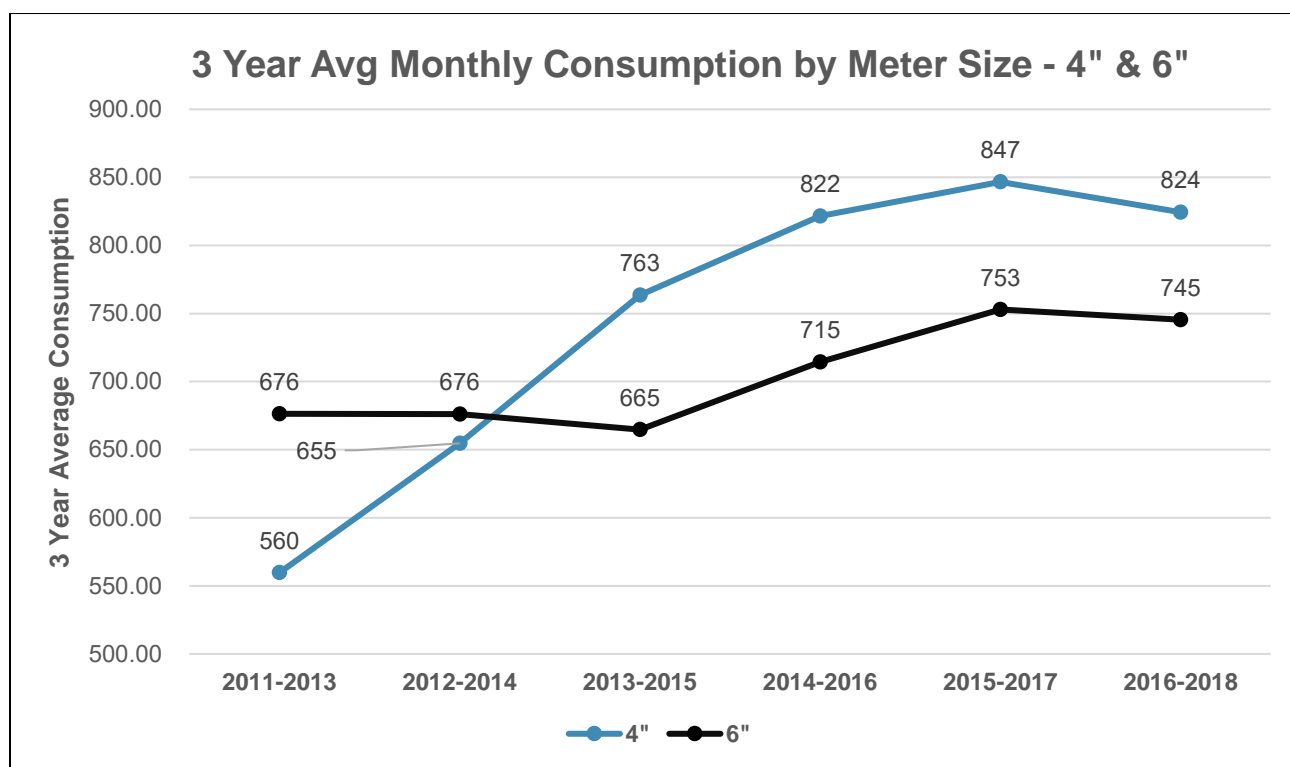


Chart 10 below shows the average consumption for the two 6" meters in service is trending downwards slightly over the last two comparison years. We currently have five 4" meters in service, four active meters and one redundant meter for medical purposes. The increase in the 2013 and forward consumption 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 more than doubles between the summer “with irrigation” and the winter “without irrigation” seasons.

TABLE 3: 3 YEAR AVERAGE MONTHLY CONSUMPTION BY METER SIZE FOR ALL CUSTOMER CLASSES COMBINED (2016-2018)

Meter Size	With Irrigation	Without Irrigation
5/8"	7.43	3.42
3/4"	10.11	4.36
1"	38.30	18.09
1.5"	85.62	43.29
2"	137.20	60.63
3"	200.46	103.44
4"	875.21	751.57
6"	876.45	561.83

CHART 11: 3 YEAR AVG MONTHLY CONSUMPTION ¾" METERS

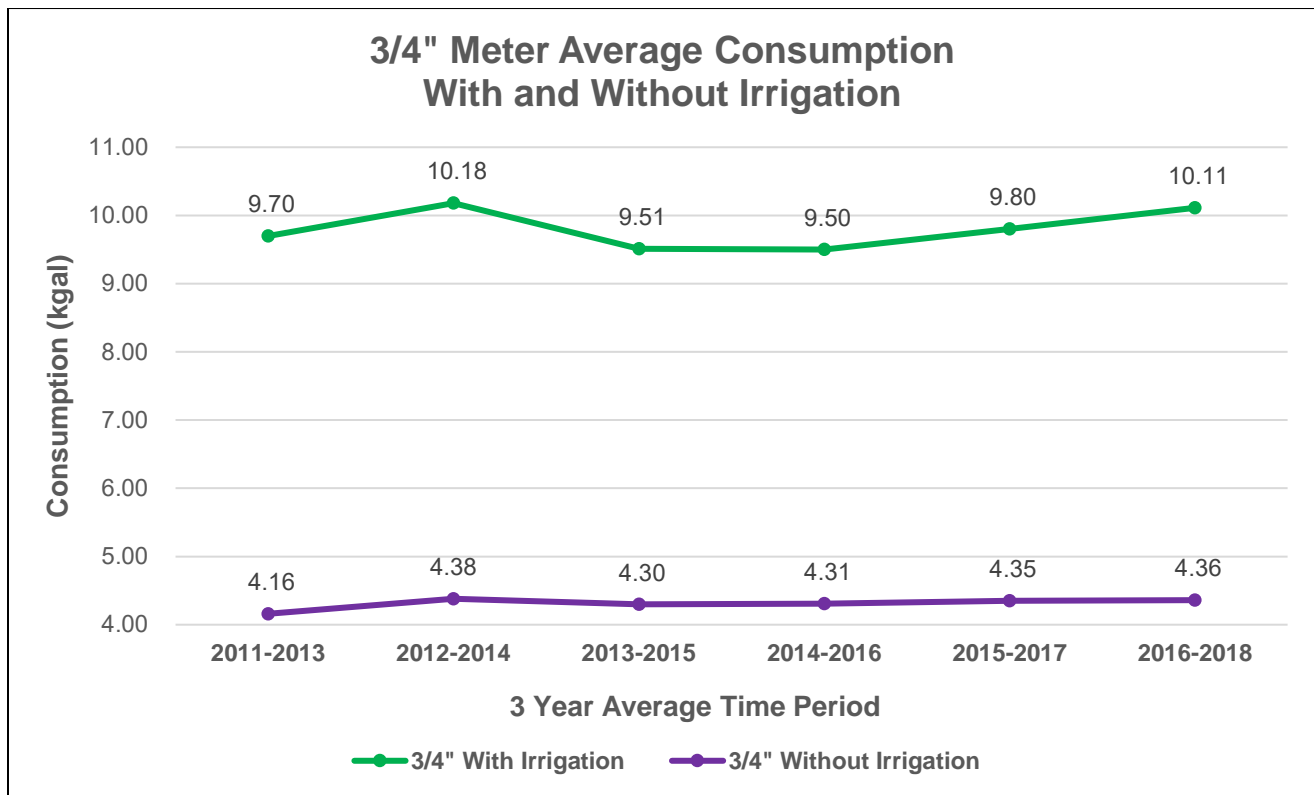


Chart 11 above shows that ¾" meter accounts usage "without irrigation" is very consistent from year to year. Approximately 97% of the ¾" meters are residential accounts. This trend indicates indoor water usage from year to year for these meters is staying consistent, even with the increase in the number of accounts. However, we are starting to see a slight trend upward in the last two comparison periods for the ¾" meter usage "with irrigation" indicating that the irrigation usage for these accounts is trending slightly upward which is a pattern we will want to keep a focus on. Weather conditions and rainfall could be contributing factors.

CHART 12: 3 YEAR AVG MONTHLY CONSUMPTION 1" METERS

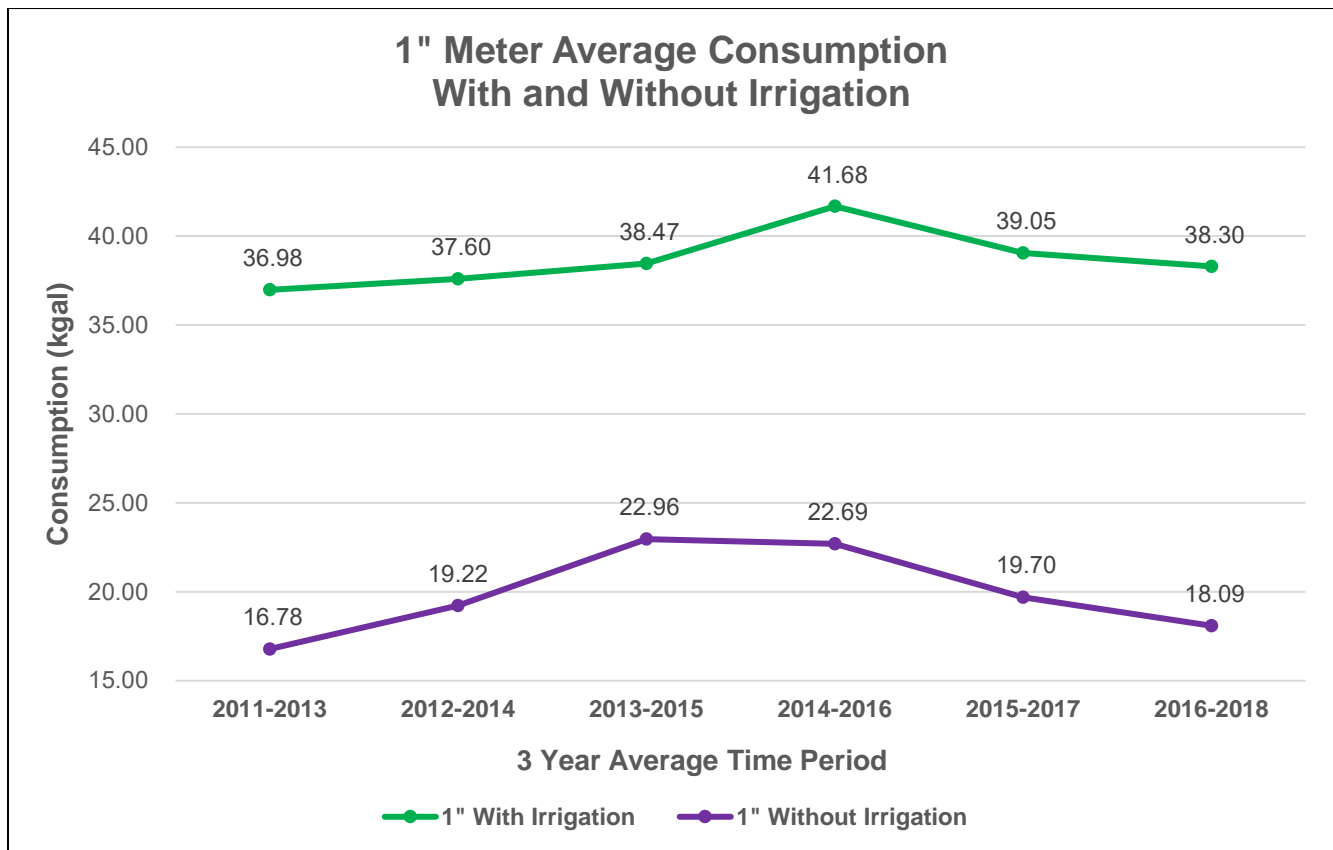


Chart 12 above shows that 1" meter accounts usage "without irrigation" is trending downward from year to year, which is a good trend to see. Despite an increase of 27 accounts over the last year in the 1" meter count, this trend indicates indoor water usage from year to year for meters this size are decreasing slightly. We are also starting to see a slight trend downward in the last two comparison periods for the 1" meter usage "with irrigation" indicating that the outdoor usage for these accounts is slightly trending downward.

Chart 13 below shows the accounts usage "without irrigation" for all 1.5" accounts is relatively flat over the comparison periods. Despite an increase of 28 accounts over the last year in the 1.5" meter count, this trend indicates indoor water usage from year to year for meters this size are remaining steady. We are also seeing a relatively flat trend for the 1.5" meter usage "with irrigation" indicating that the outdoor usage for these accounts is not trending up or down given the number of new accounts.

CHART 13: 3 YEAR AVG MONTHLY CONSUMPTION 1.5" METERS

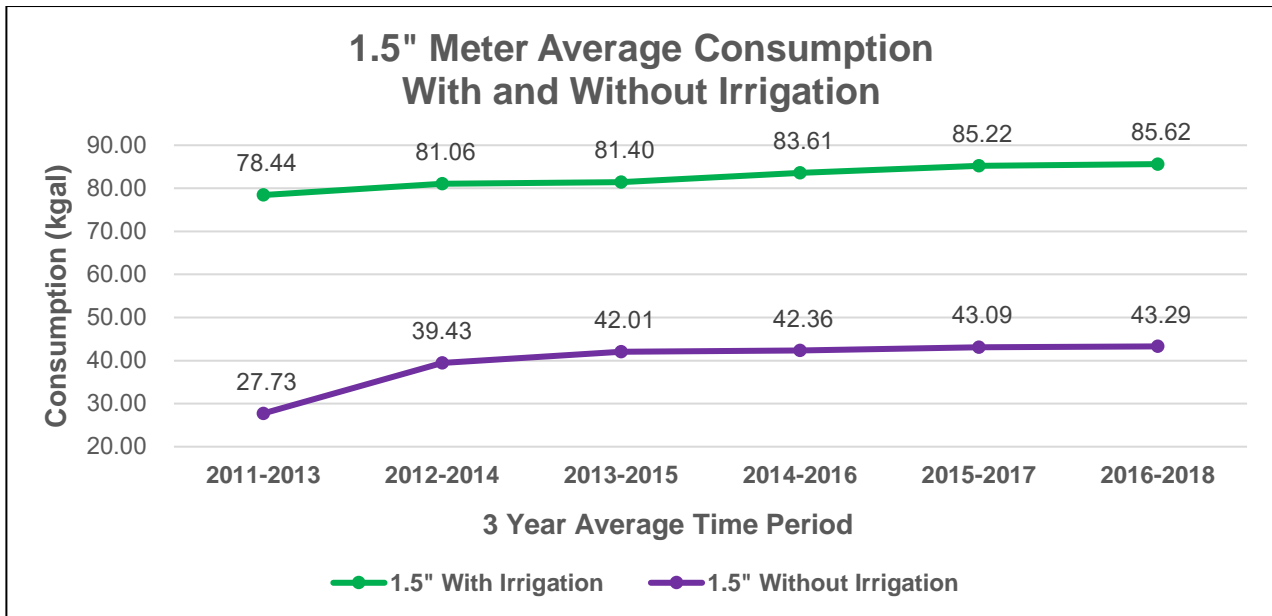


CHART 14: 3 YEAR AVG MONTHLY CONSUMPTION 2" METERS

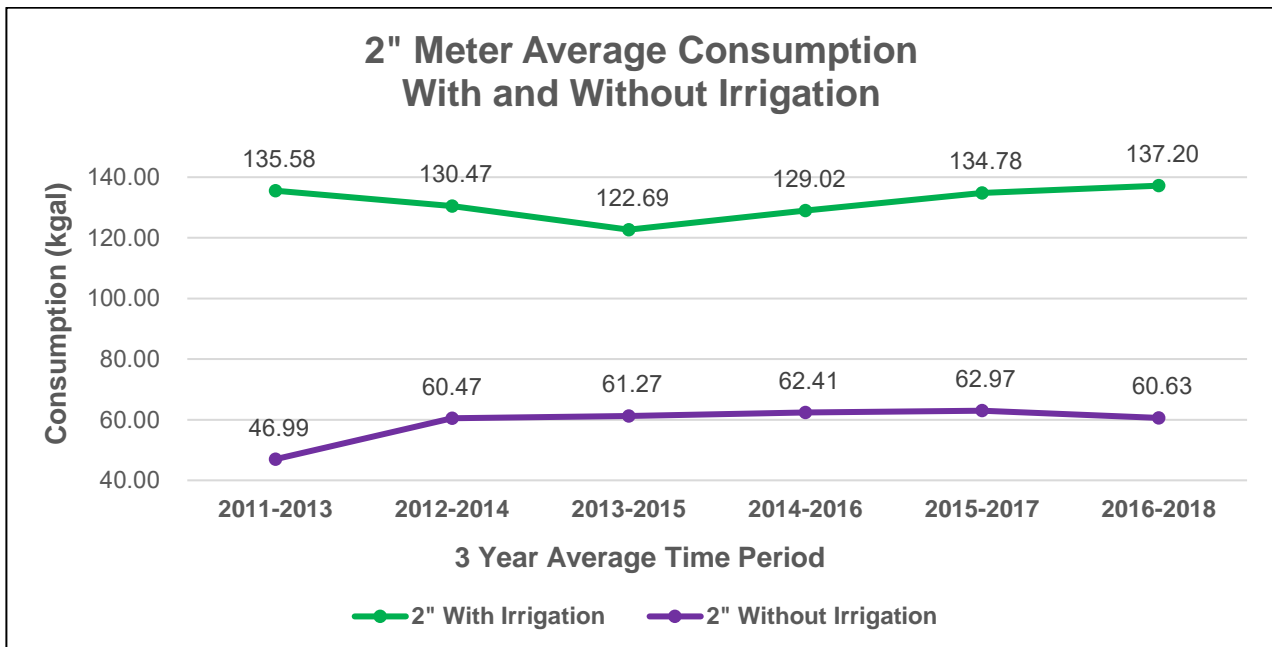


Chart 14 above for 2" meters and Chart 15 below for 3" meters both indicate that the consumption trends for these two larger types of meters are remaining relatively flat over the last two comparison periods for both the irrigation and winter seasons.

