The Jasmine Project

Study on Greenwood Hills Water Conservation

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This report outlines the study findings of a residential water audit and analysis performed at 14 properties in the Greenwood Hills HOA in Greenwood Village. Recommendations on how to implement residential, outdoor water savings to the greater community of Greenwood Village are listed in the Executive Summary, and a more detailed description can be found on page 11 if the report.

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Context of Project

The Greenwood Hills neighborhood is characterized with large, mature residential properties, each an acre or larger, that require above average amounts of irrigation water to maintain healthy landscapes and property values. Irrigating these properties during the summer cost each customer between $300 and more than $1,000 per month. In an effort to identify water savings opportunities, Denver Water completed free water audits for 14 homeowners in located in the Greenwood Hills neighborhood of the City Greenwood Village. Detailed water use analyses and recommendations to achieve efficient outdoor watering were provided to the homeowners.

Objectives

The objective of the study is to assess and apply best management practices and technology for saving residential irrigation water based on irrigated area and plant types for homeowners. The cost effectiveness of irrigation water saving measures taken by the participating homeowners has been assessed. The intention of the project is to implement similar water savings measures across the broader community of Greenwood Village. Additional research will be completed in 2014 and 2015.

Project Highlights

Thirteen out of fourteen homeowners reduced outdoor water use from the baseline year (2012) to the study year (2013) when water savings measures were applied. The measures taken were easy and inexpensive to implement, and could be applied to the broader community. Below is a brief list of measures that were applied by the participating homeowners:

- Repair leaks on irrigation systems that were detected during the water audit.
- Retrofit existing spray nozzles with efficient rotary nozzles.
- Adjust irrigation controller settings to water efficiently.
- Shut off irrigation systems after precipitation events.
- Install a rain sensor to automatically prevent irrigation system from turning on after precipitation events.
- Replace turf with drought tolerant plants that require less water.

Feedback from Jasmine Project Participants

"Really appreciated the objectivity of the audit – how do we replicate this type of service and education?"

"Water audit was fabulous; testing was impressive and gave me tremendously valuable results."

"Audit Report pointed out that my problem is water pressure, which before I did not realize."

"Auditor found irrigation main line leak under driveway which would not have been otherwise discovered by me."

Recommendations

The following list of recommendations is based on the feedback and results of the Jasmine Project, in addition to general ideas that if implemented, could potentially lead to an overall reduction in water use in the City of Greenwood Village.

1. Single-family residential properties in the City of Greenwood Village will receive a letter each month (May-September) during the irrigation season of 2014. The letter will include a graph showing the target water consumption amount based on the property's irrigated area, and will show the actual amount of water being used. This will allow customers to see whether or not they are using more water than required, and can make adjustments to reduce water use if needed. Also, the letter will compare residents to their neighbors with similar landscape characteristics. Customers who are using more than the target amount, or more than their comparable neighbors may contact Denver Water to request a water audit. Recommendations on ways to achieve water savings will be listed on the water budget letter as well.

2. Denver Water will work with the City of Greenwood Village to educate residents on the Garden in a Box Program. Denver Water works with the Center for Resource Conservation on the Garden in a Box program. Denver Water provides a discount to customers who purchase the gardens and use them to replace a portion of turf in their landscape. The gardens consist of low-water-use plants, and come with a planting model so customers know how much space to leave between plants and how to arrange them. These Xeric areas, once established, will not require as much irrigation water as Kentucky bluegrass.

3. To further educate residents on the different types and appearance of Xeriscape landscapes, Denver Water could match the cost of replacing turf with Xeric demonstration gardens in public spaces that are frequently viewed by Greenwood Village residents.

4. As the capacity of Denver Water to perform residential irrigation audits is limited, the City of Greenwood Village and Denver Water may investigate additional mechanisms to promote residential irrigation audits that include education about efficient irrigation technology and watering practices. The potential to offer a financial incentive for residents to hire a certified landscape contractor to perform an irrigation audit for their property may be investigated.

