



## Homeowner Associations – An Overlooked Water Sustainability Opportunity in the Desert

Hans Huth

Hydrologist, M.S.

University of Arizona – Water Resource Research Center

June 1, 2023 : 12:00 – 1:15 PM



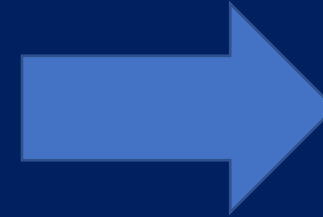
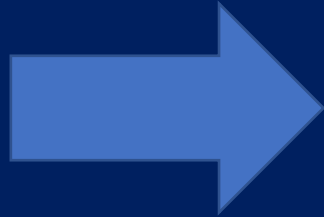
# Homeowners Associations (HOAs)

Water Conservation Strategies  
Successes, Challenges, What's Next

# Homeowners Associations (HOAs)

HOA Board

Residents



Management Company



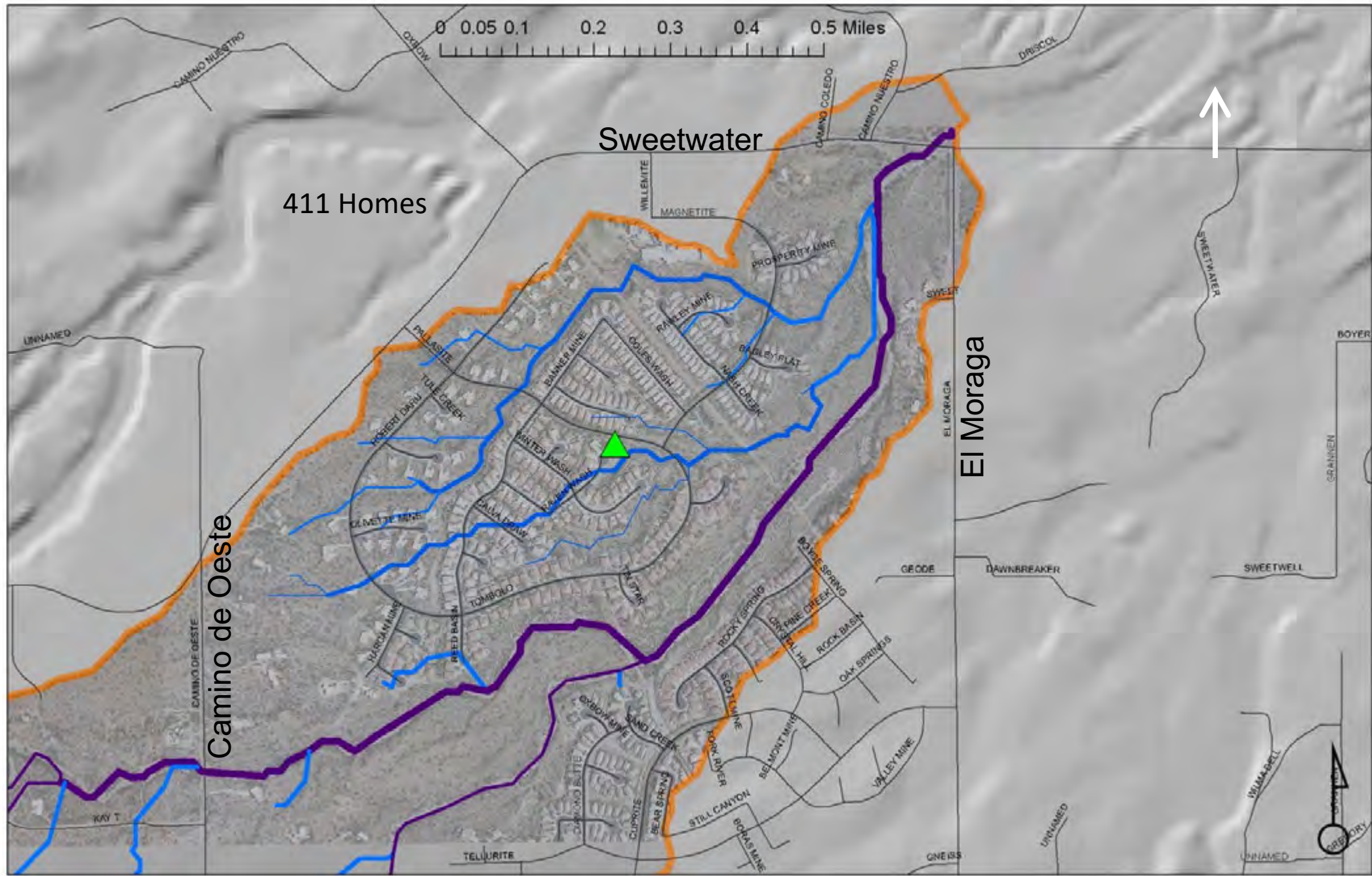
Sweetwater in the Foothills

6 miles

Downtown, Tucson

















# *Money-Saving Opportunities Through Water Harvesting and Erosion Control*

*Agua Dulce HOA  
Common Area Subcommittee*

*Hans Huth  
M.S. Hydrology  
WMG-Certified  
August 27, 2013*

Photo courtesy of David Bygott





*Milagro Co-Housing Community, Tucson, Arizona*





HarvestingRainwater.com ©2008 Brad Lancaster



*Milagro Co-Housing Community, Tucson, Arizona*



©David Bygott

August, 2003

April, 2004

January, 2005

August, 2006

March, 2008





“Do you water your plants?”

“Yes - individuals water what they feel needs it, mostly in hot June, but occasionally during the year. Monsoons are a big help in summer and winter plants are pretty much dormant.”



## Approach for mitigating ponding and scouring of pathways:



- Scrape back the gravel and decomposed granite
- Create shallow basins on either side of path
- Use extra soil to raise the path and/or create swales so it sheds water to basins
- Resurface pathway

<http://watershedmg.org/>























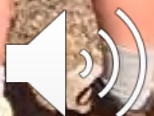
# Before and After







February, 2015







March 10, 2018





Today





February, 2015





March 10, 2018





Today





February, 2015





March 10, 2018





Today





February, 2015





March 10, 2018





Today





February, 2015





March 10, 2018





July, 2014





March 10, 2018





Today





May, 2015





March 10, 2018





Today









December, 2015





March 10, 2018





Today





December, 2015





March 10, 2018





Today





**Next Meeting**

TBD

Please contact Hans for more information

**Committee Members**

**Chairperson**  
**Hans Huth**

**Guy Brunt**

**David Koenig**

March, 2015

## Water Harvesting and Erosion Control

**Committee responsibilities and duties:**

- Gently contouring common areas to channel rainwater away from paths where runoff may contribute to erosion, and promoting infiltration of runoff in areas where it can be put to beneficial use.
- Identifying bare areas that may be seeded or planted with native vegetation (per CC&Rs approved plant palette), to help promote erosion control while improving the natural aesthetic of the community.
- Coordinating water harvesting training and/or volunteer events for the community at large.
- **Surveying the common area drip system for leaks or problems.**