CHART 15: 3 YEAR AVG MONTHLY CONSUMPTION 3" METERS

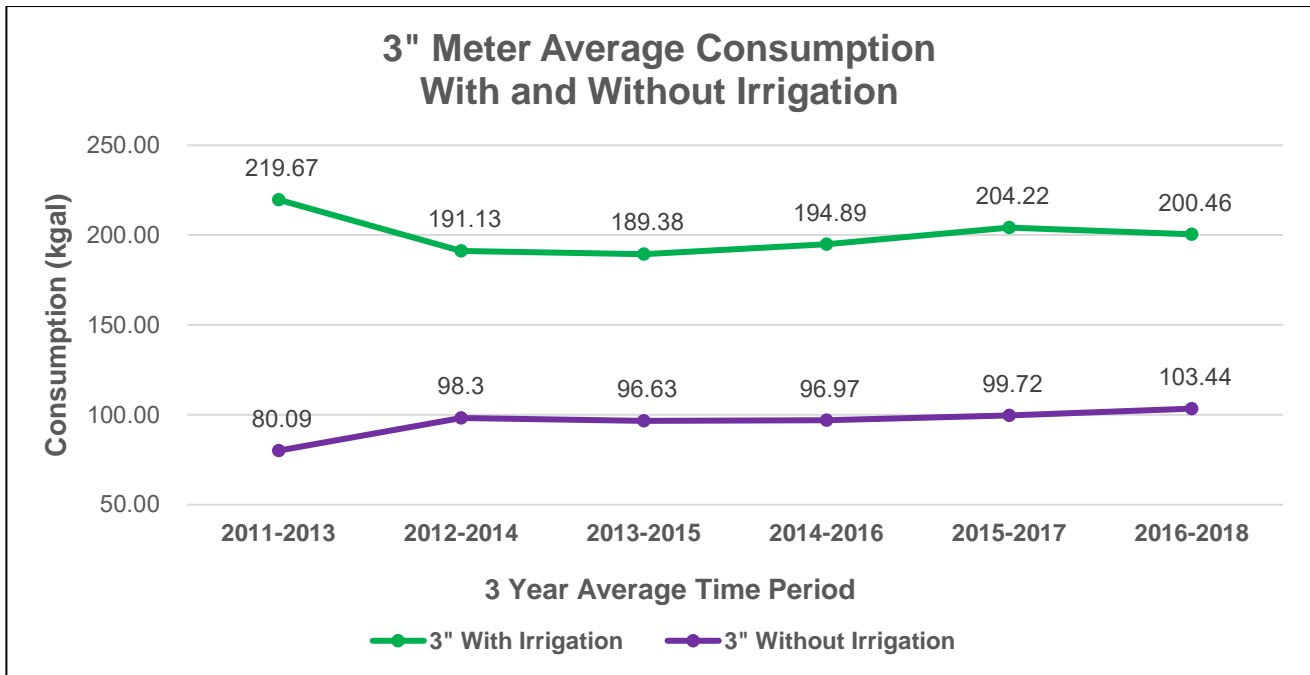


CHART 16: 3 YEAR AVG MONTHLY CONSUMPTION 4" METERS

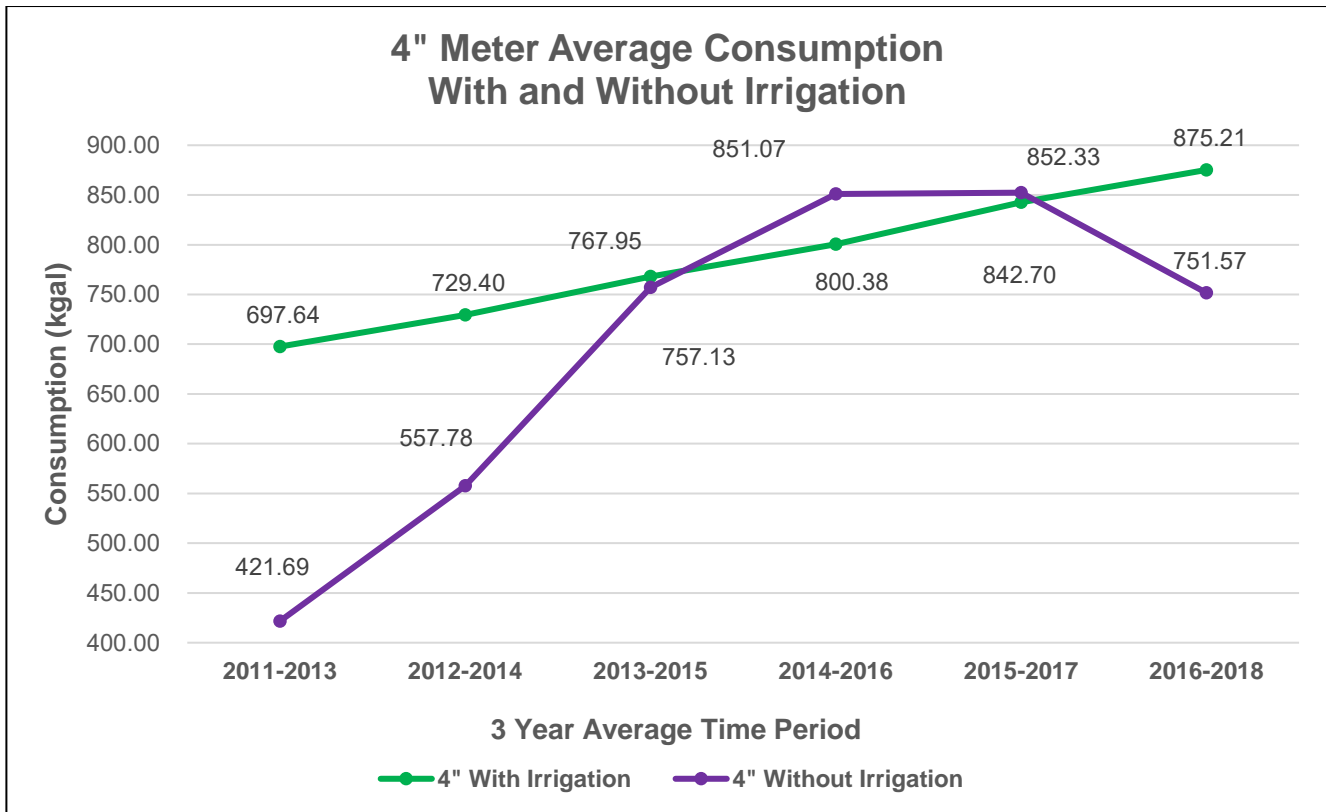
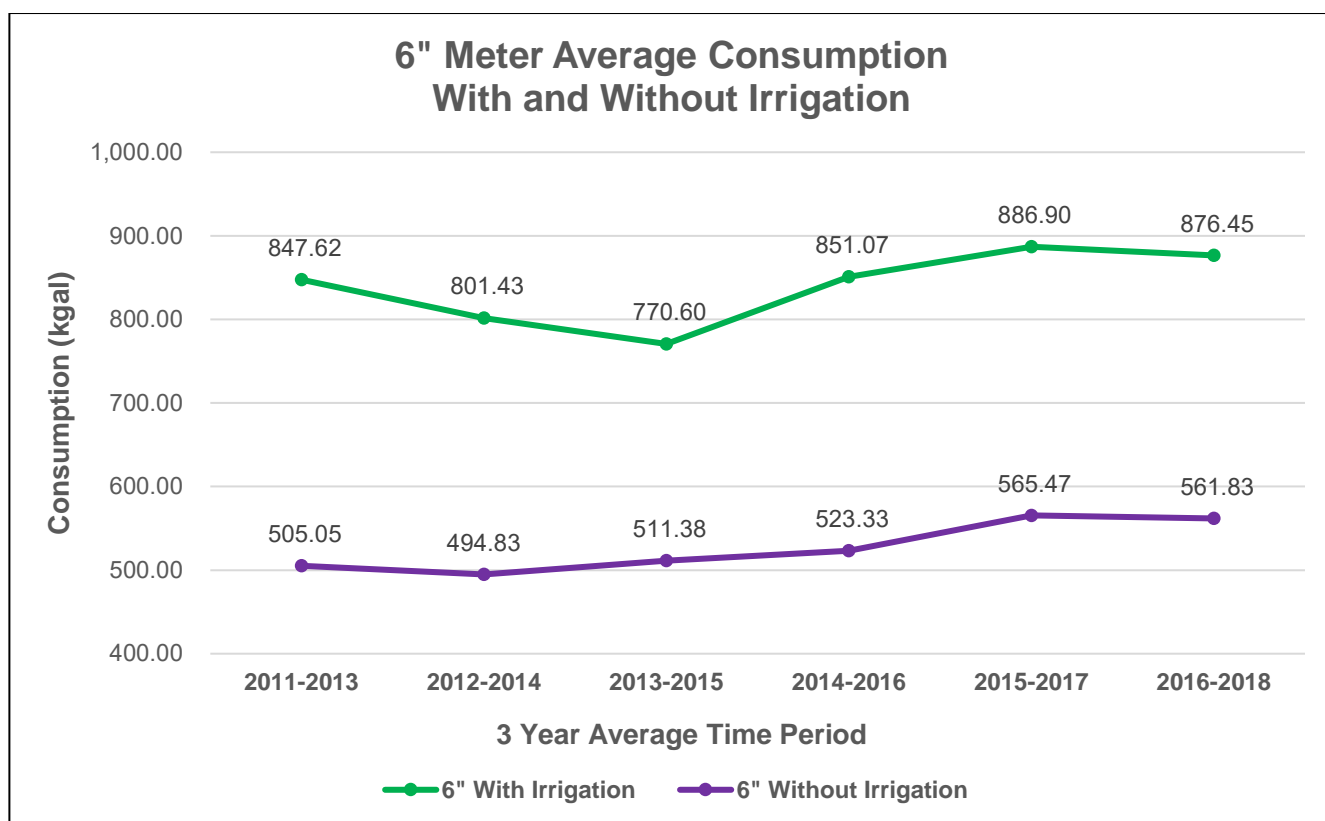


Chart 16 above shows mixed results when comparing the last two comparison periods. The consumption patterns for winter season are showing a steep decline while the consumption patterns for the irrigation season shows a steep increase.

Chart 17 for 6" meters shows that the average monthly consumption for these 2 meters has remained consistent over the last few comparison periods.

CHART 17: 3 YEAR AVG MONTHLY CONSUMPTION 6" METERS



EQUIVALENCY FACTORS

There are two different types of equivalency factors. The first is the hydraulic capacity method based on the relative capacity of different meter sizes and meter types utilized to deliver water. The second equivalency factor method takes into consideration the relative potential demands of different customers. Based on the characteristic hydraulic demands, a single-family meter size of $\frac{3}{4}$ " serves 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 compares 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 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 $\frac{3}{4}$ " single-family residential customer. The equivalency factor in Table 4 is an input into the system development fees model used to calculate the number of SFE's. This is achieved by multiplying

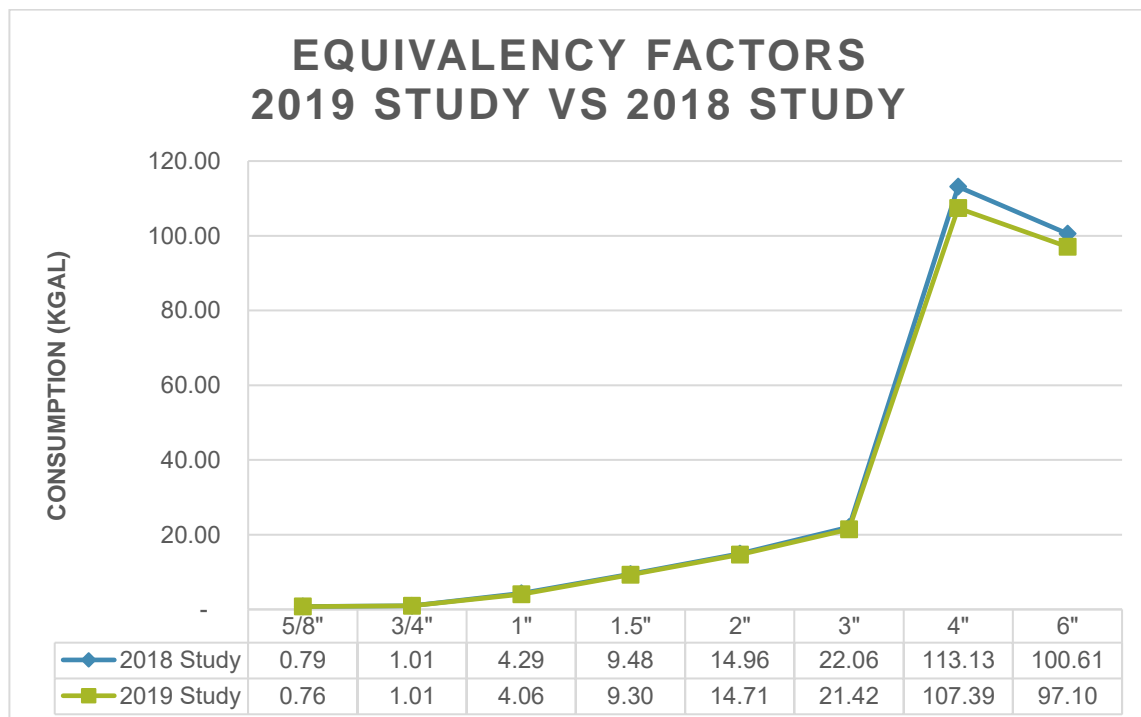
the equivalency factor times the number of meters which then equals the number of SFE's currently being served by the system.

Chart 18 compares the equivalency factors calculated from the most current rates and fees study to the prior year study. As seen in the chart no major variances exist from study to study so no methodology change is recommended to the 2019 study.

TABLE 4: 2019 STUDY ACTUAL USE EQUIVALENCY FACTORS (BASED ON 3 YEAR AVG. 2016-2018)

Meter Size	Residential	Multifamily	Commercial	Irrigation	MultiFamily Indoor Use Only	Commercial Indoor Use Only	Equivalency Factor
5/8"	0.71	-	-	4.85	0.41	0.31	0.76
3/4"	1.00	2.68	1.21	4.09	0.40	1.16	1.01
1"	2.43	4.12	4.09	9.22	1.77	3.28	4.06
1.5"	-	9.21	7.98	18.33	5.62	5.90	9.30
2"	-	13.02	8.73	28.77	9.50	9.40	14.71
3"	-	41.84	22.36	57.24	1.17	12.03	21.42
4"	-	43.59	-	78.55	-	172.97	107.39
6"	-	-	97.10	-	-	-	97.10

CHART 18: EQUIVALENCY FACTORS 2019 STUDY COMPARED TO THE 2018 STUDY



REPRESENTATIVE CUSTOMER BY CUSTOMER CLASS

Customer data for the last three years (2016-2018) determines an average representative customer for each customer class. One customer from each customer class then represents the class average and their consumption patterns calculate a typical customer's annual bill. The process includes the following steps:

- Calculate the average consumption, total consumption, and consumption for irrigation season and winter season based on the most recent billing data (Jan18-Dec18).
- 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.
- Eliminating customers with atypical consumption from the pool of customers eliminates skewing the average calculation for a representative customer by class.

Results of the representative customer analysis shown in Table 5 are very similar to those we calculated in the prior year study. Average Winter Monthly Consumption (AWMC) calculated by averaging the total potable water consumption used by the customer in the months of November-February is in accordance with standard operating procedures maintained by Castle Rock Water. This represents the amount of water for indoor use (Tier 1) and the amount of wastewater treated each month. Since new customers do not have an established AWMC, the customer class average for water and a \$36/SFE monthly fee for wastewater is used.

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
2018 BILLING DATA**

Customer Class	Meter Size	Total Annual Consumption (kgal)	Average Monthly Consumption (Jan-Dec 2018) (kgal)	Average Winter Monthly Consumption (kgal)	Average Irrigation Monthly Consumption (kgal)
Residential	¾"	84.97	7.88	4.30	10.38
Multifamily (with irrigation)	1.5"	925.28	71.33	51.07	86.31
Commercial (with irrigation)	¾"	108.32	8.83	6.33	10.60
Irrigation	¾"	376.38	31.72	5.44	33.09
Multifamily Indoor Use Only	¾"	107.44	3.00	3.11	2.93
Commercial Indoor Use Only	¾"	89.73	9.50	8.11	10.46

CONSUMPTION BY TIER

To compare the total water usage by tier over time, Table 6 and Table 7 were prepared from actual billing data for January 2018 through December 2018. Charts 19-23 compare the total water usage by tier for each customer class for the years 2012-2018. Surcharge revenue funds water conservation programs such as the rebate program in the Water Resources Fund.

**TABLE 6: BILLED USAGE BY CUSTOMER
CLASS BY TIER JANUARY 2018-DECEMBER 2018**

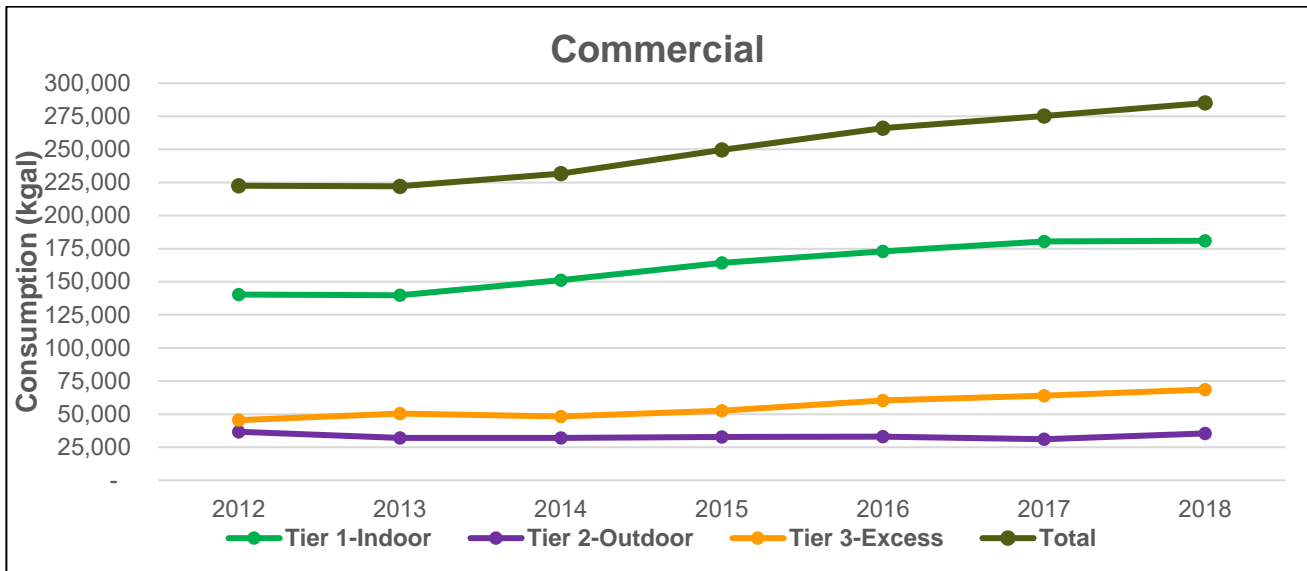
Class	Tier 1	Tier 2	Tier 3	Total	Surcharge
Commercial	109,402	-	44,864	154,266	-
Commercial w/ Irrig	71,576	35,470	23,705	130,751	-
Irrigation	-	314,749	43,446	358,195	-
MultiFamily	87,049	-	16,302	103,351	-
MultiFamily w/ Irrig	56,161	21,090	11,959	89,210	-
Residential	837,578	754,298	162,876	1,754,752	12,966
Total Kgals	1,161,766	1,125,607	303,152	2,590,525	12,966
Tier % of Total	45%	43%	12%	100%	

