A GUIDE TO DESIGNING CONSERVATION-ORIENTED WATER SYSTEM DEVELOPMENT CHARGES

WESTERN RESOURCE ADVOCATES

RAFTELIS

PROTECTING THE WEST'S LAND, AIR, AND WATER

Acknowledgements

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EXECUTIVE SUMMARY

A growing number of Colorado communities have crafted ways to reduce the water demands of new development by redesigning their water system development charges (SDCs) to incentivize highly water efficient homes and developments. These communities, like many others in the U.S., are challenged by water scarcity coupled with population growth. Most of these conservation-oriented SDC programs are only a few years old, but as substantial water savings have been realized by some, more communities are looking to these methods to help manage future water demands.

SDCs (also referred to as "fees" throughout the document) are one-time charges assessed to new developments to help pay for the infrastructure and water resources capacity needed to support them. These fees are often based on meter size, but they can also be scaled in proportion to the volume of water that each new development is projected to use. For example, instead of one fixed fee applying to all new single-family residential homes, homes with highly water efficient landscapes and interiors would pay a lower fee than a home with a large water-usage profile.

Conservation-oriented SDCs are still a new tool, but one that is a logical extension of more traditional SDC calculation methods. The use of conservation-oriented system development charges is not yet widespread, but adoption in Colorado is increasing as more communities seek ways to reduce future water demands and as communities see the successes achieved by their peers. These newer types of SDCs can recognize water-demand variations within a customer class and provide greater equity among customers, in comparison to traditional methods.

Traditional methods of calculating SDCs (such as meter size and "equivalent residential units" [ERUs]) are each based on measurements of water demands and are typically applied to a broad class of customers. For example, all residential units with the same meter size pay the same fee, or all commercial developments with the same meter size pay the same fee.

By contrast, conservation-oriented SDCs are scaled in proportion to calculated, individualized water demands. The estimates are more accurate, but still involve assumptions. This method acknowledges that different water demands exist within the same customer class and provides a logical mechanism for incentivizing water efficiency. That is, highly water efficient developments with lower demands are rewarded with a lower fee, while less efficient developments with higher demands are assessed a larger fee.

Conservation-oriented SDCs can be appealing to developers, and several incentive options exist. Regulatory requirements, such as landscape ordinances, are likely the most impactful method of achieving water savings but may not be viable in every community. Lower fees can be a powerful financial incentive for developers to integrate highly water efficient systems into their buildings and landscapes, when the incentives can impact their bottom-line sufficiently. Developers often like having a choice in what amount they pay for a fee and tend to be inclined to choose the lower-cost options. A lower fee up-front—in exchange for highly water efficient interiors and exteriors—will reduce the initial costs to developers and likely increase their profit margin. Typically, savings are not passed on to the buyer, but other benefits to buyers exist, such as lower monthly water bills.

Lower fees can be a powerful financial incentive for developers to integrate highly water efficient systems into their buildings and landscapes, when the incentives can impact their bottom-line sufficiently.

Importantly, there are other incentive options available to utilities that can be used to encourage water efficiency features. The options include offering a deferred timing of the payment or a guaranteed fee for future development and allowing the developer to submit an alternative to the standard fee schedule/water allocation. Good communication between the utility and the local development community can help to determine which incentive options will work best in a particular community.

Local regulations—for landscapes in particular—may be the most effective way to achieve water savings in a widespread fashion for all new developments. However, in some communities it may be politically infeasible for highly water efficient regulations to be adopted. By contrast, voluntary incentive mechanisms like conservation-oriented SDCs may be more politically viable, but they will likely achieve less water savings than a regulatory mechanism. A water utility may have little influence on the landscape code, as it is rarely (if ever) within the purview of a water utility's decision-making authority. But one of the benefits of an SDC incentive is that it is wholly within the utility's purview to design and manage, and due to its voluntary nature, it may be a more favorable policy to adopt by a city council or other decision-making body.

Conservation-oriented SDCs can benefit utilities and customers by improving equity among customers, better capturing the true cost of development, and substantially reducing water demands in new development. Conservation-oriented SDCs that better connect the fee with expected water demands will result in each new customer paying their "fair share" of the utility's costs to provide the water resources and infrastructure. This is a benefit to both customers and utilities. Customers' monthly water bills will likely be lower and, depending on the landscape installed, they may enjoy a lower-maintenance landscape, too.

More efficient users have lower demands on infrastructure, which can delay and downsize the need for new infrastructure. This can then free up funding for replacement projects, enable communities to use existing facilities more efficiently to serve new development, or meet other near-term objectives.

In addition, reducing water demands from the start of construction—as opposed to installing retrofits later on—is cost effective for utilities and customers. Substantial water savings can be achieved through these nontraditional conservation programs.

Conservation-oriented SDCs typically require more time, expertise, and stakeholder engagement during the design, adoption, and administrative phases. Good water-use data and analysis are necessary to develop more accurate estimates of projected water use in the design phase of an SDC assessment schedule. Good communication with stakeholders and decision-makers is key to building understanding and can be especially important during the design and adoption phase to gather early input, ideas, and concerns. Decision-makers on a utility board or city council also must understand the need and benefits of a new SDC so that they may embrace a new, and likely more complicated, fee design.

To administer the fees properly, staff may need to be educated in reviewing development plans and engineering designs and assigning fees properly. In addition, staff will need to be able to communicate clearly with fee payers about the structure and incentive options. It is recommended that the fee calculation method be made easily accessible to the public along with explaining the process that developers will go through. Both of these steps help to improve understanding and transparency.

Ensuring the longevity of water savings over time is essential and is achievable through conservation-oriented rate structures, administrative solutions, customer education, and tracking the water-use patterns of new developments over time. Conservation-oriented monthly water rates are a natural pairing with conservation-oriented SDCs. They will help to reinforce the value of water and need for water efficiency to the owners/occupants of a building through ongoing and recurring charges. In addition, in the event that water use exceeds the projected demands of a new development, conservation-oriented water rates provide a cost-recovery mechanism for the utility.

Administrative solutions that officially record the water allocation and the fee paid for a new development through forms and plans filed with a land use authority are a strong reinforcement mechanism. This option may be most viable for municipal utilities that can more easily coordinate with the local land use authority.

Customer education is essential if water savings are expected to be sustained over time. Customers need education about the water allocation that was paid for through the SDC and what level of water use is expected of them in the property they occupy; they also need to know what steps to take to maintain that level of water use. Importantly, customers may also need education about properly managing the installed irrigation system and where to get assistance if needed.

Finally, tracking water use over time is essential to providing insight about the performance of a fee design. Basic data about new developments should be recorded by the utility so that they are able to calculate estimated water savings and compare with similar new developments that did not use the incentive. SDC designs may need to be revised based on the results of the data tracking.

Conservation-oriented fees are a powerful option to help reduce water demands in new developments. Not only can they save substantial amounts of water, but they can also improve equity among customers and allow the utility to play a stronger role in shaping the water footprint of the growing population it serves.

The City of Aurora's z-zone program for large, landscaped areas has saved an estimated 170 acre-feet of water per year after being in place for four years. That is enough to supply 350 families per year, a significant savings to the City, and far more easily obtained than if they focused only on landscape retrofit programs.

The City of Fountain, much smaller than Aurora, has saved an estimated cumulative five-year water savings of 80 acre-feet from residential landscape incentives, which is also a significant savings to the City.

INTRODUCTION

Many communities are challenged with a growing population that will increase water service requirements, yet these communities often face great expense and difficulty obtaining a sufficient or sustainable water supply to support that growth. In response to this, an increasing number of Colorado communities are crafting ways to reduce the water demands of new growth by redesigning their water system development charges (SDCs) to incentivize highly water efficient homes and developments. Substantial water savings from these programs are already being realized in some communities. The purpose of this Guide is to provide a variety of options to consider when designing conservation-oriented SDCs for new connections in the residential, irrigation, and industrial/commercial/institutional sectors. Examples from five Colorado communities are included throughout this Guide, and the full case studies (along with a summary matrix) can be found in Appendix C.

SDCs (also referred to as "fees" throughout the Guide) are one-time charges assessed to new developments to help pay for the infrastructure and water resources capacity needed to support new development. These fees can be scaled in proportion to the volume of water that each new development is projected to use. For example, instead of a fixed fee applying to all new single-family residential homes (which is often the case), homes with highly water efficient interiors and exteriors could pay a lower fee than a home with a large water-usage profile, because the infrastructure and water resources facilities needed to serve them is less.

Conservation-oriented SDCs can benefit utilities, developers, and customers. Utilities seeking to reduce water demands can help developments build "water smart" from the start, rather than working with the customer years later to retrofit indoor appliances and outdoor landscapes. This may help to advance long-term planning objectives for the utility and can fairly be viewed as a type of conservation program. Furthermore, if water demand reductions are sustained, utility capital projects can be delayed or deferred, which can provide a financial benefit. While regulations such as water efficient landscape regulations might be more effective at achieving water savings community-wide, they are rarely within the purview of a water utility's decision-making authority, and/or regulations may be politically

A note on terminology: Communities use a wide variety of terms to describe system development charges (SDCs). Synonymous terms include: connection charges, tap fees, plant investment fees, system development fees, license fees, and impact fees. In this Guide, we use the terms "SDCs" and "fees" interchangeably.

infeasible. In these cases, conservation-oriented SDCs, which are voluntary and incentive based, can help to reduce new water demands in a growing community.

Lower fees can be a powerful financial incentive to developers, particularly when the fees are relatively high and the incentives are sufficient to impact the bottom-line. Developers often like having a choice in what they pay for a fee and tend to be inclined to choose lower-cost options. A lower fee up-front will reduce the initial costs of development and likely increase profit margins. The fee savings are not necessarily passed on the customer, however, as the property sale price will be based on market value, but customers do benefit in other ways, described below.

Customers' monthly water bills will likely be lower, and depending on the landscape installed, they may enjoy a lower-maintenance landscape too. Moreover, since scaling the fees in accordance with projected water demands will better capture the true cost of each new development, it improves fairness to all new customers. Rather than SDCs reflecting the average cost for the customer class—which can result in one customer subsidizing another—each new customer will pay their "fair share."

Every utility has its own set of unique circumstances, policies, and community goals. The type of utility enacting these fees (municipal, special district, distributor, etc.) will impact which approaches are most feasible in their community, and this is acknowledged throughout the Guide to the greatest extent possible. In addition, the suitability of a conservation-oriented SDC will necessarily be determined on a community-by-community basis, and its effectiveness in saving water will depend in part on the design, the implementation, and developers' preferences in that community.

The information in this Guide presents generally accepted approaches to developing SDCs. Chapter 1 provides a variety of metrics to estimate projected water demands; outlines the various data sources that can be used for each metric; and discusses the benefits and challenges of each approach. Chapter 2 addresses issues related to the administration and implementation of conservation-oriented fees, such as ensuring the persistence of water demand reductions through time, communicating with stakeholders, and presents a variety of other incentive, regulatory, and administrative options. The appendices provide the following information:

Appendix A: Financial calculation options for SDCs

Appendix B: Developers' perspectives on water efficiency and policies

Appendix C: Case studies (and a summary matrix) of five communities that have implemented conservation-oriented fees

This first-of-its-kind Guide attempts to capture a wide variety of approaches to the design and implementation of conservation-oriented fees that can be used by many utilities—some methods are proven, while others need more time to understand their impact. Other approaches not included in this Guide do exist or are being crafted at the time of this writing; in this sense, this Guide provides a snapshot in time of this burgeoning field. This Guide can be a foundational resource to many communities looking to reduce the water demands of new construction through the design of their system development charges.

Since scaling the fees in accordance with projected water demands will better capture the true cost of each new development, it improves fairness to all new customers.

Chapter 1. Conservation-Oriented Assessment Methodologies

Chapter 1 presents a variety of methods to estimate the water demands of individual new buildings in the residential, irrigation (large landscapes), and industrial/commercial/institutional sectors. A variety of water-demand metrics are provided for both indoor and outdoor water demands, and this chapter outlines the various data sources that can be used and the benefits and challenges of each. An individualized assessment method can improve fairness within and across customer classes and also be used to incentivize more water efficiency in new construction.

SDCs are one-time charges assessed to new developments to help pay for the infrastructure and water resources capacity needed to support new development.

1.1 SDC Calculation Basics

The calculation of SDCs is typically based on three primary components: 1) the value of backbone system facilities and water resources facilities; 2) the capacity associated with those facilities; and 3) the customer's demand requirements. Backbone facilities typically include major infrastructure such as conduits, transmission mains, raw (untreated) and treated water storage, treatment plants, and pumping facilities. Water resources facilities often include water rights and other raw water infrastructure such as reservoirs and raw water transmission. Capacity refers to the size of the system (for example, the number of millions of gallons of water per day that can be delivered) and is often expressed in terms of firm-yield. The customer demand is a measure of a customer's water demand over a year (acre-feet per year), or a measure of a customer's highest water demand on one day (gallons per day).

The basic formula for calculating a two-part SDC is as follows:

Water Resources Fee:

$$\frac{\text{Water Resources Value (\$)}}{\text{Resource Capacity Annual Yield (acre-feet)}} \times \text{Customer Demand Requirements (acre-feet per year)} = \text{SDC (\$)}$$

Infrastructure Fee:

$$\frac{\text{Backbone System Facilities Value (\$)}}{\text{System Capacity in Gallons Per Day (gpd)}} \times \text{Customer Demand Requirements (gpd)} = \text{SDC (\$)}$$

Typically, these two fee components are added together, creating the full fee (although some utilities also include additional fee components, the details of which are beyond the scope of this report). This two-part approach is common among many Colorado utilities but is not necessarily required to design a conservation-based SDC. Some utilities assess a single water SDC where infrastructure and water resource values are combined and the capacity may be based on peak facility requirements. See Appendix A for a detailed explanation of SDC calculation components and methodologies.

In the two-part approach, *annual water demand* is most often used in the calculation of the water resources fee. This fee component accounts for the annual volume of water that the utility must obtain to serve the new development. Water resources costs may include water rights (surface water or ground water); raw water infrastructure such as reservoirs; or other facilities designed for raw water delivery to the system.

By contrast, the infrastructure fee is often based on the projected *peak water demands* of a development. This fee component accounts for the water treatment facilities, treated storage facilities, pump stations, and the water distribution network. Peak demands are the largest water demands of a customer on a given day—for example, a hot day in July when outdoor watering demands are highest. Importantly, the water system infrastructure must be built to accommodate the peak demands of all customers; otherwise, the utility risks delivery shortages.

While these two SDC fee components (water resources and infrastructure fees) are often based on two different measures of water demand (annual demand and peak day demand), it is ultimately up to the utility whether to use both of these fee components and how specifically to calculate one or both of them. Water-conservation-oriented assessment methods could apply to both fee components, as is done in Castle Rock, Colorado, or to the water resources component only, as is done in Fountain, Colorado. The decision about how to approach this is ultimately up to the utility as it considers goals such as fairness, cost recovery, conservation objectives, one-time and ongoing administrative costs, and any other utility goals.

The focus of Chapter 1 is on the "customer demand requirements" part of the equation, generally. The variety of water-demand metrics presented here (such as lot size or irrigated area) can generally be correlated with annual water demands or peak water demands through analysis of utility consumption data.

Annual water demand is most often used in the calculation of the water resources fee. By contrast, the infrastructure fee is often based on the projected *peak water demands* of a development.

1.2 Conservation-Oriented SDC Rationale

New residential developments are usually charged the same fee, regardless of the size of the house or landscape attributes. This customer class is typically thought to have very similar water-use patterns from one house to the next, but when the new houses being built are dramatically different from one another, this assumption no longer holds. Consider the following two house types:

The first home is large with several bedrooms and bathrooms, has an expansive lawn and even a swimming pool. The second home is comparatively small with a small, xeriscape yard. In many communities, these two homes would be charged the same SDC because their water meter size is the same. This type of example is valid also in the industrial, commercial, institutional (ICI) sector and for irrigation connections (for large, landscaped areas) where meter size often drives the difference in the SDC charged, rather than the amount of water being used.

This presents a clear question of equity—is it *fair* that each should be charged the same, when one home has a larger impact on the system? Many would say no. Conservation-oriented SDCs present the opportunity to increase fairness to customers within and across customer classes by scaling the fee in proportion to projected water demands and to achieve greater water efficiency in the design of any new construction.

Utilities will need to consider their specific goals and needs related to SDCs—which may include increasing water conservation, encouraging certain types of development, improving equity, cost recovery, transparency, simplicity—and consider all of the options related to SDCs before moving toward one approach. For example, a simple assessment method is meter size, which is easy to administer and easily understood by customers; it treats all customers with the same meter size the same. However, it does not fully account for the water-demand differences that exist among customers with the same meter size. Conversely, an individualized approach calculates an SDC based on specific characteristics of the property that are better determinants of the potential water demand. This individualized approach can improve fairness in the fees charged to customers, and provides an avenue for encouraging efficiency but is typically more complex to administer and harder for customers to understand.

There are numerous methods to consider when developing an individualized approach. This chapter outlines several options —with examples—for individualized assessment schedules for the residential sector, irrigation connections, and the industrial/commercial/institutional sector. The considerations related to administering these charges, which have important implications for utilities, are addressed in Chapter 2, as are some of the other options available to utilities to incentivize water conservation or otherwise reduce future water demands.

1.3 Residential System Development Charges

1.3.1 Traditional Fee Assessment Methods

Traditional fee assessment methods for the residential sector typically assign the same SDC based on their customer class. In other words, this method assumes each single-family home customer has the same water demand and therefore the same fee, regardless of the size of the home, the landscape, or any other water-using characteristics. Multi-family developments, such as apartment buildings, may also be based on meter size, or they may be assessed on a per-unit basis (such as an apartment), using the very common "equivalent residential unit" (ERU) method described below. While both of these methods fail to consider the unique demand characteristics in their assumed water demands, they both provide a good foundation for transitioning to conservation-oriented fee designs, as described below.

Meter Size: One traditional approach to SDC assessments is using the water meter size. Most single-family residential homes require ⅝ inch or ¾ inch meter. The necessary meter size is determined through engineering calculations based on maximum predicted flow rate, which is often determined by the number and type of water-using fixtures (indoor and outdoor). The maximum flow rate is used as the proxy for water demand, and the SDC fees can be charged accordingly, as illustrated in Table 1. The 1" meter has 2.5 times the flow rate capacity as the ⅝ inch meter, and the fee is accordingly 2.5 times higher.

Table 1 **Sample Relationship between Meter Size and System Development Charge**

Meter Size	Maximum-Rated Safe Operating flow in gallons per minute (GPM)	Meter Equivalent Ratio	SDC
5/8 inch	20	1.0	$2,000
3/4 inch	30	1.5	$3,000
1 inch	50	2.5	$5,000
2 inch	160	8.0	$16,000

Source: Adapted from American Water Works Association's (AWWA) M1 Principles of Water: Rates, Fees, and Charges, Seventh Edition. pg. 338.

Equivalent Residential Units (ERUs): An ERU typically represents the average water demand required to serve a single-family residential customer. For example, if an ERU is equal to 120,000 gallons annually, this demand would be used to determine the fee, say $10,000. An apartment unit with a typical demand of 72,000 gallons annually would represent 0.6 ERU and would be charged $6,000. Larger facilities, such as those in the industrial, commercial and institutional (ICI) sector, may be assigned multiple ERUs depending on their demand profile.

Pros & Cons of Traditional Methods: Some of the benefits of these methods are that they are widely used and accepted, straightforward to administer, and easy to explain to a developer or homeowner. They are both more readily estimated during planning stages of new residential development before the construction is completed. And, when meter size is used as the determinant of the SDC, the meter and fee account for a maximum potential flow of water. That is, in the event that the highest predicted volume of water is ever actually demanded, the meter and infrastructure will be able to provide that flow of water, and the fee covers this demand.

However, both of these traditional methods provide only a coarse mechanism for allocating fees in proportion to an anticipated water demand, and this can result in some individual customers over-paying while other customers under-pay. In addition, these methods do not include a way to incentivize water efficiency.

The following sections describe how to estimate water demands of residential properties more precisely and how to integrate water-conservation incentives.

1.3.2 Conservation-Oriented Assessment Methods

A summary matrix of the conservation-oriented assessment methods used in each of the five case study communities can be found in Appendix C, along with the full case studies.

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1.3.2.1 Single Metric Assessment

Meter-based and ERU assessment methods rely on a "single metric" to determine an SDC: meter size and average annual water demand, respectively. Conservation-oriented SDCs for residential developments can be designed to integrate with these single metric assessment methods.