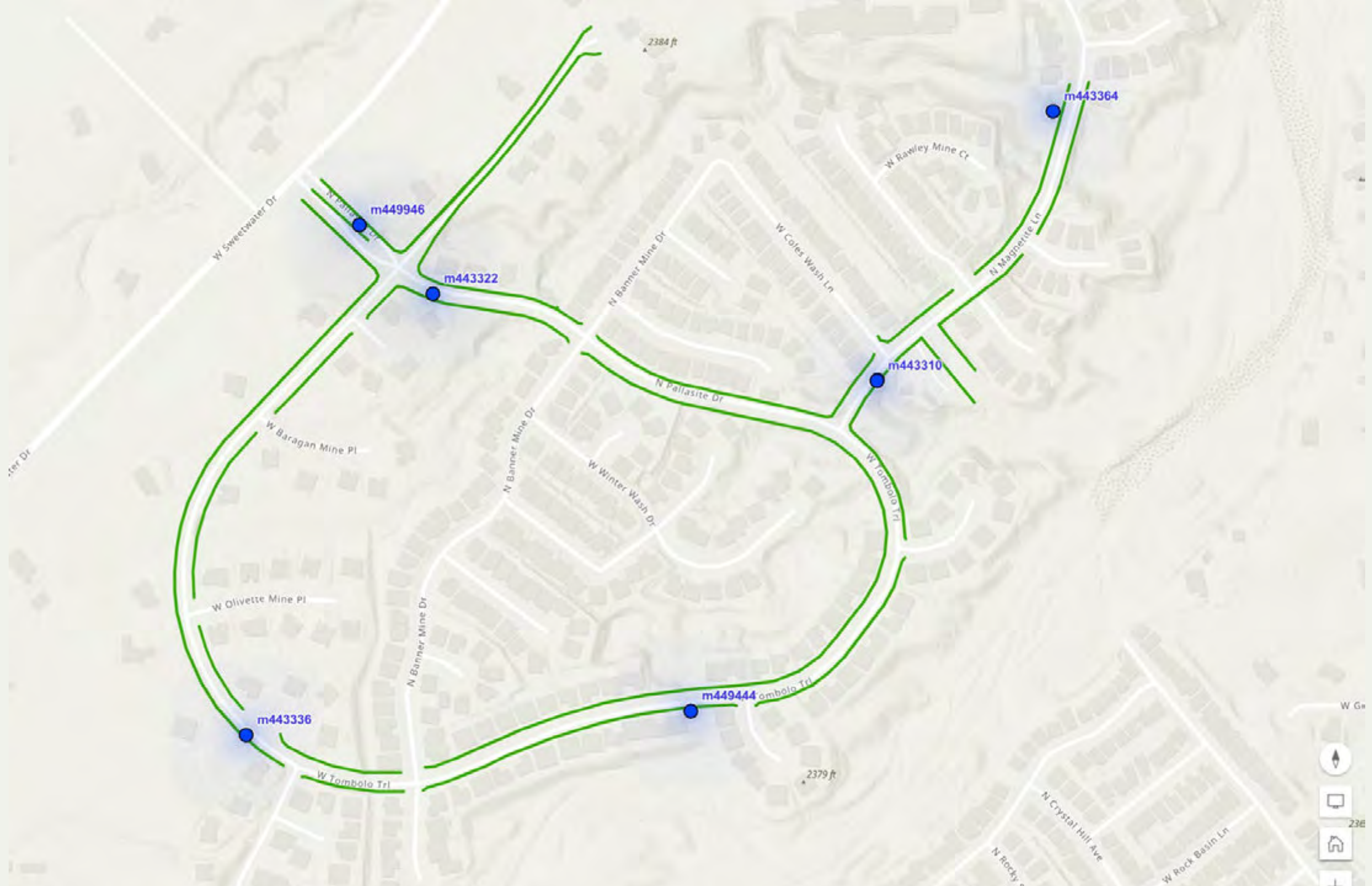
With the goal of ensuring both the safety and sustainability of common areas, WHECC recommendations must be approved by the board before executing the same.

***Anyone interested in this committee should contact the Chairperson.***

This article demonstrating that local realtors are looking towards low impact development technologies to support sustainability.  
[Click Here](#)

Select here for [September 2017](#) Committee Report  
 Select here for [August 2017](#) Committee Report  
 Select here for [July 2017](#) Committee Report  
 Select here for [June 2017](#) Committee Report





m449946

m443322

m443310

m443364

m443336

m449444

W Sweetwater Dr

W Baragan Mine Pl

W Olivette Mine Pl

W Tombolo Trl

N Banner Mine Dr

N Banner Mine Dr

W Winter Wash Dr

N Banner Mine Dr

N Pallasite Dr

W Cotes Wash Ln

W Rawley Mine Ct

N Rocky

N Crystal Hill Ave

W Rock Basin Ln

N Magperre Ln

2384 ft

2379 ft



W G

238





## IRRIGATION EFFICIENCY INCENTIVE PROGRAM

COMMERCIAL & MULTI-FAMILY



USING WATER  
EFFICIENTLY FOR  
A HIGH QUALITY  
LIFESTYLE

IMPROVING IRRIGATION EFFICIENCY



September 19, 2016

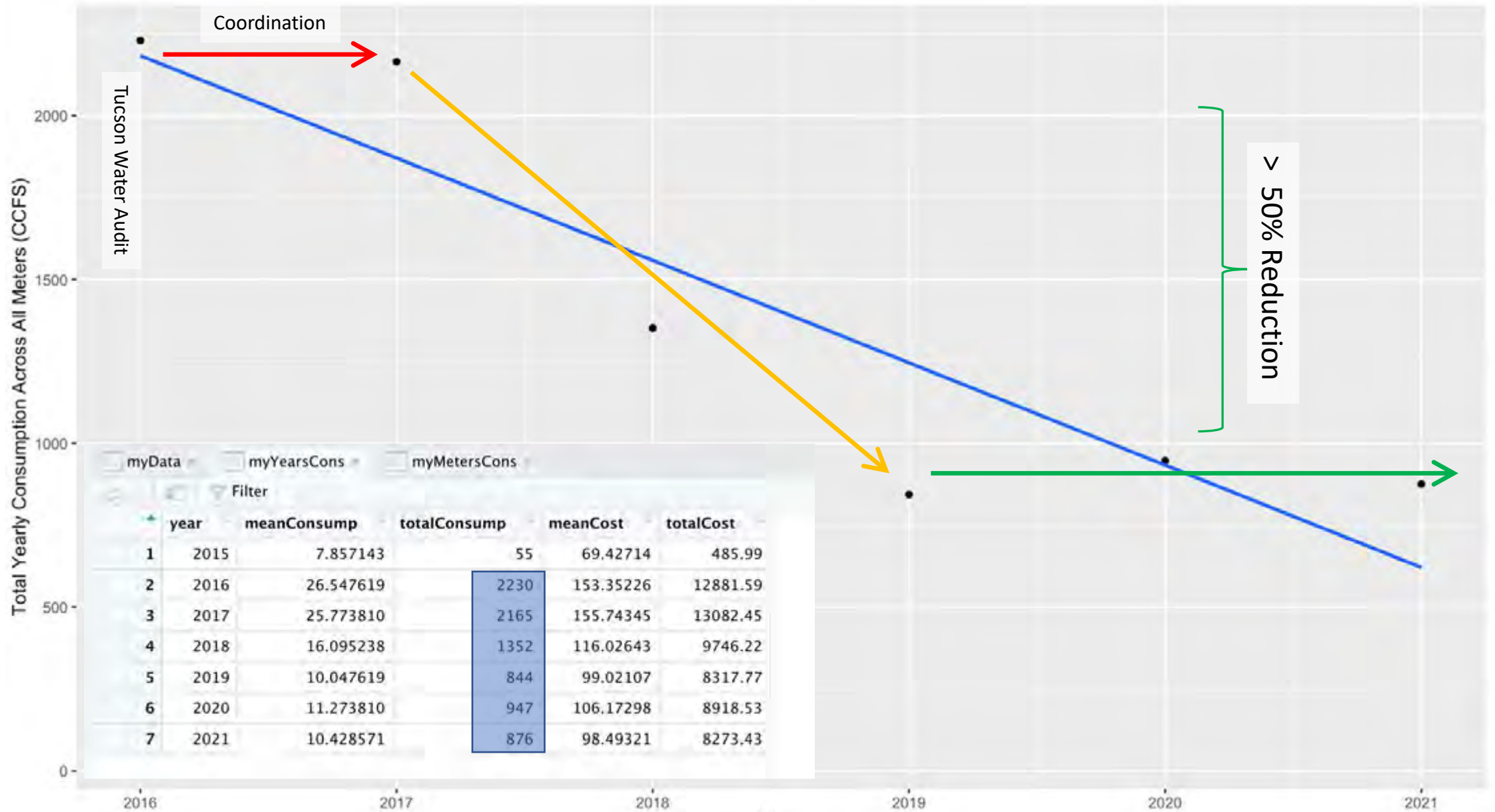
### *Landscapers notified*

A desktop audit of our HOA's water use was completed on September 20. Joaquim noted we have an irrigation scheduling problem in that we are not following scientific guidelines for watering. The chart of consumption should be a bell curve that should be almost zero consumption in January, peaks in June, and zeroes out back in January. None of our irrigation meters show this trend.

The issue may be resolved with smart technology (i.e. smart controllers that can be tied to flow sensors or meters that provide us with real time reads), and via communication with our contracted landscaper.