**TABLE 7: BILLED USAGE BY SEASON BY CUSTOMER
CLASS BY TIER JANUARY 2018-DECEMBER 2018**

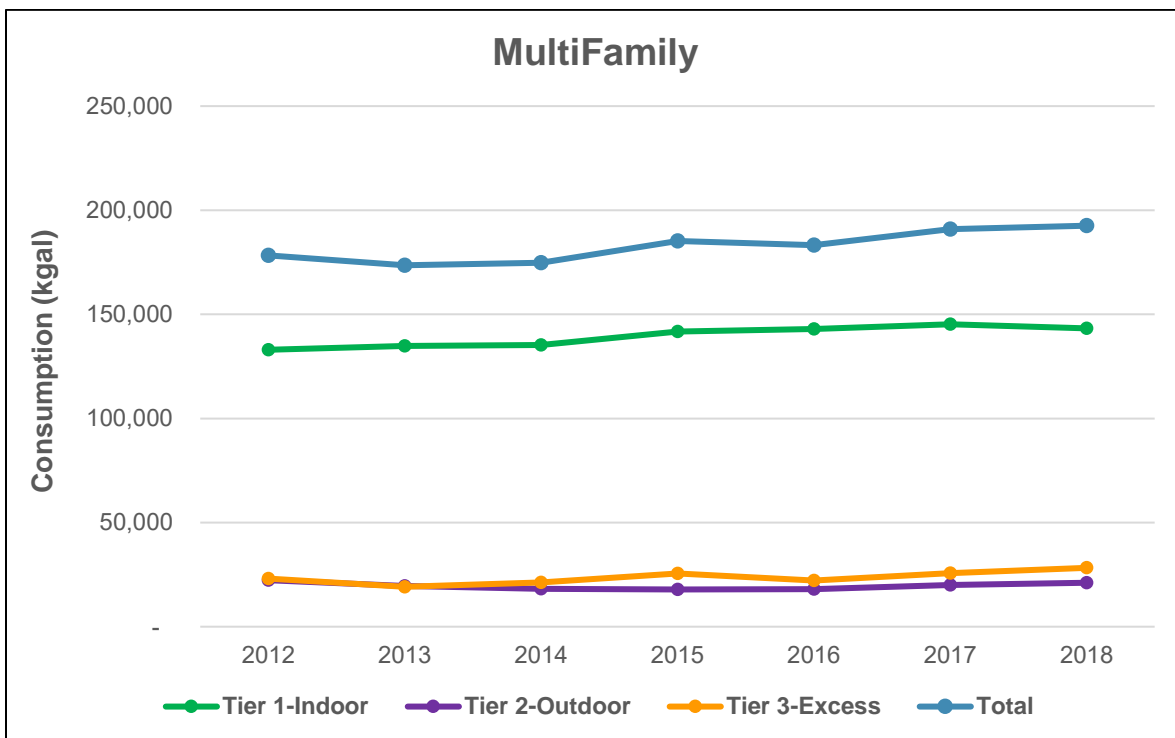
Winter Season					
Class	Tier 1	Tier 2	Tier 3	Total	Surcharge
Commercial	44,963	-	12,457	57,420	-
Commercial w/ Irrig	29,028	-	5,083	34,111	-
Irrigation	-	-	2,534	2,534	-
MultiFamily	36,052	-	5,307	41,359	-
MultiFamily w/ Irrig	23,045	-	2,525	25,570	-
Residential	334,895	-	60,242	395,137	365
Total Kgals	467,983	-	88,148	556,131	365
Tier % of Total	84%	0%	16%	100%	

Irrigation Season					
Class	Tier 1	Tier 2	Tier 3	Total	Surcharge
Commercial	64,439	-	32,407	96,846	-
Commercial w/ Irrig	42,548	35,470	18,622	96,640	-
Irrigation	-	314,749	40,912	355,661	-
MultiFamily	50,997	-	10,995	61,992	-
MultiFamily w/ Irrig	33,116	21,090	9,434	63,640	-
Residential	502,683	754,298	102,634	1,359,615	12,601
Total Kgals	693,783	1,125,607	215,004	2,034,394	12,601
Tier % of Total	34%	55%	11%	100%	

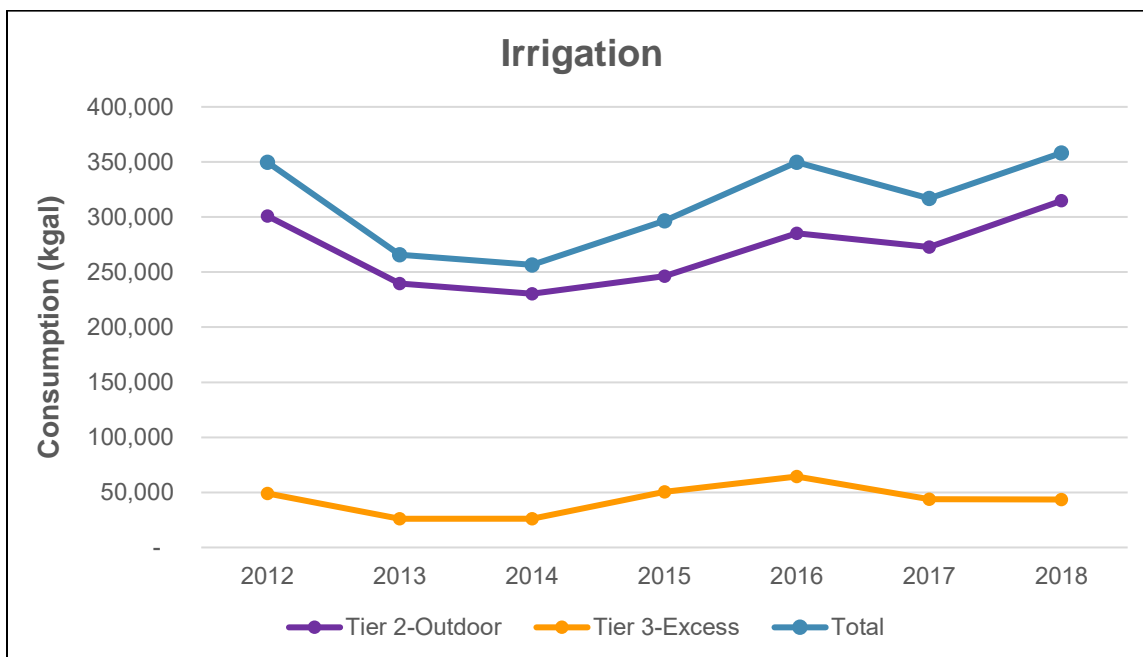
**CHART 19: COMMERCIAL CUSTOMER CLASS
ANNUAL BILLED USAGE BY TIER 2012-2018**



**CHART 20: MULTIFAMILY CUSTOMER CLASS
ANNUAL BILLED USAGE BY TIER 2012-2018**



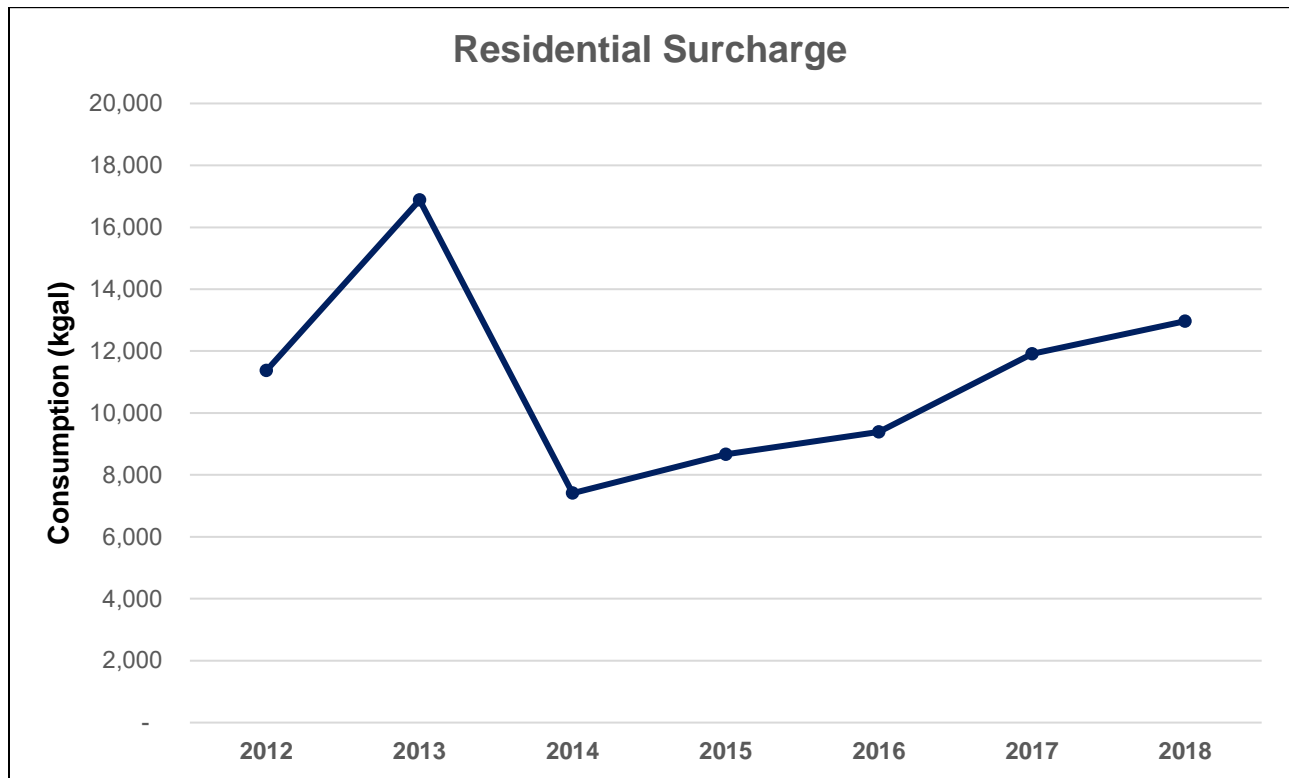
**CHART 21: IRRIGATION CUSTOMER CLASS
ANNUAL BILLED USAGE BY TIER 2012-2018**



**CHART 22: RESIDENTIAL CUSTOMER CLASS
ANNUAL BILLED USAGE BY TIER 2012-2018**



**CHART 23: RESIDENTIAL CUSTOMER CLASS
ANNUAL BILLED USAGE
SURCHARGE ONLY 2012-2018**



Charts 19-20 show that even though growth has continued through 2018 consumption by tier for Commercial and Multifamily customer classes have remained consistent. However, Chart 21 shows that even with the addition of 34 new accounts from 2017 to 2018, those customers are staying within Tier 2 since Tier 3 usage has remained virtually flat. Residential account usage by tier in Chart 22 appears to be trending in the opposite direction. With the addition of more accounts, the usage across all accounts is decreasing in Tier 1 and increasing in Tiers 2 and 3.

Surcharge usage has started to trend upward again over the last few years. In the 2018 study, Castle Rock Water analyzed the impact on accounts if the surcharge started at 30,000 gallons or 35,000 gallons rather than 40,000 gallons that is currently in place.

Chart 24 shows the surcharge threshold comparison for the 2019 study. Chart 25 shows the surcharge threshold comparison for the 2018 study.

The analysis conducted in the 2019 study showed in 2018 there were 627 residential customers who were at or over the 40,000 gallons per month threshold during January 2018-December 2018 billing data. When taking the same billing data and lowering the threshold to 35,000

gallons, 1,038 residential customers were impacted. When lowering the threshold to 30,000 gallons, significantly more customers at 1,932 are impacted. In conclusion, reducing the 40,000 gallons surcharge threshold to 30,000 gallons impacts approximately 9.69% of the residential customers and accounts for 2.19% of the total residential consumption. Most of the consumption charged in surcharge is the result of a leak. Based upon Castle Rock Water’s leak policy, if the leak is fixed and consumption patterns return to normal, the surcharge amount credits back to the customer’s account.

Chart 25 shows the same information from the 2018 study. Although the number of customers impacted in the 35,000 and 40,000 thresholds have increased in the 2019 study, the results for the 30,000 threshold customers impacted show a significantly higher result in the 2019 study. Table 8 shows a comparison of the impact in consumption and the number of customers over the last 3 years should the threshold be changed.

CHART 24: SURCHARGE THRESHOLD COMPARISON – 2019 STUDY

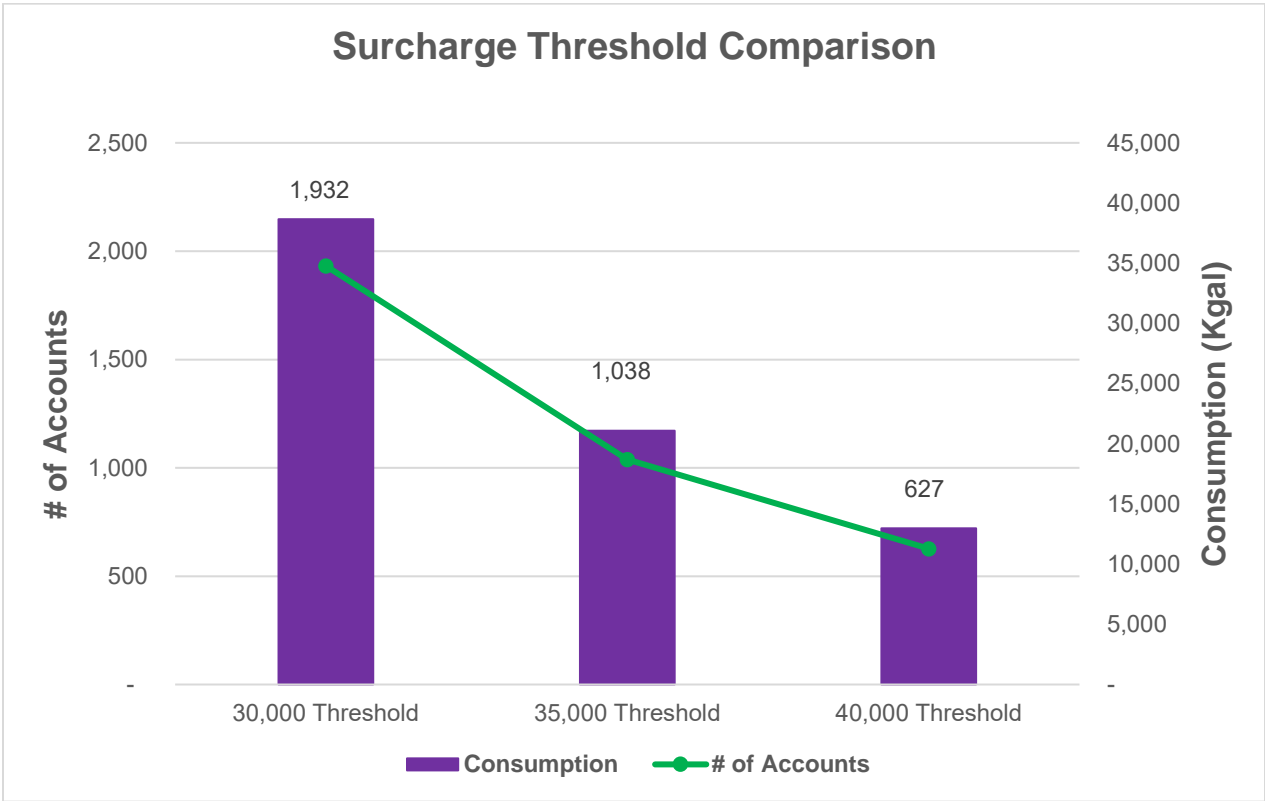


CHART 25: SURCHARGE THRESHOLD COMPARISON – 2018 STUDY

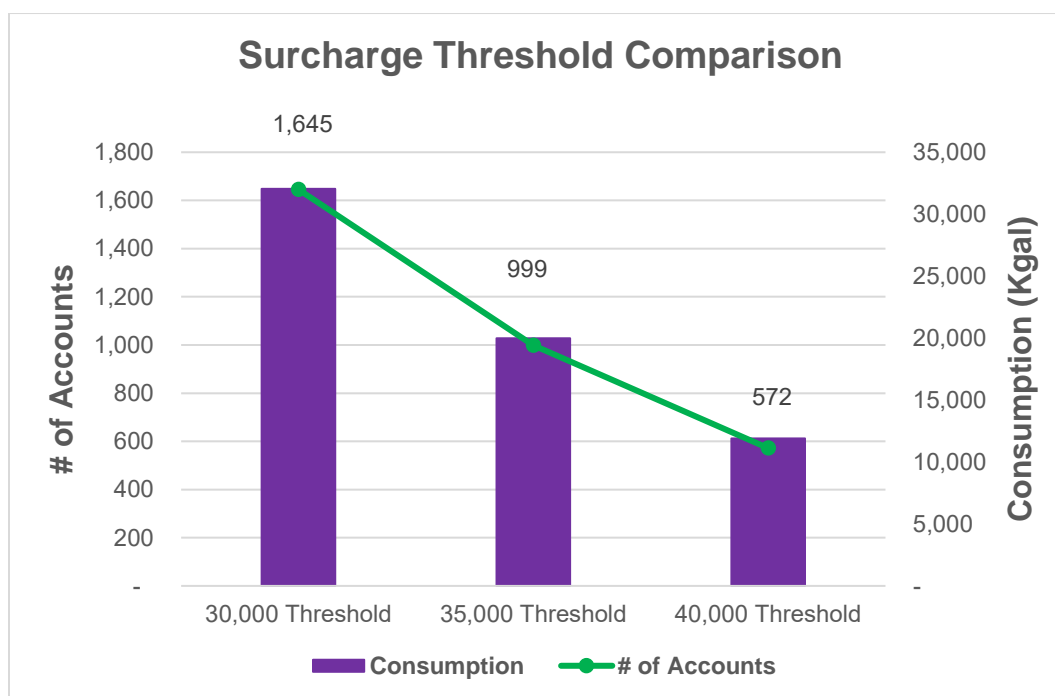


TABLE 8: RESIDENTIAL SURCHARGE THRESHOLD COMPARISON BY YEAR

	2016	2017	2018
# of Customers Surcharge – 40K	485	572	627
# of Customers Surcharge – 35K	805	999	1,038
# of Customers Surcharge – 30K	1,347	1,645	1,932
Usage in Surcharge 40K threshold (kgals)	9,388	11,913	12,966
Usage in Surcharge 35K threshold (kgals)	15,661	19,981	21,073
Usage in Surcharge 30K threshold (kgals)	26,056	32,049	38,656
% Increase in Accounts	3.95%	4.53%	5.72%
% of Residential Accounts in Surcharge	2.69%	3.03%	3.14%

We also looked at Tier 3 usage to see how many customers used Tier 3 only once or twice in the year versus how many used Tier 3 consistently throughout the year. For the 2019 study, the data shows that during irrigation season 63% of the customers only hit Tier 3 once or twice and 37% of the customers only hit Tier 3 once or twice in the winter season.