Conservation-oriented SDCs based on meter size: Meter size is determined by the maximum flow rate required of a given building, determined by the number and type of fixtures. Calculations made by a professional engineer will determine the exact gallons per minute (GPM) requirement of a plumbing system. While this is most often done for nonresidential buildings and submitted during the plan review phase of a new development, it could also be done for residential buildings. Looking back to Table 1, each meter size safely provides up to a certain maximum flow rate. In the event that the calculated flow rate is between those maximums, the fee could be prorated based on the calculated GPM to encourage greater water efficiency in the design of the new construction, which would financially incentivize the developer. The meter size issued would still be large enough to accommodate the necessary flow. See the case study on the town of Castle Rock, which has adopted this approach along with several interesting features.

Conservation-oriented SDCs based on ERUs: ERUs provide a natural transition to conservation-oriented SDCs. Because ERUs are based on "average" annual water demand of a home, a more precise estimate of a new home's water demands could be used instead and then assigned a proportionate fee. For example, if the annual projected water demand of a new home is 20% lower than the average ERU demand, then the fee would be based on 0.8 ERUs.

Utility billing data—if sophisticated enough—can show the distribution of single-family residential water usage by day, month, and year. Ideally, data about newer homes could be extracted from the data set for comparison, since newer homes tend to have lower indoor water usage than older homes[1] due to more water efficient fixtures being installed per federal, state, or local requirements. Water-demand analysis would also ideally account for other variables such as weather and home size. See the case study on Little Thompson Water District as an example. Alternatively, engineering calculations that estimate the annual water demands of a new home could be used, and this figure can be used to determine the proportionate fee.

In fact, within many "resort" communities in Colorado, the ERU is defined with the number of kitchens, bedrooms, and/or baths, or the size of the building for single-family residential homes. Within these communities, the range of single-family residential developments tends to vary more widely than within more traditional urban and suburban communities.

Pros and Cons of Conservation-Oriented Single Metric Assessment Methods: These proportionate fee assessment methods can improve fairness within the residential customer class. They provide a method for more precisely estimating the projected water demands of a new development. The incentive to developers to build more water efficient developments stems from the reduced fees that will be charged for installing lower-flow fixtures and more efficient landscapes.

The incentive to developers to build more water efficient developments stems from the reduced fees that will be charged for installing lower-flow fixtures and more efficient landscapes.

If a professional engineer is used to make GPM or water demand calculations, this could be an additional step and expense to the developer, since it is not as commonly used for residential demands as it is for assessing irrigation or ICI demands. It would add another step in the review process for the utility to understand and verify these plans and will add to the complexity of administering the fee. Alternatively, if the utility analyzes their customer database instead, this will require staff time and related expenses as well. In addition, efficient fixtures and lower-water-using landscaping could be removed after the permit is issued, which reduces the benefit to the utility as well as the basis for a lower SDC. These kinds of administrative considerations are very important and are described in more detail, along with possible solutions, in Chapter 2.

1 Newer homes can be defined as those built after the year 2000, but local regulations may provide a better cutoff date. For example, in Colorado, only WaterSense (high-efficiency)-labeled toilets, faucets, and showerheads can be sold in the state since September 2016, so that date may provide a more accurate picture of water use.

Case Study

Castle Rock Water's system development fees include a water system fee that pays for infrastructure investments and a water resources fee that pays for the actual water obtained and developed by the utility. In 2015, the fees were based only on meter size; meter size was determined through engineering calculations. In 2016, to encourage water conservation, the utility developed a water-conservation option that rewarded lower water-usage requirements with a reduced fee.

To illustrate, a typical meter size for a residential property is ¾" by ¾", which has the capacity to provide a maximum flow of up to 30 gallons per minute (GPM). Under the original fee structure, if the engineering calculations resulted in a predicted maximum flow rate of 26 GPM, then the developer had to pay the fee associated with 30 GPM. Under the new fee structure, however, the developer pays a prorated water, water resources, and wastewater fee and then receives an additional financial incentive equal to a 2 GPM reduction (which is adjustable by the Town of Castle Rock), resulting in a fee based on 24 GPM. Table 2 shows the fees charged for three GPM flow rates.

Table 2 Castle Rock Water's Fee Schedule

Meter Size	GPM	Single-Family Equivalent	Water System Fee	Water Resources Fee	Wastewater Fee	Water Fee Total
5/8" x 3/4"	20	0.67	$2,220	$10,216	$2,303	$14,739
3/4" x 3/4"	24*	1.00	$2,658	$12,229	$2,757	$17,643
3/4" x 3/4"	30	1.00	$3,314	$15,248	$3,437	$21,999

*24 GPM reflects the 2 GPM credit applied to the calculated 26 GPM flow rate.

The prorated water resources fee is applicable only if a water efficiency plan is created for the new development. The water efficiency plan must meet a set of minimum standards, which are described in detail in the document "Minimum Standards for Water Efficiency Plans." The minimum standards have several parts:

1. Indoor Water Efficiency
2. Outdoor Water Efficiency
3. Resident Education
4. Third-Party Verification
5. Monitoring and Enforcement

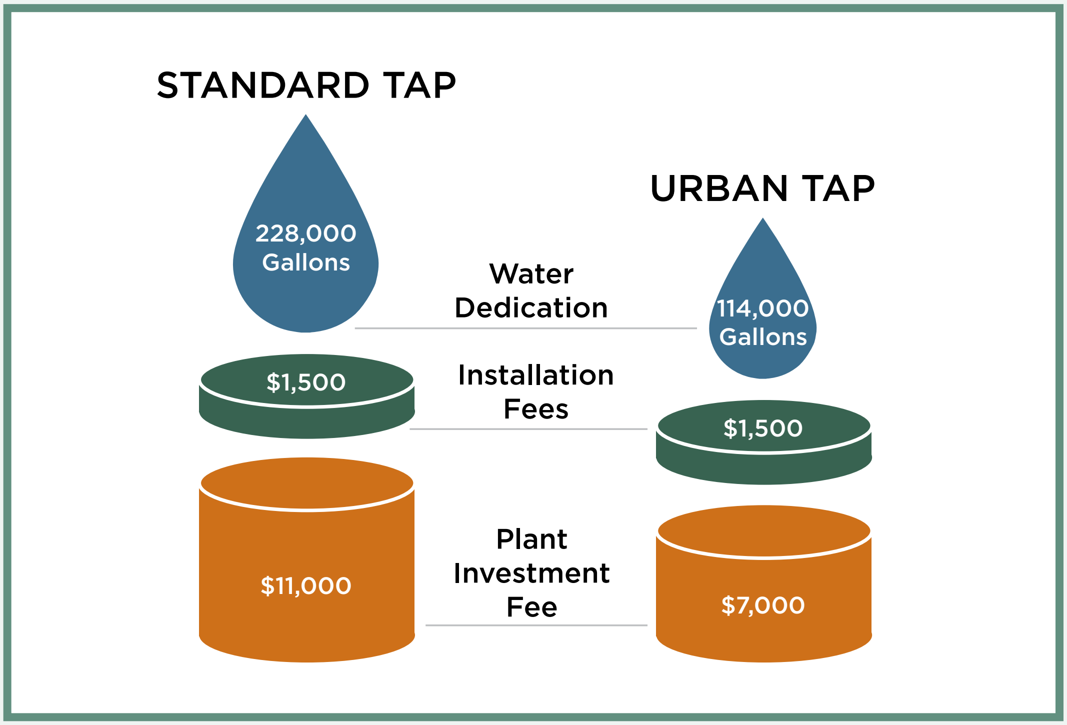
For more information about this case study, see Appendix C.

Case Study

Little Thompson Water District (LTWD) provides water to a historically rural community with just 7,700 residential connections in a service area of 300 square miles. In recent years, new residential developments have become denser and more typical of urban and suburban development patterns.

In 2016, LTWD revised its tap fee structure in an effort to better correlate the fees it was charging with the actual water-use trends of its customers. LTWD analyzed its customers' water usage and correlated that with lot size, taking into account seasonal usage and weather conditions (such as years of drought vs. wet years). The analysis showed that smaller lots—up to 9,000 square feet—most often used less than 114,000 gallons per year. LTWD then established an "Urban" SDC that is associated with an annual allocation of 114,000 gallons per year per household. This allocation is the same as the household's water budget for the year which, if exceeded, incurs overage charges in the monthly bill. LTWD maintained their "standard" SDC that is associated with 228,000 gallons per year per household, but there are no overage charges.

Figure 1 Comparison of Little Thompson Water District's Standard and Urban Tap Fees



For more information about LTWD, please see the full case study in Appendix C.

1.3.2.2 Indoor and Outdoor Metrics Assessment

Another way to estimate the water demands and allocate fees for residential homes is to separate the indoor usage from the outdoor usage. The separation of indoor and outdoor demands allows a utility to better tailor the SDC to a development's specific usage characteristics.

Indoor

Indoor water usage can be estimated through a variety of methods. The first set of metrics, called "Indoor Water Demand Metrics," provides options for getting a basic estimate of indoor water demand, but these metrics will not incentivize water efficiency by themselves. These metrics tend to have static values that are not affected by water efficiency measures installed in a new home. By contrast, the fixture unit metric is the only metric listed under the "Conservation-Oriented Indoor Metric" category that does encourage efficiency because the value of the metric will change with the selection of high- or low-efficiency fixtures. A lower fixture count represents lower potential indoor water demand, which will result in a lower SDC fee.

The separation of indoor and outdoor demands allows a utility to better tailor the SDC to a development's specific usage characteristics.

Indoor Water-Demand Metrics

Dwelling Size – The square footage of a house can be a proxy for indoor water use. The best way to determine this correlation is through an analysis of water billing data and assessor's property data, which is typically available to the public (in Colorado through the County Tax Assessor). Often this analysis would be a "regression analysis," which mathematically demonstrates the relationship between two variables (in this case, square footage and water demand). This analysis can be performed on a statistical sample in lieu of a full data set. Once the typical correlation between dwelling size and indoor water usage is known, those numbers can be applied to new developments. The square footage of new homes and buildings is often obtainable from the design plans submitted to the water utility or the local land use authority.

Number of Bedrooms/Bathrooms – The number of bedrooms or bathrooms can be a proxy for the number of inhabitants, and therefore, the water-demand profile. A similar regression analysis would be needed for this method too. This information is typically available in the construction design plans that are submitted to the water utility or local land use authority. This may be relatively easy or hard to get, depending on the water utility's relationship with the land use planning authority. For example, municipally owned utilities may have a greater degree of integration with the land use planners already or can more easily forge those relationships. Nonmunicipal utilities may be involved in water-related design reviews and meter size determination, but not typically in land use processes.

Average winter consumption (AWC) – Average winter consumption is a monthly average of water use over the winter months when outdoor watering does not take place (at least in some regions). This is frequently used to estimate the indoor water demand of a given customer or class of customers. This is a simple approach that can be determined through utility billing data and does not require specific information like the number of people in the household, the number of fixtures, or the number of bathrooms, etc., but is more useful in predicting demands when it is correlated with those variables (for example, AWC per square foot or dwelling unit).

Conservation-Oriented Indoor Metric

Fixture Units – Water-using devices (faucets, dishwashers, etc.) each have an associated "fixture unit" count which is used in engineering calculations to determine the maximum instantaneous demand of the plumbing system in a building. The total fixture unit count is usually obtainable by a utility once the interior design plans are submitted to the utility or public works department, although a fixture unit count may not always be required. This method is used by many utilities to determine the SDC. Importantly, this metric can be good at incentivizing water efficient fixtures (beyond plumbing code) if the associated fee is lower when the total fixture count is lower. It is important to note that developers need to be aware of the financial benefits of selecting higher-efficiency fixtures before plans are submitted, at which point it may be too late to make changes. Pre-application meetings are a common way for developers to discuss preliminary plans with the City. A water provider staff person at this meeting can be essential in fully communicating incentive options to developers.

Case Study

In the City of Aurora, Colorado, the fees were not adequately covering the City's costs for infrastructure and water. Changes in water demand and growth patterns had shifted the balance of water use between customer classes, such that residential fees were effectively subsidizing larger water users' fees (for example, irrigation, commercial). In addition, there were requests from the building community to lower the fees. New leadership at the utility initiated a process to develop a connection charge structure that would better align the fees with water utility costs and provide an incentive to builders to construct more water efficient developments.

As part of the process to re-design fees, the City analyzed six years' worth of billing data to determine average daily demands of residential homes. Through this analysis, the number of bathrooms was found to be a reasonable proxy for indoor residential water demand.

For more information about this case study, see Appendix C.

Outdoor

Fees for outdoor water demands can be calculated based on a variety of factors. Many of the metrics below are based on an area (square footage), and the fee would be assessed by multiplying a cost per square foot ($/sq ft). It is, of course, important to consider that customer behavior will impact actual water use, and this consideration is explored further in Chapter 2, "Ensuring Longevity of Water Savings." The first two options are not going to incentivize water efficiency by themselves. Rather, they will provide options for getting a basic correlation between outdoor water use and an associated fee. The three conservation-oriented options identified can help to drive water efficiency in new construction.

Outdoor Water-Demand Metrics

Lot size – The size of a lot can be correlated with irrigation water use through analysis of water billing data and assessor's data. Obtaining the lot size information from development plans is usually very easy. However, it is a less precise approximation of outdoor water usage than the other metrics listed here because lot size does not indicate how much of the lot will be taken up by the footprint of the house, which could be large or small. Nor does it provide information about how much area is landscaped or what type of landscaping may be in place (and watered); very large lots (like estates) tend not to be 100% landscaped. In this case, applying a cost per square foot of lot size may unduly penalize large lot buyers. Of note, some communities—like Little Thompson Water District—may use lot size as a proxy for both indoor and outdoor water demand, based on billing data analysis (see case study for more information).

Lot size minus house footprint – Subtracting the "footprint" of the house (in square feet) from the total lot size provides a bit more accuracy. The "footprint" is the two-dimensional area taken up by the house, not the finished square footage of the whole house (which can have multiple floors, etc.). A footprint calculation provides a better approximation of the landscapable area and therefore its likely water demands. However, it still does not address the problem posed by estates as identified above, nor does it distinguish areas that might be irrigated from those that are paved or pervious.

Conservation-Oriented Outdoor Metrics

Irrigable area – The irrigable area of a new development is a more refined metric than the two outdoor water-demand metrics. It can be calculated by subtracting the house footprint from the lot size and should also exclude any paved areas like driveways and walkways and other nonirrigated areas like rock. To correlate irrigable area with expected water demands, utilities can multiply the irrigable area by the inches of water needed (or typically used) per square foot during the irrigation season to estimate annual water demand. To estimate peak demand, utility consumption data can be analyzed or a peak inches per square foot can be calculated.

Irrigable area is a more difficult value to obtain and can only be obtained once landscape plans for the site are submitted. However, some utilities (especially municipal ones) already review landscape plans, and so it may be easier for them to obtain this data. Nonmunicipal utilities, especially those that do not have an established relationship with the local land use authority, will likely have a more difficult time obtaining these plans. In addition, an inspection after the landscape is installed should be performed to ensure that the landscape plans are adhered to. One challenge with this approach is the potential for the landscape to change over time; this issue is more fully addressed in Chapter 2.

Plant type and area – Accounting for the plant type and landscaped area goes one step beyond looking at the irrigated area, as it would account for low, medium, and high water-using landscape types. For example, a higher water allocation could be assigned to any turf areas, a medium water allocation could be assigned to certain varieties of trees, shrubs, and flowers, and a lower water allocation could be assigned to appropriate varieties of shrubs, flowers, and native grasses. The total water allocation (in gallons) could be assessed a fee ($/gallon). This method would necessitate an

Accounting for the plant type and landscaped area goes one step beyond looking at the irrigated area, as it would account for low, medium, and high water-using landscape types.

inspection of the landscape post-installation. This method requires a greater degree of expertise to administer and inspect and also can provide one of the most powerful ways to incentivize low-water landscapes in new construction. See the case study about Fountain, Colorado, for an example of this.

Other water efficiency incentives – The type of irrigation system installed can have significant implications on the total water use. Sprinkler, rotor heads, and drip irrigation systems all have different levels of efficiency and should be designed to provide the necessary water evenly and efficiently. Similarly, soil amendments and mulch can help to retain moisture and properly drain water for the benefit of plant health and water efficiency. These types of landscape management practices can be incentivized through a credit (reduction) in the system develop charge. It may also be possible to associate a volume of water saved through these measures and scale the credit accordingly. The magnitude of the incentive should account for any extra expense and work that is required.

Case Study

The City of Fountain, Colorado, provides two kinds of incentives to install less grass in the landscapes of new residential developments. Their fee has two parts: an infrastructure fee and a water acquisition fee, with the latter reduced in proportion to reductions in turf area.

The residential water acquisition fee not only varies by landscape type (turf or nonturf), but also by lot size. Smaller fees are charged for smaller lots because their irrigation needs are commensurately smaller. Within each lot size class, a water-conservation incentive is given for reduced turf areas, at either 50% or 30% turf cover (called "irrigated area" by the City). See Table 3 below.

Table 3 Fountain's Residential Landscape Fee Incentives

Lot Size	Water Aquisition Fee	Water Aquisition Fee with Conservation Insentive: 50% or Less Irrigated Area	Water Aquisition Fee with Conservation Insentive: 30% or Less Irrigated Area
Less than 9,000 sq ft	$4,875	$2,438	$1,024
9,001 to 13,000 sq ft	$5,688	$2,844	$1,706
Greater than 13,000 sq ft	$6,500	$3,250	$1,950

Fees are smaller for smaller turf areas and for smaller lots.

The City provides landscape templates to help developers understand how to meet the requirements of the incentive. Over five years, from 2013–2017, 716 lots used this incentive and the estimated cumulative five-year water savings was 80 acre-feet.

For more information about this case study, see Appendix C.

Case Study

Little Thompson Water District (LTWD) does not have land use authority and, therefore, cannot impose landscaping requirements on its customers. So instead, LTWD created two water-conservation incentive programs for new developments that can be used by either the developer or the residential customers.

The District offers a $500 rebate to amend soil in residential properties that purchased a water tap after January 1, 2016. Soil amendment improves the quality of the soil by improving plants' access to water, nutrients, and oxygen, ultimately reducing the amount of water that needs to be applied for a healthy landscape. The soil amendment requirements include: 1) applying a minimum of three cubic yards of soil amendment per 1,000 square feet of area to be landscaped, and 2) rototilling or mixing the soil amendment into the top four to six inches of soil.

The other incentive applies to the purchase of lower-water-using plants from Plant Select®, a nonprofit collaboration of Colorado State University, Denver Botanic Gardens, and professional horticulturists. A rebate of up to $250 may be applied to the total cost of plants purchased. This rebate is available only to homes with a tap purchased after January 1, 2016. Both rebates are issued with proof of receipts. There is no inspection of the soil amendment or plantings.

For more information about this case study, see Appendix C.

Pros and Cons of Indoor and Outdoor Demand Metrics

Calculating separate indoor and outdoor water demands will provide a better estimate of future water demands for a given development than a single metric will. Importantly, it will account for outdoor demands better, which can be about half of a single-family home's annual water demands, and there is also significant potential outdoors for water savings. Indoor water demands tend to be more consistent from one similarly occupied home to the next, and as Colorado has adopted statewide requirements for more efficient faucets, showerheads, and toilets, developers will have to seek out ultra-high efficiency devices to drive down indoor water demands below the status quo. Assessing both indoor and outdoor water demands does require more analysis, which can be conducted by utility staff or consultants, and therefore will require more time and resources.

1.4 Irrigation SDCs

Large landscapes that are served by an irrigation meter—such as irrigated areas in homeowner associations (HOAs), multi-family complexes, office parks, and others—provide a great opportunity to influence the water usage and efficiency of these landscapes, which are typically large water consumers. Turf is a typical option that many developers prefer to install because it is relatively easy to install and its appearance is generally well-liked. While the aesthetics of a landscape are always important, it may not be desirable or necessary to have an entire irrigable area covered in grass. Often just a portion of grass is sufficient for aesthetic and/or practical needs. The incentive options below are similar to the residential landscape options but also include an incentive for the use of nonpotable water.

Conservation-Oriented Landscape Metrics

Plant type and area – Lower-water-using plants can comprise all or a portion of a large, landscaped area. The water use associated with each plant type (or category) can be calculated based on water needs for a given climate. The total water allocation for a landscaped area (in gallons per year, for example) can be assessed with a $/gallon fee or $/sq ft fee. Unirrigated areas—like permeable pavement, mulched areas, rock etc.—can be charged a $0/gallon fee. It is important to consider what the desired aesthetic and function is because unirrigated areas could increase run off during storms, impacting stormwater facility requirements (for example, if hardscape is selected), or they may not provide the desired look and feel. This method would require a post-landscape installation inspection. This method requires a greater degree of expertise to administer and inspect, but it can provide one of the most powerful ways to incentivize low-water landscapes in new construction. See case studies on Westminster and Aurora, Colorado.