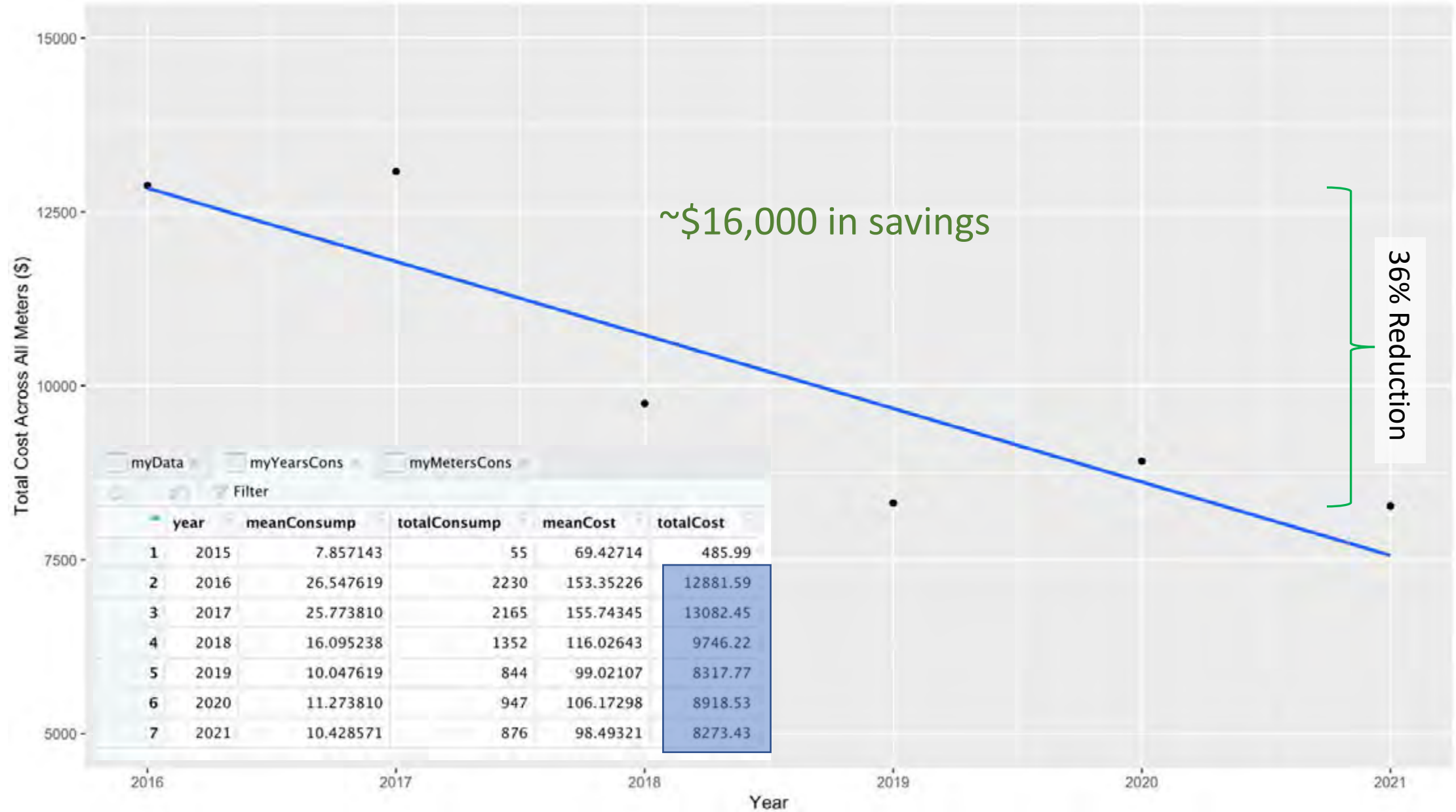


# Yearly CCFS Consumption Across All Meters (2015 – 2021)



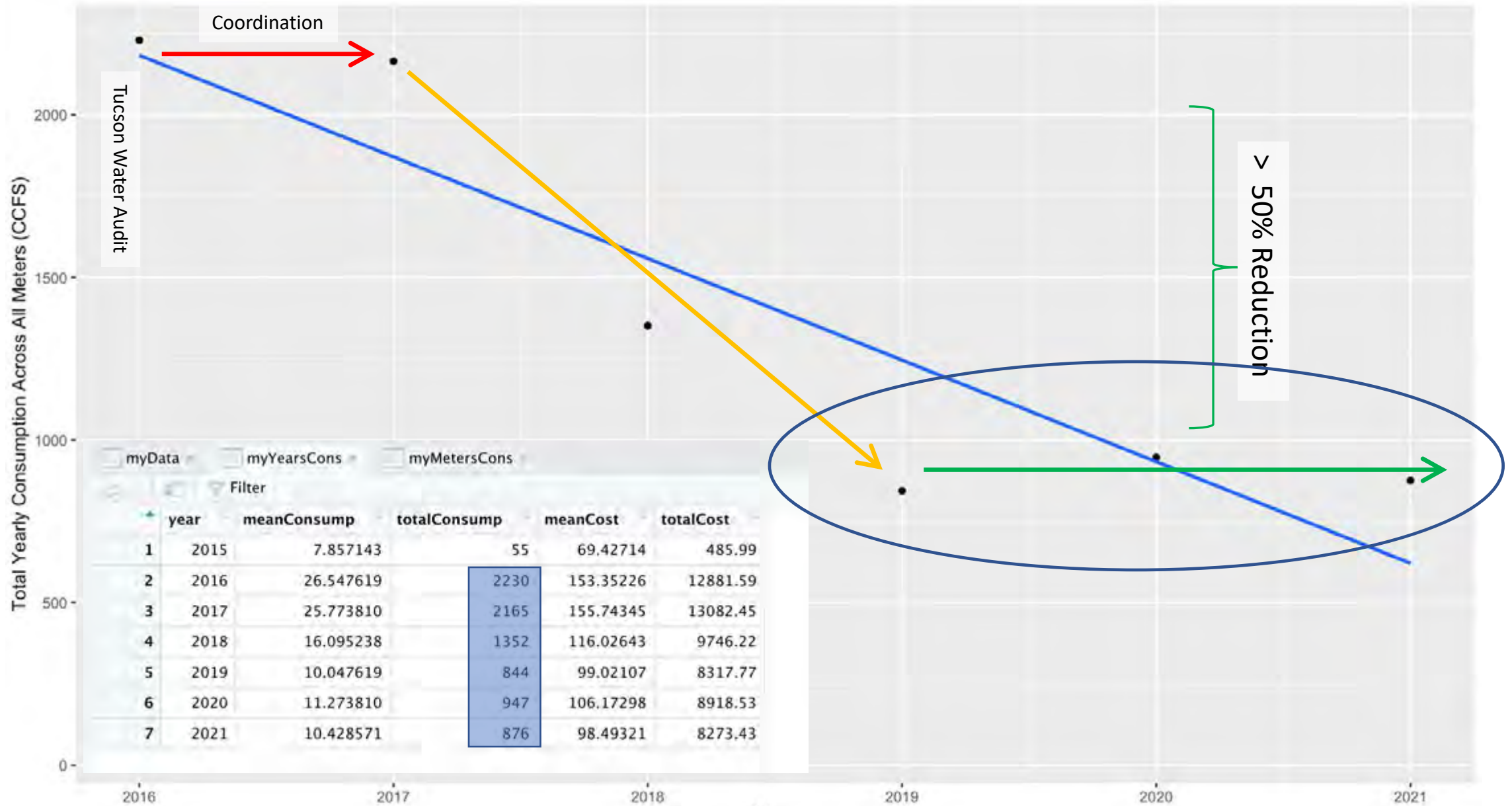


# Yearly CCFS Cost Across All Meters (2015 – 2021)





# Yearly CCFS Consumption Across All Meters (2015 – 2021)





# Latest Metrics

- Relative to our 2016 baseline, the 6-year aggregate cost savings relative to (pre) drip-system repairs and Committee/Common Area Chair activities yielded cost savings of **\$18,906 resulting from 4.6M gallons water saved.**
- Water use in 2022 relative to 2021 increased significantly by 166K gallons (20%) for the year. Not accounting for inflation, this contributed to a **\$1,772 increase in water billing** relative to 2021.

year	meanCCFS	totalCCFS	Delta	meanCost	totalCost	deltaCost yr/yr	deltaCost yr vs 2016	Delta gal Yr/ Delta gal Yr vs 2016
2016	26.55	2230		\$ 153.35	\$ 12,881.59			
2017	25.77	2165	-65	\$ 155.74	\$ 13,082.45	\$ (200.86) Increase	\$ (200.86) Increase	48623 48623
2018	16.10	1352	-813	\$ 116.03	\$ 9,746.22	\$ 3,336.23 Savings	\$ 3,135.37 Savings	608166 656790
2019	10.05	844	-508	\$ 99.02	\$ 8,317.77	\$ 1,428.45 Savings	\$ 4,563.82 Savings	380010 1036800
2020	11.27	947	103	\$ 106.17	\$ 8,918.53	\$ (600.76) Increase	\$ 3,963.06 Savings	-77049 959751
2021	10.43	876	-71	\$ 98.49	\$ 8,273.43	\$ 645.10 Savings	\$ 4,608.16 Savings	53112 1012862
2022	14.26	1098	222	\$ 130.46	\$ 10,045.20	\$ (1,771.77) Increase	\$ 2,836.39 Savings	-166068 846795
Total 6 year savings							\$ 18,906	4,561,621