TABLE 9: TIER 3 CUSTOMER USAGE - 2018 BILLING DATA

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	7,133	4,527	2,606	63%	37%
Residential-WIN	14,906	10,853	4,053	73%	27%
Total	22,039	15,380	6,659	70%	30%

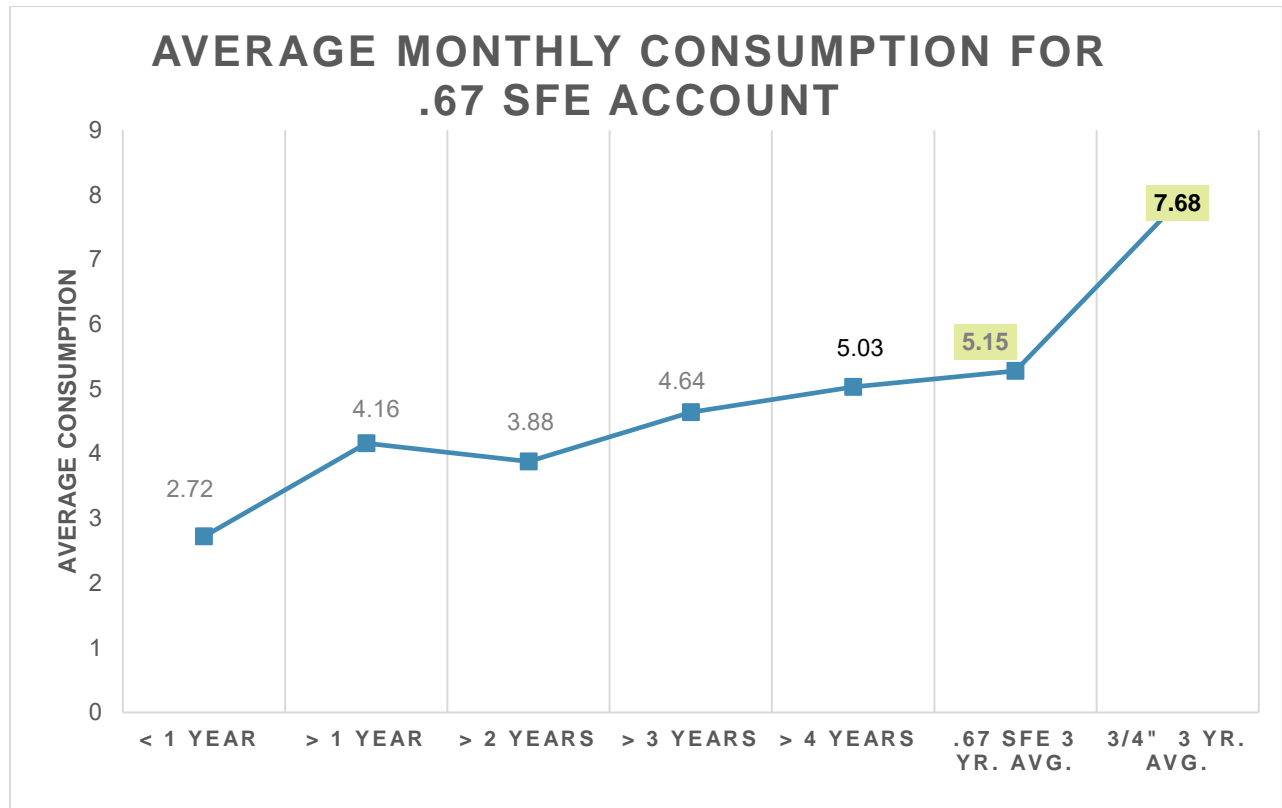
TABLE 10: ANNUAL CONSUMPTION AND REVENUES BY TIER - 2018 BILLING DATA

Residential Tier	Consumption		Revenues		
Tier 1	837,578	47%	\$	2,361,969	30%
Tier 2	754,298	43%	\$	4,171,268	53%
Tier 3	162,876	9%	\$	1,183,974	15%
Surcharge	12,966	1%	\$	107,488	1%
Total	1,767,718	100%	\$	7,824,700	100%

5/8" ACCOUNTS - .67 SFE

Castle Rock Water evaluated these accounts to determine performance relative to the goal of 67% of average residential use. A more detailed evaluation showed that certain homebuilders were not meeting the intent, while others were. Changes made to the fixture count criteria and administrative approval process intends to bring these types of accounts more into line with the expectation of the program. As shown in Chart 26 below, the 7.88 is the average monthly consumption for a 3/4" residential account or one SFE, whereas the 5.28 is the monthly consumption that a .67 SFE account should be using. Although the 4 year average remains under the requirement, the average continues to rise year over year.

CHART 26: .67 SFE ACCOUNT CONSUMPTION BY YEAR



IRRIGATION USAGE BASED ON WATERING SCHEDULES

Each irrigation season Castle Rock Water puts out a residential watering schedule based on the last digit of their service address representing a circle, diamond or a square. In 2018, non-residential customers were assigned 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 watering schedule.

Below are charts that show the residential and non-residential water usage from 2012 to 2018 based on the assigned symbols mentioned above. For residential customers, circle and diamond customers have very similar usage for all the years, whereas 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 7,699 customers, circle is second with 6,236 customers and diamond has the least with 6,011 customers based on the 2018 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 1,005 than the west side at 624 customers based on the 2018 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 in meeting peak demands.

CHART 27: RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE

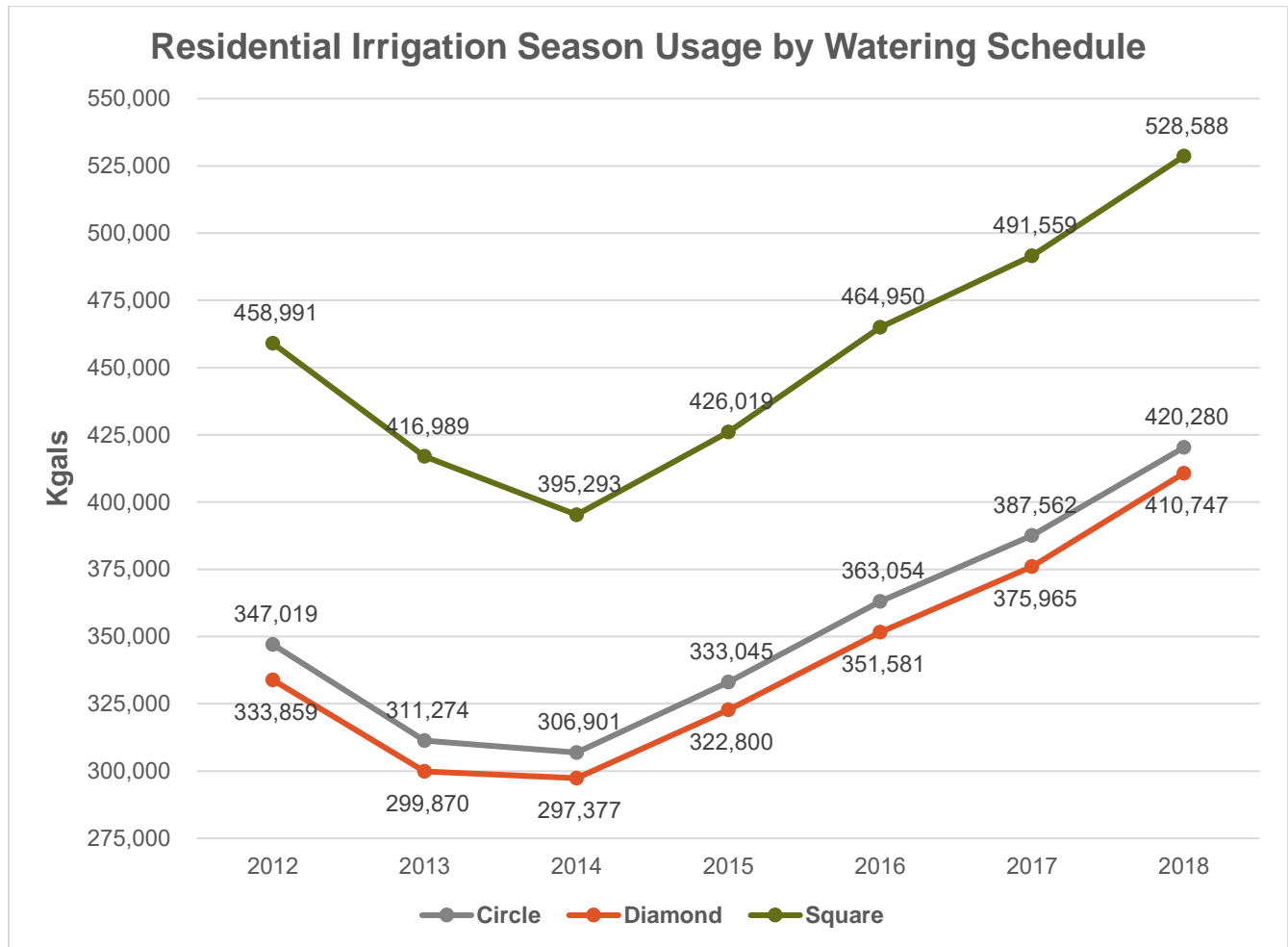
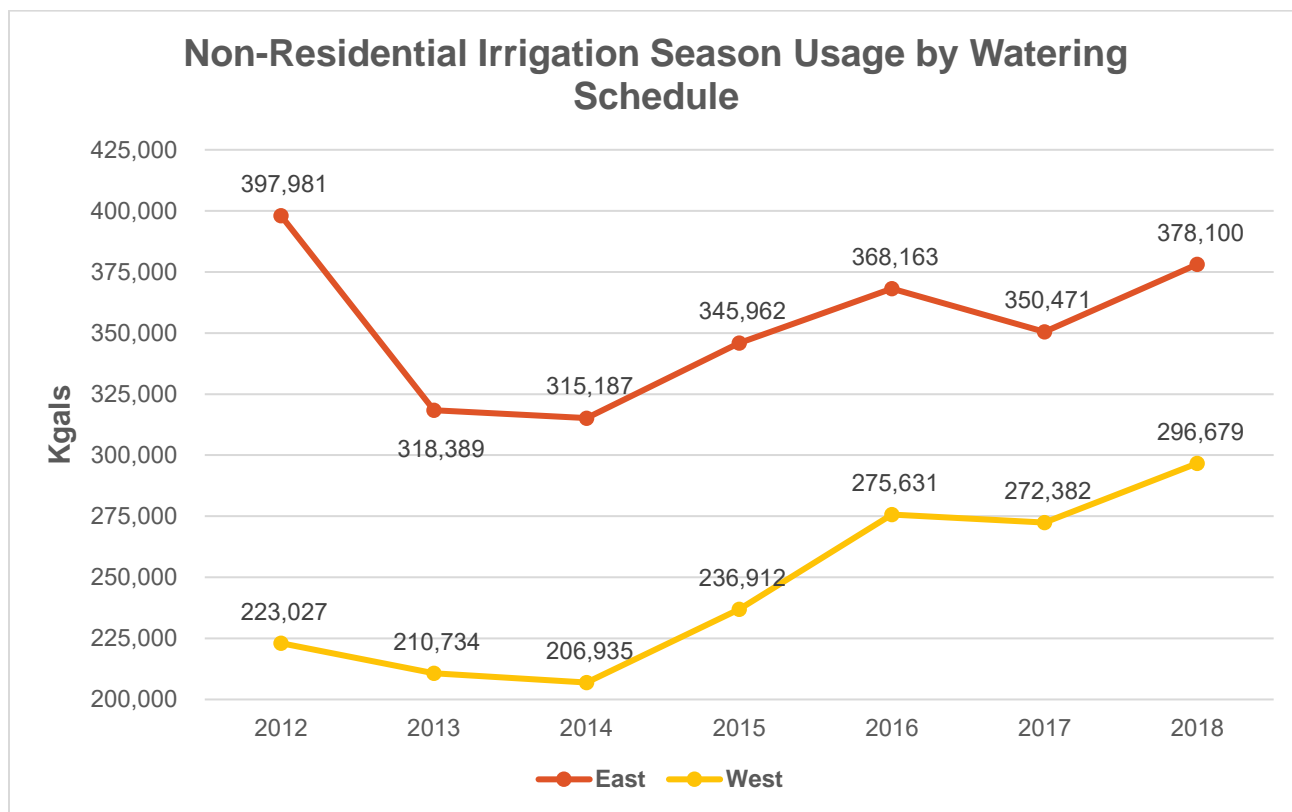


CHART 28: NON-RESIDENTIAL IRRIGATION SEASON USAGE BY WATERING SCHEDULE



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 customers on water conservation and more efficient landscaping ideas. As a water wiser customer, you can 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**

# of Months Before and After Water Wiser	Average Usage Before Water Wiser Class	Average Usage After Water Wiser Class	% of Customers to Decrease Usage After Water Wiser Class
36 Months	9.8	8.3	70%
24 Months	8.9	8.3	62%
12 Months	8.6	8.2	57%

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 70% of people have decreased their average usage, which means that 30% 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 consumption, it shows that only 57% of users decreased their usage and at 24 months consumption this increased to 62%. There is room for improvements for 30% of the water wiser customers.

NON-RESIDENTIAL IRRIGATION BUDGETS

In the 2018 study, 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. Kentucky Blue Grass requires 31 inches of supplemental irrigation whereas a Texas Hybrid requires 19 inches of supplemental irrigation. Kentucky Blue Grass, prior to July 2003, was allowed. However, any accounts started after July 2003 will have individualized adjusted budget allocations.

With a new flyover in October 2018, approximately 893 non-residential irrigation accounts have updated irrigation areas and plant types identified. This sets the new water budget allocations effective for the 2020 irrigation season. Each customer will receive a new map and graph showing their new water budget. Customers will have all of 2019 to make changes to their irrigation systems with no financial consequences. Table 12 is only an estimate of the project impact.

**TABLE 12: IRRIGATION CUSTOMERS BUDGET
ALLOCATION COMPARISON**

Customer Class	# of Accounts	2018 Actual Water Usage (kgals)	2019 Allocated Budget (kgals)	2020 Adjusted Budget (kgals)	Consumption Difference (kgals)	% Difference
Commercial w/Irrigation	278	95,280	78,781	44,777	34,004	43%
Irrigation	503	355,493	714,105	339,218	374,887	52%
Multifamily w/Irrigation	112	63,640	34,873	27,587	7,286	21%
Total	893	514,413	827,759	411,582	416,177	50%

IMPACT OF IRRIGATED AREAS (SQUARE FEET)

Chart 29 shows the number of residential accounts by irrigated area. Chart 30 shows the average monthly consumption by irrigated area. As you would expect the more irrigated area, the more the average consumption per month. Chart 31 shows total usage by irrigated area for commercial accounts. Chart 32 shows average monthly consumption for commercial accounts by irrigated area.