Jasmine Project Demonstration

I. Introduction

1. Study Area and Purpose

The Greenwood Hills Neighborhood is characterized with large, mature residential properties, each nearly an acre or larger, that require above average amounts of irrigation water to maintain healthy landscapes and property values. Irrigating these properties during the summer cost each customer between $300 and more than $1,000 per month. In response to this high water use, community members and Denver Water conservation staff developed a citizen-based initiative to demonstrate and document best management practices for irrigation, including efficient irrigation technology and educational tools. The purpose of the initiative is to educate homeowners on methods to reduce outdoor water use while maintaining healthy landscapes, and assessing the cost savings of conservation measures taken on the overall billed consumption for outdoor use. Fourteen property owners in Greenwood Hills, a neighborhood homeowners association in Greenwood Village, participated in a pilot project to discover mechanisms that could potentially reduce water consumption for outdoor use. The title of the project is the Jasmine Project.

2. Demonstration Project Objectives

The main objectives of the Jasmine Project are to:

- Assess and apply best management practices and technology for saving residential irrigation water based on the homeowners' site-specific conditions and needs.
- Assess the cost effectiveness of the measures taken.
- Educate the broader community about water-saving opportunities.

We expect the project will be conducted over a two-year period (spring 2013 through winter 2015). The first year of the project has been completed. During this first year, Denver Water conservation technicians audited each of the 14 properties to document their water use, analyzed their water use and recommended ways to conserve. The second year of the project will involve looking at additional conservation recommendations that could benefit a larger group of residents in Greenwood Village and their outdoor water use, in addition to providing water savings that will help Denver Water achieve its conservation goals.

3. General Approach

The study compared outdoor water use for each participant for 2012 and 2013. The main conservation measures that were assessed included:

- Adjusting irrigation controller settings to account for weather and seasonal changes.
- Taking action on audit report recommendations.

- Shutting off sprinkler systems during or after rain.
- Repairing leaks.
- Using more efficient irrigation technology.

Some key discoveries of the project that can apply to the larger scale are documented in this report. While it is difficult to attribute water savings to any particular measures taken, there are several measures that stand out and can be applied to other residents of Greenwood Village to improve outdoor water efficiency. Another consideration worth noting is the difference in weather for the two comparison years. The first year of the study, 2012, was a very hot, dry year, and most residential customers increased outdoor water use to accommodate for the weather and maintain healthy landscapes. The next year, 2013, was a normal weather year, meaning the amount of precipitation that fell across the greater Denver area over the course of the entire year to date is considered to be normal (with other factors such as evapotranspiration considered as well). Therefore, the amount of water required to maintain healthy landscapes was considerably less in 2013 than in 2012. Despite this difference in weather, water-savings measures that were implemented during the project improved outdoor watering efficiency.

II. Study Methods

Each of the 14 participants in the study volunteered to receive a free irrigation system water audit from Denver Water during spring 2013. The audits were completed from May 20 through May 28. During the audit, a Denver Water field technician completed the following:

a) Thorough inspection of landscape, including plant types, slopes, shaded areas versus sunlit areas, and irrigation zoning.
b) Thorough inspection of current irrigation technology, including system controller and settings, and irrigation heads.
c) Thorough inspection of each irrigation zone, in which field technicians looked for broken heads, sprinkler line leaks, appropriate hydro zoning, misaligned sprinkler heads, obstructed sprinkler heads, and efficient system design.
d) A distribution uniformity test to determine if water was applied uniformly and efficiently to each zone.

1. Audit reports were provided to each participant and included the following:
   a) Five years of actual outdoor consumption compared to corresponding annual target consumption (based on weather, plant type and landscape size).
   b) Map showing irrigated area, irrigation zones, and efficiency rating.
   c) Potential savings estimates.
   d) Description and location of irrigation system issues encountered.
   e) Scheduling recommendations.
   f) Rebate and incentive program information.

2. Water use analysis reports were provided to each participant and included the following:

a) Actual outdoor water use for three years, using the median indoor use from January through March for each year to estimate indoor water use.
b) Maximum outdoor water demand according to gallon per square foot (gpsf) requirement for Kentucky bluegrass and shrubs.
c) A chart specifying each participant's irrigation zoning, with metrics to change minutes, cycles, and days of watering to account for various weather patterns throughout the month. The participants were able to make adjustments to the number of minutes, days, and cycles to determine the amount of water that would be used from making those adjustments.

3. Control Group

A control group, consisting of properties in the same neighborhood with similar landscape characteristics and landscaped areas, was analyzed for outdoor water use. A comparison between the control group and the Jasmine Project group was completed by combining the entire irrigated area and total water use for each group (for the past three years), and determining the gallons per square foot used. A discussion about the amount of gallons per square foot used for the control group and the Jasmine participant group is in the results section of this document.