# *HOA Common Area Maintenance Paradigm*

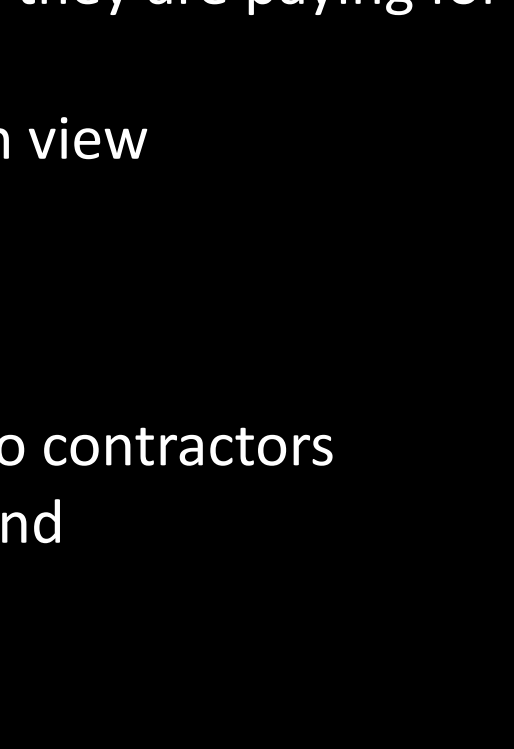
- One property manager, many accounts
  - Pays the bills, hosts meetings, guides actions in line with bylaws
- HOA dues pay the bills, but residents don't easily see what they are paying for
  - Community costs aggregated in an annual report
  - Costs for irrigation and leaks subsequently hidden from view
  - Proper oversight relies on dedicated volunteers
- Lack of oversight encourages high water use
  - High water use keeps areas looking “fresh” at no cost to contractors
  - Removal of ground cover and mulch compounds demand







# *HOA Common Area Maintenance Paradigm*

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    - Removal of ground cover and mulch compounds demand
  - Overwatering desert natives encourages rapid growth
    - High maintenance costs justified in annual contracts
- 



# *HOAs (and other managed properties) are not set up for efficiency*

- Not entirely transparent
- Not accountable without significant effort
- *Degenerative*





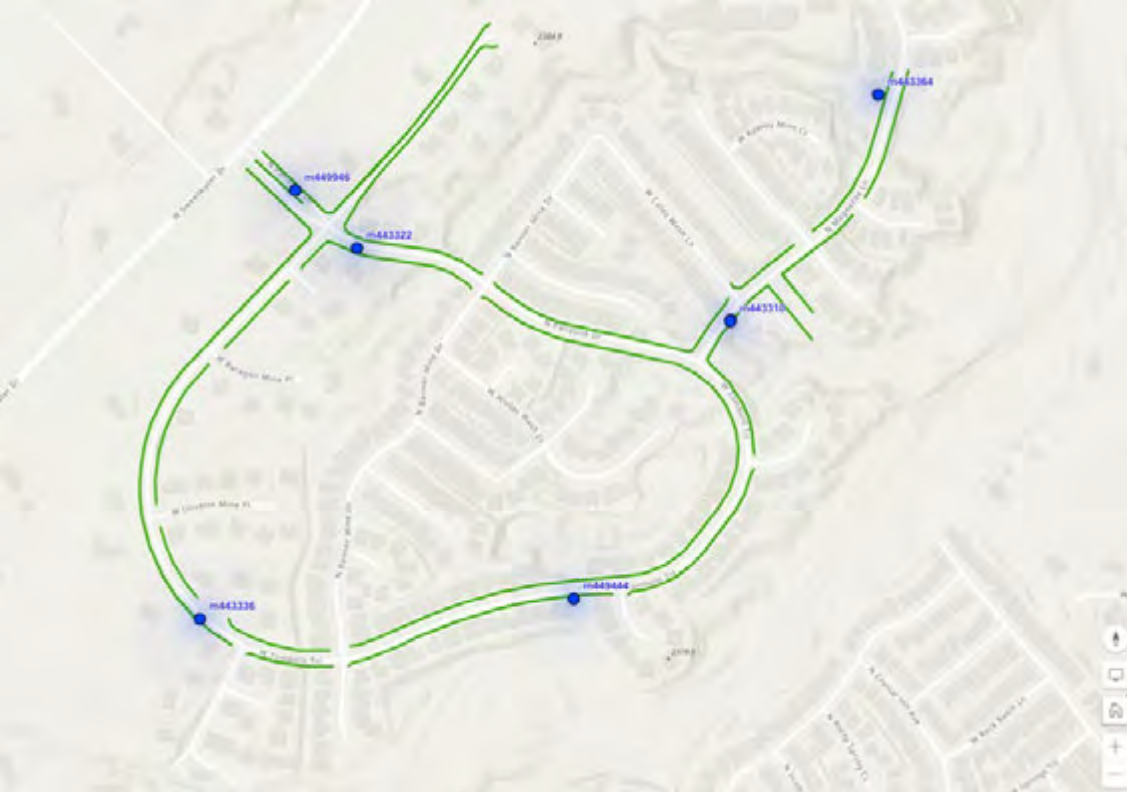
# Generative Strategies



*At the administrative local level (HOAs, business parks), what's next?*

- Improve common area watering visibility
- Improve technology for realizing irrigation efficiency
- Improve opportunities for volunteerism
- Memorialize the change and highlight the wins
- Link conservation to lower maintenance costs
- Link conservation to higher property values





Select Language ▼

## Pay Your Utility Bill

- Tucson Water**
- Pay Your Utility Bill
  - FAQ - New Online Payment Portal
  - Customer Service
  - About Your Water Quality
  - Contractors, Developers, and Engineers
  - Rates and Monthly Charges
  - Technical Library
  - Public Policy
  - Public Education and Outreach
  - Community Relations

### Online Payment System

Utility Bill Payment Portal

Make One-time Payment

Create a secure account to:

No registration required

- Set up payment methods
- View statements electronically
- Set up Autopay
- Receive billing notices by email or text
- Set up Text-to-Pay



**Difference between 2017 - 2016**

Change (48,623.38) GALLONS

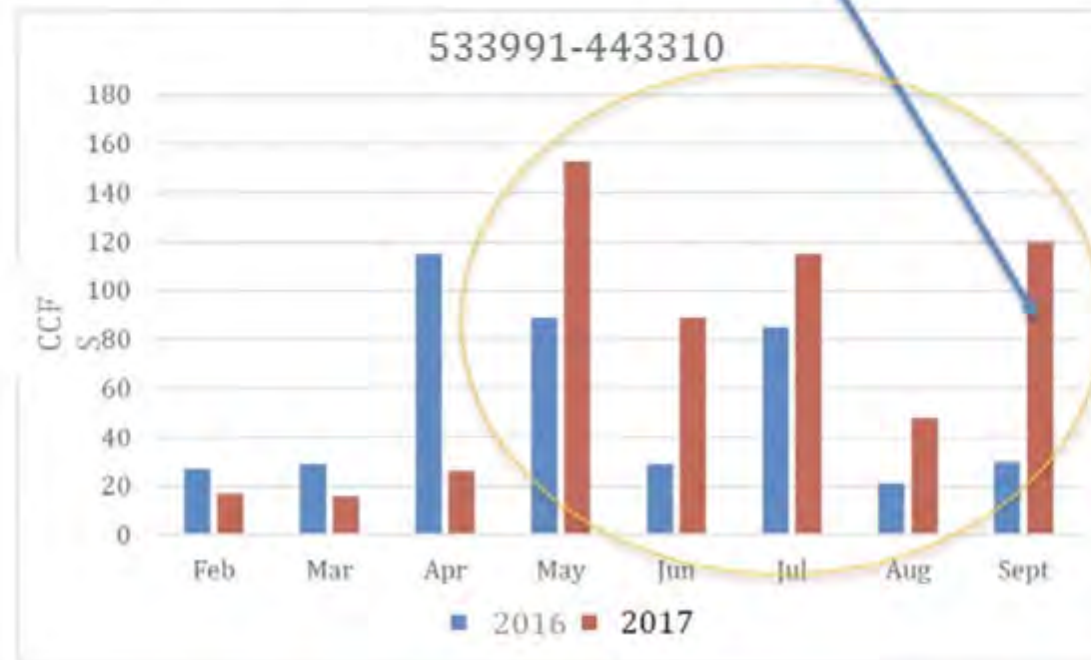
Statement	3720 N Magnelite Ln 533991-443310	3771 N Pallasite Driv 533991-443322	4377 W Tombolo Trail 533991-443336	3873 North Magr 443364	4191 West Tomu 533991-449444	3790 North Paler 567303-449946	3720 N Magnelite Ln 567303-456902	Month	Year
Jan	157,838.97	(1,496.10)	(13,464.94)	-	-	(3,740.26)	3,740.26	142,877.93	(48,623.38)
Dec	41,890.91	(1,496.10)	(5,236.36)	-	-	(3,740.26)	11,220.78	42,638.96	(191,501.31)
Nov	(4,488.31)	(21,693.51)	(748.05)	2,244.16	-	(5,236.36)	2,992.21	(26,929.87)	(234,140.28)
Oct	(748.05)	2,244.16	8,228.57	4,488.31	-	2,244.16	1,496.10	17,953.25	(207,210.40)
Sep	67,324.68	(2,992.21)	17,205.20	2,992.21	-	(2,992.21)	2,992.21	84,529.88	(225,163.65)
Aug	20,197.40	(120,436.37)	(29,174.03)	-	-	(5,236.36)	(1,496.10)	(136,145.46)	(309,693.53)
Jul	22,441.56	(24,685.72)	(26,929.87)	1,496.10	2,244.16	(3,740.26)	5,984.42	(23,189.61)	(173,548.06)
Jun	44,883.12	(2,992.21)	(13,464.94)	-	-	(1,496.10)	1,496.10	28,425.98	(150,358.45)
May	47,875.33	8,976.62	(14,212.99)	-	-	-	7,480.52	50,119.48	(178,784.43)
Apr	(66,576.63)	(18,701.30)	(17,953.25)	-	-	1,496.10	1,496.10	(100,238.97)	(228,903.91)
Mar	(9,724.68)	(32,914.29)	(22,441.56)	-	(748.05)	5,236.36	(26,181.82)	(86,774.03)	(128,664.94)
Feb	(7,480.52)	(28,425.98)	(3,740.26)	-	-	(1,496.10)	(748.05)	(41,890.91)	(41,890.91)