CHART 29: RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

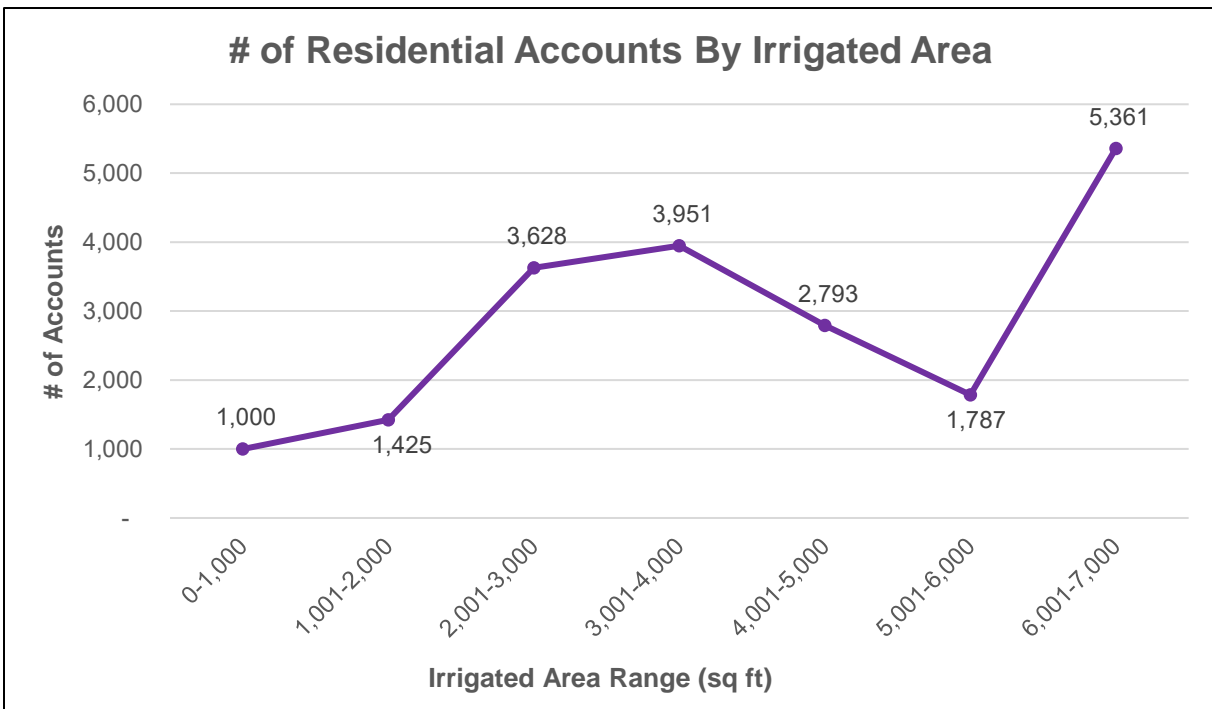


CHART 30: RESIDENTIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA

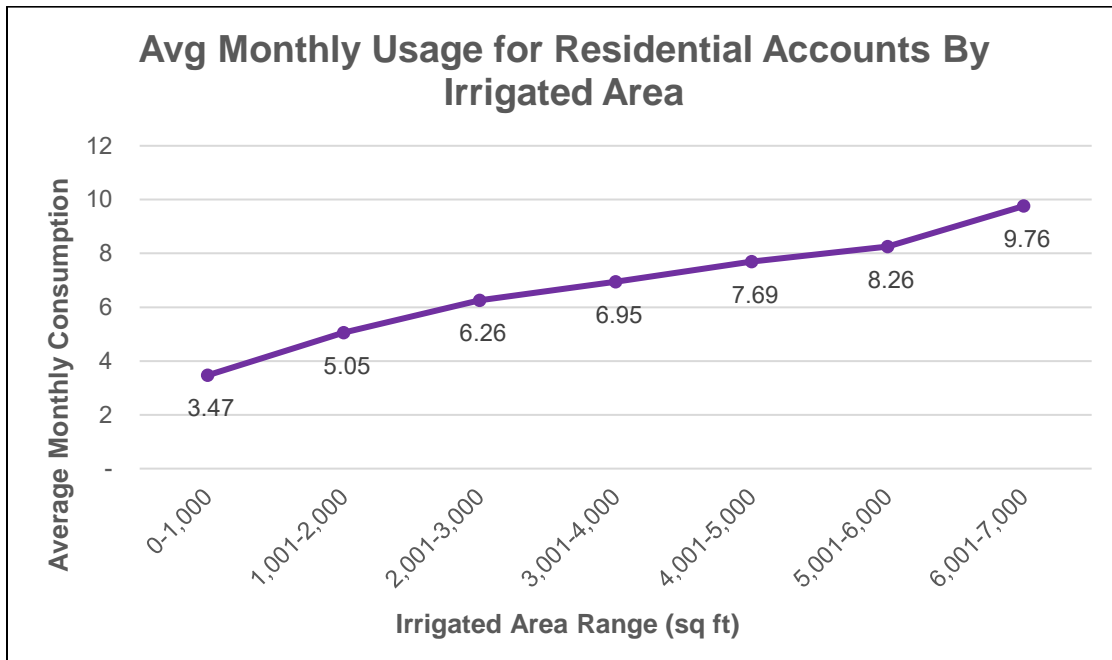


CHART 31: COMMERCIAL ACCOUNTS BY IRRIGATED AREA

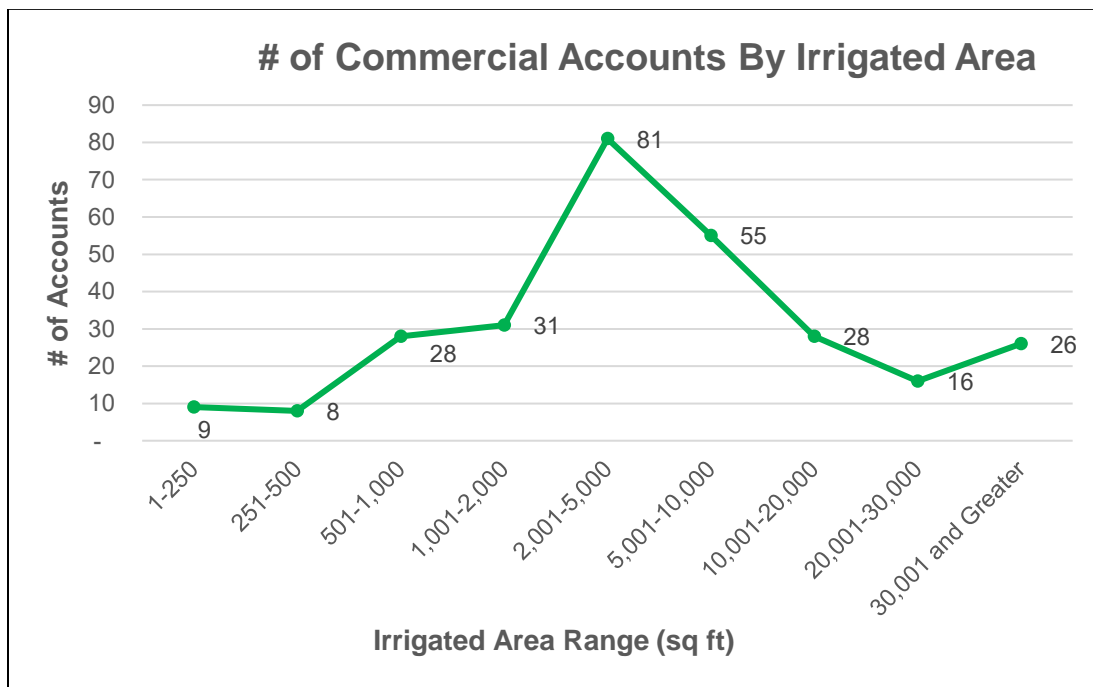
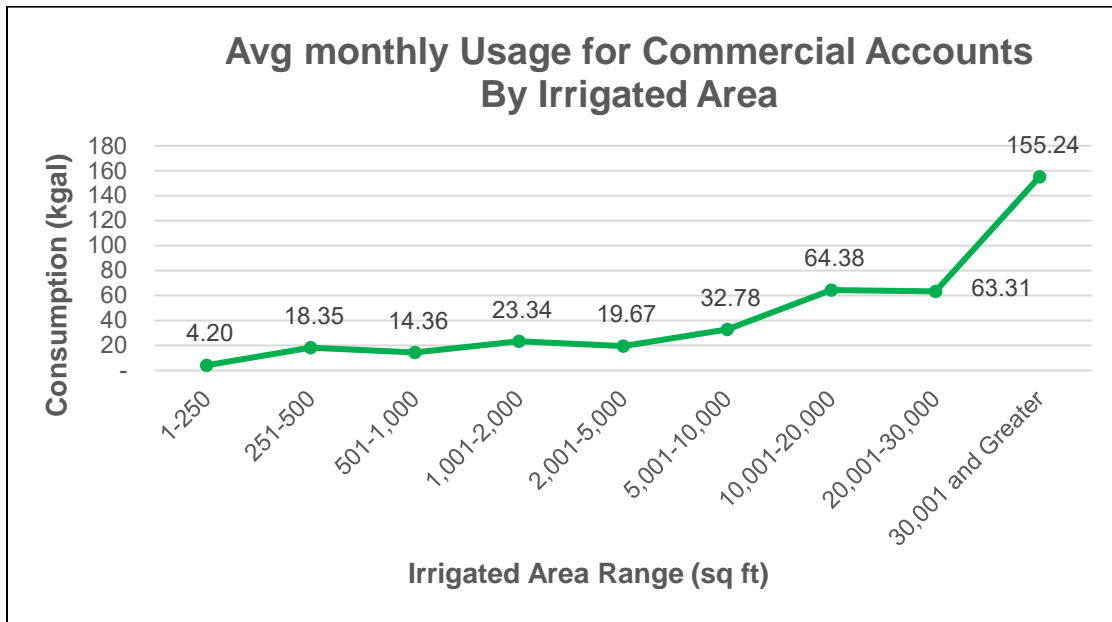


CHART 32: COMMERCIAL AVERAGE MONTHLY CONSUMPTION BY IRRIGATED AREA



HOA'S AVERAGE MONTHLY CONSUMPTION

CHART 33 AVERAGE MONTHLY CONSUMPTION FOR ALL HOA'S (85) COMBINED

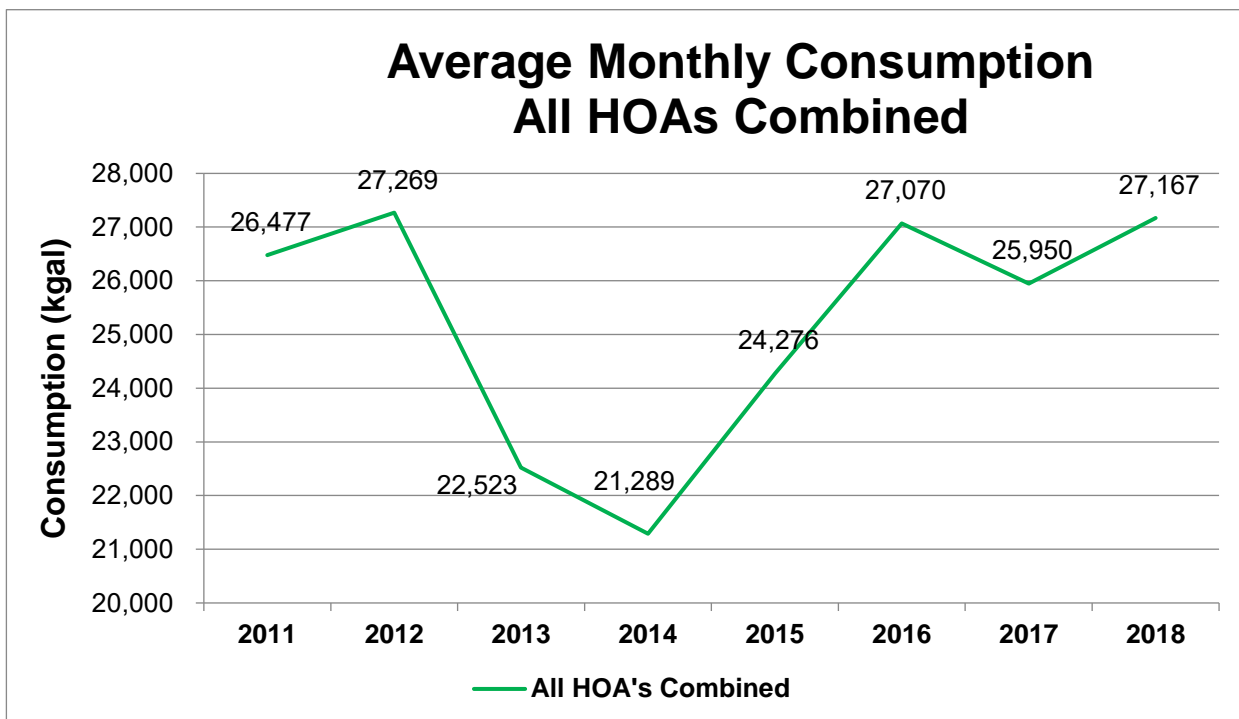
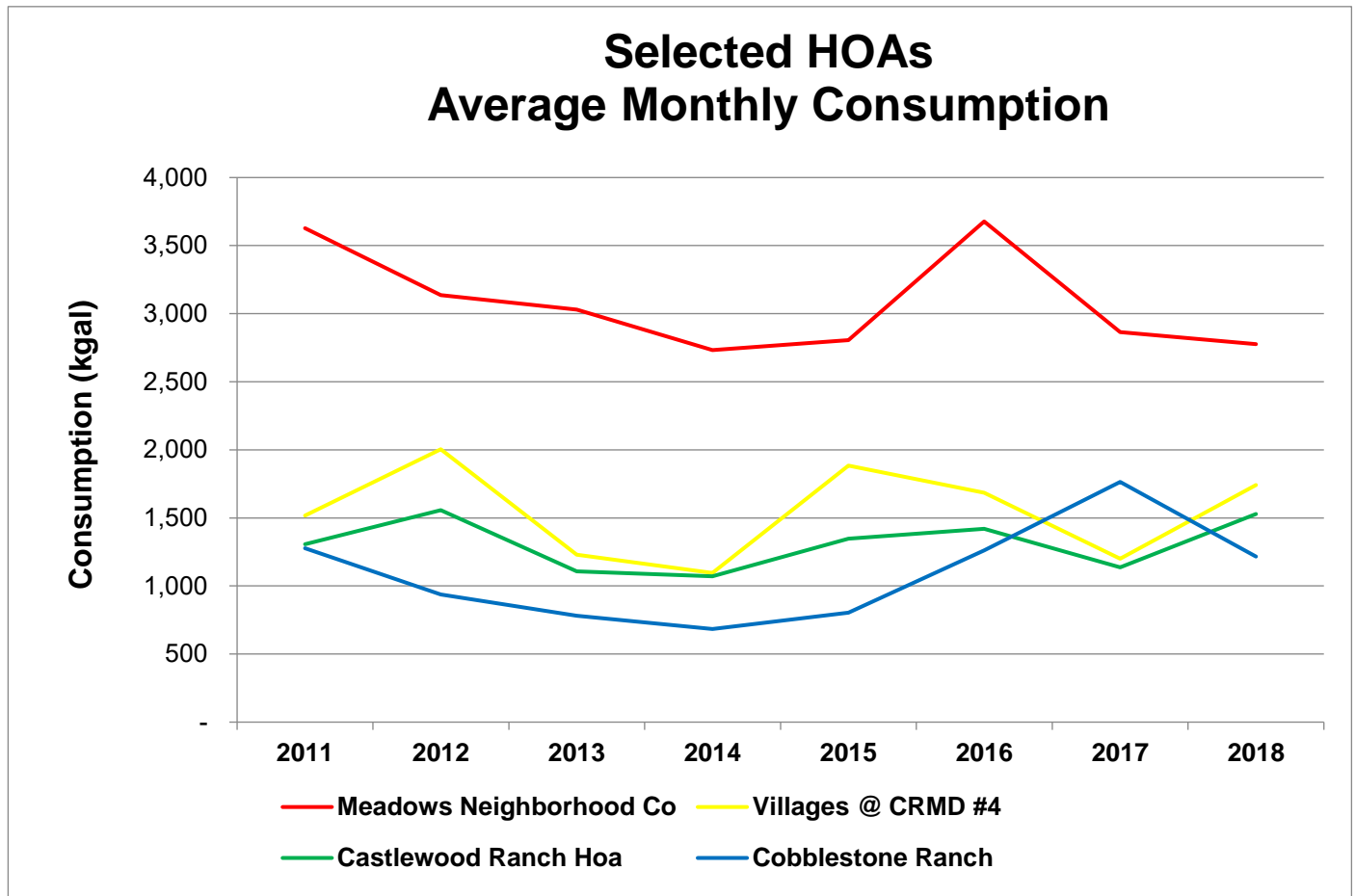


Chart 34 shows four HOA's that were selected at random to show the average monthly consumption patterns for these user types.

