

Fairway Ridge 2019 Water Wise project estimates of cost savings and payback periods for turf to landscaping conversion on our common / community areas.

Note: The scope, plans and finances for the Fairway Ridge project can be found elsewhere and will not be reproduced here. The goal of this document is to review some of the calculations / estimations of cost savings and payback periods for the 2019 Water Wise project.

Summary - It is estimated that our total cost (not including any financial value for the many hours of volunteer labor) was approximately **\$2.30 per square foot of converted turf**. With a 50% match from Northern Colorado Water Conservancy, our conversion cost was reduced to \$1.15 per square foot. With additional financial support for our volunteer labor, the cost was further reduced to about \$0.62 per square foot. Based on our historical difference in the annual cost to **maintain turf (\$0.26 per square foot) versus landscaped areas (\$0.14 per square foot), the estimated \$0.12 per square foot savings per year will see a payback is a little over 5 years**. Without the volunteer labor support, the payback would have been closer to 10 years and without the grant support from Northern Colorado Water Conservancy, the payback would have been a little over 19 years.

The process for obtaining these estimates follows.

STEP 1 - Determine the amount and percentage of water used on the turf areas and landscape (drip) areas.

Using our water consumption data from 2013 through 2016, we averaged 4.1 million gallons of irrigation water per year. (Note: Fairway Ridge began to adjust the irrigation system with a new Rain Bird satellite control logic in 2017 so the years prior to this change was considered our “baseline” years.) Using the Resource Central’s Slow the Flow 2018 report on the evaluation of our irrigation system, estimates of the water usage of both the spray nozzles and rotor nozzles were made.

For the estimated 1,000 spray nozzles used on our site, an estimate was made on the gallons per minute per spray head, based on the measured inches per hour laydown (average of 1.56 inches per hour) from Resource Central’s report. The “average nozzle” selected for this analysis was a Rain Bird 12’ VAN spray nozzle at 50 PSI, set at a 180 degree arc for a water usage of 1.18 gallons per minute. Next, an estimated seasonal runtime was made, using some past data, that included irrigating for 15 minutes per day, three days per week for 26 weeks for the irrigation season. Rounding these numbers revealed an estimated 1,400 gallons used per season per spray nozzle. Using the estimated 1,000 spray nozzles on our site, an estimate of an average 1.4 million gallons of water was consumed annually by these spray nozzles, or about 34% of the 4.1 million gallons of water total used annually.

For our estimated 200 rotor nozzles, the measured (average) water lay down was 0.78 inches per hour. Using a Hunter rotor irrigation nozzle (Red 7) at 180 degrees, the average water usage was estimated to be 3.2 gallons per minute. (NOTE: water lay down for this rotor nozzle is listed at 0.4 inches per hour by the manufacturer versus the measured 0.78 inches per hour from Resource Central's report. However, rotor zones have a significant overlap of irrigation distribution patterns so I'm estimating that the measured value included overlap from multiple rotor zones. Also note that generally, spray nozzles do not have as significant an overlap zones so overlap was not included in the spray nozzle calculations.) Using some past data for irrigating with the rotor head, rotor irrigation for 45 minutes per day, three days per week for 26 weeks for the irrigation season and rounding these numbers revealed an estimate 11,000 gallons per season per rotor. Thus for all of the rotor heads, an estimate of an average 2.2 million gallons of water or 54% of the 4.1 million total was used annually.

The remaining 0.5 million gallons (4.1 million total minus 1.4 million spray and 2.2 million rotor) was divided among the drip irrigation zones (landscaping) and miscellaneous water usage from zones on Node controllers, times the zones were run on Manual and water loss due to leaks. It was estimated that the drip irrigation zones used 0.4 million gallons and the remaining 0.1 million gallons was consumed by the Nodes, Manual operations and loss.

Based on these assumptions and calculations:

Water usage by the spray and rotor nozzle heads of 3.6 million gallons would be about 88% of the total water usage

Water usage by the drip irrigation areas of 0.4 million gallons would be about 10% of the total water usage.

Water usage of the remainder would be about 2% of the total

For simplicity, a value of 90% of water usage was assigned to turf irrigation (spray and rotor) and 10% to the drip irrigation areas.

Step 2 - Determine the square footage of turf to landscape areas at Fairway Ridge.

Thanks to the Google maps function (HT to the Northern Colorado folks who mentioned this feature), turf and landscape areas were measured and summarized. Our site has almost a 12 acre footprint and the turf was estimated at 188,000 square feet while the landscape areas were measured at about 52,000 square feet. Thus for the estimated 240,000 square feet of irrigation zones, almost 80% is turf and about 20% is landscape by square foot.

Step 3 - Allocate Fairway Ridge Operating expenses to the turf and landscape areas.

There are five main components of the Fairway Ridge Operating Budget that deal with our turf / landscape areas. They are a) Water consumption, b) Grounds maintenance, c) Fertilizer / Weed / Insects, d) Grounds improvements and e) Sprinkler system maintenance. These expenses are shown below.