III. Demonstration Study Findings

1. Approach

Irrigation water usage and savings in 2013 were estimated from the water meters of each of the 14 properties that participated in the Jasmine Project. To determine irrigation usage, conservation technicians subtracted the winter use, which is mostly indoor consumption, from the water use during each month of the summer. Indoor water use estimates for 2012 and 2013 are shown in Table 1 for each participant.

Table 1 – Monthly Indoor Water Use Estimates

Participant Number	2012	2013
5490	3,000	3,000
5632	12,000	7,000
5700	4,000	4,000
5701	6,000	5,000
5702	9,000	8,000
5721	8,000	4,000
5741	3,000	3,000
5742	8,000	11,000
5745	4,000	3,000
5761	6,000	7,000
5781	8,000	6,000
5782	7,000	7,000
6000	6,000	7,000
6401	3,000	5,000
Average	6,200	5,700

In order to estimate water savings from the project, an expected or targeted irrigation water demand for 2012 and 2013 was calculated based on seasonal weather conditions and each property's specific landscaping and irrigation system. The landscape industry estimates normal annual irrigation water demand in the Denver area for turf (Kentucky bluegrass) at 18 gallons per square foot (gpsf), and similarly for shrubs/perennials on drip/hand watering systems at 12 gpsf. For each property, the percent of turf, shrubs and perennials was estimated from property maps as shown in Table 2.

To factor in differences in weather for 2012 (the base year) and 2013 (the study year), Denver Water developed a weather factor based on weather readings from four Denver-metro weather station locations. Weather factors of 1.15 for 2012 and 1.01 for 2013 – where 1 is an average year and 2 is a very dry year – were used to multiply the irrigation target or landscaping demand estimates.

Table 2 – Property Landscaping Characteristics

Participant Number	% Turf	% Shrub/Perennials	Irrigated Area (square feet)
5490	80%	20%	21,245
5632	80%	20%	19,967
5700	80%	20%	18,583
5701	50%	50%	20,842
5702	90%	10%	20,961
5721	75%	25%	24,332
5741	90%	10%	12,066
5742	80%	20%	30,309
5745	85%	15%	27,145
5761	55%	45%	25,547
5781	60%	40%	26,081
5782	40%	60%	20,139
6000	85%	15%	21,571
6401	50%	50%	27,840
Average	71%	29%	22,616

Water savings (or excess) for each property were estimated for 2012 and 2013 by comparing the target irrigation requirements for each property. Thus, if a participant property used less water than the target watering amounts for turf and shrubs/perennials, considering the percentage of turf and shrubs within the property, the difference in that amount is water saved in that year. To estimate the additional amount of irrigation water saved in 2013 (study year) over the amount saved in 2012 (base year), the difference in the amount of water saved in each year was calculated (e.g., year-to-year water savings is equal to water savings in 2012 subtracted from water savings in 2013). The incremental amount of irrigation water saved in 2013 was used to estimate the corresponding monetary savings in 2013.

2. Summary of Data Analysis – Water Savings Results

Table 3 (provided on the following page) provides a summary of the data analysis for each Jasmine Project participant, including:

a. Irrigation water use – actual usage estimates for 2012 and 2013 subtracting indoor water use estimates for each year.

b. Target amount – Denver Water estimate of the irrigation requirement to meet landscaping demand based on property-specific landscaping and annual weather conditions.

c. Annual water savings – the difference between items 1 and 2 above for each year. A positive value is the estimated water saved each year.

d. 2013 incremental water savings – the difference in the amount of water saved in 2013 versus 2012. A positive value is the net savings in 2013.

e. Estimated 2013 cost savings – based on the value in item d multiplied by the highest unit water rate of $10.44 per 1,000 gallons. The highest rate is used because most, if not all, water saved would be charged at the highest rate during the summer irrigation season.

As shown in Table 3 on the row labeled "Water Savings," nearly all participants used less water each year than the recommended target amount. This is likely because of the water pricing schedule and property sizes, making irrigation water use more expensive when used in significant amounts. The amount of the difference in actual irrigation water used versus the suggested target use for each participant in 2013 is shown on a square footage basis in Table 4.