<https://youtu.be/wfiZ3cgYva0?t=837>



Agua Dulce Homeowners Association  
Water Harvesting and Erosion Control Committee  
September 2017 Report  
Prepared by Hans Huth

- In August (September statement), all HOA common areas used 182% more water than the prior month of July. The increase in consumption totals 132,396 gallons.
- Consumption for meter 533991-443310 on Magnetite (near the swimming pool) increased by 90 CCFS (67,320 gallons) relative to the same period in 2016. Billing for this meter totaled \$654.59. This meter has now suffered from higher water use relative to 2016 over the last five months. For August (September billing), there was a significant spike. Overall, the increase in water use is odd since there is now less vegetation due to shrub removal, and wetter conditions relative to last year. A comparison of 2016 to 2017 consumption for this meter follows for billing month:





Charts

Get started

You can explore maps, add layers, and more without signing in. To save your work, sign in before creating your map.

[Learn more about Map Viewer](#)

Cost-Consumption Combined

- Meter Consumption Over Time (2019 - Present)
- Meter Cost Over Time (2019 - Present)
- Aggregate HOA Cost and Consumption (2019 - Present)
- Cost Distribution by Meter (2019 - Present)
- Consumption Distribution by Season (2019 - Present)

Cost-Consumption by Meter

- Selected Meter Consumption Over Time (2019 - Present)
- Selected Meter Cost Over Time (2019 - Present)
- Selected Meter Cost and Consumption (2019 - Present)
- Selected Meter Consumption by Season (2019 - Present)

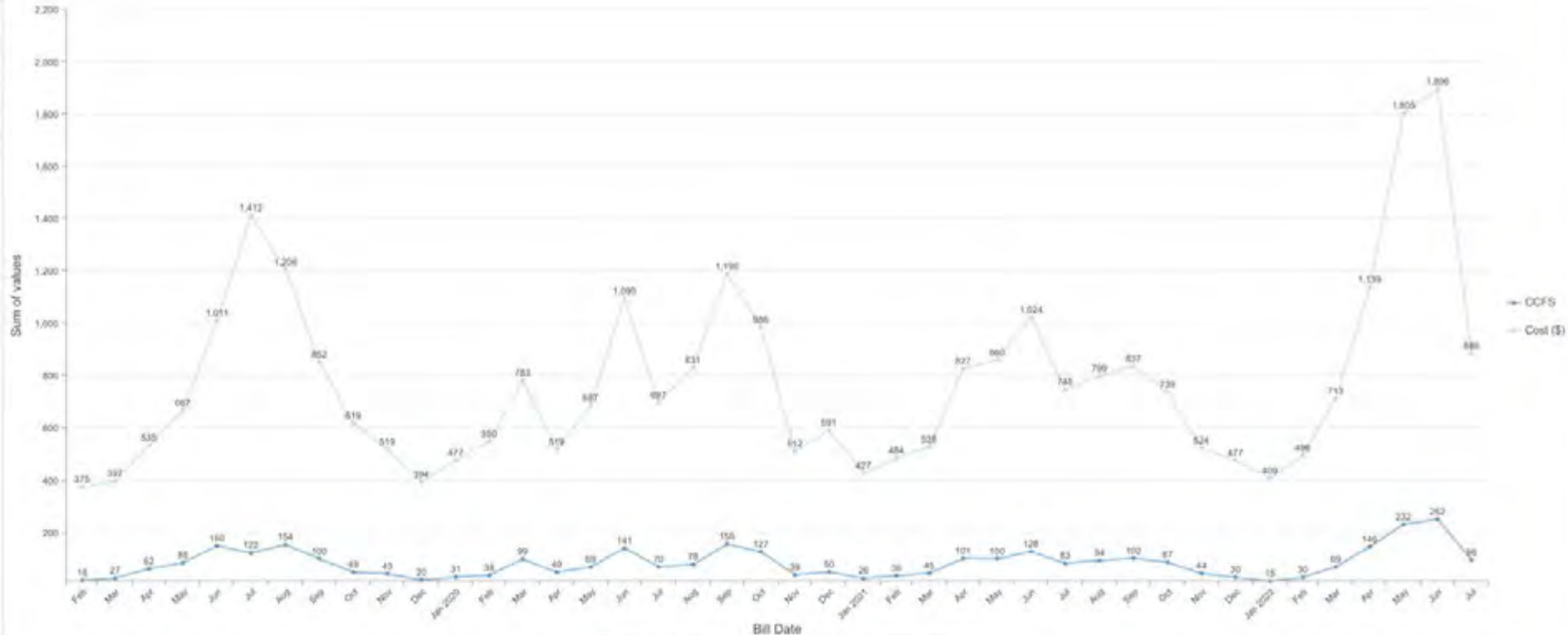
Cost-Consumption by Meter-Season

- Selected Meter-Season Consumption Over Time (2019 - Present)
- Selected Meter-Season Cost Over Time (2019 - Present)
- Selected Meter-Season Cost and Consumption (2019 - Present)



Line chart

Aggregate HOA Cost and Consumption (2019 - Present)



Data sourced Tucson Water Payment Portal: <https://www.tucsonaz.gov/water/payutility>