CHART 34: SELECTED FOUR HOA'S AVERAGE MONTHLY CONSUMPTION



MONTHLY CONSUMPTION BY SUBDIVISION

CHART 35: MEADOWS AVERAGE MONTHLY CONSUMPTION

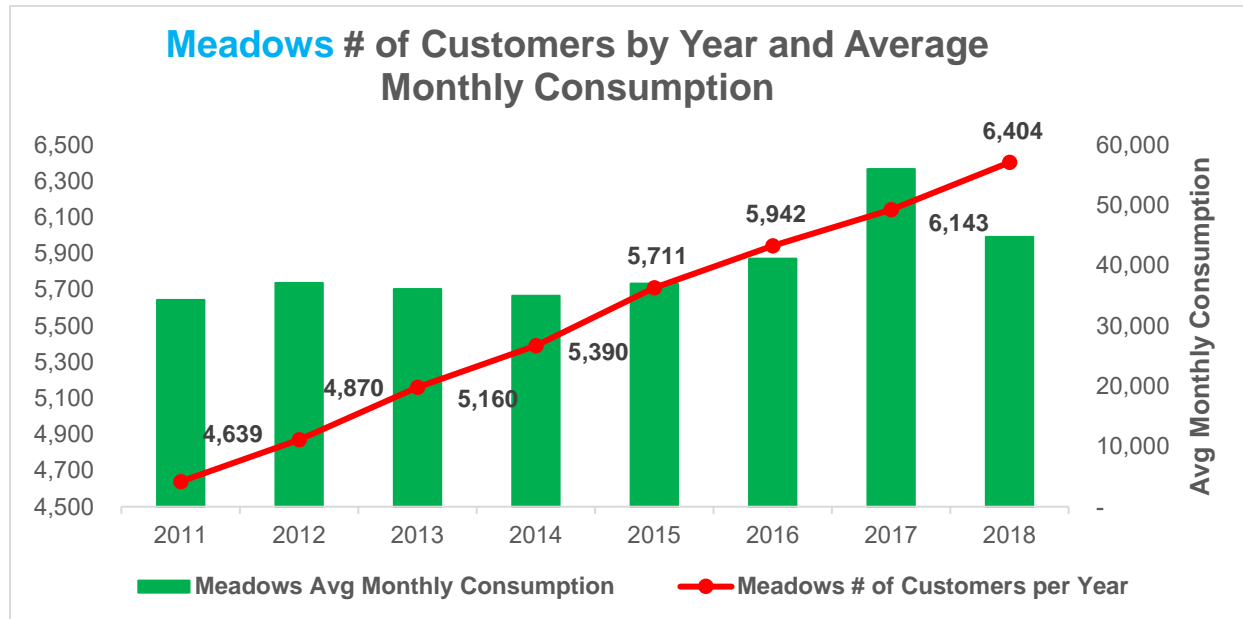


CHART 36: MEADOWS AVERAGE MONTHLY CONSUMPTION BY CUSTOMER

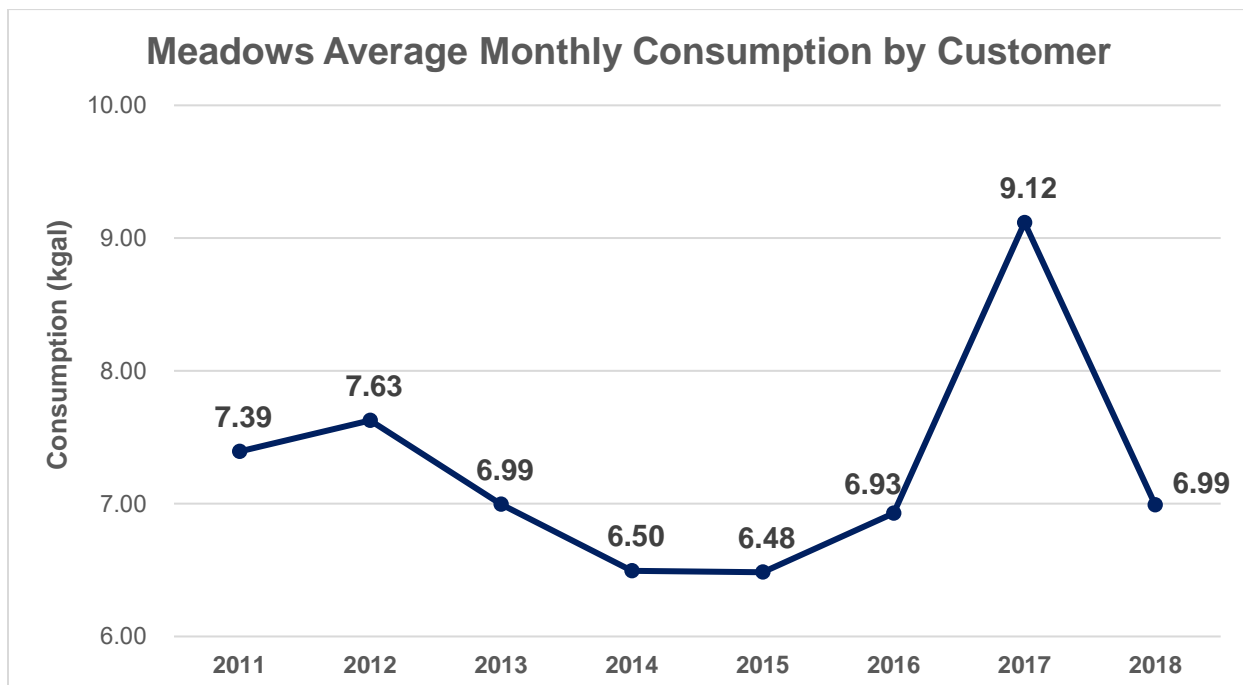


CHART 37: MEADOWS RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

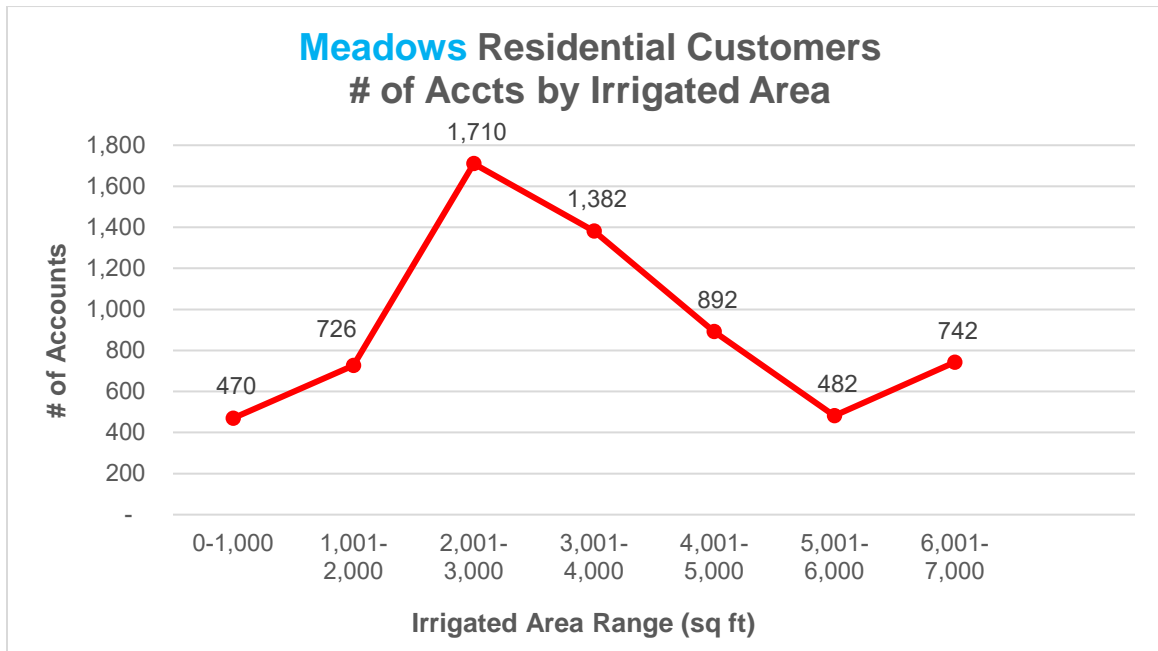


CHART 38: MEADOWS RESIDENTIAL ACCOUNTS IRRIGATED AREA BY CUSTOMER

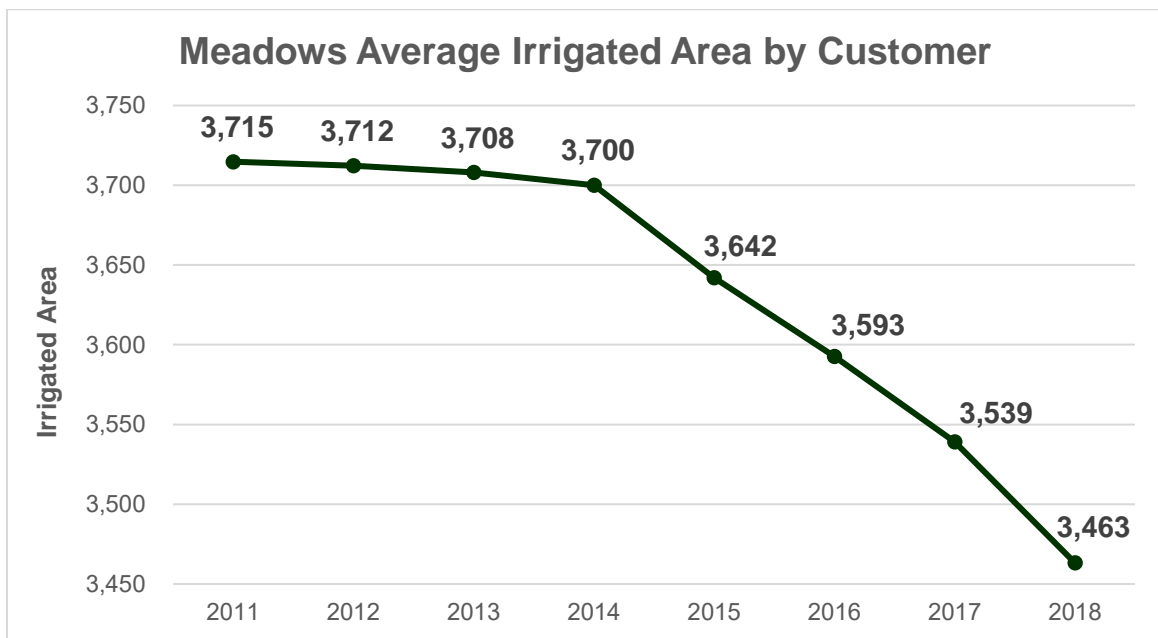


CHART 39: FOUNDERS AVERAGE MONTHLY CONSUMPTION

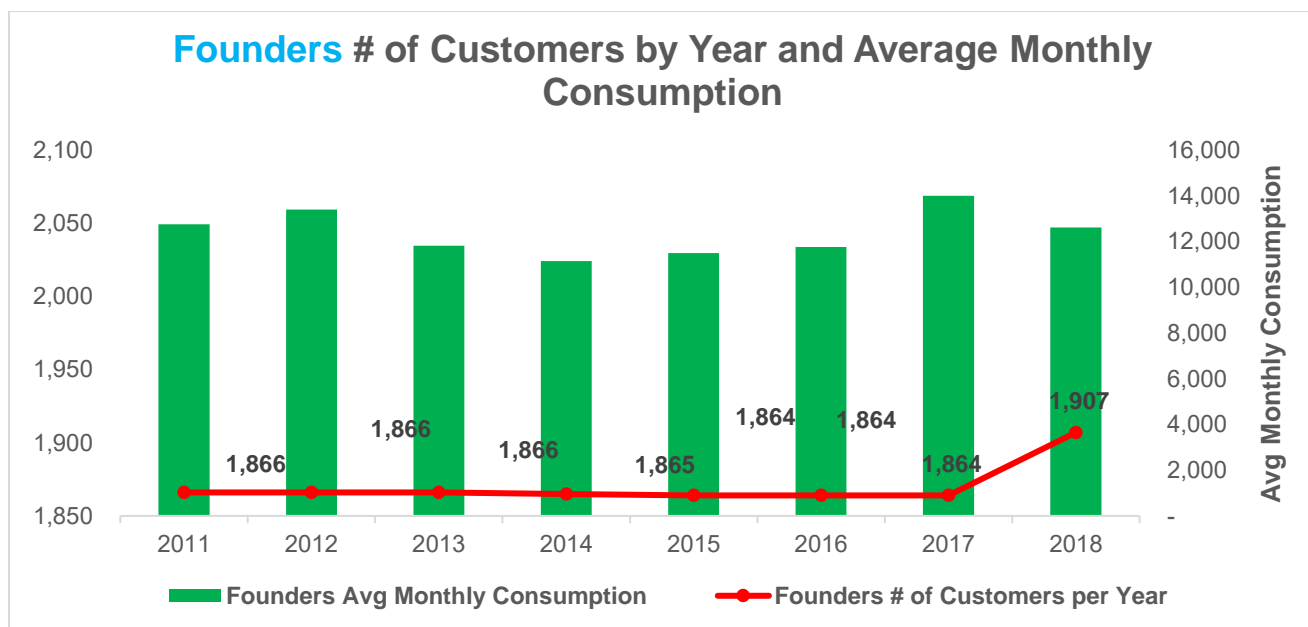
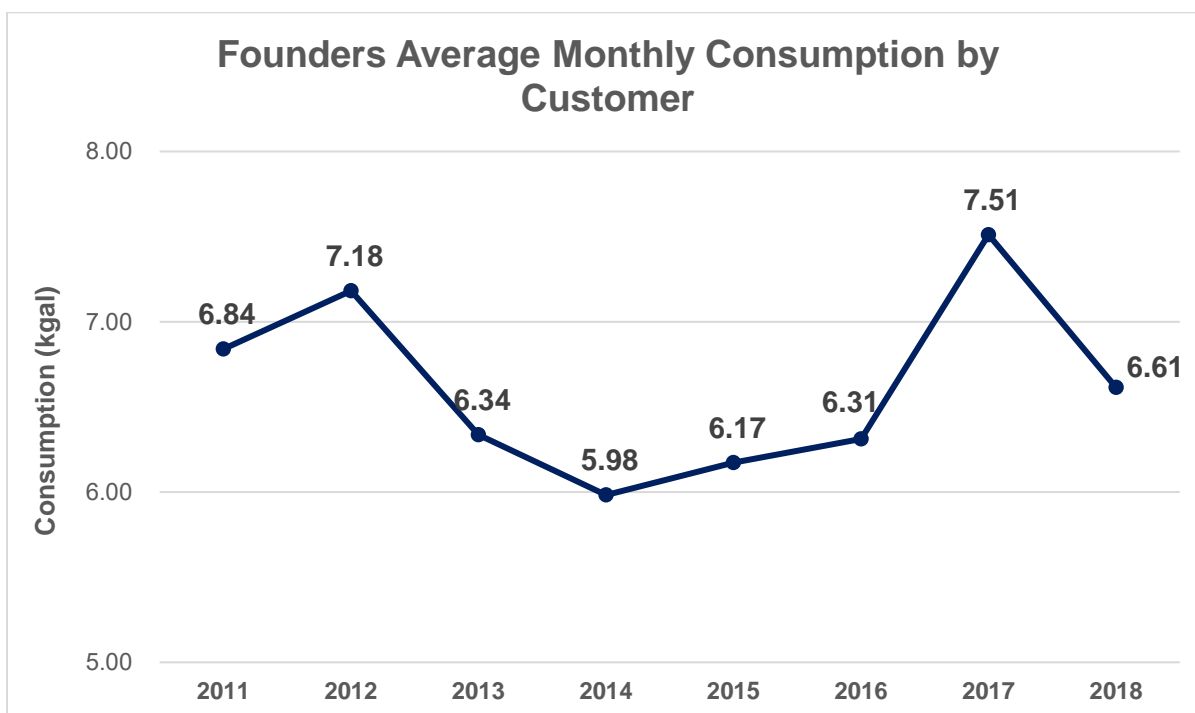
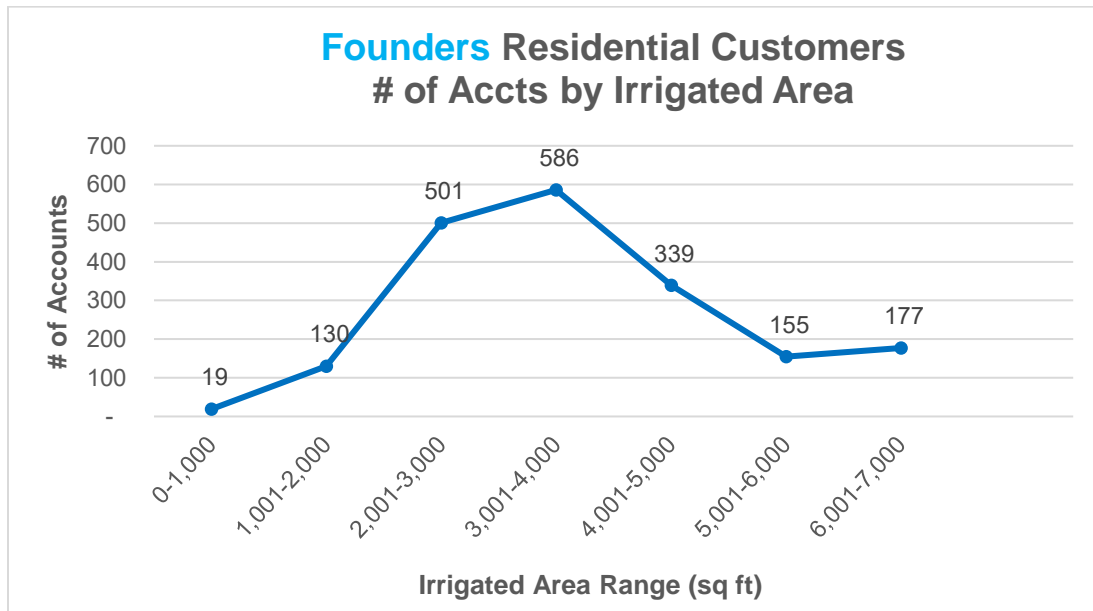