All but one of the participant properties used less water in 2013 than in 2012; 2013 was a wetter year than 2012, but the difference in the amount of irrigation water used by the study participants in 2013 compared to 2012 is greater than would result from this weather difference alone. This finding is reflected on Table 3 in the row labeled "2013 Incremental Water Savings." From these net water savings, we can estimate the value to each study participant of their water-savings actions in 2013 (last row on Table 3). On average, participants saved nearly 74,000 gallons of irrigation water per property in 2013, which saved each participant an average of $770. The cost savings per property ranged from negative a $773 to a positive $1,399. Based on these estimates, 13 of the 14 study participants would save money on their water bills in 2013. These cost savings are the amount that would have been saved if the weather in 2013 and 2012 was the same, and not the actual cost difference between in 2013 and 2012, which in each case should be higher than these estimates.

Table 3—Summary of Findings

Participant Number	5490	5632	5700	5701	5702	5721	5741	5742	5745	5761	5781	5782	6000	6401	Average
Irrigation Water Use															
2012	340,000	495,000	347,000	422,000	356,000	413,000	222,000	375,000	381,000	263,000	289,000	139,000	468,000	310,000	344,429
2013	214,000	330,000	206,000	274,000	170,000	268,000	136,000	173,000	267,000	192,000	162,000	172,000	304,000	202,000	219,430
Target Amount *															
2012	417,685	275,545	365,349	363,959	427,457	469,272	246,061	595,887	543,624	455,478	474,552	336,929	431,995	486,163	420,855
2013	366,836	242,000	320,872	319,651	375,418	412,143	216,106	523,344	477,444	400,029	416,780	295,912	379,405	426,978	369,638
Water Savings															
2012	77,685	(219,455)	18,349	(58,041)	71,457	56,272	24,061	220,887	162,624	192,478	185,552	197,929	(36,005)	176,163	76,569
2013	152,836	(88,000)	114,872	45,651	205,418	144,143	80,106	350,344	210,444	208,029	254,780	123,912	75,405	224,978	150,352
2013 Incremental Water Savings	75,151	131,455	96,523	103,692	133,961	87,871	56,045	129,457	47,820	15,551	69,228	(74,017)	111,410	48,815	73,783
Estimated Cost Savings in 2013**	$ 785	$ 1,372	$ 1,008	$ 1,083	$ 1,399	$ 917	$ 585	$ 1,352	$ 499	$ 162	$ 723	$ (773)	$ 1,163	$ 510	$ 770
* Target Use Amount is adjusted based on property landscaping and annual weather differences															
** Cost Savings are based on the highest unit cost of $10.44 per 1,000 gallons															

Table 4 – Difference in Actual Versus Target Irrigation Water Use for 2013

Participant Number	2013 Target Water Use Value (gpsf)	2013 Actual Irrigation Water Use (gpsf)	Difference (gpsf)
5490	17	10	7
5632	12	17	-4
5700	17	11	6
5701	15	13	2
5702	18	8	10
5721	17	11	6
5741	18	11	7
5742	17	6	12
5745	18	10	8
5761	16	8	8
5781	16	6	10
5782	15	9	6
6000	18	14	3
6401	15	7	8
Average	16	10	6

3. Control Group Comparison

In order to further assess the effectiveness of the Jasmine Project in promoting actions to reduce water use, irrigation water usage of a control group that did not participate in the study was compared to that of the Jasmine participants. The control group consisted of a similar set of 14 properties in the same general area as the Jasmine project properties. Unlike the Jasmine participants, detailed information on the landscaping and irrigation systems of the control group, particularly any difference between total landscaped area and total irrigated area, was not available. Based on available data, the average water usage (in gallons per square foot) for the Jasmine participant properties and control group properties was calculated for three years (2011, 2012, and 2013) and compared. These comparison values are presented in Table 5.

Table 5 – Comparison of Irrigation Water Use with Control Group

Year	Jasmine Project Irrigation Water Use (gpsf)	Control Group Irrigation Water Use (gpsf)
2011	11	12
2012	15	15
2013	10	9

As shown in this table, average irrigation water usage is estimated to be similar between the two groups, suggesting that factors other than those attributable to the Jasmine Project may have helped save water for the control group residences too. It should be noted, however, that if the irrigated area of the control group properties is less than the total landscaped area(as is the case with the Jasmine properties), the control group values would be higher than shown in Table 4. While it is likely that the irrigated area of the control properties is less than the total landscaped area, by how much is not known. If, for example this difference is 15% as it is the Jasmine group, the control group values would be 14 gallons per square foot for 2011, 18 gallons per square foot for 2012 and 11 gallons per square foot for 2013, and thus higher than for the Jasmine project properties. Thus, the control group caparison is difficult to make with the limited information currently available on the control group.