Charts

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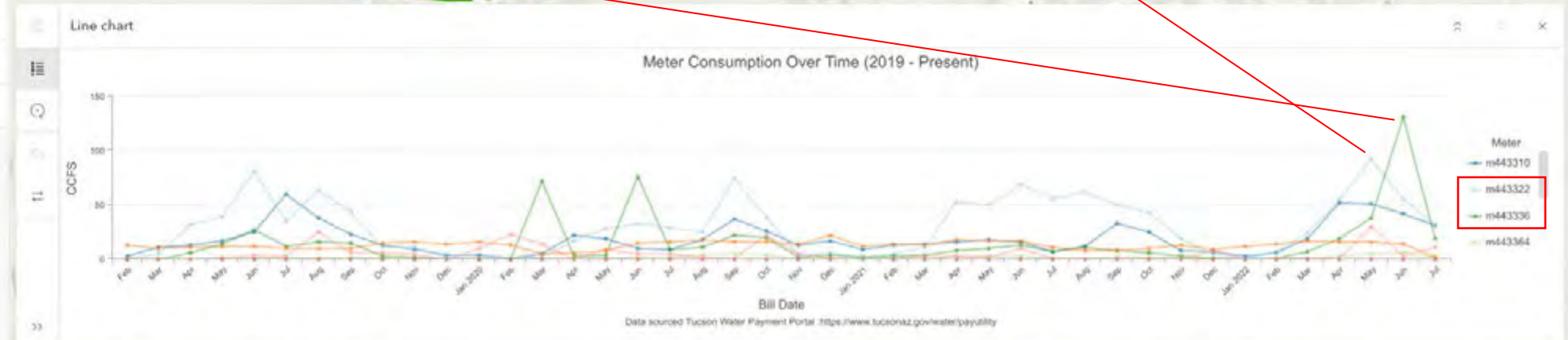
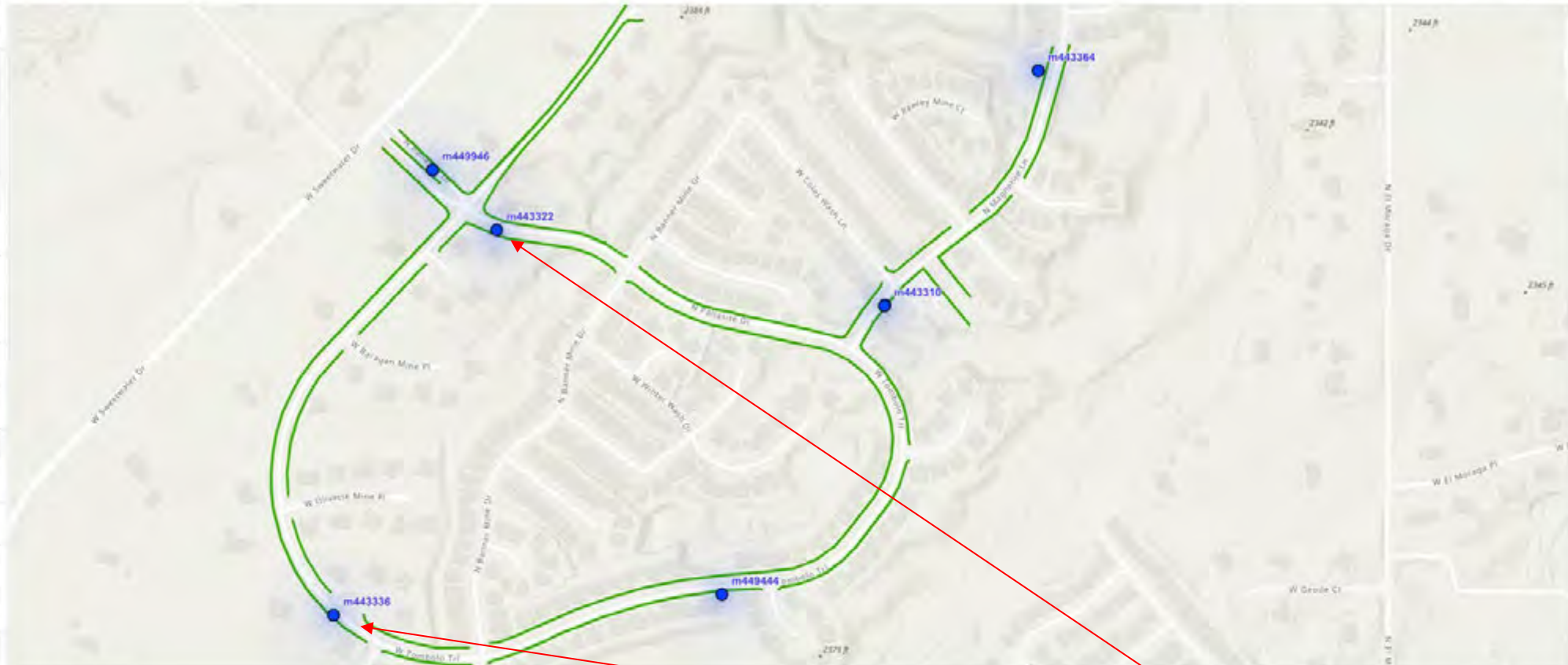
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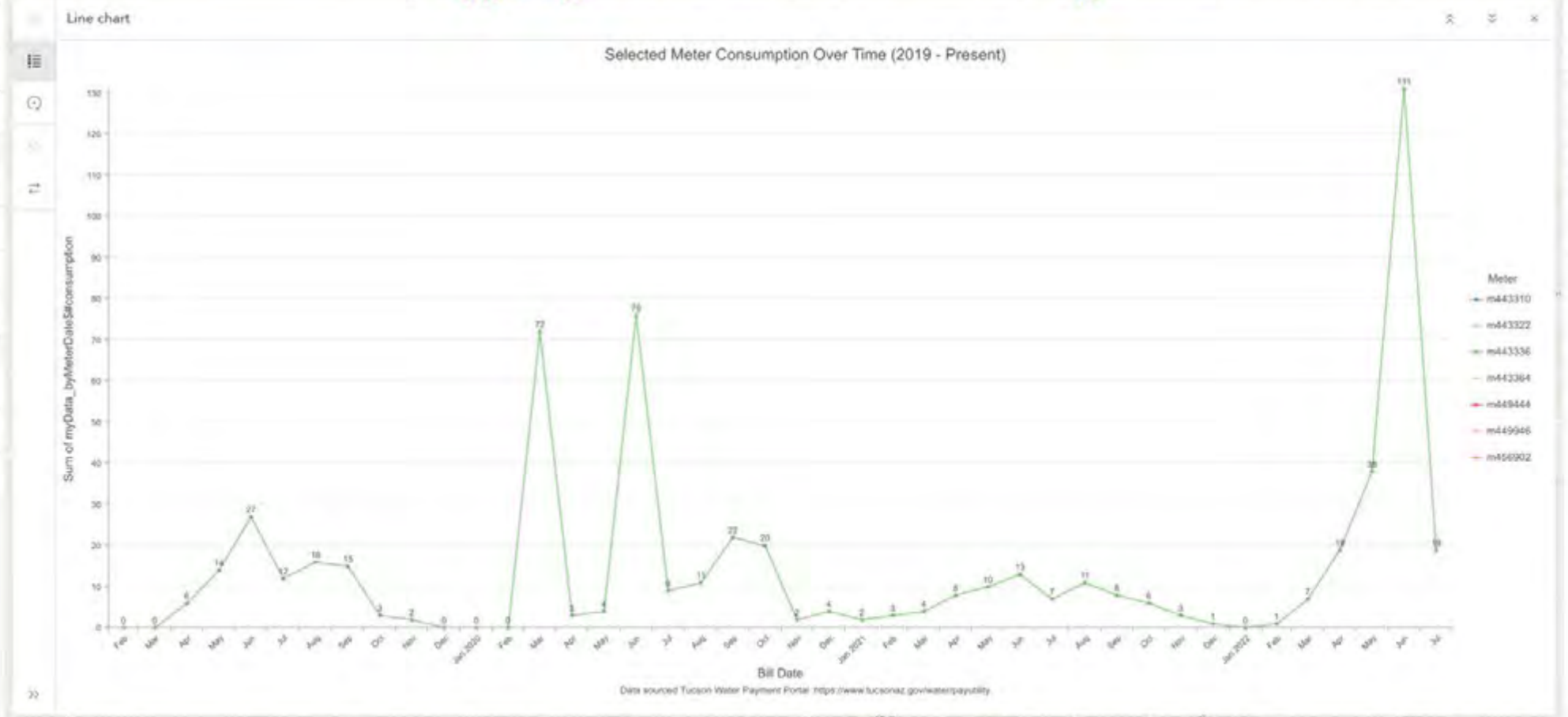
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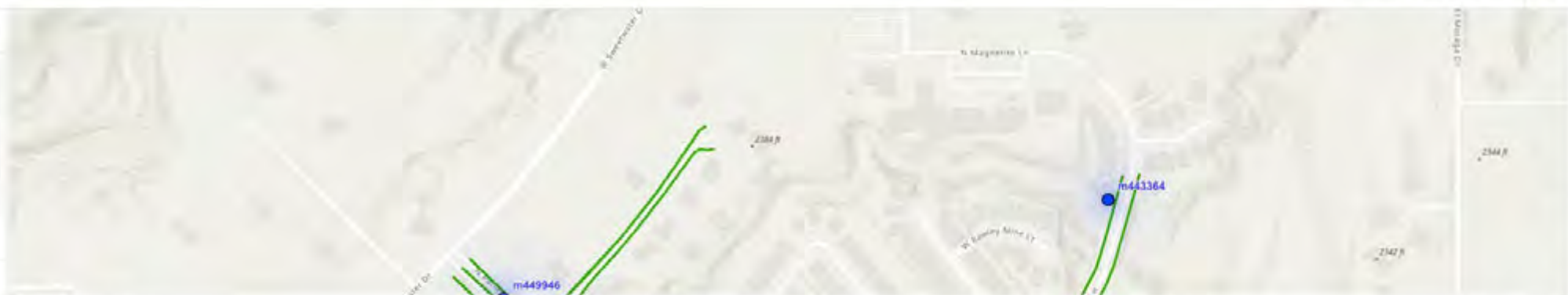