FWR landscaping without tree expenses	2013	2014	2015	2016	2017	2018
Water consumption	\$9,155	\$10,922	\$11,450	\$13,044	\$12,388	\$12,911
Grounds maintenance	\$38,500	\$38,500	\$38,000	\$26,541	\$24,226	\$25,775
Fert / Weed / Insects	\$5,000	\$5,000	\$5,500	\$5,772	\$5,872	\$8,060
Grounds improvement	\$1,934	\$5,950	\$1,740	\$8,581	\$9,026	\$2,191
Sprinkler system maint	\$2,628	\$2,943	\$6,900	\$7,418	\$5,180	\$3,744
	\$57,217	\$63,315	\$63,590	\$61,356	\$56,692	\$52,681
For 240,000 sq ft of irrigation (\$/sq ft)	\$0.24	\$0.26	\$0.26	\$0.26	\$0.24	\$0.22

For the five Operating budget components listed above, the cost split between turf and landscape was based on the water usage data. Thus 90% of the expenses were allocated to turf and 10% to landscape for the components a) Water consumption, b) Grounds maintenance and e) Sprinkler system maintenance.

For c) Fertilizer / Weed / Insect component, a slightly higher percentage went to turf (95%) and the other 5% to the landscape area. This is based on the assumption that landscape areas normally only gets pre-emergent treatment and some broadleaf spot treatments.

For d) Grounds improvement component, the allocation to landscape was higher (replacement of shrubs) and was estimated at 40% of this item. The turf area received 10% of this expense. The remaining 50% was allocated to trees and thus not used in this calculation.

The result of this allocation is the following:

Turf (188,000 sq ft)	2013	2014	2015	2016	2017	2018
Water (90%)	\$8,240	\$9,830	\$10,305	\$11,740	\$11,149	\$11,620
Grounds maintenance (90%)	\$34,650	\$34,650	\$34,200	\$23,887	\$21,803	\$23,198
Fert / Weed / Insect (95%)	\$4,750	\$4,750	\$5,225	\$5,483	\$5,578	\$7,657
Grounds improvement (10%)	\$193	\$595	\$174	\$858	\$903	\$219
Sprinkler maint (90%)	\$2,365	\$2,649	\$6,210	\$6,676	\$4,662	\$3,370
	\$50,198	\$52,474	\$56,114	\$48,644	\$44,096	\$46,063
Turf cost (\$/sq ft)	\$0.27	\$0.28	\$0.30	\$0.26	\$0.23	\$0.25
Landscape (52,000 sq ft)	2013	2014	2015	2016	2017	2018
Water (10%)	\$916	\$1,092	\$1,145	\$1,304	\$1,239	\$1,291
Grounds maintenance (10%)	\$3,850	\$3,850	\$3,800	\$2,654	\$2,423	\$2,578
Fert / Weed / Insect (5%)	\$250	\$250	\$275	\$289	\$294	\$403
Grounds improvement (40%)	\$774	\$2,380	\$696	\$3,432	\$3,610	\$876
Sprinkler maint (10%)	\$263	\$294	\$690	\$742	\$518	\$374
	\$6,052	\$7,867	\$6,606	\$8,421	\$8,083	\$5,522
Landscape cost (\$/sq ft)	\$0.12	\$0.15	\$0.13	\$0.16	\$0.16	\$0.11

The average annual cost of the six years for turf irrigation was \$0.26 per square foot and for landscape area (Drip / Shrubs) was \$0.14 per square foot. The average difference between the maintenance cost of turf versus landscape areas was thus determined to be \$0.12 per square foot. It was then assumed that, initially, Fairway Ridge could see a decrease in annual maintenance costs of \$0.12 per square foot for every square foot converted from turf to landscape.

Step four - Calculating the cost of conversion of turf to landscape with the 2019 Water Wise project.

Four sections of Fairway Ridge were converted from turf to landscape. These four were known as:

- a) East Clubhouse Court Island (980 square feet)
- b) West Clubhouse Court Island (960 square feet)
- c) Storm Drain Park (1,300 square feet)
- d) West Rossum (net 2,400 square feet from 2,900 square feet total minus utility area contained in this converted zone equaling 500 square feet).

The total was an estimated 5,640 square feet converted or for simplification, 5,600 square feet converted.

Original budgeted amount for conversion was \$18,930 or about \$3.40 per square foot estimated.

Actual / final cost (funds spent) was \$12,951 or about \$2.30 per square foot converted.

Grant reimbursement (50% match) lowered the cost of the project to \$6,476 or about \$1.15 per square foot converted.

A 50% of estimated "labor in kind" or volunteer hours lowered the cost by another \$2,990 to \$3,487 or about \$0.62 per square foot.

Step five - Compute payback calculations

Finally, the payback estimates (assuming similar costs going forward):

For the estimated total cost, after all Grant support of \$0.62 per square foot divided by the annual savings of \$0.12 per square foot results in an estimated 5 year payback.

The other estimated paybacks (before various Grant amounts) can be easily calculated by dividing the estimated cost per square foot by \$0.12.

With irrigation costs rising faster than inflation, Fairway Ridge would expect these costs to be recovered faster than these calculations present. Other maintenance costs may also rise faster, resulting in a shorter payback for conversion.

If you have any questions regarding these calculations or the data supporting these numbers, please contact Mike Kocsis at fwrhoatreas@gmail.com or mikekocsis@gmail.com

For the Water Wise project team,

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