Other Water Efficiency Incentives – The type of irrigation system installed can have significant implications on the total water use. Sprinkler, rotor heads, and drip irrigation systems all have different levels of efficiency and should be designed to provide the necessary water evenly and efficiently. Similarly, soil amendments and mulch can help to retain moisture and properly drain water for the benefit of plant health and water efficiency. These types of landscape management practices can be incentivized through a credit (reduction) in the SDC. It may also be possible to associate a volume of water saved through these measures and scale the credit accordingly. The magnitude of the incentive should account for any extra expense and work that is required to install the measure.

Nonpotable Water – Nonpotable water, sometimes referred to as “reuse” water, is not treated to drinking water standards. Nonpotable water is sometimes available for irrigating large landscapes. Each community’s water rights requirements and ability to use “reuse” water is a significant variable for nonpotable water use within Colorado. While this option is not a water efficiency measure on its own, it could be combined with water efficiency measures. Importantly, it makes good use of an “alternative” water supply and can be a less expensive commodity than potable water. Therefore, the fee charged for nonpotable water can be lower than potable water connections for landscape irrigation.

Case Study

The City of Westminster, Colorado, requires separate irrigation meters on all non-single-family projects. Since 1998, Westminster has incentivized water efficiency in large landscaped areas, such as commercial landscapes and common areas, or wherever an irrigation water meter is required. Irrigation connection charges are based on the area of landscaping and the projected annual water demand, as determined by the water requirements of the plants—the cost per square foot is highest for turf areas and lowest for low-water-use landscapes. The three types of landscapes are defined in the City's Landscape Regulations, as reflected in the table below. In addition, the cost to use reclaimed water is about 80% the cost of potable water because no additional water acquisition is necessary.

Table 4 Westminster's Irrigation Water Tap Fees (2018)

Landscape Type	Potable Water Cost (per sq ft of irrigated area)	Water Aquisition Fee with Conservation Insentive: 50% or Less Irrigated Area
High Water (>10 Gallons/sq ft annual use)	$2.45	$1.98
Medium Water (3-10 Gallons/sq ft annual use)	$1.21	$0.96
Low water (<3 Gallons/sq ft annual use)	$0.60	$0.48

Before this tiered irrigation fee schedule was in place, the typical irrigation tap was using three times as much water as was projected by the City. With the new system that is based on water use by landscape type, it is only 25% more than projected.

As a result of this tiered landscape connection charge, more low-water-use and medium-water-use landscaping has been installed. In 2004, the City developed a Landscape Plan establishing new water quality and water efficiency standards for landscape installations. Most new landscapes are now coming in below the City's Landscape Plan limits for turf and with more water efficient irrigation technologies, such as drip and subsurface irrigation. As a side benefit, developers are not incentivized to undersize irrigation taps, since the tap fee is based on the irrigated area, ensuring proper operations.

For more information about this case study, see Appendix C.

Case Study

In Aurora, Colorado, irrigation meter fees are assessed in three tiers: $2.75/sq ft for non-water-conserving landscape (for example, bluegrass); $1.47/sq ft for water-conserving landscape; and $0/sq ft. for "z-zone" landscapes (2015 prices). "Z-zone" refers to the landscaped areas in new developments that contain low-water-using native plants, typically native grasses that do not require irrigation after an initial establishment period.

As of 2018, 25 new developments have used the z-zone option since the program's inception in 2014. Combined, these projects will have installed more than 4,400,000 square feet of z-zone landscapes. This is estimated to result in more than 170 acre-feet of water savings per year—enough to supply nearly 350 families per year! This estimate assumes that the z-zone area otherwise would be a mix of landscape types that are typical in Aurora.

Most large landscape proposals that have come to the City have a mix of z-zone, conserving, and nonconserving landscapes. The entire landscape has an annual water allocation (i.e., "budget") that is greater for the first three years to account for the z-zone areas. After three years, the allocation for the z-zone areas drops to zero, reducing the overall landscape water allocation.

Exceeding the annual water allocation (of the conserving and nonconserving landscapes) due to watering of the z-zone, or for any other reason, incurs charges. These include, for example, charges of $11.98 per 1,000 gallons when the annual allocation is exceeded before June 30, and $5.99 per 1,000 gallons when the annual allocation is exceeded after June 30. On January 1 of the subsequent year, however, the annual water allocation resets to the original allocation and the rates return to the original levels.

For more information about this case study, see Appendix C.

1.5 Industrial/Commercial/Institutional SDCs

Anticipating the water demands of customers in the industrial, commercial, and institutional (ICI) sector is challenging because there is such a wide variety of customers within this group. This group may include restaurants, office buildings, retail businesses, car washes, libraries, warehouses, manufacturing facilities, hospitals, and more, each with a very different water-usage profile.

In many cases, a proposed facility would project their anticipated water usage through engineering calculations that are submitted to the permitting authority and/or water utility. Often, the fee is determined on a case-by-case basis when users have a large enough meter size and/or large water demands (for example, hospitals, hotels, or car washes), and this actually provides an opportunity to assess the fees based on the characteristics of the facility type and incentivize water efficiency at the same time.

However, for some types of developments—such as a strip mall with multiple commercial properties—the end user or tenant may not be known when the SDC is assessed (for example, when one large meter is installed). This then requires additional follow-up to confirm that the projected water demands are in line with the fee paid, and it is possible that credit or additional payment will be due.

An additional challenge is that tenants change over the life cycle of the connection, each with varying water usage and demand requirements. For example, if a space once occupied by an insurance agency becomes a small restaurant, then a yoga studio, each business has different water demands which cannot be known at the time when the SDC was assessed. This issue of redevelopment is an important and challenging one for many communities but is beyond the scope of this report to address fully. Some related considerations on this topic are provided in Chapter 2, for example, on ensuring the longevity of water savings through time at individual properties.

Mixed use developments—those with two or more types of uses within a single structure—can be addressed in a few ways. Typically, these developments blend residential and nonresidential properties. Many communities determine the customer classification by the predominant use, either residential or nonresidential, and assess the SDC according to that schedule. A less common approach is to separate the residential and nonresidential components by assessing the residential fee by ERU and the nonresidential fee based on meter size, such as is done in the City of Longmont, Colorado. Very urban communities with several mixed use developments sometimes choose to create a mixed use customer classification to handle these developments. The same challenges referenced above exist for the ICI components of mixed use developments.

Conservation-Oriented Metrics

Fixture Units – Water-using devices (faucets, dishwashers, etc.) each have an associated "fixture unit" count that is used in engineering calculations to determine the maximum instantaneous demand of the plumbing system in a building. The total fixture unit count may be obtainable with one-time investments and ongoing data maintenance by a utility once the interior design plans are submitted to the utility or public works department. This method is used by many utilities to determine the SDC. Importantly, this metric can be good at incentivizing water efficient fixtures (beyond those required in the plumbing code) if the associated fee is lower when the total fixture count is lower. It is important to note that developers need to be aware of the financial benefits of selecting higher-efficiency fixtures before plans are submitted, at which point it may be too late to make changes. Pre-application meetings are a common way for developers to discuss preliminary plans with the City. A water provider staff person at this meeting can be essential in fully communicating incentive options to developers.

Outdoor Assessment – By separating the fees for estimated indoor and outdoor water usage, a water utility can incentivize water efficiency in both spaces. Outdoor water use can be incentivized for ICI customers through any of the methods described previously in the Irrigation and Residential SDC sections.

Water-Usage Profiles by Facility Type – Water-usage characteristics of a hotel, for example, will certainly vary with the size of the hotel (for example, 50 versus 500 rooms) and other features such as the presence of a restaurant, swimming pool, etc. But if these variables are accounted for, the water-use estimates may be accurate enough for fee assessment purposes and to provide the opportunity to incentivize water efficiency.

To obtain information about the typical water-use profiles of facility types, there are some data sets available, or an analysis of water-usage patterns within one's own community can be conducted. The former is likely easier to obtain although more generic, and the latter is much more time consuming but likely more accurate. There are many technical considerations and challenges when benchmarking ICI water use; further detail is beyond the scope of this report. A list of data and informational resources is provided below to help identify the opportunities and challenges for the interested reader.

Data and Informational Resources on ICI Water Use:

- AWWA Research Foundation. Residential, Commercial, and Institutional End Uses of Water. Report #90806. 2000. Accessed May 18, 2018. http://www.waterrf.org/Pages/Projects.aspx?PID=241.
- Brendle Group. Developing Water Use Metrics and Class Characterization for Categories in the CII Sector. Water Research Foundation. Project #4619; due in 2019. Accessed May 18, 2018. http://www.waterrf.org/Pages/Projects.aspx?PID=4619.
- Dziegielewski, Dr. Benedykt. National Survey of Commercial, Industrial, and Institutional Water Efficiency Programs. National Survey, American Water Works Association. 2016. Accessed May 18, 2018. https://www.awwa.org/Portals/0/files/resources/water%20knowledge/rc%20water%20conservation/AWWAsUtilitySurveyofCIIWaterEfficiencyProgramsReport.pdf.
- EPA Water Sense. "Types of Facilities." Accessed May 18, 2018. https://www.epa.gov/watersense/types-facilities.
- Keifer, Jack C., Lisa R Krentz, Benedykt Dziegielewski. Methodology for Evaluating Water Use in the Commercial, Institutional and Industrial Sectors. Water Research Foundation. Project #4375. 2015. Accessed May 18, 2018. http://www.waterrf.org/Pages/Projects.aspx?PID=4375.
- Morales, Miguel A., James P. Heaney, Kenneth R. Friedman, and Jacqueline M. Martin. "Estimating commercial, industrial, and institutional water use on the basis of heated building area." Journal of American Water Works Association 103:6 (June 2011): 84-96.
- Task Force for Colorado WaterWise Council. Benchmarking Task Force Collaboration for Industrial, Commercial & Institutional (ICI) Water Conservation. 2007. Accessed May 18, 2018. http://coloradowaterwise.org/Resources/Documents/ICI_toolkit/docs/Brendle%20Group%20and%20CWW%20ICI%20Benchmarking%20Study.pdf.
- Vickers, Amy. Handbook of Water Use and Conservation. 2001. Accessed May 18, 2018. http://waterplowpress.com.

Water Budgets – A water budget is a monthly or annual water allocation assigned to each water connection (home, business, etc.). Typically, if a budget is exceeded, overage charges are incurred; once the new month or year comes, the budget is reset. An SDC can be correlated with a water budget. That is, the SDC can be charged in proportion to the annual water budget, with lower fees charged for lower water budgets, and higher fees charged for higher water budgets. This provides an incentive for the developer to choose a construction design that will conform to a lower water budget, and the owner/occupant will then be responsible for keeping their water usage within that budget or pay the overage charges. There is an inherent challenge in charging a lower fee up-front with the expectation that actual water use will remain as low as projected. This challenge is especially pronounced since it is usually the developers who pay the initial fee, but the owner/occupant who must manage the water use. This important topic and solutions for addressing it are discussed in more detail in Chapter 2, "Ensuring the Longevity of Savings." Also see the case studies for Aurora and LTWD.

Case Study

Westminster, Colorado

In 1998, Westminster reviewed its connection charge structure and discovered that the fees paid by the ICI sector were not fully or equitably covering their true financial impacts to the system, in contrast with the fees paid by the residential sector. The ICI connection charges were based on meter size, which is determined by instantaneous peak demand. However, customers with the same meter size often had very different water-demand profiles over the course of a year. Effectively, this resulted in customers with lower annual water use subsidizing the higher water users' fees. Thus, the City developed a fine-tuned system to assign costs more proportionately.

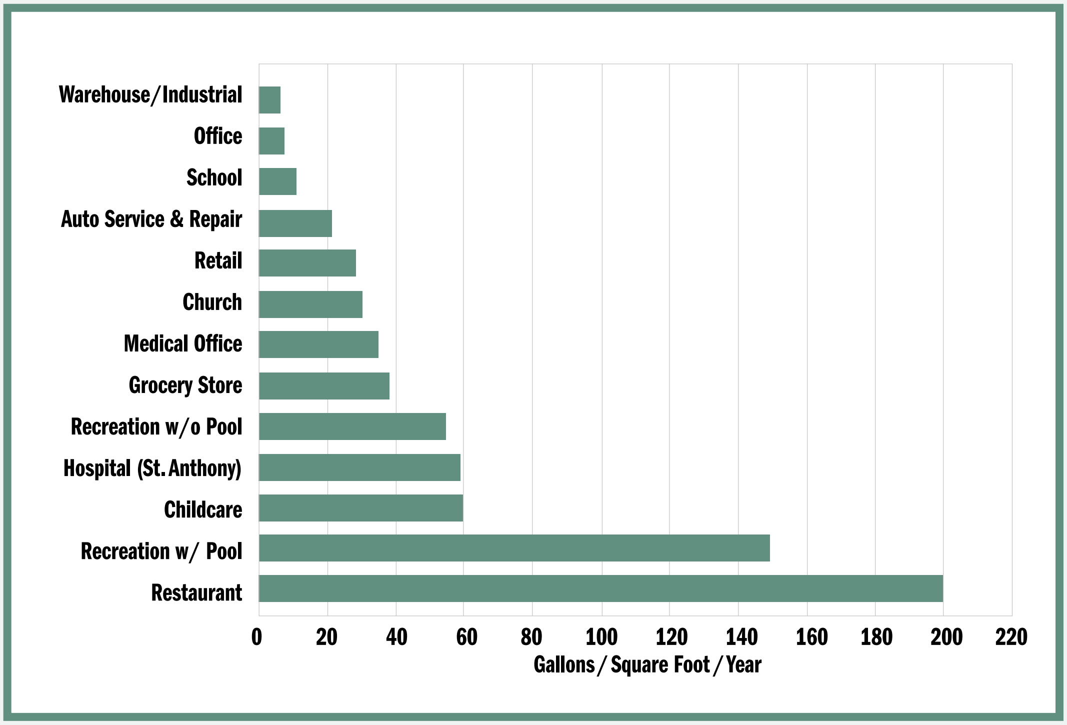
The City developed a connection charge structure for the ICI sector that is composed of two main parts: the infrastructure fee and the water resources fee. The infrastructure fee is based on the size of the meter, which is determined by the number of "fixture units." The fixture unit count tallies the number and types of fixtures to be installed and accounts for peak demand of the customer. When City staff members review the new development's design plans, they have the opportunity to recommend water efficiency measures that could result in a reduced fee. The infrastructure fee increases with increasing meter size; a 5/8-inch by 3/4 -inch meter was about $10,000, and a 2-inch meter was a little more than $80,000 in 2014.

The water resources fee is proportionate to the customer's projected annual water use. Average annual water for each type of ICI customer—for example, restaurants, hotels, schools, and warehouses—was determined by analyzing Westminster customer data and researching national data sources. The utility developed a table of water use for each type of ICI customer, expressed as a function of the size of the establishment. For example, the average water use of a restaurant was found to be 200 gallons per square foot per year, and the average water use of a hotel was found to be 23,500 gallons per hotel room per year. Figure 2 shows the range of water uses in gallons per square foot per year for a variety of ICI customers. The water resource fee, therefore, depends on the type of business establishment and its size. While water resource fees vary widely, they typically range from $10,000 to $100,000.

Case Study (continued from previous page)

Westminster, Colorado

Figure 2 Westminster's Data on Water Use for Various Industrial, Commercial, and Institutional Facilities, Measured in Gallons Per Square Foot Per Year



This data was determined by City of Westminster staff using customer data and nationally available resources.

For more information about this case study, see Appendix C.

Chapter 2. Implementation Considerations

The implementation of a conservation-oriented SDC schedule is as important as the calculation methodology, because the manner in which it is implemented will have a direct bearing on its success. The implementation considerations begin when a fee revision is initially being contemplated (to take into account the needs and perspectives of stakeholders and decision-makers) and continues through every stage including post-occupancy of the new development. This chapter identifies the key considerations that utilities should think through before launching a conservation-oriented SDC schedule.

The implementation of a conservation-oriented SDC schedule is as important as the calculation methodology, because the manner in which it is implemented will have a direct bearing on its success.

2.1 Ensure the Longevity of Water Savings

When considering a conservation-oriented SDC, a major concern of water utilities is ensuring that water reductions are realized in the near-term and sustained over the long term. Because SDCs are one-time fees assessed for a perpetual service commitment, the long-range water demands and capacity requirements are important considerations for the utility. Consider the scenario in which a developer pays a lower SDC in exchange for installing an efficient irrigation system and low-water-using plants, but when the owner/occupant manages the system, they either overwater significantly or change the landscape to higher-water-using plant species. Not only would the intent of the program not be realized, but also the fee that was paid would be insufficient to cover the impact of the actual water use in the development. Fortunately, there are a few options that utilities can implement to prevent this situation from happening in the first place or to recover the costs.

2.1.1 Implement Conservation-Oriented Water Rates

Conservation-oriented monthly water rates provide a two-fold benefit: They provide an economic signal to prevent excessive water usage by customers and, in the event that water usage is excessive, allow the utility to receive greater revenue that can help to recover costs that should have been originally captured through the SDC. In addition, this is a mechanism that can be used by any utility, unlike administrative avenues of enforcement described in the next section.

There is more than one way to recover the costs of over-usage of water. Additional fees can be charged as a flat fee on a bill; an overage charge proportionate to the over-usage of water can be charged; and/or specific tiers of higher rates can be included in the design of the rate structure. Whichever options are chosen, it is important that the fees are fair and justified and communicated well to customers.

There are many resources available that articulate how to design monthly rate structures that encourage water efficiency, such as the AWWA's *M1 Manual "Principles of Water Rates Fees, and Charges."* Perhaps the most common approach is an inclining block rate structure, which typically charges higher rates per thousand gallons at certain thresholds. For example, the rate could be $2 per thousand gallons up to 10,000 per month and then increase by $1 per thousand gallons every 5,000 gallons thereafter. Flat and declining block rate structures do not send a conservation pricing signal and should be avoided if conservation is the key objective.

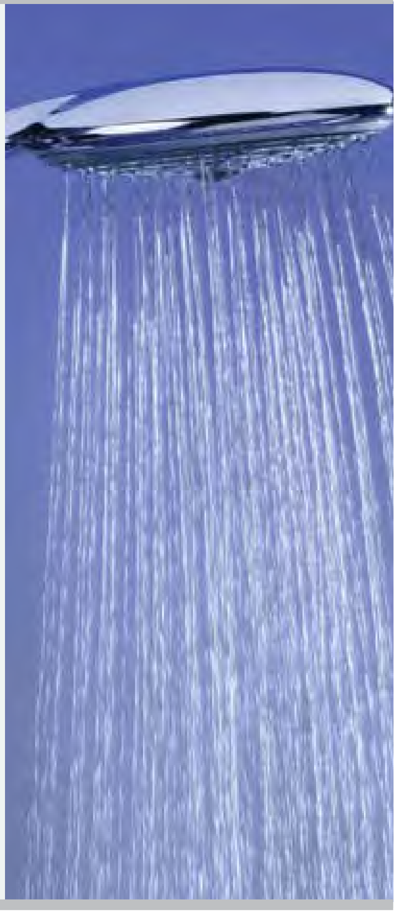
Inclining block rate structures can also be tied to individualized water budgets. Here, the lowest rates (for example, $2/1,000 gallons) may be charged to typical indoor water-usage levels; higher rates are assigned to the next tier that covers outdoor water usage; and the highest rate is assigned usage beyond the water budget. The highest rate may be significantly higher than the other rates, effectively acting like an overage fee or punitive charge.

Case Study

Little Thompson Water District, Colorado

LTWD has adopted an inclining block rate structure for its residential monthly water rates. Urban tap customers (see full case study for definition) who are within their annual budget of 114,000 gallons pay monthly for their water in accordance with the rate schedule in Table 5. However, if Urban tap customers use more than their budgeted 114,000 gallons within a year, then there is a surcharge of $8.00 per 1,000 gallons once the allotment is exceeded. At the beginning of the next year, the water budget is "reset" and the surcharge is removed. The $8.00 surcharge almost doubles the price of water in the highest tier of water use for residential customers. This sends a very strong financial signal to customers that their water usage is too high. LTWD helps its customers know how much water they are using in relation to their water budget by printing the information on every customer's monthly bill regarding their year-to-date water use and their budget (114,000 gallons/year). Customers can upgrade their water allocation to the Standard tap's allocation (228,000 gallons/year) if they pay the difference in the tap fees.