4. Irrigation Audit Results

Denver Water certified irrigation auditors performed irrigation audits for each Jasmine Project participant property in May 2013. Each participant received a detailed irrigation audit report with specific findings and recommendations. These audit findings and recommendations are summarized in Table 6.

Table 6 – Summary of Irrigation Audit Findings and Actions Taken

Area of Audit Recommendation	# of Actions Recommended	# of Actions Taken	No Action Taken	% Where Actions Taken
Broken Heads	7	7	0	100%
Broken Lines	5	5	0	100%
Sunken Heads	13	4	9	31%
Clogged Nozzles	3	3	0	100%
Overspray	13	5	8	38%
Obstructed Heads	6	2	4	33%
Mixed Sprinkler Types	10	1	9	10%
High Water Pressue	7	2	5	29%
Low Water Pressure	6	0	6	0%
Hydrozoning	12	0	12	0%
Poor Design	6	0	6	0%
No Rain Sensor	12	3	9	25%
Excessive Run Times	1	0	1	0%
Cycle and Soak	11	4	7	36%
Use of Water Budget	5	0	5	0%
Controler Upgrade	5	2	3	40%
All	122	38	84	31%

As shown, in a number of important areas, such as broken heads and sprinkler lines, as well as clogged nozzles, participants fixed the problem 100 percent of the time. In a few cases, auditors found breaks in the sprinkler system lines, and homeowners were able to save a significant amount of water by having those leaks fixed. In the case of many of the recommendations, homeowners were less likely to fix the problem in 2013 because they required significant modifications to the irrigation systems or landscaping. Overall, about a third of all recommendations were acted upon in 2013 by the study participants.

Additionally, the irrigation audits were appreciated and valued by the participants. Comments from some of the participants on the Denver Water audits included:

- Water audit "was fabulous," testing was impressive and gave me "tremendously valuable results," including:
    - Audit Report pointed out that my problem is water pressure, which before I did not realize.
    - Advice on how to program clock – separate drip zone from other zones
- Really appreciated the objectivity of the audit – how do we replicate this type of service/education?
- Appreciated the audit and the rain sensor that was installed.
- Auditor found irrigation main line leak (under driveway), which would not have been otherwise discovered by me.

4. Actions Affecting Irrigation Water Savings

The following actions were identified as those most often taken by the study participants to affect water use and savings.

a. Reduced irrigation controller settings – Four participants (5632, 5701, 5702, 6000) reduced the amount of watering in 2013 by lowering total watering times and/or frequency.

b. Rain delay settings (shutting off system during and after rain) – Based on interviews, we believe that all participants shut off their irrigation system during and immediately after significant rain. During 2013, this action may have had the most significant impact on reducing irrigation water use because the area experienced significant rainfall during the early summer months of 2013 and also in August and September (July being the hottest and driest month of 2013). Only five of the 14 participants used rain sensors in 2013. The other nine manually implemented rain delay functions on their controller or manually shut off the system during and after rain.

c. Leak repair – Repairing minor and major leaks helped conserve irrigation water. Because of Denver Water's audit, a homeowner repaired a leaking sprinkler line under a concrete driveway.

d. Use of more water-efficient irrigation spray heads – Five participants (5490, 5701, 5721, 5741, 5782) installed efficient spray heads to help save water. In at least one case (5721), the homeowner replaced spray heads with more efficient rotary nozzles in a large sunny area by redesigning the system. Despite the required redesign, the participant was able to use most of the existing irrigations lines and zones.

e. Other irrigation system changes (such as the recommendations in the irrigation audit reports) – In all, nine of the fourteen participants took actions to address multiple issues identified as a result of Denver Water's irrigation audit recommendations.

f. Lawn maintenance (aeration, fertilization, etc.) and landscape alteration (including xeriscape) – Eight participants implemented more aggressive lawn maintenance programs involving multiple-pass aeration, fertilization and compost addition (5490, 5632, 5700, 5701, 5721, 5741, 5742, 5745). One of the participants redesigned the property's irrigation system and included areas of Xeriscape (5782).

It is interesting to note that the one property (5782) in which more water was used in 2013 than in 2012 was where significant irrigation system and landscaping modifications were made, including more Xeriscape area. The reason for this increase is likely the result of additional watering required to establish new plants.