CHART 40: FOUNDERS AVERAGE MONTHLY CONSUMPTION BY CUSTOMER



**CHART 41: FOUNDERS RESIDENTIAL ACCOUNTS
BY IRRIGATED AREA**



**CHART 42: FOUNDERS RESIDENTIAL ACCOUNTS
IRRIGATED AREA BY CUSTOMER**

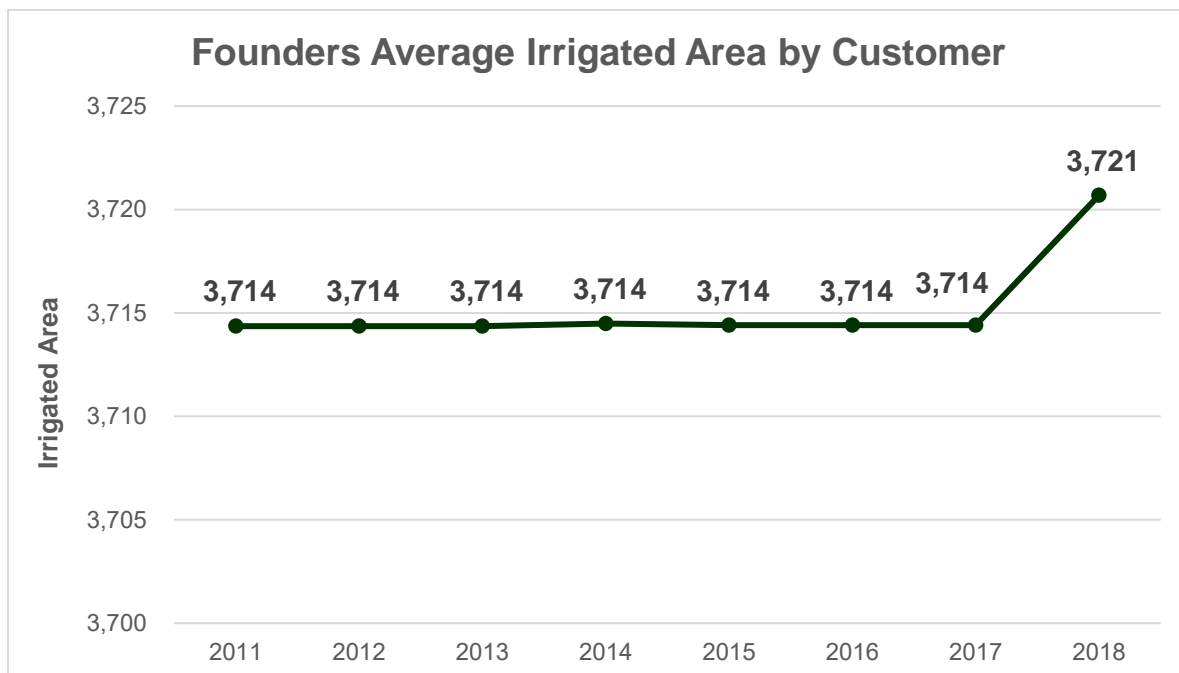


CHART 43: PLUM CREEK AVERAGE MONTHLY CONSUMPTION

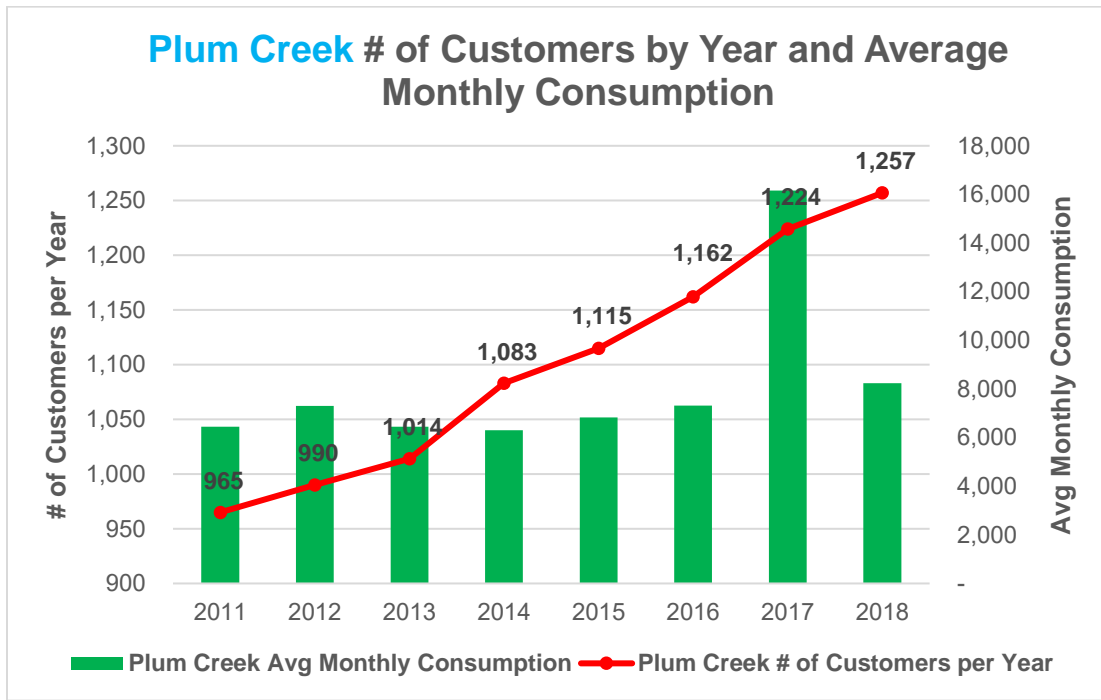


CHART 44: PLUM CREEK AVERAGE MONTHLY CONSUMPTION BY CUSTOMER

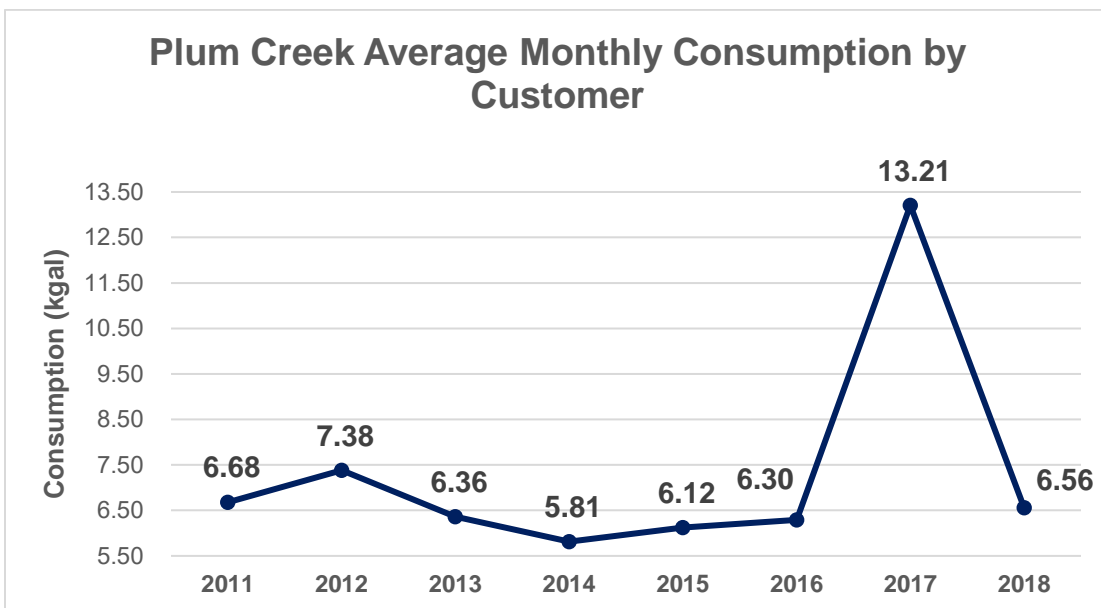


CHART 45: PLUM CREEK RESIDENTIAL ACCOUNTS BY IRRIGATED AREA

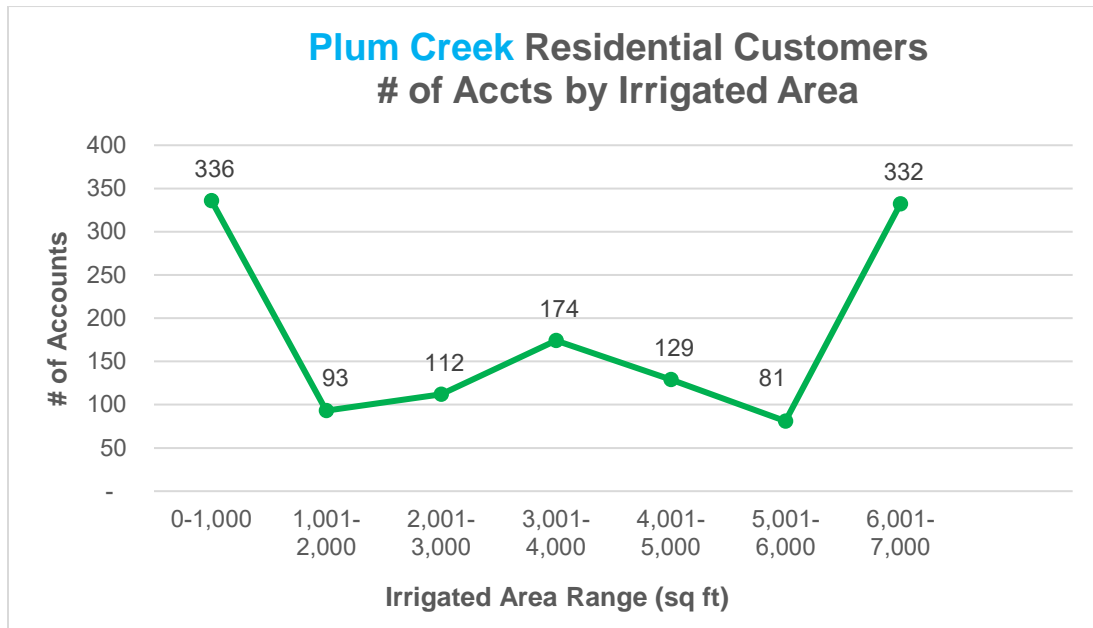
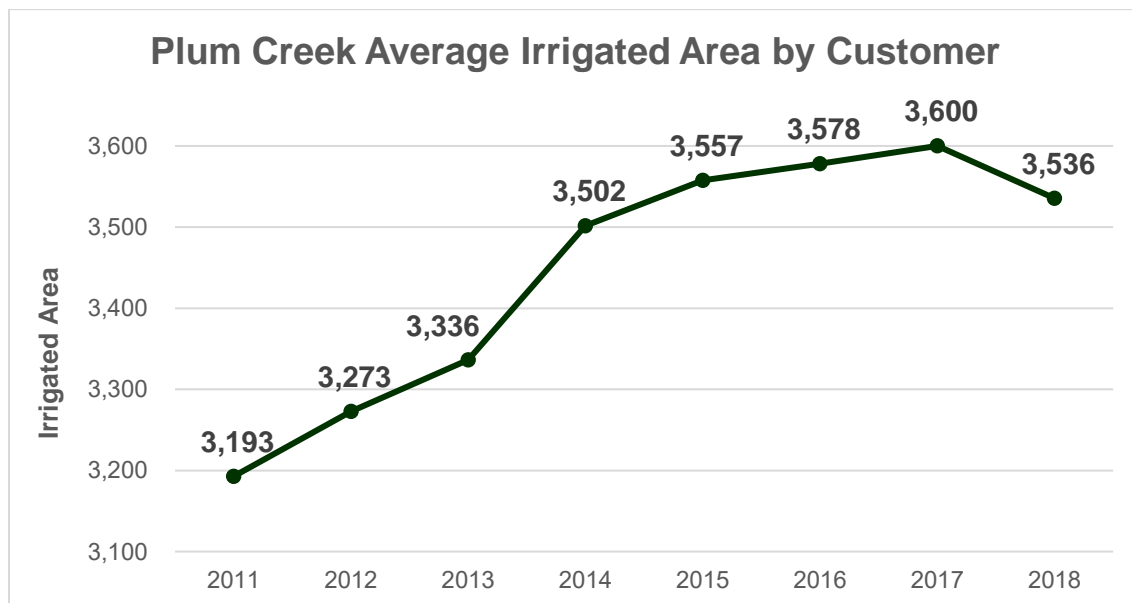


CHART 46: PLUM CREEK RESIDENTIAL ACCOUNTS IRRIGATED AREA BY CUSTOMER



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 2018. These accounts vary from year to year based on the need and demand of the customers using the program.

CHART 47: BULK HYDRANT AND STATION ACCOUNTS

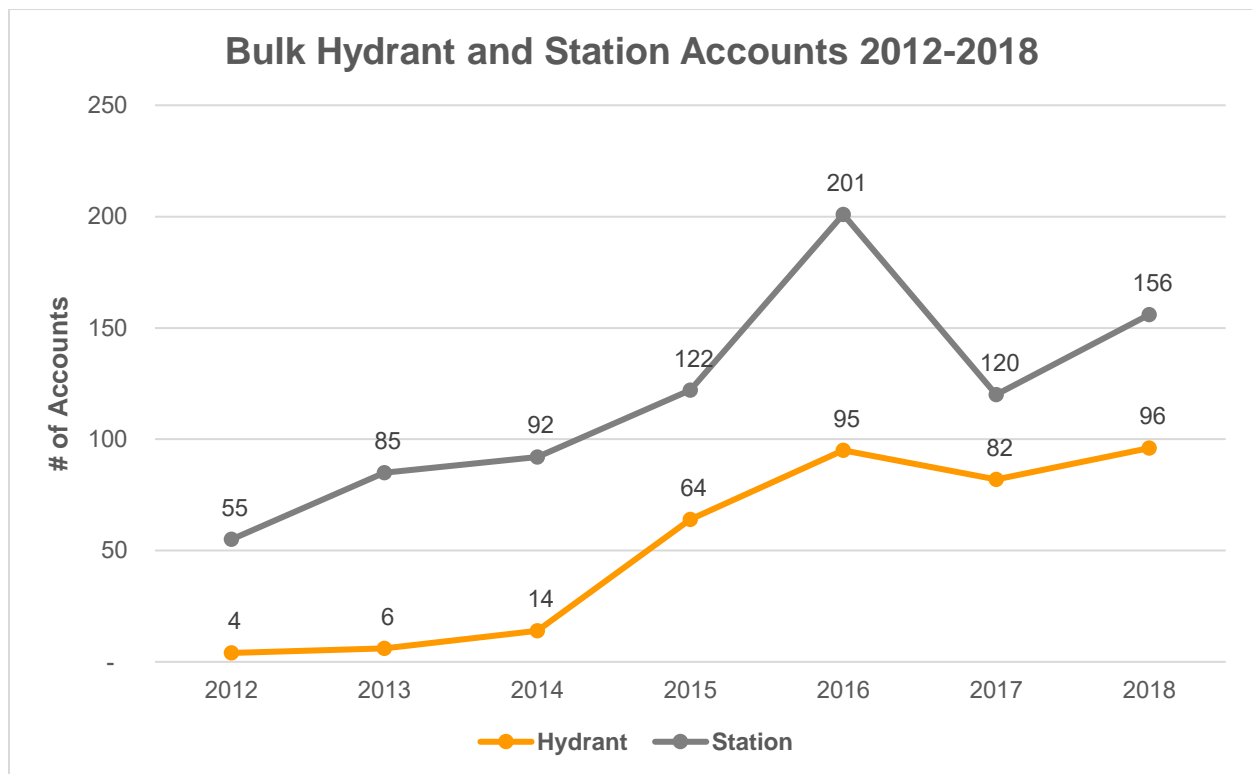


CHART 48: BULK HYDRANT USAGE

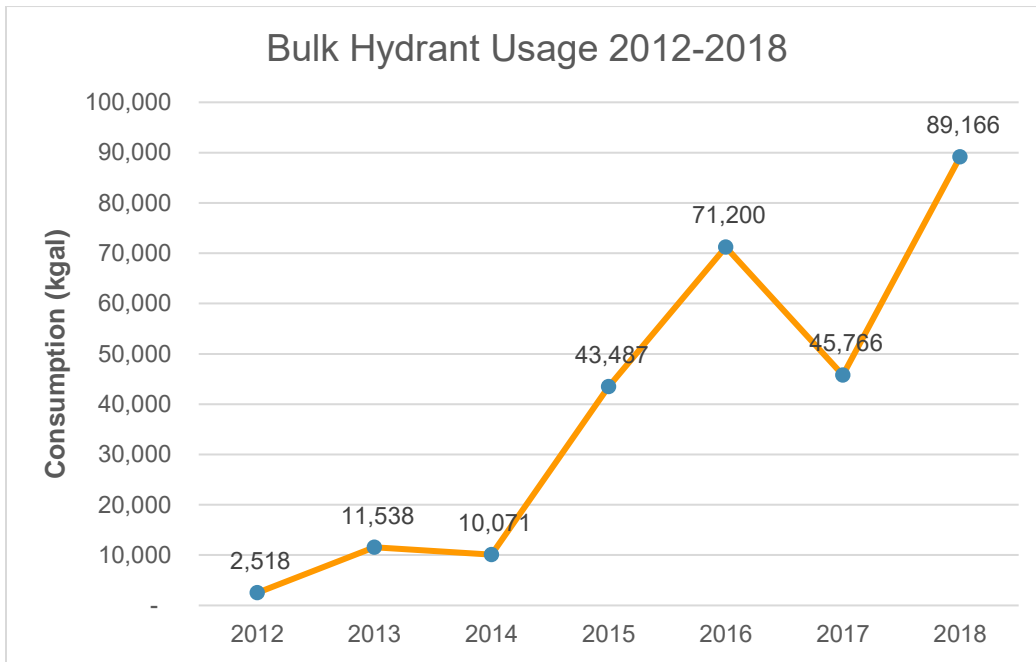
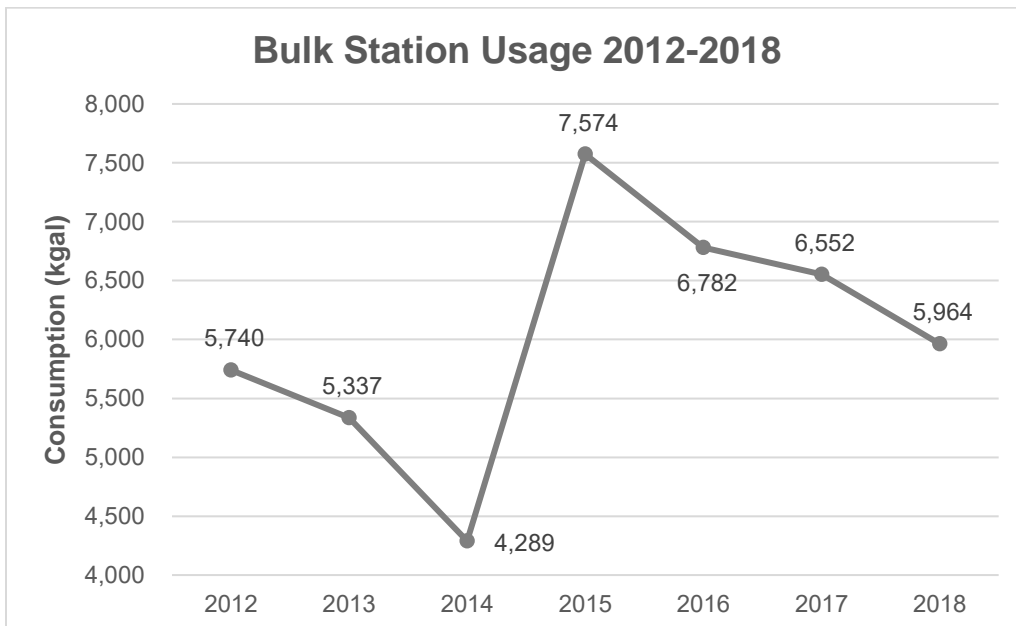


CHART 49: BULK STATION USAGE



TOWN ACCOUNT CONSUMPTION

Below is a chart showing overall town consumption from 2012 to 2018. From 2017 to 2018 consumption increased slightly, which was mainly due to the Parks Department.

CHART 50: TOWN CONSUMPTION

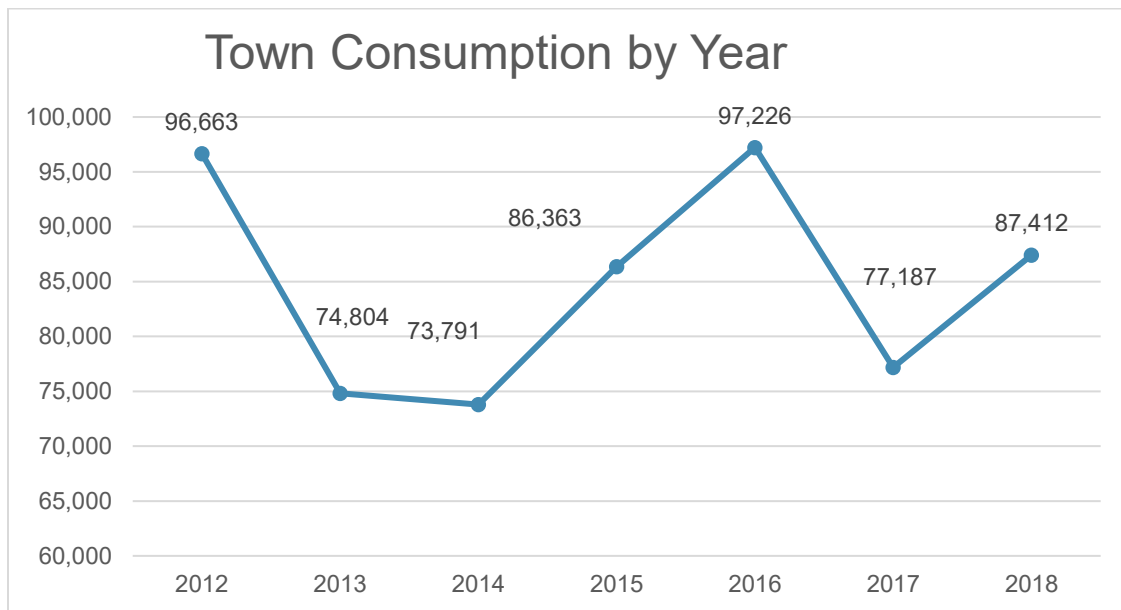


TABLE 13: TOWN CONSUMPTION BY YEAR AND DEPARTMENT (Kgal)

Department	2012	2013	2014	2015	2016	2017	2018
CRW	918	1,087	2,078	2,238	1,544	693	757
Facility Maintenance	0	0	0	0	0	22	25
Fire	937	1,209	1,164	1,274	1,117	861	1,152
Golf Course	365	342	340	379	385	325	326
Parks	85,461	63,324	63,467	75,079	87,041	66,867	76,539
Police	340	258	326	340	231	210	264
Rec Center	7,431	7,243	5,299	5,308	5,586	6,246	5,890
Service Centers	1,051	698	830	898	789	771	689
Streets	0	0	0	0	0	416	430
TownHall	160	147	154	165	172	172	335
Treatment Plants	0	496	133	682	361	604	1,005
Total Consumption	96,663	74,804	73,791	86,363	97,226	77,187	87,412

WASTEWATER ENTERPRISE FUND

NUMBER OF ACCOUNTS BY METER SIZE & CUSTOMER CLASS

Table 14 shows the number of accounts by meter size and customer class using 12 months of billing data (Jan18-Dec18). This shows that 20,868 customers were receiving wastewater service during this capture period. The FY2017 accounts based on 12 months of billing data (Jan17-Dec17) shows that 19,742 accounts were receiving wastewater service. There are 1,126 more accounts in FY2018 than FY2017.

There are approximately 779 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 Castle Rock Water's wastewater services.