Continued on next page



Case Study (continued from previous page)

Table 5 **Tap Fees and Water Rates Charged to Residential Homes in LTWD's service area**

		One-Time Fees Charged to Developers	Monthly Rates Charged to Residential Occupants		
Tap Size	Annual Water Allocation	Tap Fees	Monthly Base Fee	Monthly Rates for Residential Water Use	Surcharge for Exceeding Annual Allocation
Urban (5/8" meter)	114,000 gallons	Installation fee:* $1,500 Plant investment fee: $7,000	$26.86	$2.37 (0–6,000 gal.) $2.98 (6,001–15,000 gal) $4.03 (>15,000 gal)	$8.00 per 1,000 gallons
Standard (5/8" meter)	228,000 gallons	Installation fee:* $1,500 Plant investment fee: $11,000	$26.86	$2.37 (0–6,001 gal) $2.98 (6,000–25,000 gal) $3.50 (25,00–50,001 gal) $4.03 (>50,001 gal)	None

* The installation fee is for the cost of labor and parts when installing the service line, meter, and meter pit. The installation fee is reduced to $365 if the water service line and meter pit are installed by the developer.

For more information about this case study, see Appendix C.

2.1.2 Consider Administrative Reinforcement Solutions

It is possible to establish formal documentation of the SDC paid and the allocated water for a given property. These documents would most likely be filed outside of the water utility (such as a county recorder's office) and this may be more difficult for nonmunicipal utilities. Formal documentation of agreements, including any associated terms, conditions, or penalties, are a strong reinforcement mechanism to uphold the intent of a conservation-oriented SDC in perpetuity. An administrative filing will require good communication between the utility, land use authority, developer, and the owner/occupant. In addition, enforcement of this policy is necessary for it have real meaning. Additional measures that can complement the administrative filing approach are the cost-recovery and customer education pathways described in the next section.

Case Study

Westminster, Colorado

In the City of Westminster, it is required that the Official Development Plan, filed with the City's Department of Community Development, include a landscape plan and that it is adhered to for the life of the development. For any changes to be made, a proposal must first be reviewed by the utility and, if water demands are projected to increase, then additional SDCs must be paid. However, if water demands are projected to decrease, the City does not refund any fees because the City had already purchased water and infrastructure to support the original design.

Aurora, Colorado

In the City of Aurora, the developer must sign an agreement that is tied to the property through a lien filed with the county recorder, agreeing to a specific water budget for that property. In this way, the reduced fee that the developer agrees to is officially tied to a water budget (i.e., water allocation) for the property that the owner inherits as part of the property requirement. As of 2018, this agreement is currently required in only two cases: when a "z-zone" is selected for a large irrigated area that features low and no-water-using plant selections for a $0 SDC and for specific agreements related to estate lots.

For more information about these case studies, see Appendix C.

2.1.3 Educate Customers

Customer education is essential to the success of ensuring the persistence of water savings over time, in addition to any financial or administrative solutions that may exist. Actual water use is in the hands of the customers, and they need to understand why using water efficiently is important and what reinforcing mechanisms (like overage charges) might affect them. Many utilities have already developed communications materials, and these can be leveraged to explain monthly rates and SDCs as appropriate.

Case Study

Castle Rock, Colorado

The prorated water resources fee (which results in a discount for highly water efficient developments) is applicable only if a water efficiency plan is created for the new development. The water efficiency plan must meet a set of minimum standards, which are described in detail in Castle Rock Water's "Minimum Standards for Water Efficiency Plans" document. The minimum standards have several parts: 1) Indoor Water Efficiency, 2) Outdoor Water Efficiency, 3) Resident Education, 4) Third-Party Verification, and 5) Monitoring and Enforcement. Resident education is required and must include all necessary information about the operation and maintenance of the irrigation system, the utility water budget rate structure, and the indoor and outdoor water efficiency measures that have been installed.

For more information about this case study, see Appendix C.

2.1.4 Track Water Use through Time

After the initial incentive program is adopted, the utility should record basic data about the new developments that have used the incentive. Two of the communities profiled in the case studies in Appendix C—Aurora and Fountain—took steps to track details about all the new developments making use of their SDC incentives. By doing this, they are able to calculate estimated water savings every year.
For example, the City of Aurora tracks all the details of the developments using the z-zone program (location, square footage of z-zone, dates, etc.). This allows them to estimate that the program has saved an estimated 170 acre-feet of water per year after being in place for four years, enough to supply 350 families per year. The City of Fountain, much smaller than Aurora, also tracks the developments using their incentives, and they estimate that their program has saved 80 acre-feet cumulatively over a five-year period.

Both communities report "estimated" savings because tracking actual water savings will take a few more years. It takes time to develop and build a site, and it must be occupied before the water-use patterns can be analyzed. Landscape water-use savings will take even more time to be realized because usually the first two to three years require more water for the plants to become "established" and thrive under lower water conditions.

Utilities should track the water-use performance of these new developments over several years to determine the impact of the incentive program.

Utilities should track the water-use performance of these new developments over several years to determine the impact of the incentive program. Only with robust information can a utility determine if its program is functioning as expected or if adjustments should be made. In general, this type of data management will require additional staff time at the utility, but the information it provides is critical to the ultimate success of any incentive program.

2.2 Consider Other Incentive Options

The process of administering SDCs is a very important consideration when designing the SDC structure. As described in the methodology section, some methods require data from other departments, an understanding of fixtures counts or engineering designs, or even inspections of landscaped sites by knowledgeable landscape professionals. All of this can increase the number of staff required and the time staff spend assessing and confirming the fees; these activities will have a tendency to increase the time spent communicating with the developer. So it is important that the necessary skills/training are provided and that the cost of providing these services is built into the fee.

These administrative hurdles may be too large for some utilities. Importantly, there are other incentive mechanisms that are appealing to developers and provide a water-conservation incentive, which may also be easier to administer. These options are listed below. These approaches will not provide the equity between and among customer classes as the approaches described in Chapter 1 will, but they may be effective in achieving water conservation. For more information on these options, see Appendix B entitled "Development Community Perspectives on Water Efficiency in New Construction."

Defer Timing of Payment: Often SDC payments are paid to receive the building permit to begin construction. An alternative is to collect the fee much later on (for example, when the certificate of occupancy is issued), usually several months later. This may be a significant incentive to the development community because it would require less capital earlier in the process, which helps their cash flow and may save on financing costs. The deferred payment could be offered in exchange for certain water efficiency measures.

Offer a Guaranteed Fee: Another incentive option is to offer a guaranteed fee for future construction projects through a certain date or a guaranteed fee to be applied to a particular future project. A defined time period is important as a guaranteed fee in perpetuity would create other equity issues, particularly if it applies to some developments and not to others. Guaranteed fees are a benefit to developers because they provide some certainty in costs to the developer, and typically developers work in a very uncertain environment. In addition, if the utility were to increase fees before construction began, the developer would not have to pay those higher fees for a fixed period of time or the guaranteed fee expires.

Allow Alternative Submissions: Either in addition to a conservation-oriented SDC schedule, or in lieu of it, communities can allow developers to submit alternatives to the water utility. The alternative would identify in detail why their project will use less water than would otherwise be estimated by the utility and why it is valid to be charged a lower fee. Utilities willing to consider these case-by-case proposals may do so only if certain water efficiency measures are included in the development design.

2.3 Consider Regulatory Options

Local regulations can require water conservation and efficiency measures within the landscape codes and/or design guidelines or within building and plumbing codes. Typically, any such regulatory options would involve the local land use department and ultimately require approval from a city council or similar decision-making body. While the focus of this Guide is on conservation-oriented SDCs, it is important to weigh the benefits and disadvantages of an incentive-based SDC program as compared with regulatory mechanisms.

While the focus of this Guide is on conservation-oriented SDCs, it is important to weigh the benefits and disadvantages of an incentive-based SDC program as compared with regulatory mechanisms.

All of the same water efficiency measures that can be incentivized could be required through ordinances and codes instead. Building and plumbing codes can include requirements for fixture efficiency, smart meters, programmable irrigation timers, rain sensors, drip irrigation, and other measures. Landscaping codes and design guidelines can include requirements to improve ("amend") the soil, to establish minimum or maximum areas of various plant types (such as for grass or native or drought tolerant species), and to require specific irrigation systems.

Regulations could require all new construction to meet certain indoor and outdoor water efficiency standards and are typically enforced by inspectors who review the building and landscape to ensure that all requirements are adhered to. If the standards are not met, inspectors can withhold final approval, such as the issuance of Certificate of Occupancy that allows the building to be occupied. Regulations are only effective if properly enforced, but they can be a powerful way to ensure that all new development meets certain water efficiency standards and are likely to result in total water savings being higher than with an incentive-based mechanism. However, a city council, county commission, or similar decision-making body must approve any new regulatory measures, and their willingness to do so varies greatly. There can be strong resistance among decision-makers to mandate additional requirements on the development industry, particularly if the community prefers a limited role for government and/or is striving to create a "business friendly" environment.

An incentive—like a conservation-oriented SDC—is voluntary and will likely not be used by every new development; therefore, highly water efficient construction and landscaping will occur only in some locations. As a result, the total water savings will likely be lower than with a regulation. SDC incentives are typically adopted either by a water utility board, city council, or similar decision-making body, and it may be a much easier political decision to approve because of the voluntary nature of the incentive option.

2.4 Practice Transparency and Good Communication

Employing conservation-oriented SDCs should be a clearly understood policy decision. The need for demand reduction has to be clear to the utility and decision-making body (utility board or city council) and should align with long-term utility goals and planning. But these kinds of SDCs are typically more complex than SDCs based on meter size or ERUs. It is therefore important to be clear with stakeholders why this approach is beneficial and how it works. The following tips provide some key suggestions for working with a variety of stakeholders.

Involve Stakeholders: When considering a conservation-oriented fee schedule, it is important—if not essential—to have a stakeholder process that allows for input on the proposed schedule from the public, staff, impacted stakeholders, and decision-makers. Importantly, getting early input on concerns and interest—even before an official fee schedule has been developed—can go a long way toward ensuring that the draft proposal better meets stakeholder needs and that they feel included in the process. If interests and needs are not understood and addressed early on, the proposal could be met with significant resistance and ultimately not get adopted by the utility board or city council. To illustrate the point, the City of Aurora, Colorado, developed the "z-zone" irrigation fee schedule in cooperation with developers over a period of about six months. Together they found a solution that met both the financial needs of the development community and the conservation objectives of the utility. For more information about this, see Appendix C.

Work with Decision-Makers: It is also very important to communicate the value of a conservation-oriented SDC to the water utility's board or city council, as their approval is required for it to be adopted. Particularly as the complexity of the fee schedule increases, people's understanding of the technicalities and value of the proposal decreases. Having clear justification of the need and benefit provides a good basis for understanding any complexities in fee design. It can be a time-consuming process to gain buy-in from decision-makers, but it is certainly necessary for the ultimate passage of any new type of SDC schedule.

Be Transparent with Public: Finally, once a new fee schedule is passed, it is important to make it easily accessible to the public and easy to understand. Many utilities publish their fee schedules on an obvious place on their websites, while others have the fee schedule located within city code or otherwise not easily accessible on line. All fee schedule information should be easily accessible and well-explained to provide a greater level of transparency and reduce the staff time that is spent answering basic questions. In addition, some communities make their fee review process readily

> "The administration time has increased a bit with the new z-zone methodology. This is a result of the required Service Connection Fee agreements and recording of the documents. At most, this program takes about 5% of my time. The projected benefit from water savings shows great promise, so it is worth it."
>
> – Tim York, Water Conservation Supervisor, Aurora Water

available to developers and other fee payers through their website. It is very beneficial for a utility to communicate directly with developers early in the development process to make them aware of the fee structure and any incentive programs. Often this can be accomplished at a pre-application meeting before any detailed plans have been drawn.

2.5 Revise SDCs As Needed

It is not uncommon for a community to leave a fee schedule in place for a decade or so. But more frequent revisions are necessary in many communities because of changing circumstances. It is recommended that SDC schedules be revised at least every 3-5 years with annual indexing for inflation or when there is a significant change in the following:

- The water utility's capital improvement plan (typically updated annually)
- The water utility's master plan
- The regulations governing drinking water quality, infrastructure, etc.
- Population growth and development activity

It also may be necessary to make minor adjustments to the SDC schedule after its initial adoption to ensure that it is meeting the original intent. For example, Aurora Water adjusted the administrative aspects of their z-zone program after a couple years to better streamline the administrative process and integrate better with their water budget system. For more information about this, see the "2018 Update" to the Aurora case study in Appendix C.

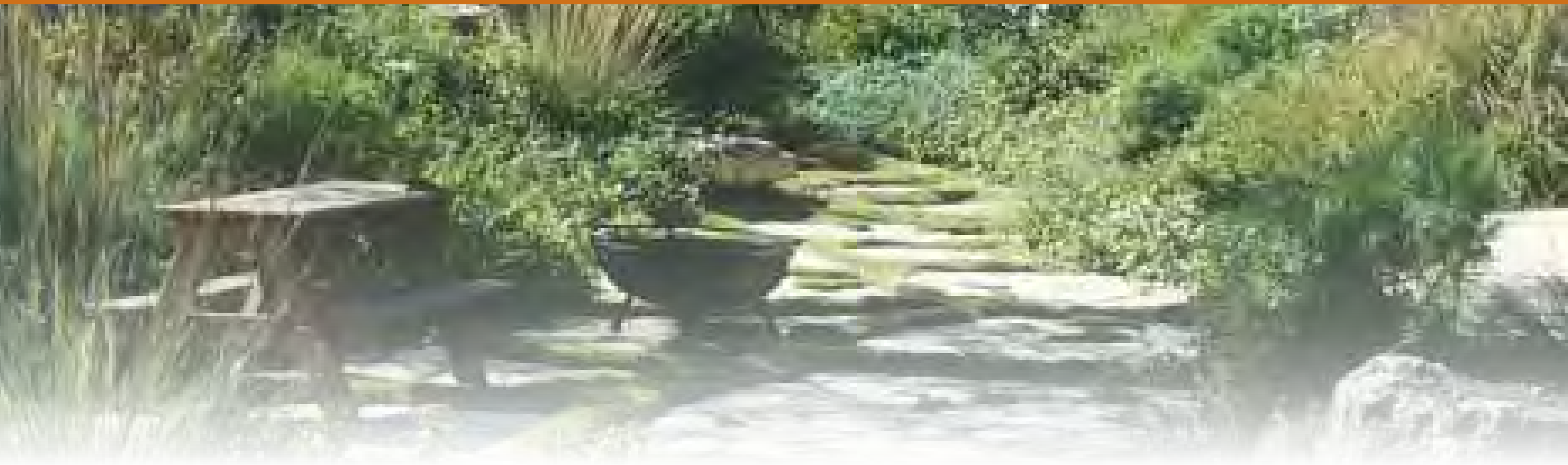
2.6 Consider Costs and Benefits

As with virtually any new program undertaken by a utility, a thorough consideration of the costs and benefits should be weighed to determine the best course of action. The benefits may include water-demand reductions in new developments; greater equity within and between customer classes; alignment with utility objectives (for example, long-range planning, per capita targets, etc.); community growth objectives; and lower monthly water bills for residents.

The costs of a conservation-oriented fee schedule will stem primarily from the time and effort to design the new structure, followed by administration of the new system. The design phase may include costs associated with staff time (or consultants) for data analysis, working with stakeholders, and drafting and finalizing the schedule. The administration of the fees will again be a cost primarily through staff time but may also require training of staff to gain the necessary expertise (in plan review, for example). One-time and ongoing investments may be required in billing systems, IT, and/or developing and maintaining more individualized customer data.

Note that the methodological options outlined in Chapter 1 provide a range of simple and complex metrics that will have different costs associated with them. For example, lot size may be easy to determine in a given community, whereas evaluating the plant type and area would be more time consuming and costly. Water conservation incentives can also be simple and relatively easy to administer, such as providing a flat fee credit in exchange for specific efficiency measures, or complex and costlier such as plan review and documentation that require deeper integration with the land use planning department than is customary.

> "There is more time involved when talking to developers, land owners, and potential customers when we get inquiries about tap purchases. There has to be a conversation about what the differences are between the two types of taps, the annual allocation, and the surcharge. One of the major benefits of our Urban tap program is that it pushes off the need to accept less attractive water sources or invest in large raw water infrastructure. The District can also slow the rate of agricultural dry-up."
>
> – Nancy Koch,
> Water Resources Manager,



CONCLUSIONS

1. Conservation-oriented SDCs are still a new tool, but one that is a logical extension of more traditional SDC calculation methods.

The use of conservation-oriented SDCs is not yet widespread, but adoption in Colorado is gaining traction as more communities seek ways to reduce future water demands, and as communities see the successes achieved by their peers. These newer types of SDCs can recognize water-demand variations within a customer class and provide greater equity among customers, in comparison with traditional methods (such as those based solely on meter size).

The variety of methodologies and administrative considerations presented in this Guide are a reflection of many of the ways utilities have designed and implemented their conservation-oriented SDCs. Many of these methods are readily replicable by other utilities, while surely more fee designs and processes will be developed in the coming years.

2. Conservation-oriented SDCs can be appealing to developers, and several incentive options exist. Regulatory requirements, such as landscape ordinances, are likely the most impactful method of achieving water savings but may not be viable in every community.

As a general principal, developers try to minimize costs so that they may maximize profits. If a reduction in an SDC can impact their bottom-line sufficiently, then developers are often willing to take actions that go beyond code requirements—such as installing higher-efficiency fixtures or lower water-using landscapes—to realize those savings. Developers' support for these kinds of incentives is demonstrated in the research presented in Appendix B and is evidenced in the case studies profiling different communities (Appendix C).

Local regulations—for landscapes in particular—may be the most effective way to achieve water savings in a widespread fashion. However, in some communities, it may be politically infeasible for highly water efficient regulations to be adopted. By contrast, voluntary incentive mechanisms like conservation-oriented SDCs may be more politically viable, but they will likely achieve less water savings than a regulatory mechanism.

3. Conservation-oriented SDCs can benefit utilities and customers by improving equity among customers, better capturing the true cost of development, and significantly reducing water demands in new development.

Conservation-oriented SDCs that can better connect the fee with expected future water demands will result in each new customer paying their "fair share" of the utility's costs to provide the water resources and infrastructure. This is a benefit to both customers and utilities. Customers' monthly water bills likely will be lower, and depending on the landscape installed, they may enjoy a lower-maintenance landscape. And when done right, these fees will better capture the true costs of development incurred by each entity and may provide better cost recovery for the utility. Reducing water demands from the start—as opposed to installing water efficient retrofits later on—is also cost effective for utilities and customers. It is always more expensive to retrofit a landscape than it is to install the landscape just once. And importantly, two of the communities profiled in the case studies— Aurora and Westminster, Colorado—have tracked the water savings from their programs and have realized significant water savings as a result of their conservation-oriented SDCs.

4. Conservation-oriented SDCs typically require more time, expertise, and stakeholder engagement during the design, adoption, and administrative phases.

Good water-use data and analysis are necessary to develop more accurate estimates of projected water use in the design phase of an SDC assessment schedule. In addition, good communication with stakeholders—like the development community and the public—can result in strong support for the fee design, especially if it benefits them financially. Decision-makers on a utility board or city council also must understand the need and benefits of a new SDC so that they may appreciate the value in a new, and likely more complicated, fee design.

To administer the fees properly, staff may need to be educated in reviewing development plans and engineering designs and assigning fees properly. In addition, staff will need to be able to communicate clearly with fee payers about the structure and incentive options.

5. Ensuring the longevity of water savings over time is essential and is achievable through conservation-oriented rate structures, administrative solutions, customer education, and tracking the water-use patterns of new developments over time.

Conservation-oriented monthly water rates are a natural pairing with conservation-oriented SDCs. They will help to reinforce the value of water and need for water efficiency to the owners/occupants of a building. In addition, in the event that water use exceeds the projected demands of a new development, conservation-oriented water rates provide a cost-recovery mechanism for the utility.

Administrative solutions that officially record the water allocation and the fee paid for a new development through forms and plans filed with a land use authority are a strong reinforcement mechanism. This option may be most viable for municipal utilities that can more easily coordinate with the local land use authority.

Customer education is essential if water savings are expected to be sustained over time. Customers need education about the water allocation that was paid for through the SDC, what level of water use is expected, and how to maintain that level of water use through proper management of the irrigation system.

Finally, tracking water use over time is essential to providing insight about the performance of a fee design. Basic data about new developments should be recorded by the utility so that they are able to calculate estimated water savings and compare with similar new developments that did not use the incentive.