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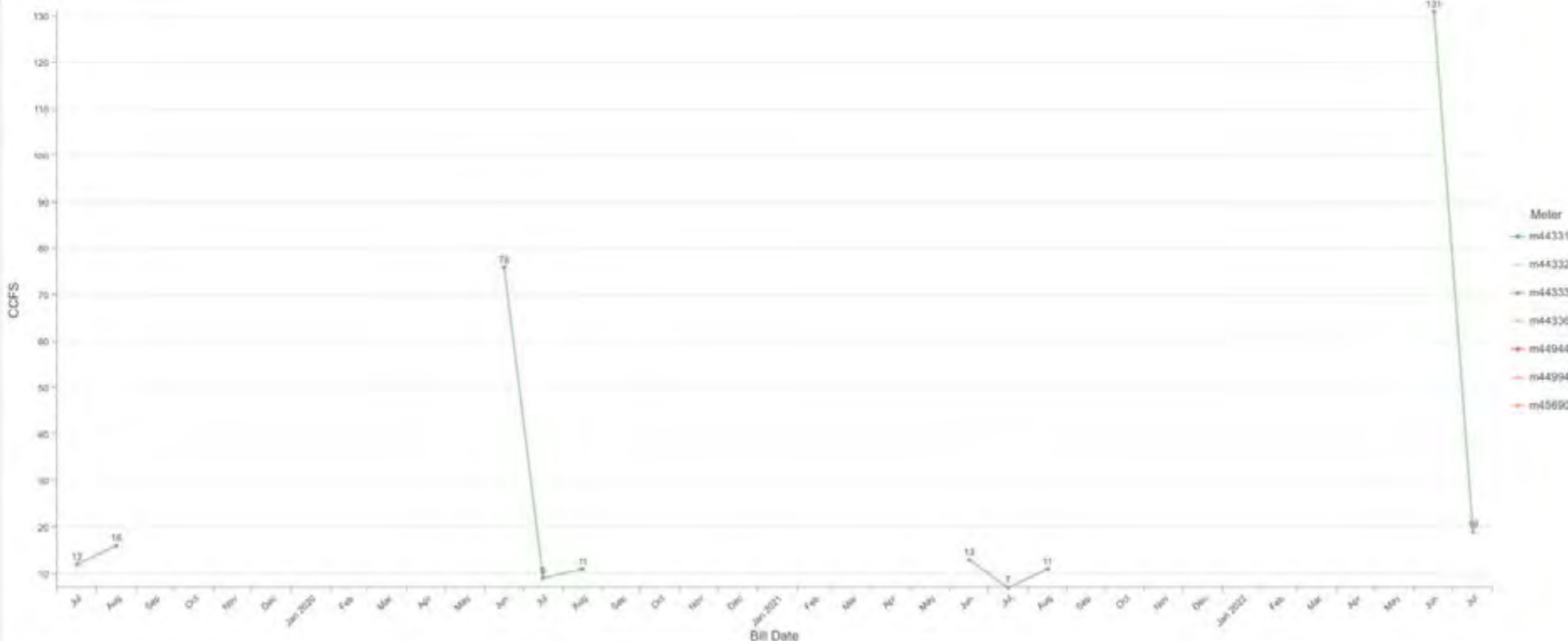
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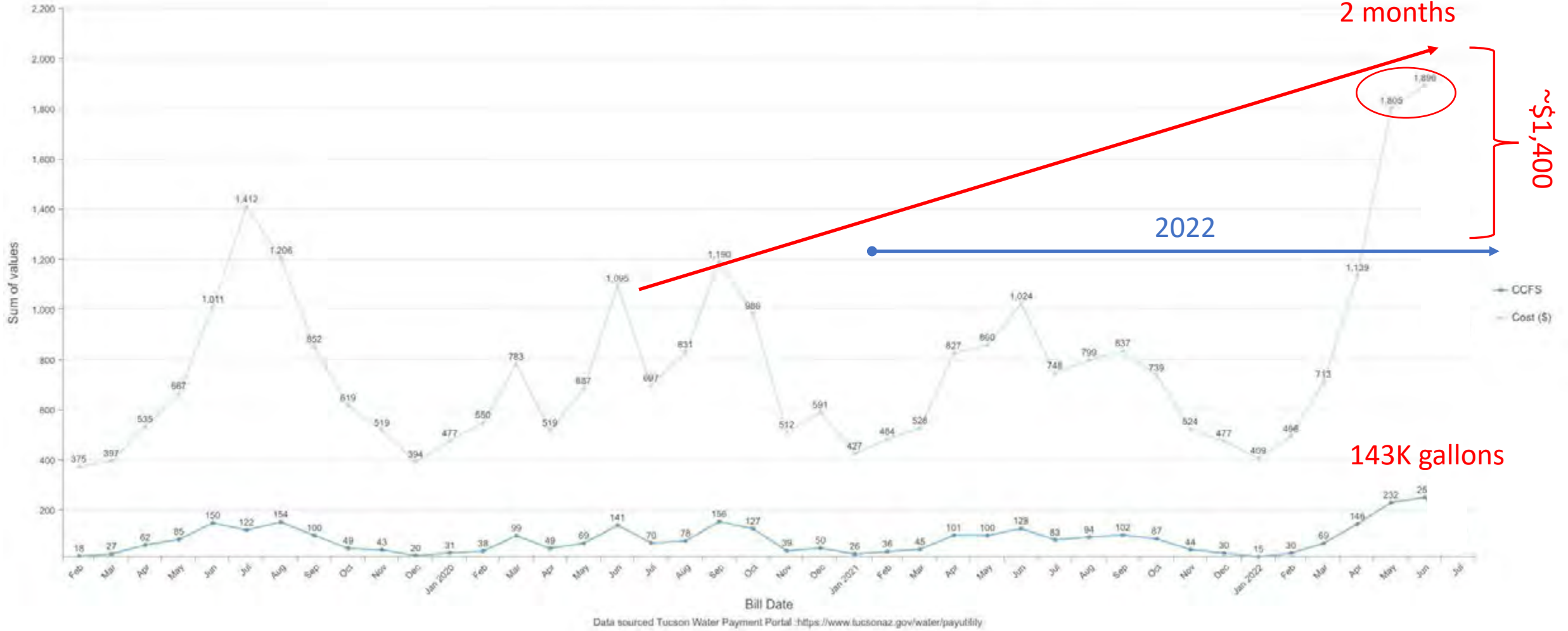
Selected Meter-Season Consumption Over Time (2019 - Present)