TABLE 14: ACCOUNTS BY METER SIZE & CUSTOMER CLASS (FY2018)

Meter Size	Residential	Multifamily	Commercial	MultiFamily	Commercial	Total
				Indoor Use Only	Indoor Use Only	
5/8"	1,194	-	-	4	7	1,205
3/4"	18,572	14	124	101	114	18,925
1"	22	25	67	94	86	294
1.5"	-	55	48	109	81	293
2"	-	15	25	41	44	125
3"	-	2	5	2	13	22
4"	-	1	-	-	1	2
6"	-	-	2	-	-	2
Total	19,788	112	271	351	346	20,868

CHART 51: RESIDENTIAL WASTEWATER ACCOUNTS

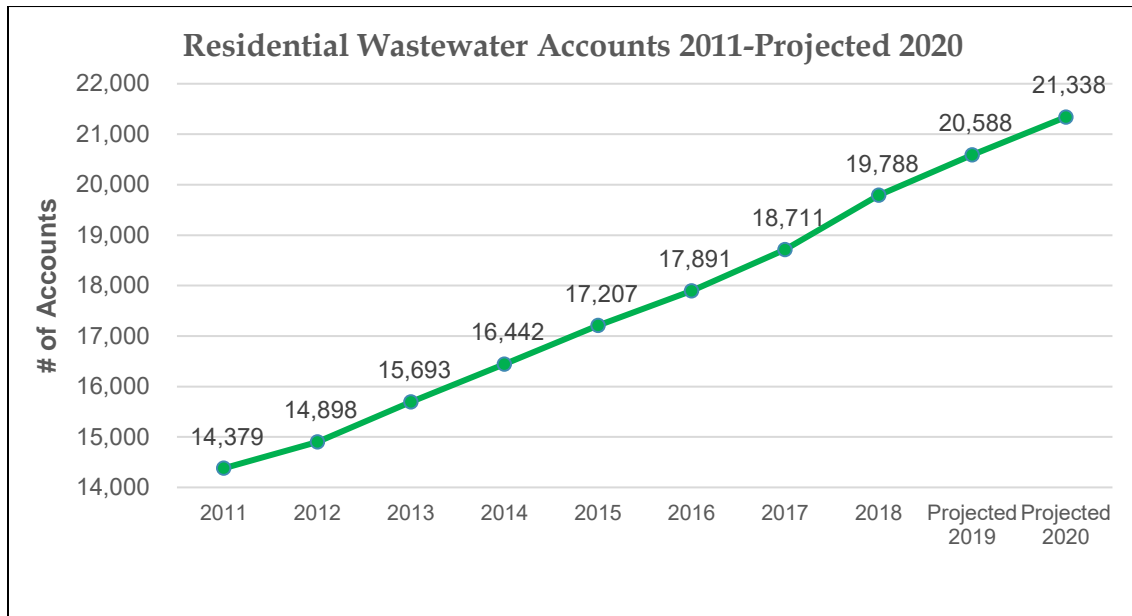
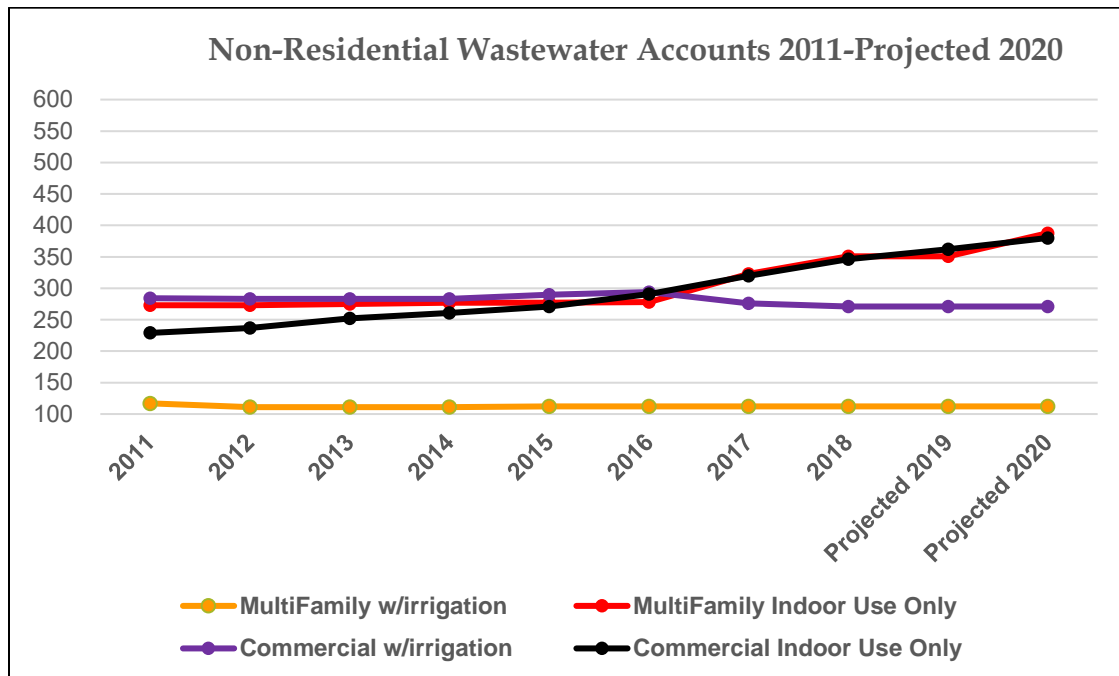


CHART 52: NON-RESIDENTIAL WASTEWATER ACCOUNTS



Castle Rock Water projects FY2020 wastewater accounts by using 2018 billing data plus projected growth for FY2019 and FY2020. The FY2020 wastewater accounts are projected to equal 22,489 (21,338 for residential and 1,151 for non-residential).

2019 Projected Accounts by Customer Class:

48 Residential (.67 SFE)
 752 Residential (1 SFE)
 16 Commercial
 816 Total

2020 Projected Accounts by Customer Class:

45 Residential (.67 SFE)
 705 Residential (1 SFE)
 37 Multi-Family
 18 Commercial
 805 Total

Total growth of 816 accounts is projected for FY2019 and 805 for FY2020 for a total of 1,621 projected for the wastewater fund thru FY2020.

WATER RESOURCES ENTERPRISE FUND

NUMBER OF ACCOUNTS BY METER SIZE & CUSTOMER CLASS

Table 15 shows the number of accounts by meter size and customer class using 12 months of billing data (Jan18-Dec18). This shows 21,634 accounts served by the water resources enterprise fund. The FY2017 accounts based on 12 months of billing data (Jan17-Dec17) showed 20,461 water resources accounts. There are 1,173 more accounts in FY2018 than in FY2017.

TABLE 15: ACCOUNTS BY METER SIZE AND CUSTOMER CLASS (FY2018)

Meter Size	Residential	Multifamily	Commercial	Bulk	Irrigation	MultiFamily	Commercial	Total
						Indoor Use Only	Indoor Use Only	
5/8"	1,193	-	-	-	23	4	7	1,227
3/4"	18,729	14	127	96	152	101	120	19,339
1"	23	25	69	-	103	94	90	404
1.5"	-	55	50	-	132	109	81	427
2"	-	15	25	-	76	41	45	202
3"	-	2	5	-	6	2	14	29
4"	-	1	-	-	2	-	1	4
6"	-	-	2	-	-	-	-	2
Total	19,945	112	278	96	494	351	358	21,634

CHART 53: RESIDENTIAL WATER RESOURCES ACCOUNTS

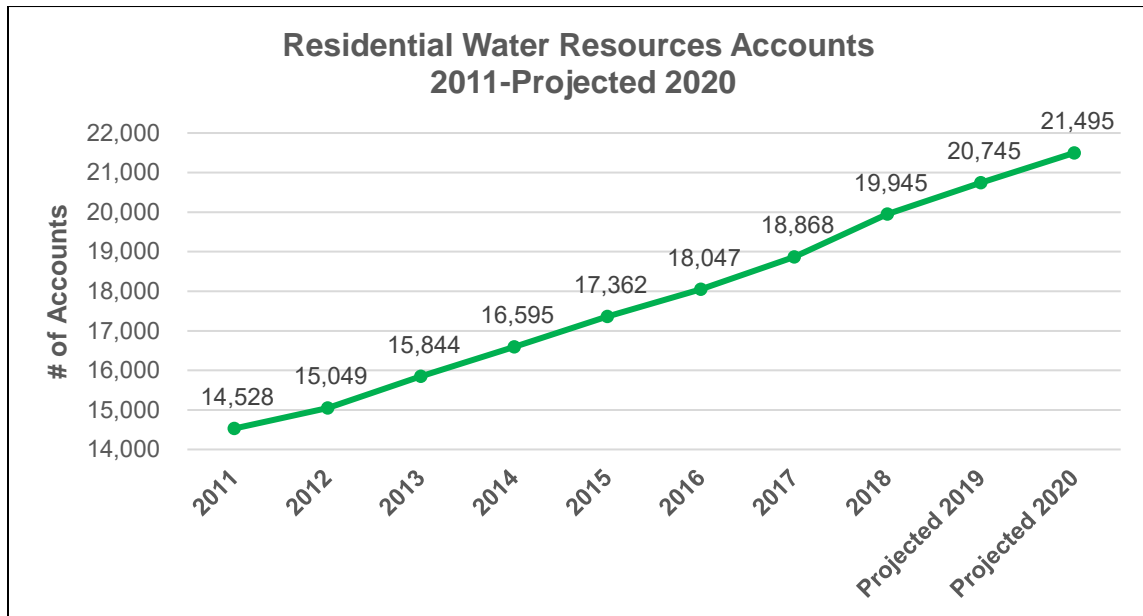
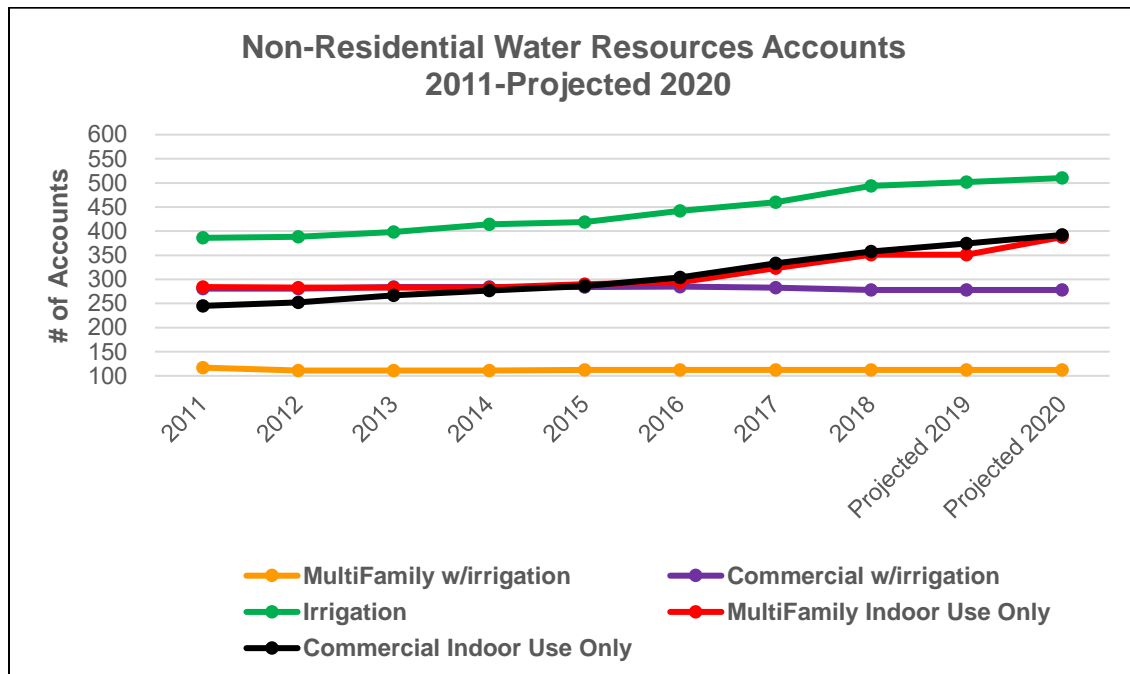


CHART 54: NON-RESIDENTIAL WATER RESOURCES ACCOUNTS



Castle Rock Water projects FY2020 water resources accounts by using 2018 billing data plus projected growth for FY2019 and FY2020. The FY2020 water resources accounts are projected to equal 23,271 (21,495 for residential and 1,776 for non-residential).

2019 Projected Accounts by Customer Class:

48 Residential (.67 SFE)
 752 Residential (1 SFE)
 16 Commercial
 8 Irrigation
 824 Total

2020 Projected Accounts by Customer Class:

45 Residential (.67 SFE)
 705 Residential (1 SFE)
 37 Multi-Family
 18 Commercial
 8 Irrigation
 813 Total

Total growth of 824 accounts is projected for FY2019 and 813 for FY2020 for a total of 1,637 projected for the water resources fund thru FY2020.

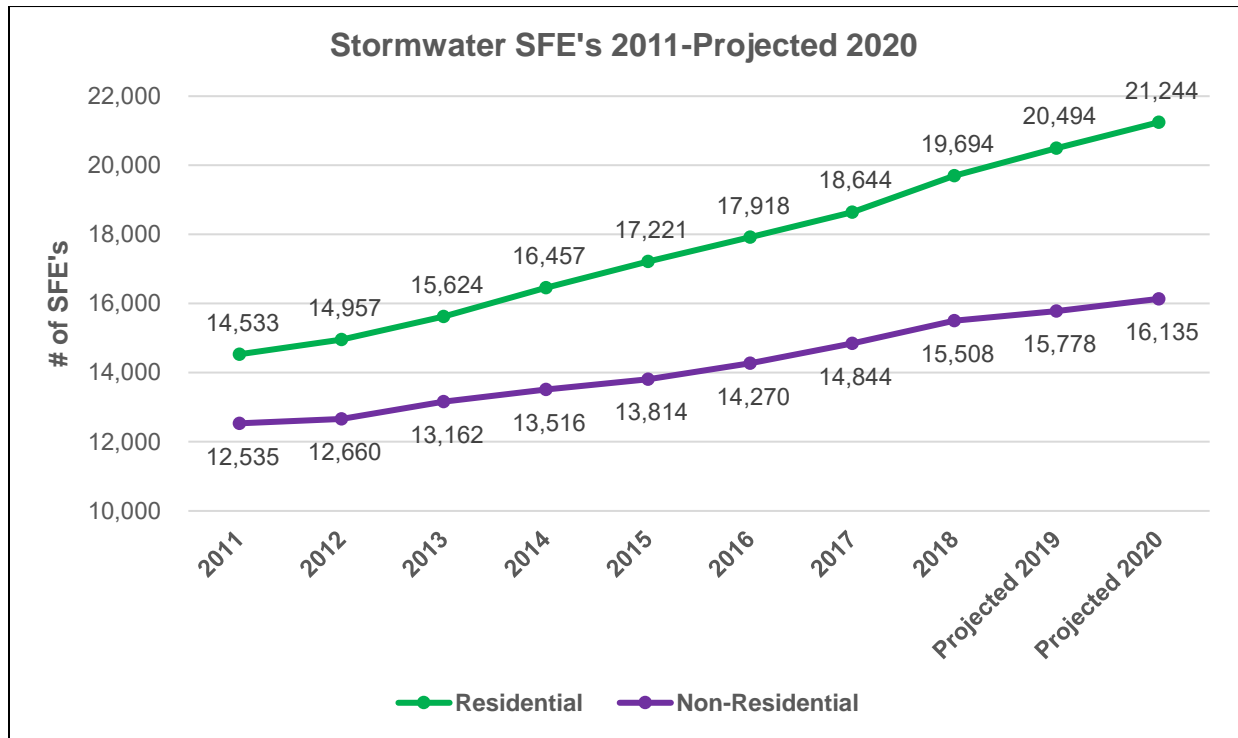
STORMWATER ENTERPRISE FUND

Table 16 shows stormwater average monthly SFEs based on 12 months of billing data (Jan18-Dec18). This shows that 35,202 SFE's were receiving stormwater services during this capture period. The FY2017 billing data (Jan17-Dec17) showed 33,488 SFE's receiving stormwater services. There are 1,714 more SFE's in FY2018 than FY2017.

TABLE 16: STORMWATER SFE'S (JAN 18-DEC 18)

Total Monthly SFE's	
Residential	19,694
Non-Residential	15,508
Stormwater SFE's	35,202

CHART 55: STORMWATER SFE'S



Castle Rock Water shows FY2020 projected stormwater SFE's based on 12 months of billing data (Jan18-Dec18) plus projected growth for FY2019 and FY2020. The FY2020 stormwater SFE's are projected to equal 37,379 (21,244 for residential and 16,135 for non-residential).

2019 Projected Accounts (SFE's)

800	Residential
112	Detached in Cherry Creek Basin
688	Detached in Plum Creek Basin
270	Commercial in the Plum Creek Basin
1,070	Total

2020 Projected Accounts (SFE's)

750	Residential
218	Detached in Cherry Creek Basin
532	Detached in Plum Creek Basin
358	Commercial in the Plum Creek Basin
1,108	Total

Total growth projected for the stormwater fund is 1,070 SFEs in FY2019 and 1,108 for FY2020.

Appendix D

Stantec Consulting Services Inc. Study Review Letter



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

August 28, 2019

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 2019 Rates and Fees Study,
Volume 1 of 2, 2020 – 2024 Rates**

As part of the 2019 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 fee and system development fee (SDF) 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 presents a five-year forecast of rate recommendations and a single test year of cost-of-service (COS) rates, CRW's annual updates to the COS models for water and wastewater allow for more granular monitoring of the equity of CRW's rates and fees for its water and wastewater utilities. As a result, Stantec recommends that CRW continue to evaluate the equity among its customer classes. Outside of the annual rates and fees study, CRW may complete a detailed comparison of costs of service by class calculated in the COS models with revenues collected from each class. This comparison of class costs of service with actual revenues collected by customer class will indicate whether adjustments to rates for certain customer classes may enhance equity in the water and wastewater systems.

In reviewing annual revenue requirements for each of CRW's enterprise funds, Stantec recommends that CRW use the financial modeling tools to balance projected rate revenue needs with revenue requirements for at least 10 years. This practice of fully balancing the financial models in the short term while maintaining a longer-term forecast of rates prepares CRW for expenditures outside the rates and fees study focus of a five-year plan. A financially sustainable utility demonstrates that each enterprise fund meets financial targets such as minimum reserves every year and properly plans for future capital expenditures. Considering a longer-term forecast provides insight into rate adjustments that may be needed earlier to avoid large increases beyond the Study period.

When considering reserve levels, CRW policy is to maintain a catastrophic failure reserve fund equal to 2% of original fixed asset values. To avoid excessive accumulation of funds as capital improvements are constructed in the future, CRW may consider a maximum or cap to the reserve level.

To further balance revenue needs with expenditures, Stantec recommends that CRW establish accounts in each enterprise fund to transparently track SDF revenues and growth-related expenditures separately from operating revenues and expenses. This separation of rate revenues and growth-related revenues and expenses provides explicit proof that growth is paying for the costs of growth.

August 28, 2019

Anne Glassman, Business Solutions Manager

Page 2 of 2

Reference: Stantec Financial Review Services for Castle Rock Water's 2019 Rates and Fees Study, Volume 1 of 2, 2020 – 2024 Rates

This year CRW is evaluating a new approach to funding stormwater capital improvements. For the first time, debt is being considered as a source of funds for these improvements. Stantec suggests CRW monitor the stormwater fund revenues closely to ensure future debt service is recovered from both user fees and development impact fees. In the event the proposed debt issuance requires debt service coverage obligations, revenues should be reviewed each year and adjusted if financial targets are not met.


As indicated in 2018's recommendations, CRW can use the water, water resources, stormwater, and wastewater financial planning models' Key Performance Indicators (KPI) worksheets to obtain further insight into its financial standing relative to industry standards. The KPI worksheets forecast and compare 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 hand. Affordability metrics can include the traditional approach that considers utility bills as a percentage of median household income (MHI), as well as more modern approaches such as the affordability ratio of the 20th income percentile (AR20) and the hours worked at minimum wage (HM). Stantec recommends reviewing which metrics CRW considers important for tracking purposes and ensuring KPIs are reviewed in the annual rates and fees study process. Stantec assisted CRW in evaluating affordability results for the AR20 and HM methods for 2019. We recommend CRW continues to update these calculations.

Finally, CRW's water budget-based rate structure remains an innovative approach in the industry for addressing water conservation. CRW is among a small group of utilities in Colorado that have successfully implemented such a structure. Stantec recommends CRW use the Conservation Impact Model (CIM) if future adjustments in water budget-based rates are desired and possible refinements to its water conservation goals need to be evaluated from a rate structure perspective.

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

As usual, we appreciate 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,



Carol Malesky
Principal, Financial Services

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