Conservation-oriented fees are a powerful option to help reduce water demands in new developments. Not only can they save substantial amounts of water, but they can also improve equity among customers and allow the utility to play a stronger role in shaping the water footprint of the growing population it serves.

APPENDIX A: A Technical Primer on System Development Charges

A1.1 Introduction

SDCs are one-time charges assessed to new development. An SDC is designed to recover the cost of facilities needed to meet the capacity requirements of new development. SDCs may also be assessed to existing customers that require an increase in capacity. SDCs provide a source of funds that allow utilities to finance future projects to serve growth as well as a reimbursement mechanism for cost of previous expansion projects. The philosophy behind SDCs is that the costs of incremental capacity are borne by those who require it. The use of SDCs provides utilities with a cost-based analysis of existing and/or planned facilities needed to serve new capacity requirements. The primary goal of selecting an appropriate methodology is to ensure equity between new and existing customers and to be legally defensible.

The general steps in calculating an SDC are as follows:

- Determine value of existing system assets and future capacity-related project costs
- Estimate system capacity
- Calculate unit cost of capacity
- Determine customer demand characteristics
- Apply unit cost of capacity to customer's demand characteristics.[2]

A1.2 Legal Framework and Precedent

Many states have codified statutes regarding the development and implementation of SDCs. Colorado Revised Statutes (CRS) §29-20-104.5 outlines the requirements for calculating and implementing an SDC.[3] The basic tenets of the Statute are listed below.

- Fees must be generally applicable to a broad class of property (for example, residential, commercial, etc.).
- Fees must be intended to defray the projected impacts on capital facilities caused by proposed development.
- Fees are directly related to service that a local government is authorized to provide.
- The asset has an estimated useful life of five years or longer.
- The SDC is required by the charter or general policy of a local government pursuant to a resolution or ordinance.

In addition to each state's legal requirements, there are a number of national court cases that have helped shape how SDCs are developed. Cases such as Dolan v. City of Tigard and Nolan v. California Coastal Commission are pivotal decisions that

2 Demands that may vary by customer type and/or meter size.

3 Impact fees are also referred to as tap fees, plant investment fees, connection fees, system development fees, capital fees, etc.

have provided the framework. Collectively, these cases helped establish that there be a rational nexus between the fee and the needs created by development and the benefits incurred by the development.

Another case, specifically about water and sewer impact fees, was Banberry Development Corp. v. City of South Jordan. This case confirmed that newly developed properties must not bear more than their equitable share of the capital cost in relation to the benefits conferred. Out of this case came the "Banberry Factors" that many SDC practitioners use as a test to determine if their impact fees are rationally related to the cost and benefit provided:

1. The cost of existing capital facilities
2. The manner of financing existing facilities
3. The relative extent to which newly developed properties and other properties have already contributed to the cost of existing facilities
4. The relative extent to which newly developed properties contribute to the cost of the facilities in the future
5. The extent to which newly developed properties are entitled to a credit because of construction of new public facilities
6. Extraordinary costs to service newly developed properties
7. The time-price differential

A1.3 SDC Calculation

The development of SDCs is typically based on three primary components: the value of backbone system facilities, the capacity associated with those facilities, and the customer demand requirements. Backbone facilities include major infrastructure such as water resources, transmission mains, raw and treated water storage, treatment plants, and pumping facilities. Some utilities develop SDCs for each of the backbone facilities based on their specific capacity requirements. In Colorado, it is more common to see a two-part SDC; a fee, cash-in-lieu, or dedication requirement for water resources, and a fee for treated infrastructure. The basic formulas for calculating an infrastructure and water resource fee is illustrated below.

Water Resources Fee:

$$\frac{\text{Water Resources Value (\$)}}{\text{Resource Capacity Annual Yield (acre-feet)}} \times \text{Customer Demand Requirements (acre-feet per year)} = \text{SDC (\$)}$$

Infrastructure Fee:

$$\frac{\text{Backbone System Facilities Value (\$)}}{\text{System Capacity in Gallons Per Day (gpd)}} \times \text{Customer Demand Requirements (gpd)} = \text{SDC (\$)}$$

This two-part approach is common among many Colorado utilities but is not necessarily required to design a conservation-based SDC.

With the two-part approach, *annual water demand* is most often used in the calculation of a water resources fee, which is the fee component of an SDC that accounts for the annual volume of water that the utility must obtain to serve the new development. Water resources costs may include water rights, raw water infrastructure such as reservoirs or other facilities designed for raw water delivery to the system.

By contrast, the water infrastructure fee, another SDC fee component that accounts for the treatment, treated storage facilities, pump stations, and the water distribution network, is often based on the projected *peak water demands* of a development. Peak demands are the largest water demands of a customer on a given day—for example, a hot day in July when outdoor watering demands are highest—and the system of infrastructure is built to accommodate all peak demands of all customers.

While these two SDC fee components (water resources and infrastructure fees) are often based on two different measures of water demand (annual and peak day), it is ultimately up to the utility whether to 1) use both of these fee components and 2) how to calculate them. Water-conservation-oriented assessment methods could apply to both fee components, as is done in Castle Rock, Colorado, or to only the water resources component, as is done in Fountain, Colorado. The decision about how to approach this is ultimately up to the utility as it considers its goals such as fairness, cost recovery, conservation objectives, and any other utility goals.

The development of SDCs generally follows a 5-step process as listed in the table below. The methodologies included in the table are discussed in the following sections.

Table A-1 Comparison of System Development Charge Methodologies

Step	Methodology		
	Buy-in	Incremental	Hybrid
1	Estimate value of exhisting available assets to serve new development	Estimate value of future growth-related projects that add capacity	Estimate value of existing available assets to serve new growth and future growth-related projects that add capacity
2	Determine existing/available capacity	Estimate future incremental capacity added	Determine existing capacity and future incremental capacity
3	Calculate unit cost		
4	Calculate customer demand profiles		
5	Develop assessment schedule		

A1.4 Step 1. SDC Methodologies

The following sections review the generally accepted methodologies used to calculate SDCs. Each method is designed to recover the cost of capacity to serve new growth.

The selection of a methodology should consider a utility's goals and objectives for recovering capacity-related capital costs. The three methodologies include:

- Buy-in
- Incremental
- Hybrid

The table below lists the basic parameters that a utility may consider when selecting a methodology that best meets their needs.

Table A-2 System Development Charge Considerations

Decription	Buy-in	Incremental	Hybrid
Available existing capicity, sufficient to accommodate new growth	X		
No existing capacity with significant future capacity requirements		X	
Some existing capacity available with future capacity requirements needed to accommodate new growth		X	X

A1.4.1 Buy-in Method

The buy-in method considers the valuation of existing assets and the capacity of those assets to determine the SDC. This method is typically reserved for utilities that have capacity available in the existing system to serve new customers in the near and long term. The buy-in method recoups the new development's proportionate share of capacity. This SDC essentially reimburses the existing rate payers that funded the original facility investment. This equates to the new development buying into the system. However, this methodology, as with the other methodologies, does not imply a transfer or impart ownership of the assets to the customer.

There are four approaches to determine the value of assets under the buy-in methodology that are listed below:[4]

- Original cost (OC): Historical cost as recorded on utility's account records
- Original cost less accumulated depreciation (OCLD): Historical cost less depreciation
- Replacement cost new (RCN): Today's cost
- Replacement cost new less accumulated depreciation (RCNLD): Today's cost less depreciation

4 With the buy-in methodology, the value of the system can be based on the total system capacity or the value of the remaining capacity available in the system. If the latter is chosen, the unit cost should be based on the remaining value and capacity in the system. See Section A1.5 for estimating system capacity.

The OC approach values existing facilities at the original cost in the year the facilities were completed. This allows new customers to buy into the system at the same cost level as existing customers. The OCLD approach also values existing facilities at the original cost in the year the facilities were completed; however, it reduces the cost by accumulated depreciation. Accumulated depreciation accounts for the loss in value of an asset due to use, repair, and obsolescence. With the OCLD approach, new customers buy into the system at a lower cost than existing customers. The accumulated depreciation not recovered when using the OCLD approach is recovered through other rates, fees, and/or charges. Because new development occurs over time, both the OC and OCLD approaches do not reflect the time value of money and do not compensate the existing customers for carrying costs of the initial funds used to add capacity.

The RCN and RCNLD approaches both consider the current value of facilities as if they were added at the time of the new connection. However, RCNLD deducts indexed accumulated depreciation from the current replacement value. The RCN and RCNLD approaches estimated the value of facilities using historical asset data and applying a cost index factor from publications such as the *Engineering News Record, or the Handy Whitman Cost Index for Public Utilities*. These methods account for inflation or the market value of facilities over time and fairly compensate existing customers for the carrying cost of building facilities in advance of serving new development. These carrying costs can serve as a mechanism to mitigate future rate increases.

The primary difference in selecting an OC approach or a replacement cost approach depends on where the utility wishes to place the burden/benefit of opportunity costs. Using OCs, all new customers buy-in at the same cost as existing customers. However, capacity is built in large increments and there often is excess capacity, as legally required, to serve new customers. With the OC approach, existing customers bear that cost. Conversely, the replacement costs approach assesses facilities at current dollars. This shifts the carrying costs or the time value of money to new customers. This essentially reimburses existing customers for the cost of carrying capacity for future customers connecting to the system, but not the direct cost of financing improvements if external debt was used to fund infrastructure.

A1.4.2 Incremental Method

The incremental method is typically used by utilities experiencing rapid growth while possessing little to no available capacity in their current system. The incremental method usually relies on a utility's long-term expansion capital improvement program to estimate costs and capacity of new facilities. The incremental method is a forward-looking approach and considers a utility's growth-related projects contained in a long-term capital expansion program or master plan. The incremental cost is defined as the cost to serve the next incremental amount of growth.

A1.4.3 Hybrid Method

The hybrid or combined methodology combines the system buy-in and the incremental methodologies. The hybrid methodology is appropriate for utilities with some available capacity in the existing system as well as measurable future expansion.

The hybrid methodology valuation includes the existing systems valuation plus the cost of future growth-related facilities. This recognizes that a portion of the SDC is to reimburse existing rate payers for their up-front investment as well as a portion to fund growth-related projects. The valuation of existing assets can be determined using the OCLD, OC, RCNLD, or RCN approach. The future growth-related facilities should be valued at current year dollars.

A1.4.4 Credits and Adjustments

Utilities should evaluate the use of credits or adjustments to SDCs. Credits and adjustments often include grants, contribution in aid of capital, and loans. The applicability of credits or adjustments depend on the costs included in the SDC. Similarly, credits and adjustments may be accounted for differently depending on the methodology selected (buy-in, incremental, or hybrid). Grants and contributions in aid of construction can be deducted from the SDC valuation using any of the methodologies. Contributions in aid of construction typically refers to when developers are required to construct, install, and dedicate onsite facilities serving the development and then dedicate these facilities to the utility. It may also include funding, oversizing, or installing off-site or backbone facilities, and may require additional individualized adjustments for each development. Grants also provide no-cost infrastructure to the utility.

Another practice, most common with the buy-in methodologies, is to reduce outstanding principal from debt used to construct those facilities. If rate-based revenues, assessments, or other dedicated revenues are the sole repayment source for outstanding debt, that may require additional analysis for each community. Once a new customer connects to the water system, they pay for service through user charges or rates. For some communities, rates are designed to fully recover principal and interest costs on outstanding debt while SDCs are dedicated to cash funding capital facilities. By reducing the SDC by outstanding principal, it avoids double-counting this cost in both rates and SDCs.

Alternatively, communities that repay outstanding debt using SDCs may not wish to adjust the value for outstanding principal as SDCs are used to repay previously expansionary investments (for example, excess and available capacity in place). Under the incremental and hybrid methodologies, facilities related to the expansion of capacity are often designed and built to meet long-term planning horizons. SDC revenues may be insufficient to meet the initial expansion project costs. As a result, debt funding or existing reserve funds from rates are used to assist in funding the projects. Interest on bonds and loans are a cost of doing business and are often capitalized. As a result, a portion of present value of interest costs maybe be allowable in the SDC calculation. However, it is important that utilities review their state and local SDC legislation to ensure that any credits or adjustments comply with those requirements.

A1.5 Step 2. Estimate System Capacity

The second step in determining SDCs is estimating the existing and/or future capacity. There are two buy-in approaches commonly used to estimate the capacity to be served: capacity buy-in and equity buy in. SDCs under both approaches allow customers to buy-in to the existing system, but the values under each can vary significantly. Under the capacity buy-in, the SDC is based on the unit cost of capacity, often stated as $ per million gallons per day or the number of equivalents that can be served by the system.

The equity buy-in approach determines the next equity share of system cost. Unlike the capacity buy-in, the equity buy-in is calculated based on the number of current customer equivalents. For example, if there are 10 customers connected to a system, they each share in 1⁄10 of the system. The 11th customer would pay 1⁄11 of the system costs and so on. As customers are added each would be buying into an equal share of the system facilities.

The buy in methodology may consider either the total capacity of the system or the remaining capacity available in the system. Whichever method is chosen, the value of facilities and capacity should be based on the same criteria. For example, if there is 25% capacity available in the system, the asset value should reflect the value of that remaining 25%.

The incremental methodology considers the capacity that future growth-related projects will add over a specified time period. For example, if the next increment of capacity will provide treatment and transport for 10 million gallons per day (mgd), then the appropriate capacity to use for unit cost calculation is 10 mgd. The basis of capacity used to calculate the unit cost is often based on water/wastewater treatment design values, as those tend to be the largest facilities that govern system capacity.

However, SDCs can consist of separate components such as storage, pumping, and treatment. In those cases, the capacity basis should be based on each specific component and calculated per mgd or ERU.

The hybrid method captures the combined existing capacity (total or remaining available) and future incremental capacity of future growth-related projects.

A1.6 Step 3. Calculate Unit Cost of Capacity

Capacity units used to develop SDCs for customers are determined by dividing the estimated value of existing assets, growth-related projects, or both, by the capacity of the facilities included in the valuation. The unit cost of capacity is then applied to customer demand characteristics to determine the SDC. For the hybrid method, the unit cost of capacity is determined by a weighted average of the existing and future cost of capacities. The weighted average cost of capacity is the sum of the estimated existing system asset value plus the future project growth-related costs, divided by the sum of the existing and future capacity. Adding together the individual unit costs for the existing assets and the future growth-related assets could overstate or understate the unit cost of capacity since the weighted average comprises the unit cost.

A1.7 Step 4. Customer Demand Analysis

A customer demand analysis determines the demand requirements of a group of customers or the entire customer class and serves as the basis for the SDC. Customer demands must be analyzed using the same unit measurements as the unit cost of capacity calculation in order to maintain the rational nexus[5] between the cost of facilities and the cost to serve a new customer. For example, if the unit cost of treatment facilities is measured using peak day demand in gallons per day (gpd), then the new customer demands should also be measured in peak day gpd to calculate the treatment component of the SDC.

A1.8 Step 5. Assessment Schedules

The unit cost of capacity can be applied to the customer class demand characteristics to determine the cost to serve a new customer. The final task is to develop an assessment schedule in order to apply the SDC in an equitable manner. SDC assessment schedules are used to consistently and equitably apply the unit cost of capacity to new development. These schedules may be based on customer type and/or meter size, lot size, plumbing fixtures, number of units, or equivalent residential units, etc. This step is the topic of Chapter 1.

A1.9 SDCs, User Charges, and Financial Planning

It is important to note that there is a key difference between SDCs and monthly user charges. User charges are set annually to recover a specific revenue requirement on an annual basis. Conversely, SDCs recover the unit cost of capacity, and over time the fees recover the cost of facilities as customers connect. As a result, the collection of SDCs is largely dependent on the timing of new development. Major capital facilities or infrastructure often require several years to design, develop, and construct. As a result, capital costs tend to be concentrated around various points in time rather than distributed evenly over an entire planning period. Capital facilities or infrastructure that is delayed until sufficient SDC revenues have accumulated to fund those facilities may result in decreased service levels to all customers.

There may be periods of time when other revenues or financing mechanisms will be necessary to meet cash flow requirements. To accommodate cash flow shortfalls, utilities may need to borrow funds or rely on rate revenue that would be paid back through future SDC revenue.

5 More specifically, the rational nexus test requires that there be a connection between new development and facilities required to serve that development and that the cost be rationally related to the benefits reasonably expected.

Development Community Perspectives on Water Efficiency in New Construction

Authored by Amelia Nuding, WRA | January 2018

Western Resource Advocates (WRA) and the Colorado Association of Home Builders (CAHB) collaborated on an effort to better understand builders' and developers' perspectives on water efficiency in new construction. In May 2017, the two organizations convened a group of about 20 builders, developers, and real estate professionals in Northern Colorado.

The conversation was structured around a set of survey-type questions, reproduced below. The group's responses are reflected in each "Summary of Responses" which capture the majority of viewpoints expressed during the conversation. After each summary, a "WRA Recommends" section provides ideas related to the "Summary of Responses" that can help to focus the efforts of water utilities and land use planners. WRA's suggestions align with many development-community perspectives, but were not part of the conversation.

Although viewpoints undoubtedly vary among communities, the responses reflected below still can be illuminating when considering how to better integrate water efficiency into new construction. Additionally, these questions could be a useful starting point for initiating dialogue about water efficiency between the development community, the local land-use authorities, and water providers.

TERMINOLOGY

The terms "system development charge," "connection charge" and "tap fee," among others, all describe the one-time charge that covers the cost of connecting to the water system, as well as the cost of the infrastructure and water resources that were developed to support the new connection.

Question 1

Which water conservation measures that go beyond current requirements would be most and least preferred?

a. Installing water conservation measures in the interior structure
b. Installing water conservation measures in the outdoor landscaping
c. Marketing water conservation features to new home buyers in the sales process
d. Improving buyer notification and education at closing, such as providing estimates of water cost savings
e. Participating in a Water Efficiency Rating Score program for new homes

Summary of Responses

The most preferred conservation measure was (c) marketing water conservation features to new home buyers in the sales process. It was noted, however, that significant effort would be needed to educate realtors for this to be an effective option. Options (b) and (e) also were strongly preferred. Outdoor landscaping conservation measures were widely acknowledged to be the greatest water saver, and therefore were deemed more important than indoor water conservation measures. Water Efficiency Rating Scores[1]—similar to energy efficiency rating scores—were favorably viewed because they offer an objective measure of the water savings and therefore provide a level playing field to all home builders.

The least preferred options were (d) because it occurs too late in the process and is too uncertain, and (a) because the water savings were presumed to be too small.

WRA Recommends

Water utilities and land use planning departments can focus their water conservation efforts in new construction on outdoor landscapes. For example, requiring or incentivizing soil amendments, highly efficient irrigation systems, and lower water-using plants in all or part of the landscaped areas, and educating customers about landscape maintenance all can be effective in ensuring water efficient landscapes.

Question 2

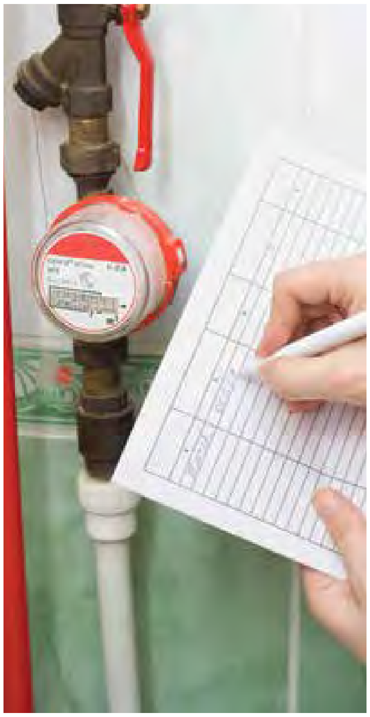
What factors drive the structure of your standard landscaping package offered with new homes (e.g., front/back, turf or plant type, irrigation system types, soil amendment, mulching, etc.)?

- a. Landscaping requirements of local government
- b. Marketing, curb appeal
- c. Competition
- d. Cost of providing landscaping
- e. Value of landscaping included in the home appraisal
- f. Allowing homeowners the opportunity to create sweat equity
- g. Other

Summary of Responses

The primary drivers of standard landscaping packages are local government requirements, which typically require the front yard to be landscaped. Curb appeal is significant factor as well, and the builders' perception is that no one wants to buy a new home without a landscaped front yard. It was noted that customers rarely change the landscaping of the new home; they care most about simplicity, and do not care very much about plants or irrigation system details.