IV. Conclusions

The Jasmine Project has demonstrated that healthy landscapes can be maintained by using less water and efficient watering techniques. Thirteen of the 14 participants reduced water use from 2012 to 2013. Based on the information collected and the response of the study participants, it appears the demonstration study was valuable in helping homeowners learn how to effectively save irrigation water – saving them money on their water bills too. Specific factors affecting irrigation water savings in general and on specific properties can only be inferred based on one year of limited data, but there are several measures that could be attributed to water savings and efficiency. The audit and project participation educated participants and made them more aware of water efficiency. Replacing spray nozzles with high-efficiency and rotary nozzles improved the efficiency of watering landscapes. Installing a rain sensor or manually shutting off the irrigation system during and after rain saved a significant amount of water. Repairing leaking fixtures minimizes water waste. Finally, adding compost to soil, and aerating and fertilizing the lawn, improves the landscape quality and reduces the amount of water a landscape needs.

One of the participating residents replaced her irrigation system and retrofitted a significant portion of turf area to xeriscape. Establishing new, low-water-use plants require more water initially; however once established, they will require significantly less water to thrive than Kentucky bluegrass. Assessing outdoor water use for this property will be completed during the 2014 irrigation season to determine if these changes affect outdoor water use.

Additionally, Denver Water's tiered rate structure is designed to create an incentive to use less water: as more water is consumed, the rate increases. This can be problematic for customers with large landscapes. The participants in the Jasmine Project used less water than Denver Water's target for turf and shrubs, indicating that the rate structure is influencing participants' watering practices. Denver Water's rate structure is not expected to deviate from the current, tiered rate structure in the near future. Therefore, reducing water use with efficient watering techniques and improved irrigation

technology, and planting landscapes that require less water, are logical first steps to lowering water use and water bills.

V. Recommendations

The following list of recommendations is based on the feedback and results of the Jasmine Project, in addition to general ideas that if implemented, could potentially lead to an overall reduction in water use in the City of Greenwood Village.

1. Each single-family residential property in the City of Greenwood Village will receive a letter each month (May-September) during the irrigation season of 2014. The letter will include a graph showing the target water consumption amount based on the property's irrigated area, and will show the actual amount of water being used. This will allow customers to see whether or not they are using more water than required, and can make adjustments to reduce water use if needed. Also, the letter will compare residents to their neighbors with similar landscape characteristics. Customers who are using more than the target amount, or more than their comparable neighbors may contact Denver Water to request a water audit. Recommendations on ways to achieve water savings will be listed on the water budget letter as well. Some recommendations may include:
   a) Adjust controller settings to run a "cycle and soak" watering schedule to maximize water infiltration through the soil and to the roots of plant material, and to minimize runoff. (Cycle and soak watering schedule education will be provided.)
   b) Retrofit current spray nozzles to rotary and/or high-efficiency irrigation nozzles.
   c) Install a rain sensor to the irrigation controller so that it will automatically shut off during and after rain.
   d) Manually shut off irrigation systems during and after rain.
   e) Repair all broken sprinkler heads, sprinkler lines, and leaks on irrigation system.

Denver Water does not have water use data from Cherry Creek Village Water District customers that reside in Greenwood Village. Therefore, Denver Water and Greenwood Village will work with Cherry Creek Village Water District to replicate or substitute a form of educational material for those residents.

2. Denver Water will work with the City of Greenwood Village to educate residents on the Garden in a Box Program. Denver Water works with the Center for Resource Conservation on the Garden in a Box program. Denver Water provides a discount to customers who purchase the gardens and use them to replace a portion of turf in their landscape. The gardens consist of low-water-use plants, and come with a planting model so customers know how much space to leave between plants and how to arrange them. These Xeric areas, once established, will not require as much irrigation water as Kentucky bluegrass.

3. To further educate residents on the different types and appearance of Xeriscape landscapes, Denver Water could match the cost of replacing turf with Xeric demonstration gardens in public spaces that are frequently viewed by Greenwood Village residents.

4. As the capacity of Denver Water to perform residential irrigation audits is limited, the City of Greenwood Village and Denver Water may investigate additional mechanisms to promote residential irrigation audits that include education about efficient irrigation technology and watering practices. The potential to offer a financial incentive for residents to hire a certified landscape contractor to perform an irrigation audit for their property may be investigated.