1 Residential Energy Services Network. 2018. "RESNET Developing A Water Efficiency Rating Index Standard – HERSH2O." Accessed February 2016. http://www.resnet.us/professional/about/resnet_to_develop_water_efficiency_rating_system



WRA Recommends

Water utilities and land use planning departments can look to their landscaping regulations to drive water efficient landscape choices. This could include requiring soil amendments, mandating installation of irrigation systems that use rotor heads instead of spray heads, and specifying plant material. Additionally, providing landscape templates and demonstration plots that feature a variety of non-turf options can make it easier for developers and builders to install water efficient landscapes.

Question 3

What problems or concerns might you have with lower water-using landscapes installed in your projects?

- a. Too costly
- b. Too time consuming
- c. Lack of experience in managing landscape installation
- d. Lack of qualified landscapers
- e. Lack of certainty in meeting landscape specifications
- f. Lack of flexibility in meeting landscape specifications
- g. Unappealing to customer/buyer
- h. Not fully valued in the home appraisal

Summary of Responses

The three primary concerns were (c) lack of experience in managing landscape installation, (g) unappealing to customer/buyer, and (h) not fully valued in the home appraisal. Cost, however, was not a major concern. The average cost of a basic turf landscaping package is $4,000 to $5,000. A xeriscape yard costs approximately $2,000 more.

WRA Recommends

Water utilities and land use planning departments can help developers by providing a list of quality landscape designers and installers that are experienced in xeric and low water-use landscapes. Additionally, model homes with efficient landscapes can be highlighted for residents and customers through websites, marketing materials, and new developments.

Question 4

How is landscaping valued in the appraisal process? Would the financial savings from water efficiency be meaningful?

Summary of Responses

Appraisals are conducted only after the landscaping is done, and good landscaping can add curb appeal, but a significant financial investment in landscaping doesn't always translate to an increased home appraisal value. Residential appraisers often don't want to deal with the assumed value of water

efficiency. Energy efficiency features in new homes have existed for much longer, yet they still are difficult to properly value. To meaningfully appraise the value of water efficiency features in a new home would require educating financial institutions, real estate professionals, and buyers, which is a significant task.

Question 5

Which incentives related to water efficiency of landscapes in new developments would be most and least preferred?

a. **An immediate credit in the water development fees**
b. **A deferral of payment of the water development fees (e.g., until Certificate of Occupancy is issued)**
c. **Density bonus**
d. **Priority inspections**
e. **Technical assistance**
f. **Guarantee of a number of future building permits at the current water development fee rate**
g. **Other**

Summary of Responses

The most strongly preferred incentive option was (f), guaranteeing that the development fee rate would remain the same for a number of future building permits. The certainty of fees is greatly valued by developers because the timeline of the projects is not always known. Also, if fees increase the subsequent year, then developers also realize some cost savings. Other highly appealing incentives included (a) a credit (i.e., discount) in the development fee, and (b) a deferral of payment of the fee. Both of these options offer cost savings to the developers. The other three options listed—(c), (d), and (e)—were appealing to the group, but not as strongly as (a), (b), and (f).

WRA Recommends

Water utilities and land use planning departments can design their water development fees to incentivize water efficiency in outdoor landscapes in several ways. The cost of the fee could be fixed when applied to a set of future construction projects in exchange for installing water efficient landscapes that go beyond code requirements. Alternatively, the fee—or a portion of the fee—could be reduced in proportion to the estimated water savings of a new development. This technique has been documented by a few communities, and profiled in WRA's report, "Water Connection Charges: A Tool for Encouraging Water Efficient Growth."[2] Another option is to delay the timing of when the fee payment is due. For example, instead of the payment being required to secure a permit, it could be due at the time that the Certificate of Occupancy is issued.

2 Western Resource Advocates. 2015. Water Connection Charges: A Tool for Encouraging Water Efficient Growth. Available at https://westernresourceadvocates.org/publications/water-connection-charges-a-tool-for-encouraging-water-efficient-growth/

Question 6

What other comments and perspectives do you have on this topic?

Response

Integrating water conservation in new construction should be mandated by the municipality or demanded by the buyer. All of the necessary products to realize greater water efficiency already exist.

WRA Recommends

Water efficiency should be required or incentivized by the water utility and land use planning department.

Response

The raw water dedication is oversized. Developers should not be required to provide more water than is used by the homeowner. Less water required means less water must be obtained or paid for by the developer. Correlating the raw water requirement (or the water supply requirement) with the projected volume of water used should be a common practice. Too often these numbers are very different.

WRA Recommends

Fee calculations and reasons for requiring a given amount of water should be very transparent. Additionally, the volume of water required and associated fees should be reviewed periodically (for example every one, three or five years) and be correlated with actual need. A clear explanation should be available to the development community.

Response

There is a need to write variances in some communities to address these oversized requirements. Unfortunately, the ability to submit variances is not available everywhere.

WRA Recommends

Fee variances should be allowed for alternative water dedication requirements, or that the fee structure reflect the projected water usage of new projects, to encourage efficiency.

Question 6 continued on next page

Response

Any move away from flat fees for residential homes is desired. Flat fees are a disincentive against smaller lots, and this poses affordability concerns. Adjusting fees by lot size and/or landscape type is a good option. For example, smaller lots and landscapes that use less water would be associated with lower fees.

WRA Recommends

Fees should be structured to incentivize lower water-using landscapes by scaling the fees in proportion to the projected water usage.

Response

Homeowners need information about how to manage and maintain their landscapes up front. Long-term water reductions will only be achieved if the management issue is addressed.

WRA Recommends

New homeowners shoukd be provided with an information packet and resources for additional information and assistance, so that they better understand how to manage their irrigation systems and properly maintain their landscapes.

It is evident from these builders' and developers' perspectives that local regulations are the primary driver of the design—and resulting water efficiency—of outdoor landscapes in new construction. There was clear willingness to go beyond the code requirements as long as appropriate compensation or incentives are provided, such as fixed fees applied to developments built in the future, discounted fees, or delaying the time at which fees are due. There was also a clear desire for homebuyers to be educated about the value of any water efficiency measures installed, and about how to properly maintain and manage water efficient landscapes to ensure water savings are realized post-occupancy.

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WESTERN RESOURCE ADVOCATES

PROTECTING THE WEST'S LAND, AIR, AND WATER

APPENDIX C: Case Studies

Colorado Case Study Matrix

Decription	Aurora Water	Castle Rock Water	City of Fountain	Little Thompson Water District	City of Westminster
RESIDENTIAL DEMAND METRICS					
# of Bathrooms	X				
Fixture Units		X			
Gallons per Minute		X			
Irrigable Area		X			
Lot Size	X		X	X	
Plant Type and Area	X*		X		
Conservation-Oriented Rates?	X	X	X	X	X
IRRIGATION DEMAND METRICS					
Irrigable Area	X				X
Irrigation Type					X
Nonpotable Water					X
Plant Type	X				
Conservation- Oriented Rates?	X	X			X
ICI DEMAND METRICS					
Customer Type					X
Fixture Units		X			X
Meter Size	X**	X	X	X	
Conservation- Oriented Rates?		X	X		X
OTHER FEATURES					
Administrative Reinforcement	X	X			X
Customer Education		X			
Flat Rebate	X			X	

*Only for estate lots
**At 3" meters and larger, engineering calculations particular to the development type determine the fee.

Aurora, Colorado

Aurora is the third-largest city in Colorado, with a population of more than 345,000 people.[1] About one-third of the land within its boundaries has been developed,[2] with more growth projected, and new water supplies are increasingly difficult and expensive to obtain. In 2014 the city adopted a new connection charge schedule that directly correlates water fees with the expected water demand (indoor and out) for each customer class. The schedule also incentivizes low-water-using landscaping through lower fees, including one particularly innovative program called the "z-zone" in which no fee is charged if the landscape requires no water after plant establishment.

DEFINITION

Water Connection Charges —

Connection charges — also called tap fees, impact fees, system development charges, or plant investment fees — are one-time charges assessed to new developments to help pay for the direct costs of connecting to a utility's water system and for the infrastructure and water resources capacity needed to support these new developments.

Communities use a wide variety of terms to describe these charges. In this case study, we us the term "connection charge," although the local term may differ.

New Connection Charges Designed to Cover Costs and Reduce Water Demands

The charges assessed under the previous schedule were not adequately covering the City's costs for infrastructure and water. Changes in water demand and growth patterns had shifted the balance of water use between customer classes, such that residential fees were effectively subsidizing larger water users' (e.g., irrigation, commercial) fees. In addition, there were requests from the building community to lower the fees. New leadership at the utility initiated a process to develop a connection charge structure that would better align the fees with water utility costs and provide an incentive to builders to construct more water-efficient developments.

Connection Charges Are Based on Robust Analysis

Aurora's connection charges help to pay for past and future capital investments in the water system, in five categories:[3]

1) Water resources (the market cost of water in the region)
2) Source of supply (the existing and projected assets required to move and store water)
3) Treatment and distribution (the existing and projected assets)
4) Carrying costs (the financial costs incurred to obtain water)
5) Water losses in the system

The cost of a gallon of water per day was calculated for each of these categories and then summed, totaling $57.45 per gallon per day. This cost is then multiplied by the projected average daily demand of each new development type (residential, multi-family, commercial), to determine the connection fee. Six years' worth of billing data were analyzed to determine projected average daily demands.

1 U.S. Census Bureau. 2013. "QuickFacts." Available at http://quickfacts.census.gov/qfd.

2 City of Aurora, Colorado. 2010. City of Aurora Comprehensive Plan. Available at https://www.auroragov.org/DoingBusiness/CityPlanning/PlansandStudies/ComprehensivePlan. See Chapter IV, Section A, page 1.

3 Van Ry, P., Aurora Water. 2013. Water Service Connection Fees presentation.

Residential Connection Charges for Indoor and Outdoor Use, and Xeric Landscaping Credit

New detached single-family residential homes are charged a two-part water service connection charge: one for indoor use and one for outdoor use.[4] The indoor use charge is either $5,509, $8,901, or $15,425, depending on the number of bathrooms in a home (1-2, 3-4, 5+, respectively). The number of bathrooms was found to be a reasonable proxy for the volume of indoor water use, based on billing data analysis.

A-Table 1. 2015 Connection Charges for Single-Family Residential (Detached).

Indoor Use Charge		Outdoor Use Charge
Number of Bathrooms	Fee	$0.941 / sq. ft. of lot size -$1,000 for 100% front yard xeriscaping
1-2	$5,509	
3-4	$8,901	
5+	$15,425	

The outdoor water use charge is $0.941/sq. ft. and is applied to the total area of the lot. In addition, if 100% of the front yard is xeric landscaping, then a $1,000 credit is given. Xeric landscapes are designed to be drought-tolerant, using low-water plants and specific techniques, such as soil amendment, mulch, and grouping of plants with similar water needs, to maximize water efficiency. The City provides a list of xeric plant species that are suited to the semi-arid environment, using no more than 15” of water per year and as little as no water after the initial plant establishment period. Establishment of landscape requires higher amounts of water during the first few months or years, until the plant is established in the soil. Once established, less water is required to maintain optimal health.

A-Table 2. 2015 Sample Connection Charges for Single-Family Residential (Detached).

House Type	Indoor Use Charge	Outdoor Use Charge	Total Charges
3 bedroom, 2 bathroom, 8,000 sq. ft. lot	$5,509	($0.941 x 8,000) = $7,528	$13,037
5 bedroom, 3 bathroom, 8,000 sq. ft. lot with front yard xeriscaped	$8,901	($0.941 x 8,000) -$1,000 = $6,528	$15,429

Irrigation Connection Charges Are Tiered for Different Landscape Types

Irrigation meters are used for irrigation water in commercial or residential common areas. They are assessed in three tiers: $2.75/sq. ft. for non-water-conserving landscape (e.g., bluegrass), $1.47/sq. ft. for water-conserving landscape,[5] and $0/sq.ft for “z-zone” landscapes that use zero water after establishment. More than 50 plants currently meet the z-zone requirement in Aurora.

If a z-zone is elected, the developer is required to put down a $20,000 deposit on the temporary irrigation meter, pay an administrative fee, and agree to a “water budget” for the landscaped area during the plant establishment period. A water budget has two parts: a calculated volume of water that the entire landscape should use if watered properly (the budget limit), and a tiered pricing structure that charges a lower rate ($/gallon) for water used up to that budget limit, with a higher rate(s) if that limit is surpassed. After the plants are established, the water utility will remove the irrigation meter and fully refund the deposit.

4 City of Aurora, Colorado. 2015. “Development and Connection Fee Schedule.” https://www.auroragov.org/cs/groups/public/documents/document/021682.pdf.

5 Water-conserving landscape means any turf or plant using less than 15 inches per year through automatic irrigation, in normal weather conditions. See City of Aurora, Colorado, Planning Department, 2014. Landscape Reference Manual. https://www.auroragov.org/cs/groups/public/documents/document/005465.pdf.

A-Table 3. 2015 Connection Charges for Irrigation Meters

Landscape Type	Cost Per Sq. Ft. of Landscaped Area	Cost for 10,000 Sq. Ft. of Landscaped Area
Non-Water-Conserving	$2.75	$27,500
Water-Conserving	$1.47	$14,700
z-zone	$0 [$20,000 deposit, 100% refundable after establishment period]	$0 after refund

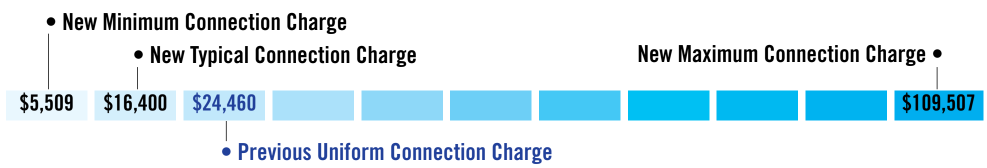
The cost of a water-conserving landscape is almost half the price per square foot as a non-water-conserving landscape. Fees for z-zones cost the least.

Uniform Charges Replaced by Multi-Factor Charges

The fee schedules prior to 2014 had uniform charges for each residential type (single-family attached, single-family detached, and multi-family). For example, a detached single-family home had a flat fee of $24,460, regardless of home or lot size. But under the 2014 schedule, that cost can range from as little as $5,509 (1-2 baths with no lot) to as much as $109,507 (5+ baths and 100,000 sq. ft. lot), as shown in Figure 1. However, those low and high figures are very rare, as the average lot size is about 8,200 sq. ft., and more than 97% of lot sizes are less than 14,000 sq. ft.[6] Thus, a home in 2014 with an 8,000 sq. ft. lot and 3-4 baths would result in a charge of about $16,400 as compared with a $24,460 charge in 2013.

Commercial and multi-family connection charges were also changed to account for projected average daily demand. Irrigation fees were significantly less expensive prior to 2014: $0.71/sq. ft. for non-water-conserving landscape and $0.36/sq. ft. for water-conserving landscape. The 2014 fees are almost four times higher, but also feature tremendous cost saving opportunities through the z-zone program.

A-Figure 1. Single-Family Residential Charges Under Aurora's New & Old Connection Charge Structures



The "typical" charge shown represents a home with an 8,000 sq. ft. lot. The minimum charge shown represents a 0 sq. ft lot, and the maximum charge shown represents a 100,000 sq. ft lot. The previous, uniform connection charge did not vary with lot size.

Stakeholder Engagement Helped Create Innovative New Program

The new connection charge schedule was developed a little over a year before it was adopted. Several private and public meetings were held with the Homebuilders Association, the Citizens Water Advisory Committee, the City/Development Community Joint Task Force (comprised of developers, landscape professionals, planners, and water utility staff), and the City's Infrastructure and Operations Committee. There was a high degree of transparency through

3 Van Ry, P., Aurora Water. 2013. Water Service Connection Fees presentation.

this process, especially with respect to how and why the new charges were to be calculated. Transparency throughout the process helped gain the support of various stakeholders — which helped lead to its adoption by City Council.

Once the new schedule was adopted, developers expressed concerns about the new charges for irrigated areas, since those costs increased significantly. The water utility met with the Joint Task Force over the course of several months to try to address this; as a result, the z-zone concept was born. It was a solution that satisfied both parties by reducing costs to developers and reducing water demands on the system.

Water Utility Is Now More Involved with the Development Approval Process

The way in which developers and city planners work together has changed a bit as a result of this new schedule. Usually the entire plan would go through the City's land use planning department, but if any area is intended to be a z-zone, the water utility now also reviews the plan. In addition, developers may choose to have a pre-development meeting with Aurora Water to go over the draft landscape plan. This provides Aurora Water the opportunity to tell them more about how the z-zone works and the other water-efficient landscaping incentives that are built into the fee schedule. There are also ongoing efforts by the utility to educate developers about xeriscape and to promote the $1,000 residential fee credit.

Multi-Factor Connection Charges Benefit the Utility, Builders, and Home Owners

The City and Aurora Water benefit from this new connection charge schedule because the charges to new customers are now in line with the costs to the utility incurred by all new customers. The connection charge structure for detached single-family homes also incentivizes the development of smaller lots — which tend to have lower water demands — which in turn reduces the burden on the City to develop additional infrastructure and acquire new water supplies.

The z-zone is a benefit to both developers and the City. A typical irrigation meter for a large landscaped area can cost $200,000 to $300,000, so the z-zone provides developers with a voluntary option to eliminate that large charge entirely. The City benefits because those landscaped areas do not create a permanent water demand; therefore, there is no need for new permanent infrastructure or water supply.

Importantly, the water utility also has a couple of financial safeguards through this program. First, if the landscaped area continues to require water on a permanent basis, then the developer must pay the normal irrigation charge. Second, the developer must agree to a water budget pricing system for the landscaped areas. Thus, in the event that the z-zone plants continue to be watered after the establishment period and after the developer's deposit is refunded, the City will recover its monthly costs through the water budget pricing structure.

Majority of New Plans Are Using the Z-Zone Option

Within the first few months of the z-zone program being adopted, the City of Aurora saw 5 of 6 plans using the z-zone option. Together, these five plans include more than 730,000 square feet dedicated to z-zone plant material, resulting in a potential water savings of 21 acre-feet per year — enough for 42 families of four people for almost a year. The utility will continue to promote this program, as well as the $1,000 xeriscape rebate program, which has not yet created as much interest as the z-zone, in the coming years.[7]

7 Lyle Whitney, Water Conservation Supervisor, Aurora Water, personal communication with author, February 4, 2015.

Case Study Update on Aurora, Colorado

Authored by Amelia Nuding, WRA | January 2018

Aurora's Development and Connection Fee schedule has changed some since the publication of the original case study in 2015. Overall, the fees increased slightly to keep up with inflation. The more significant changes, however, are related to the structure and administration of the z-zone program.

"Z-zone" refers to the landscaped areas in new developments that contain low water-using native plants, typically native grasses. It is a landscape option for large, landscaped areas such as those in home owner associations (HOAs) and in office parks. It does not include the yards of single homes. The z-zone program started in 2014, and many program features are the same today as when it started: A landscape and irrigation design must be submitted to and approved by Aurora Water, and z-zones are incentivized by the $0 per square foot fee—as compared with non-conserving landscapes[1] which cost $2.91 per square foot, and conserving landscapes which cost $1.56 per square foot.[2]

The most significant changes to the z-zone program are the way in which an irrigation system is designed, and the way that the program is administered. Originally, z-zones were equipped with a temporary irrigation meter. The meter was place for only three years to enable plants to establish (root permanently) in the soil. After three years, the water meter—and thus the ability to water—was physically removed. Developers paid a $20,000 deposit for the temporary tap, and the money was to be fully refunded once the temporary tap was removed.

Temporary taps now have been eliminated and no refundable deposit is required. A permanent tap now is installed because large landscapes tend to have a mix of z-zone, conserving, and non-conserving landscapes. The permanent water meter initially is used to water all landscape types, but the expectation is that the z-zone areas will not be watered after three years.

The entire landscape has a water allocation which is greater for the first three years to account for the z-zone areas. After three years the allocation for the z-zone areas drops to zero, reducing the overall landscape water allocation.

TERMINOLOGY

The terms "system development charge," "connection charge" and "tap fee," among others, all describe the one-time charge that covers the cost of connecting to the water system, as well as the cost of the infrastructure and water resources that were developed to support the new connection.

1 Non-conserving landscapes are defined by the City of Aurora as landscapes that require more than 15 inches of irrigation water per year. Conserving landscapes use less than 15 inches per year.
2 Aurora Water, Colorado. "Development and Connection Fee Schedule." Accessed January 2018. https://www.auroragov.org/UserFiles/Servers/Server_1881137/File/Residents/Water/PDFs/Billing/Water%20Fees%20Schedule%202018.pdf

The developer must sign an agreement accepting the water allocation for the landscape, and this agreement is tied to the property through a lien filed with the county recorder.

Although the z-zone areas *can* be watered, the intent is that they will not require watering. Exceeding the annual water allocation (of the conserving and non-conserving landscapes) due to watering of the z-zone, or for any other reason, incurs charges. These include, for example, charges of $11.98 per 1,000 gallons when the annual allocation is exceeded before June 30, and $5.99 per 1,000 gallons when the annual allocation is exceeded after June 30. On January 1 of the subsequent year, however, the annual water allocation resets to the original allocation and the rates return to the original levels.

Since the z-zone's inception in 2014, 25 new developments have used the z-zone option. Combined, these projects will have installed more than 4,400,000 square feet of z-zone landscapes. This is estimated to result in more than 170 acre-feet of water savings per year—enough to supply nearly 350 families per year! This estimate assumes that the z-zone area otherwise would be a mix of landscape types that are typical in Aurora.

In addition to the z-zone program, a new fee program was developed in 2016 for estate lots (very large residential lots). Aurora Water developed a fee-adjustment mechanism for these lots because the fees for outdoor water use are usually based on lot size, which would result in a very large fees for an estate lot even though much of the lot is not landscaped or irrigated. Aurora Water adjusts the fee such that only the square footage of the landscaped area is considered in the fee calculation, with a minimum fee equal to three-quarters of an acre (32,670 sq ft). Similar to the z-zone arrangement, the developer must sign an agreement committing to a water allocation based on the development plan that is submitted.

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Castle Rock, Colorado

Castle Rock is located south of the Denver Metro Area and is a fast-growing region with limited water supplies. The population in 2018 is about 65,000 people, but is anticipated to grow to 105,200 people by 2055.[1] Currently, a large portion of Castle Rock's water supply comes from groundwater, but the utility is actively pursuing ways to diversify the supply and increase water conservation. The structure of their system develop fees (also called "connection charges") was designed to encourage innovative water conservation measures in new developments—measures that go beyond the town's already substantial water-efficiency requirements for new development. The innovations are left to developers, and the fee discount is proportional to the amount of water the developer saves.

TERMINOLOGY

The terms "system development charge," "connection charge" and "tap fee," among others, all describe the one-time charge that covers the cost of connecting to the water system, as well as the cost of the infrastructure and water resources that were developed to support the new connection.

Projected Water Demand Affects System Development Fee

Castle Rock has relied on groundwater for decades, but due to declining aquifer levels a long term, sustainable water plan has been developed to support long term population growth. Conservation is a key component of this plan, and accordingly Castle Rock Water has developed an incentive based fee program to encourage new developments to be exceptionally water efficient.

Castle Rock Water's system development fees include a water system fee that pays for infrastructure investments, and a water resources fee that pays for the actual water obtained and developed by the utility. In 2015, the fees were based only on meter size, and meter size was determined through engineering calculations. In 2016, to encourage water conservation, the utility developed a water conservation option that rewarded lower water-usage requirements with a reduced fee.

To illustrate, a typical meter size for a residential property is ¾" by ¾", which has the capacity to provide a maximum flow of up to 30 gallons per minute (GPM). Under the original fee structure, if the engineering calculations resulted in a predicted maximum flow rate of 26 GPM, then the developer had to pay the fee associated with 30 GPM. Under the new fee structure, however, the developer pays a prorated water, water resources, and wastewater fee, and then receives an additional financial incentive equal to a 2-GPM reduction (which is adjustable by the Town of Castle Rock) in the estimated maximum flow rate. Table 1 shows the fees charged for three GPM flow rates.

1 Town of Castle Rock, Colorado. 2018. "Water Efficiency Master Plan 2015." Accessed January 30, 2018. http://www.crgov.com/DocumentCenter/Home/View/592

Table 1. Castle Rock Water Fees Schedule (2017)[2]						
Meter Size	GPM	Single Family Equivalent	Water System Fee	Water Resources Fee	Wastewater Fee	Water Fee Total
5/8″ x 3/4″	20	0.67	$2,220	$10,216	$2,303	$14,739
3/4″ x 3/4″	24	1.00	$2,658	$12,229	$2,757	$17,643
3/4″ x 3/4″	30	1.00	$3,314	$15,248	$3,437	$21,999

Fee Reduction Applies Only If Minimum Standards Are Met

The prorated water resources fee is applicable only if a water-efficiency plan is created for the new development. The water efficiency plan must meet a set of minimum standards, which are described in detail in the document "Minimum Standards for Water Efficiency Plans." The minimum standards have several parts: (1) Indoor Water Efficiency, (2) Outdoor Water Efficiency, (3) Resident Education, (4) Third-Party Verification, and (5) Monitoring and Enforcement. The requirements under each standard cannot be articulated in full here, but some of the highlights are summarized below.

Table 2. A Summary of the Minimum Water Efficiency Standards That Must Be Met By Developers Seeking a Prorated Water, Water Resources, and Wastewater Fee	
Indoor Water Efficiency	Minimum efficiency standards for indoor fixtures are based on the most current version of EPA's "WaterSense New Home Specifications", including: toilet (1.28 gallons per flush), showerhead (2 GPM), clothes washer (water factor of 6 or less), and others. Any installed hot water recirculation systems must be demand based.
Outdoor Water Efficiency	All front and rear yards must be designed and installed by the builder. The developer is responsible for seeing the landscape plan through to completion. Turf areas cannot exceed 19% to 32% of the lot size, depending on actual square footage of the lot. Kentucky bluegrass is not allowed. Allowable turf species must be approved by the town and must be able to survive on 19″of supplemental irrigation per year. 100% xeric landscapes are allowed, but must provide a minimum coverage of 75% by plant materials at 5-year maturity in front yards and side yards when adjacent to streets. Rear yards must have a minimum of 40% plant coverage at 5-year maturity. The remainder of yard coverage can be composed of mulches, aggregate surfacing, artificial turfs, and hardscape. Residential irrigation design must follow the Town of Castle Rock's *Landscape and Irrigation Performance Standards and Criteria Manual.* Automatic irrigation controllers that are weather based or soil-moisture based are required.

Table continued on next page

2 Town of Castle Rock, Colorado. 2018. "Castle Rock System Development Fees." Accessed January 30, 2018. http://crgov.com/2071/System-Development-Fees

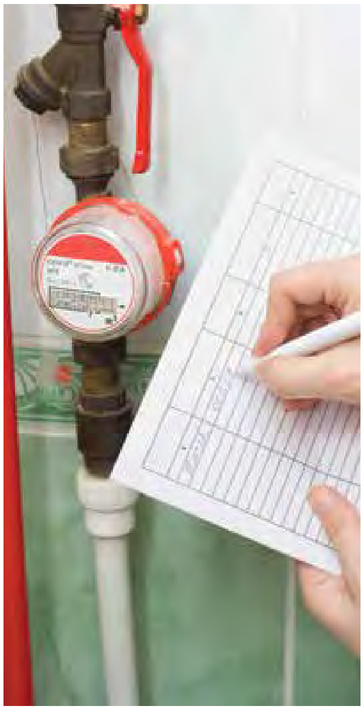

Table 2. A Summary of the Minimum Water Efficiency Standards That Must Be Met By Developers Seeking a Prorated Water, Water Resources, and Wastewater Fee (cont.)	
Resident Education	Resident education is required, and must include all necessary information about the operation and maintenance of their irrigation system, the utility water budget rate structure, as well as the indoor and outdoor water efficiency measures that have been installed.
Third-Party Verification	Prior to issuance of the Certificate of Occupancy, a town-approved third-party inspector must verify that the indoor and outdoor water efficiency measures have been installed properly.
Monitoring and Enforcement	A custom water budget rate structure for each residential customer, and will be used as a tool for monitoring compliance with the water efficiency standards and reduced water demands. The indoor budget is based on wintertime water use, and the outdoor budget is based on the lot size and the specific landscape and irrigation plan. Monthly bills will use a tiered rate fee to financially incentivize customers to keep their water use within their budget.

Results

As of 2018 there is one new development that has fully utilized this fee structure. A few other proposed developments are planning or considering using it, however those projects are in the early stages of development. Subsequent updates will provide information about these developments, how the fee structure applied, and the water savings that were achieved.

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Fountain, Colorado

Fountain is a small community in the middle of Colorado's Front Range, with a population of about 27,000 people. It is a suburban community near Colorado Springs and adjacent to a military base. In June 2014, the City of Fountain adopted an ordinance to encourage water conservation in new residential developments. Water acquisition fees are reduced by 50% for lots with 50% or less turf area, and by about 70% for lots with 30% or less turf area. In addition, smaller residential lots are assessed smaller charges.

New Connection Charge Structure Designed to Reduce Water Demands

The majority of Fountain's existing water supplies come from a transbasin water diversion (the Fryingpan-Arkansas Project), and the rest is from groundwater.[1] New water supplies are increasingly difficult and expensive to obtain, so a new connection charge structure was developed to rein in new water demands. Residential landscapes became the focus; because of Fountain's proximity to a military base, new residents are often from more water-rich regions and are not aware of the high water needs and costs associated with watering the lawn of their new home.

Residential Connection Charges Linked to Turf Percentage

The City's connection charge has two parts: an infrastructure fee and a water acquisition fee.[2] The infrastructure fee takes into account the costs of the existing and planned water delivery infrastructure (fire flow requirements, storage, treatment, and distribution). The water acquisition fee is based on the current market price for water (usually priced as $/AF)[3] and is applied to the assumed volume of water used (e.g., 1/3 AF for one household). Both fees for new commercial and multi-family buildings are based on meter size, but the residential water acquisition fee features a conservation incentive.

The residential water acquisition fee varies by lot size and landscaping type. Lot sizes are divided into three classes, and the water acquisition fees get progressively higher with larger lot sizes (see Table 1). Smaller fees are charged for smaller lots because their irrigation needs are commensurately smaller.

Within each lot size class, a water conservation incentive is given for reduced turf areas. Residential lots with turf on 50% or less of the total "landscapable" area are charged half of the full fee. The landscapable area is not the same as the lot size; it excludes the footprint of the house and driveway. A lot with turf on 30% or less of the total landscapable area pays about 30% of the full fee.[4] Non-turf areas do not have to meet specific requirements, but generally must have low-water-using plants or hardscape. These fee incentives were designed to be financially appealing to builders so that they would go through the extra work to design water-efficient landscaping.

DEFINITION

Water Connection Charges —

Connection charges — also called tap fees, impact fees, system development charges, or plant investment fees — are one-time charges assessed to new developments to help pay for the direct costs of connecting to a utility's water system and for the infrastructure and water resources capacity needed to support these new developments.

Communities use a wide variety of terms to describe these charges. In this case study, we us the term "connection charge," although the local term may differ.

1 City of Fountain, Colorado. 2015. "Water Supply and Facilities." Accessed January 28, 2015. http://www.fountaincolorado.org/department/division.php?structureid=179.

2 City of Fountain, Colorado. 2015. "Tap Fees & Water Rates." Accessed January 28, 2015. http://www.fountaincolorado.org/department/division.php?structureid=175.

3 An acre-foot (AF) of water is equal to approximately 325,851 gallons.

4 With one exception: The smallest lot size with 30% or less irrigated area pays about 20% of the normal fee. This is an additional incentive.

F-Table 1. 2015 Water Acquisition Fees for New Single-Family Residential Lots (Fountain, Colo.)

Lot Size	Water Acquisition Fee	Water Acquisition Fee With Conservation Incentive: 50% or Less Irrigated Area	Water Acquisition Fee With Conservation Incentive: 30% or Less Irrigated Area
Less than 9,000 sq. ft.	$4,875	$2,438	$1,024
9,001 to 13,000 sq. ft.	$5,688	$2,844	$1,706
Greater than 13,000 sq. ft.	$6,500	$3,250	$1,950

Fees are smaller for smaller turf areas, and for smaller lots.

F-Table 2. 2015 Connection Charge Structure for All New Commercial and Multi-Family Taps (Fountain, Colo.)

Tap Size	Infrastructure Fee	Water Acquisition	Total Connection Charge
¾”	$10,824	$6,500	$17,324
1”	$19,279	$11,577	$30,856
1½”	$42,530	$25,539	$68,070
2”	$47,433	$28,483	$75,916
3”	$110,819	$66,545	$177,364
4”	$193,740	$116,341	$310,081
¾” each unit multi-family	$6,173	$3,640	$9,813
For larger than 4” water rates are set via a contract between user and City of Fountain.			

The fees increase with tap size.

Simple Connection Charge Structure Gained Support of City and Builders

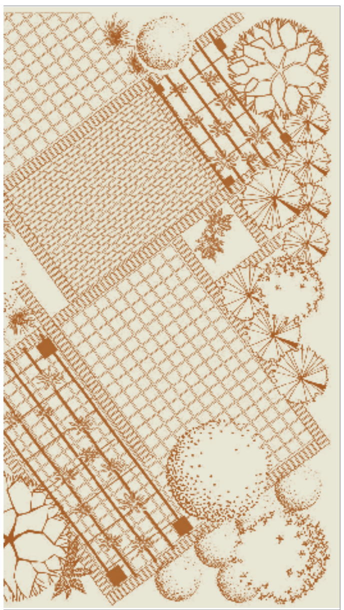
The director of the water utility initiated discussions about a revised fee structure in 2009, several years prior to its adoption. However, because the new housing market significantly declined in 2009, the effort was stalled.

A few years later, the effort was revived, and individual meetings with city council members and home builders were held to talk through the rationale, the economics, and the logistics. An initial concern in City Council was the financial implications of this change, and concerns which reduced fees while water rates were increasing. Ultimately, the high cost of new water supplies was significant enough to justify an effort to reduce new water demands through a voluntary fee incentive.

The Home Builders Association (HBA) initially had concerns about the complexity, public (homebuyer) acceptance, program enforcement, and the application process. Once those concerns were addressed, the HBA ultimately supported this new connection charge structure because it created substantial savings for their home builder members. The City adopted the simple connection charge structure, believing that a simple concept for saving water, paired with a simple fee structure, had a better chance of being understood and accepted by the community.

Landscape Templates Help Increase Adoption of Conservation Incentive

After the new connection charge schedule was adopted by City Council, the water utility developed template landscape plans to help the builders and landscape contractors meet the requirements of the conservation incentive. The landscape templates demonstrate where areas of turf can be placed, which types of low-water-using plants can be used, and how they might be arranged, all while meeting the varying turf percentage requirements. The utility reviews the builder's final landscape plan before it is installed; once installed, the landscapes are inspected before a Certificate of Occupancy is issued to ensure that the landscape is consistent with the plan and requirements. In addition, the water utility is developing brochures and informational material to promote this incentive and explain the new process to home owners and home builders.



Multi-Factor Connection Charges Benefit Utility, Builders, and Home Owners

According to the utilities director, this new connection charge structure is a win for the water utility because it can prolong its existing water supply, a win for home builders because they have an option to pay lower fees, and a win for home buyers because their water bills will be lower.[5]

In addition, the voluntary approach makes this an appealing water conservation program to all parties. The City of Fountain — residents and government alike — would not likely be supportive of a water conservation mandate, and the water utility has limited capacity to enforce those kinds of restrictions anyway.

Lastly, whereas several other Western communities have implemented turf buy-back programs to replace existing lawns with low-water-using landscapes, this program reduces turf area at the outset.

One potential challenge the utility faces is that there is no mechanism to prevent homeowners from changing their low-water landscaping to one with more turf. The utility does, however, have an inclining block rate structure with steep rate increases, which is a deterrent against installing water-thirsty landscapes.

Majority of New Residential Developments Are Using Conservation Incentive

This connection charge schedule has been in place since June 2014; as of November 2014, approximately 75% of the proposed new residential developments were making use of the incentive.[6] The water utility plans to develop a database of new homes that were designed to meet the conservation requirements, as well as to perform spot checking periodically in the future to monitor any changes and determine how successful the program is over the longer term.[7]

5 Curtis Mitchell, Utilities Director, City of Fountain, personal communication with author, November 18, 2014.

6 Ibid.

7 Ibid.

Case Study Update on Fountain, Colorado

Authored by Amelia Nuding, WRA | January 2018

The City of Fountain recently has seen a significant adoption rate of its water-conserving landscape incentives for new construction through its connection charge structure. Since its adoption in November 2013, the fees and incentive structure have not changed, but over time more and more developments have used the incentive. The fees in Fountain are a direct reflection of the cost of the city's water rights and infrastructure, and those costs have been stable in recent years.

TERMINOLOGY

The terms "system development charge," "connection charge" and "tap fee," among others, all describe the one-time charge that covers the cost of connecting to the water system, as well as the cost of the infrastructure and water resources that were developed to support the new connection.

Landscape plans still are required for all new developments. Those that use the incentive must show the square footage of pervious area (which may include turf, shrubs, trees, and rock), and the percentage of that pervious area which is turf (either 30% or 50% to meet the requirements of the incentive). In the future, the city also would like to improve the non-turf landscapes that are installed to include a greater variety of plant species and less rock, to improve the aesthetics.

Over the last several years, utilization of this incentive has increased significantly.[1] The table below shows the number of new construction projects that have used the incentive each year and the estimated water savings. The water savings estimates are based on average lot size and typical watering habits. The estimates also conservatively assume that each lot used the 50% turf incentive (rather than the 30% turf incentive), therefore actual water savings could be even greater. As shown, the estimated cumulative five-year water savings is 80 acre-feet—a very significant result that demonstrates the great potential for reducing water demands in new construction through the city's program.

1 Katie Helm, Conservation & Sustainability Program Manager, City of Fountain, personal communication with author, January 2018.

Table 1. Participation in Fee Incentive			
Year	Number of New Builds (i.e. Lots)	Number of Participants	Savings Assuming 50% Incentive
2013	176	5 (3%)	282,100 gallons
2014	134	9 (7%)	789,880 gallons
2015	115	43 (38%)	3,215,940 gallons
2016	128	72 (57%)	7,278,180 gallons
2017	163	127 (78%)	14,443,520 gallons
Five-Year Total	**716**	**256**	**80 acre-feet (26,068,114 gallons)**

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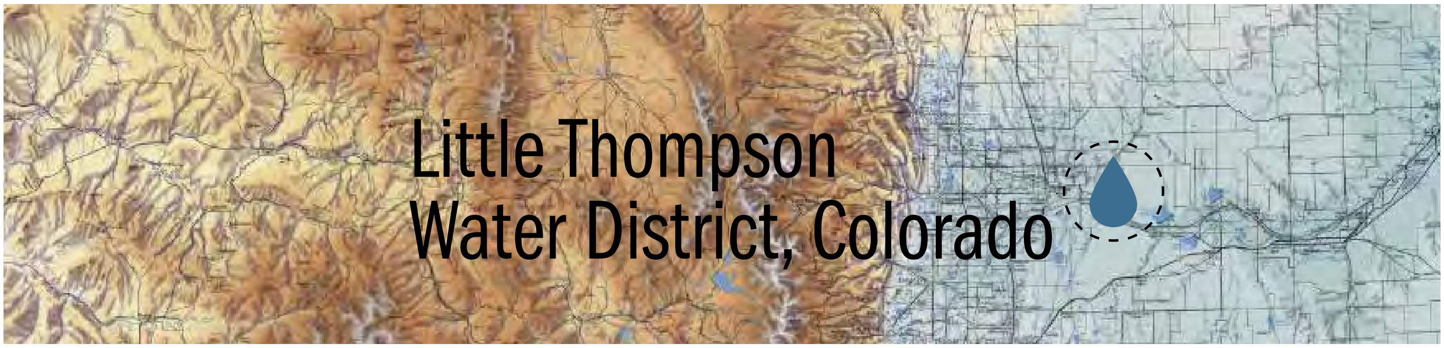


Little Thompson Water District, Colorado

Little Thompson Water District (LTWD) is located in Northern Colorado and delivers water across three counties. The District provides water to a historically rural community, with just 7,700 residential connections in a service area of 300 square miles. In recent years, new residential developments have become denser and more typical of urban and suburban development patterns.

In 2016, the District revised its tap fee structure and adopted an “Urban” tap option for residential developments that are built on smaller lots. The Urban tap not only costs less, but it also comes with an annual water budget for the residential customer, unlike the “Standard” tap. LTWD also incentivizes water conservation in new developments’ landscapes by offering cash rebates for soil amendment and the installation of lower-water-using plants.

CONNECTION CHARGE

Communities use a wide variety of terms to describe these charges. In this case study, we us the term “connection charge,” although the local term may differ.

Fees Redesigned in Response to Changing Development Patterns

The densification of new, residential developments in Little Thompson Water District’s service area is typical of Northern Colorado on the whole; new development is shifting from a more rural and agricultural character to a more urban and suburban one. As Colorado’s population grows and the demand for new housing continues, single-family residential units are being built on smaller lots than in previous decades, and more multi-family housing developments are being built as well.

LTWD requires developers to obtain the water rights necessary to support new developments. The water supply options available to developers, however, are limited. Often developers purchase shares from ditch companies (that provide water to agricultural irrigators through ditches), buy water rights directly from other rights holders, or purchase water through a broker. Once water rights are obtained, developers then dedicate those rights to LTWD in order to build their development. Obtaining water rights can be a significant hurdle for developers, since water supplies are limited and completing these transactions can be complicated and/or time-consuming.

Urban Tap Fees: The Option to Choose Less Water at Lower Cost

When new construction started to pick up again after the housing crash in 2008, LTWD reviewed its tap fee structure in response to the new development patterns. Since 2002, LTWD had a Standard residential tap fee as well as a "Conservation" tap fee. The Standard tap fee was intended for new homes built on larger lots, whereas the Conservation tap fee was designed for smaller residential lots that were expected to use less water. This meant that developers would not have to obtain as much water for smaller residential lots. The Conservation tap fee also tied the residential occupant to a monthly "water budget" (i.e., allocation) which, if exceeded, resulted in higher water rates charged to the residential occupant.

In 2016, LTWD revised its tap fee structure, in an effort to better correlate the fees it was charging with the actual water use trends of its customers. LTWD analyzed its customers' water usage and correlated it with lot size, taking into account seasonal usage and weather conditions (such as years of drought vs. wet years). The analysis showed that smaller lots—up to 9,000 square feet—most often used less than 114,000 gallons per year. LTWD renamed the Conservation tap fee an "Urban" tap fee; it also changed the associated monthly water budget to an annual water budget, with an allocation of 114,000 gallons per year per household. The Standard taps are associated with a 228,000-gallons-per-year budget; however, there is no penalty for exceeding this amount, unlike with the Urban tap.

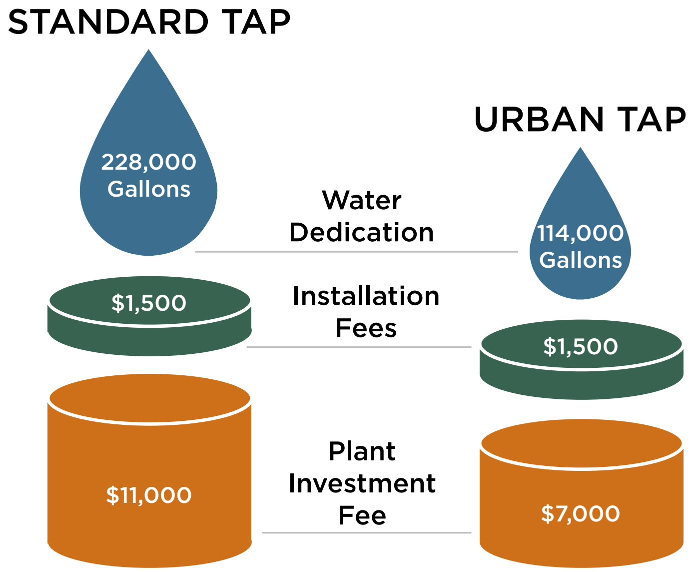
Since the water rights dedication is smaller for Urban taps, two components of the total Urban tap fee are also smaller: the "raw water dedication" and the "plant investment fee." The raw water dedication is the amount of water rights that must be obtained by the developer and then dedicated (i.e., turned over to) LTWD. The cost of these fees is proportionate to the amount of water required and is not paid to LTWD; rather, these water rights typically come from sellers of either the Colorado-Big Thompson Project rights or (irrigation water) ditch rights. Only for single lots can a fee be paid to LTWD in lieu of obtaining water rights. The Cash in Lieu fee for an Urban tap is $19,250; it's $38,500 for a Standard tap.[1] The plant investment fee recovers the capital costs associated with treatment plant capacity, storage, and transmission mains to serve new customers.

Thus, the Urban tap fees cost substantially less and come with half the water that a Standard tap does, as shown in Figure 1. As of 2017, a new development may choose either tap size, according to its projected need.

1 The Cash in Lieu fee is based on the estimated market rate of one acre-foot (325,851 gallons) of water ($55,000). Personal communication with Nancy Koch, Water Resources Manager, Little Thompson Water District. June 2017.

Figure 1. Comparison of the Standard Tap Fee and the Urban Tap Fee. An illustration of the two residential tap fees charged by LTWD. The Urban tap fee requires half as much water be dedicated and costs less due to reduced water rights costs and plant investment fees.

Figure 1. Comparison of the Standard Tap Fee and the Urban Tap Fee



Tap Fees Are Connected to Monthly Water Rates

LTWD has adopted an inclining block rate structure for its residential monthly water rates. Urban tap customers who are within their annual budget of 114,000 gallons pay monthly for their water in accordance with the rate schedule in Table 1. However, if Urban tap customers use more than their budgeted 114,000 gallons within a year, then there is a surcharge of $8.00 per 1,000 gallons once the allotment is exceeded.[2] At the beginning of the next year, the water budget is "reset" and the surcharge is removed. The $8.00 is almost a doubling of the price of water in the highest tier of water use for residential customers. This sends a very strong financial signal to customers that their water usage is too high. LTWD helps its customers know how much water they're using in relation to their water budget by printing the information on every customer's monthly bill regarding their year-to-date water use and their budget (114,000 gallons/year). A customer can upgrade their water allocation to the Standard tap's allocation (228,000 gallons/year) if they pay the difference in the tap fees.

2 As of January 1, 2017. See "Residential and Non-Residential Rates." 2017. Little Thompson Water District website. http://ltwd.org/billing-rates/residential-non-residential-rates/.

Table 1. Tap Fees and Water Rates Charged to Residential Homes in LTWD's Service Area. The Urban tap fee includes a smaller water allocation and steep surcharge for using more water than is allocated annually. The Standard tap fee—which is most appropriate for properties with large landscapes and gardens, livestock, and higher indoor usage—does not have a surcharge associated with it. The fees listed reflect the costs as of June 2017.

Table 1. Tap Fees and Water Rates Charged to Residential Homes in LTWD's Service Area

		One-Time Fees Charged to Developers	Monthly Rates Charged to Residential Occupants		
Tap Size	Annual Water Allocation	Tap Fees	Monthly Base Fee	Monthly Rates for Residential Water Use	Surcharge for Exceeding Annual Allocation
Urban (5/8" meter)	114,000 gallons	Installation fee:* $1,500 Plant investment fee: $7,000	$26.86	$2.37 (0–6,000 gal.) $2.98 (6,001–15,000 gal) $4.03 (>15,000 gal)	$8.00 per 1,000 gallons
Standard (5/8" meter)	228,000 gallons	Installation fee:* $1,500 Plant investment fee: $11,000	$26.86	$2.37 (0–6,000 gal) $2.98 (6,000–25,000 gal) $3.50 (25,00–50,000 gal) $4.03 (>50,000 gal)	None

* The installation fee is for the cost of labor and parts when installing the service line, meter, and meter pit. The installation fee is reduced to $365 if the water service line and meter pit are installed by the developer.

Incentives for New Developments Aim to Reduce Water Use

Little Thompson Water District does not have land use authority and, therefore, cannot impose landscaping requirements on its customers. So instead, LTWD created two water conservation incentive programs for new developments that can be used by either the developer or the residential customers. When a tap is purchased, the new owner is provided with a pamphlet about LTWD's incentive programs, described below. In addition, the incentive programs are promoted on the LTWD website.

The District offers a $500 rebate to amend soil in residential properties that purchased a water tap after January 1, 2016. Soil amendment improves the quality of the soil by improving plants' access to water, nutrients, and oxygen,

ultimately reducing the amount of water that needs to be applied for a healthy landscape. The soil amendment requirements include: 1) applying a minimum of 3 cubic yards of soil amendment per 1,000 square feet of area to be landscaped, and 2) rototilling or mixing the soil amendment into the top 4 to 6 inches of soil.

The other incentive applies to the purchase of lower-water-using plants from Plant Select®, a nonprofit collaboration of Colorado State University, Denver Botanic Gardens, and professional horticulturists. A rebate of up to $250 may be applied to the total cost of plants purchased. This rebate is only available to homes with a tap purchased after January 1, 2016. Both rebates are issued with proof of receipts. There is no inspection of the soil amendment or plantings.

In 2017, more than two-thirds of the taps sold by LTWD were Urban taps.[3] While both rebates have been used by new homeowners, they have not been used as frequently as LTWD predicted. LTWD does understand, however, that there is often a lag time between when a home is purchased and when the landscaping is completed. The District plans to continue these rebate programs and work to increase participation by new homeowners.

How a Small Water District Crafted Big Innovations

Little Thompson Water District recognized it had the opportunity to "right size" the water dedication requirements for new developments and proceeded to analyze the water use patterns of its customer classes. This resulted in an optional, smaller water dedication for smaller properties available through its Urban tap fee. The District also connected the issuance of an Urban tap with an annual water allocation for its customers, and when the allocation is exceeded, a surcharge is applied. LTWD actively helps its customers manage their water use by providing monthly on-bill information about the remaining water in the customers' budget, and it also provides staff assistance to customers, if requested. The District goes one step farther by helping new developments be as water-efficient as possible by providing financial incentives to improve soil quality and encourage the use of lower-water-using plants.

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3 Personal communication with Nancy Koch, Water Resources Manager, Little Thompson Water District. June 2017

Westminster, Colorado

Westminster, a suburb of Denver with over 100,000 residents, is the seventh-largest city in Colorado. In the late 1990s, the water utility began to re-examine the water demands of its customers and adjust its connection charges accordingly. Since 2001, Westminster's connection charges for industrial, commercial, and institutional customers have been carefully designed to be proportionate with each customer's projected water use. In addition, the connection charge schedule includes incentives for low-water-use landscapes installed in large irrigated areas.

DEFINITION

Water Connection Charges —

Connection charges — also called tap fees, impact fees, system development charges, or plant investment fees — are one-time charges assessed to new developments to help pay for the direct costs of connecting to a utility's water system and for the infrastructure and water resources capacity needed to support these new developments.

Communities use a wide variety of terms to describe these charges. In this case study, we us the term "connection charge," although the local term may differ.

Good Data Improved Cost Recovery and Connection Charge Equitability

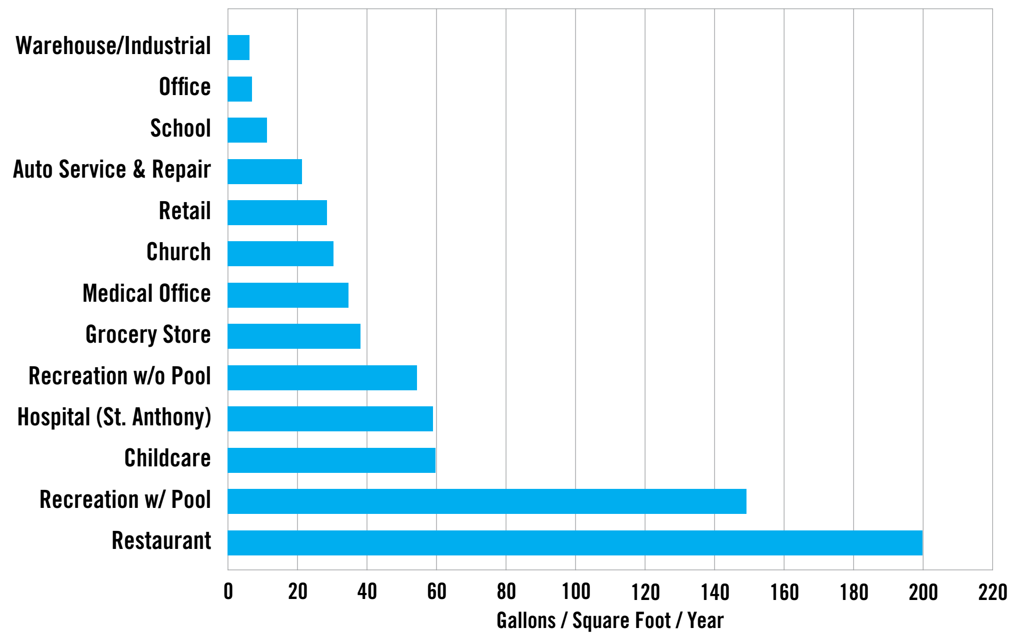
In 1998, Westminster reviewed its connection charge structure and discovered that the fees paid by the industrial, commercial, and institutional (ICI) sector were not fully or equitably covering their true financial impacts to the system, in contrast with the fees paid by the residential sector. The ICI connection charges were based on meter size, which is determined by instantaneous peak demand. However, customers with the same meter size often had very different water demand profiles over the course of a year. Effectively, this resulted in customers with lower annual water use subsidizing the higher water users' fees. Thus, the City developed a fine-tuned system to assign costs more proportionately.

The City developed a connection charge structure for the ICI sector that is comprised of two main parts: the infrastructure fee and the water resources fee. The infrastructure fee is based on the size of the meter, which is determined by the number of "fixture units." The fixture-unit count tallies the number and types of fixtures to be installed and accounts for peak demand of the customer. When City staff members review the new development's design plans, they have the opportunity to recommend water efficiency measures that could result in a reduced fee. The infrastructure fee increases with increasing meter size; a $\frac{5}{8}$-inch by ¾-inch meter is about $10,000, and a 2-inch meter is a little over $80,000.[1]

The water resources fee is proportionate to the customer's projected annual water use. Average annual water for each type of ICI customer — e.g., restaurants, hotels, schools, and warehouses — was determined by analyzing Westminster customer data and researching national data sources. The utility developed a table of water use for each type of ICI customer, expressed as a function of the size of the establishment. For example, the average water use of a restaurant was found to be 200 gallons per square foot per year, and the average water use of a hotel was found to be 23,500 gallons per hotel room per year. Figure 1 shows the range of water uses in gallons per square foot per year for a variety of ICI customers. The water resource fee, therefore, depends on the type of business establishment and its size. While water resource fees vary widely, they typically range from $10,000 to $100,000.

1 2014 data. Stu Feinglas, Water Resources Analyst, City of Westminster, personal communications with author, November 2014.

W-Figure 1. The Water Use For Various Industrial, Commercial, & Institutional Facilities is Measured in Gallons Per Square Foot Per Year.



This data was determined by City of Westminster staff using customer data and nationally available resources.

As properties redevelop or change uses, these changes are evaluated against the original Official Development Plan, and additional tap fees may be charged if water use is projected to increase or if a larger tap is required. Customers who consistently use more water than was projected are re-evaluated; if water use is not reduced to the levels purchased, they are charged an additional water resources fee.

Water-Efficient Landscapes Are More Prevalent Now Due to Fee Incentives

Westminster requires separate irrigation meters on all non-single-family projects. Since 1998, Westminster has incentivized water efficiency in large landscaped areas, such as commercial landscapes and common areas, or whenever an irrigation water meter is required. Irrigation connection charges are based on the area of landscaping and the projected annual water demand, as determined by the water requirements of the plants — the cost per square foot is highest for turf areas and lowest for low-water-use landscapes. The three types of landscapes are defined in the City's Landscape Regulations, as reflected in the table below. In addition, the cost to use reclaimed water is about 80% the cost of potable water because no additional water acquisition is necessary.

W-Table 1. Westminster Incentivizes Water Efficient Landscape Types Through Lower Connection Charges for Low Water Use Landscapes.			
	Fee ($/sq ft)		
	Turf	Medium Water Use	Low Water Use
Potable Irrigation Tap Fee	$2.05	$1.02	$0.51
Reclaimed Water Fee	$1.68	$0.84	$0.41
Water Use and Irrigation Profile	More than 10 gallons per sq. ft. Irrigation methods will typically be spray or rotor heads. Bluegrass turf is a typical grass in this zone.	No more than 10 gallons per sq. ft. Irrigation methods will typically be spray heads. Turf-type tall fescue is a typical grass in this zone.	No more than 3 gallons per sq. ft. Irrigation methods will typically be micro-spray or drip. Buffalo grass is a typical grass in this hydrozone.

Before this tiered irrigation fee schedule was in place, the typical irrigation tap was using three times as much water as was projected by the City.[2] With the new system that is based on water use by landscape type, it is only 25% more than projected.

As a result of this tiered landscape connection charge, more low-water-use and medium-water-use landscaping has been installed. In 2004, the City developed a Landscape Plan establishing new water quality and water efficiency standards for landscape installations. Most new landscapes are now coming in below the City's Landscape Plan limits for turf and with more water-efficient irrigation technologies, such as drip and subsurface irrigation. As a side benefit, developers are not incentivized to undersize irrigation taps, since the tap fee is based on the irrigated area, ensuring proper operations.

The City issues up to a certain number of water service commitments per year in a competitive process. One service commitment is equal to the typical use of a single-family home; a small hotel might be equivalent to 5–10 service commitments. Thus, projects with lower water use are given preference in light of the competition for service commitments. Many other attributes of the development are considered as well in the selection of which proposed projects will ultimately be approved by the City.

Like buildings, landscapes can change over time as well, often because of new ownership or management. What may have started as low-water-use landscape could be converted to something with a higher water demand after the connection charge has been paid. In Westminster, this issue is addressed by requiring the Official Development Plan to be adhered to; if any changes occur, they must be approved and additional water connection charges will be charged commensurately if water demands increase. The fees are not refunded if water demands decrease over time because the City has already purchased water and infrastructure to meet the originally projected demand.

2 Stu Feinglas, Water Resources Analyst, City of Westminster, personal communications with author, April 15, 2015.

Case Study Update on Westminster, Colorado

Authored by Amelia Nuding, WRA | January 2018

TERMINOLOGY

The terms "system development charge," "connection charge" and "tap fee," among others, all describe the one-time charge that covers the cost of connecting to the water system, as well as the cost of the infrastructure and water resources that were developed to support the new connection.

Only been minor changes have been made to Westminster's connection charge structure since the original case study was published in 2015. Charges increased slightly in accordance with a predetermined schedule set forth in 2016. The water-resources component of the fee reflects the increased cost of water based on recent water purchases (equaling $32,200 per acre-foot). The infrastructure component of the fee went up by 2.77%, based on the consumer price index and as set forth in city code. The updated charge schedule is available on the city's website in the Water/Sewer Tap Fees section.[1] Additionally, a "Tap Fee Process and Schedule" document[2] was produced by the City of Westminster to help developers better understand the fees and process.

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1 City of Westminster, Colorado. 2018. "Water/Sewer Tap fees." Accessed February 15, 2018. https://www.cityofwestminster.us/Government/Departments/CommunityDevelopment/Building/WaterSewerTapFees

2 City of Westminster, Colorado. 2018. "Tap Fee Process and Schedule." Accessed February 15, 2018. https://www.cityofwestminster.us/Portals/1/Documents/Government%20-%20Documents/Departments/Community%20Development/Building/2018%20Tap%20Fee%20Process%20and%20Schedule%20Handout.pdf

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RAFTELIS

<u>Tap Fee Trends and Techniques Workshop</u>

Tuesday August 14, 2018

American Water Works Association Headquarters Office

6666 West Quincy Avenue

Denver, Colorado 80112

https://rmsawwa.site-ym.com/events/EventDetails.aspx?alias=2018TapFeeWorkshop

Agenda

	Item	Session Leader	Time
	Registration		8:30 – 9:00
1.	Introductions • Name, affiliation, • What do you want to get out of today?	Jim Ginley (AWWA) Amelia Nuding (WRA)	9:00 – 9:30
2.	System Development Charge Methodology • Buy-in, incremental, hybrid • Demand requirements • Assessment schedules across customer classes (Single family residential, multi-family, ICI, irrigation)	Todd Cristiano and Andrew Rheem (Raftelis)	9:30 – 10:45
	Break		10:45 – 11:00
3.	Case Law • Fort-Collins Loveland recent court case findings	Andy Natham (NDM Law)	11:00 – 12:00
4.	Lunch & Keynote • Case Study on Westminster SDCs	Peter Mayer (Water DM)	12:00 – 1:15
5.	Policy & Administration • Q&A/Discussion • Public process –communicating changes in SDCs	Todd Cristiano (Raftelis)	1:15 – 2:00
6.	Case Studies Smaller Houses: Accessory dwelling unit/tiny home • Front Range examples • Conservation SDC ‘rebate’ programs – Denver Water & schools	Andrew Rheem (Raftelis) Jeff Tejral (Denver Water)	2:00 – 3:00
7.	Lessons Learned and Q&A • Open discussion and Q&A with the experts	Jim Ginley (AWWA)	3:00 – 3:30