Data sourced Tucson Water Payment Portal: <https://www.tucsonaz.gov/water/payutility>



### Aggregate HOA Cost and Consumption (2019 - Present)







870 gallons

X 164

*Homeowner (and Tucson Water) investment will take years to offset respective common area leaks and poor irrigation timing.*

*143,000 gallons / 870 = 164*



*At the administrative local level (HOAs, business parks), what's next?*

- Improve common area watering visibility
- Improve technology for realizing irrigation efficiency
- Improve opportunities for volunteerism
- Memorialize the change and highlight the wins
- Link conservation to lower maintenance costs
- Link conservation to higher property values







# Timed Irrigation



October: 30 minutes, 3 days a week  
May: 60 minutes, 5 days a week



No change unless request through Common Area Chair  
Common Area Chair submits request to landscapers  
Landscapers may not be able to address immediately  
No clear guidance on when to turn back on



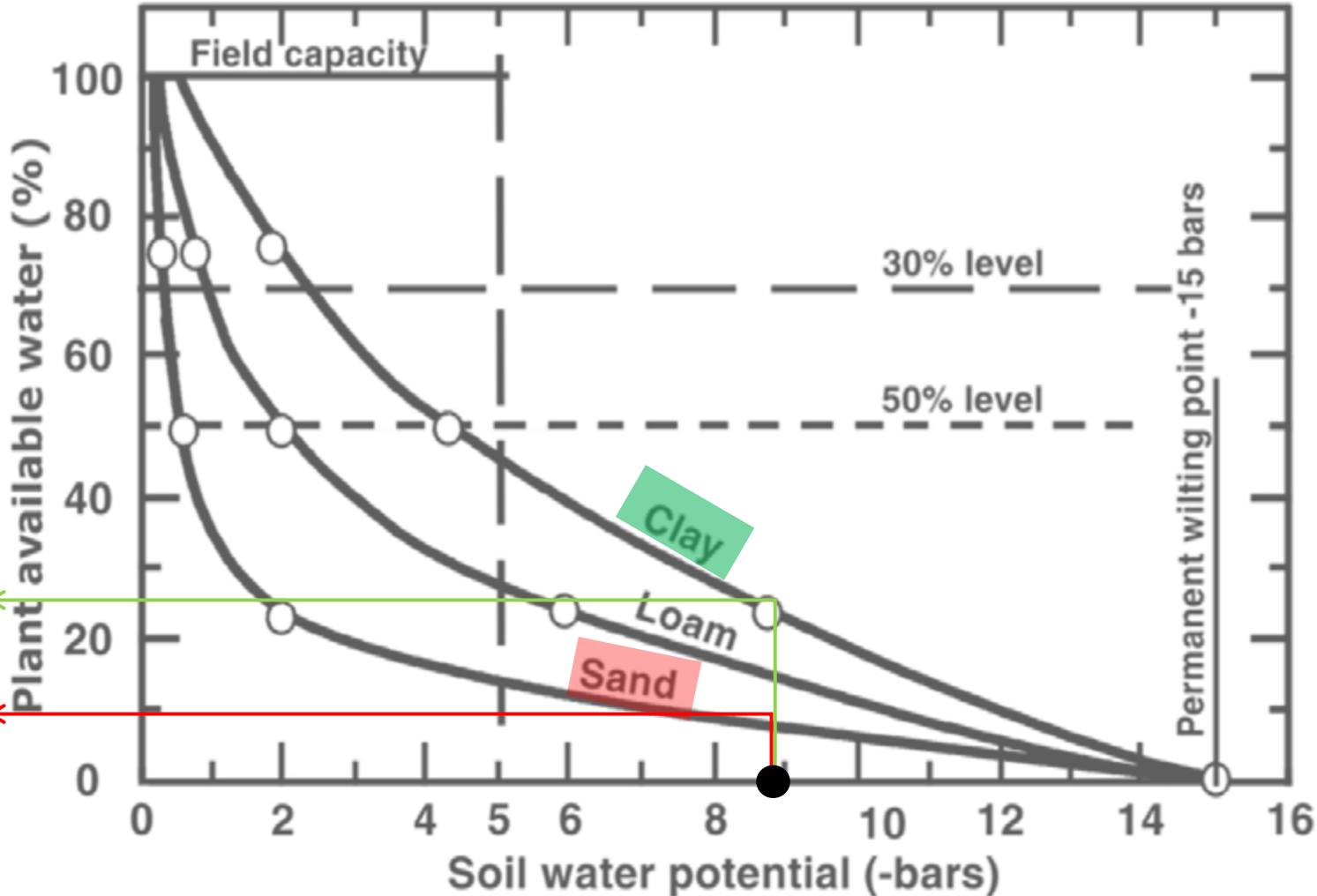




**The bar steps in the display represent centibars of soil water tension on a scale of 10 to 100.** High numbers indicate dry soil, or soil from which it is very difficult for plants to extract moisture.



For most agronomic crops

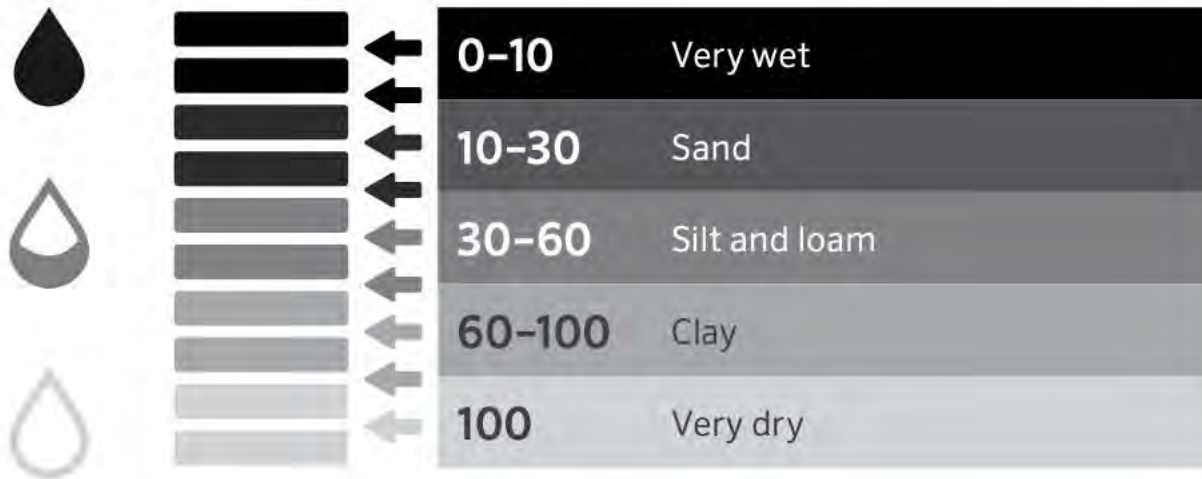


More water available ←

← Less water available



## Programming Moisture Levels



### Effectiveness Requires

- Soils expertise
- Proper sensor placement
- Refinement over time

Start with a midrange setting based on the **table or local experience.**

**Observe results and adjust as needed.**

Press **+** to increase, **-** to decrease.



## Inquiry

“At the gatehouse, there is a soil moisture sensor installed next to the timer. Do we know if that soil sensor is talking to the Timer (**does it work** or has it ever been checked)? If so, does it shut a specific zone down, or do all five zones get interrupted? Finally, do we know **where the respective sensor was installed** (e.g. is it right under the eaves of the gatehouse, or was it extended somewhere else)?”

*“I don’t believe that the sensor is doing anything at all and don’t have a clue where it is located didn’t even know there was one up there.”*

*“We don’t have the zones for irrigation timers mapped.”*



# Timed Irrigation



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No change unless request through Common Area Chair  
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No clear guidance on when to turn back on

Complicated **hands-off** systems are **not sustainable**





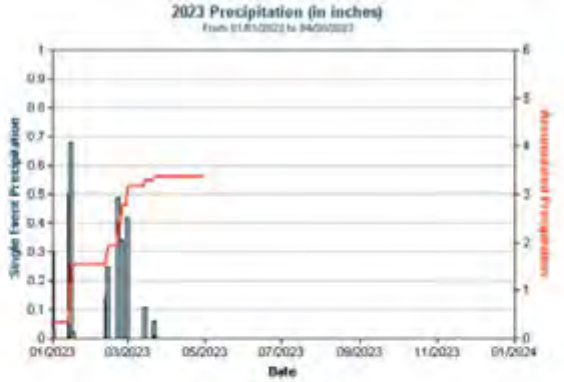
# Agua Dulce Landscape Background and Guidance

## Revision 1.04

Based on experience and our soil type, volunteers shut the irrigation down when Agua Dulce witnesses 0.25 inches of rain within a 48-hour period.

In regard to monitoring rainfall depth, <https://rainlog.org/> provides publicly accessible rainfall-monitoring data for numerous rain gages installed within our community at no cost to the HOA. Check this link for local conditions maintained by an Agua Dulce resident living on Tombolo who updates rainfall totals daily:  
<https://rainlog.org/data/daily/ytd/1306> .





Multiple Year Chart

Type: Tru-Chek/Wedge Type Gauge ID: 1306  
 Brand: Acu-Rite Model:  
 Latitude: 32.2713359166 Longitude: -111.0592353344

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.30	0.00	0.42	0.00								
2	0.03	0.00	0.00	0.00								
3	0.00	0.00	0.00	0.00								
4	0.00	0.00	0.00	0.00								
5	0.00	0.00	0.00	0.00								
6	0.00	0.00	0.00	0.00								
7	0.00	0.00	0.00	0.00								
8	0.00	0.00	0.00	0.00								
9	0.00	0.00	0.00	0.00								
10	0.00	0.00	0.00	0.00								
11	0.00	0.00	0.00	0.00								
12	0.00	0.00	0.00	0.00								
13	0.00	0.14	0.00	0.00								
14	0.00	0.25	0.00	0.00								
15	0.50	0.00	0.11	0.00								
16	0.68	0.00	T	0.00								
17	0.02	0.00	0.00	0.00								
18	0.00	0.00	0.00	0.00								
19	0.00	0.00	0.00	0.00								
20	0.00	0.00	0.00	0.00								
21	0.00	0.00	0.00	0.00								
22	0.00	0.49	0.06	0.00								
23	T	0.00	0.01	0.00								
24	0.00	0.00	0.00	0.00								
25	0.00	0.34	0.00	0.00								
26	0.00	0.00	0.00	0.00								
27	0.00	0.00	0.00	0.00								
28	0.00	0.00	0.00	0.00								
29	0.00		0.00	0.00								
30	0.00		0.00	0.00								
31	0.00		0.00									
Mo:	1.53	1.22	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Year:	1.53	2.75	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35

T=Trace, A=Absent, P=Poor quality reading, S=Snow w/o rain equiv

Day	Comment
January 23	short snow shower
February 13	A short spaf of hail in the afternoon
February 14	and a dusting of snow!
February 15	really cold - low of 23.7 this morning
March 1	And SNOW on the ground this morning



# Agua Dulce Landscape Background and Guidance

## Revision 1.04

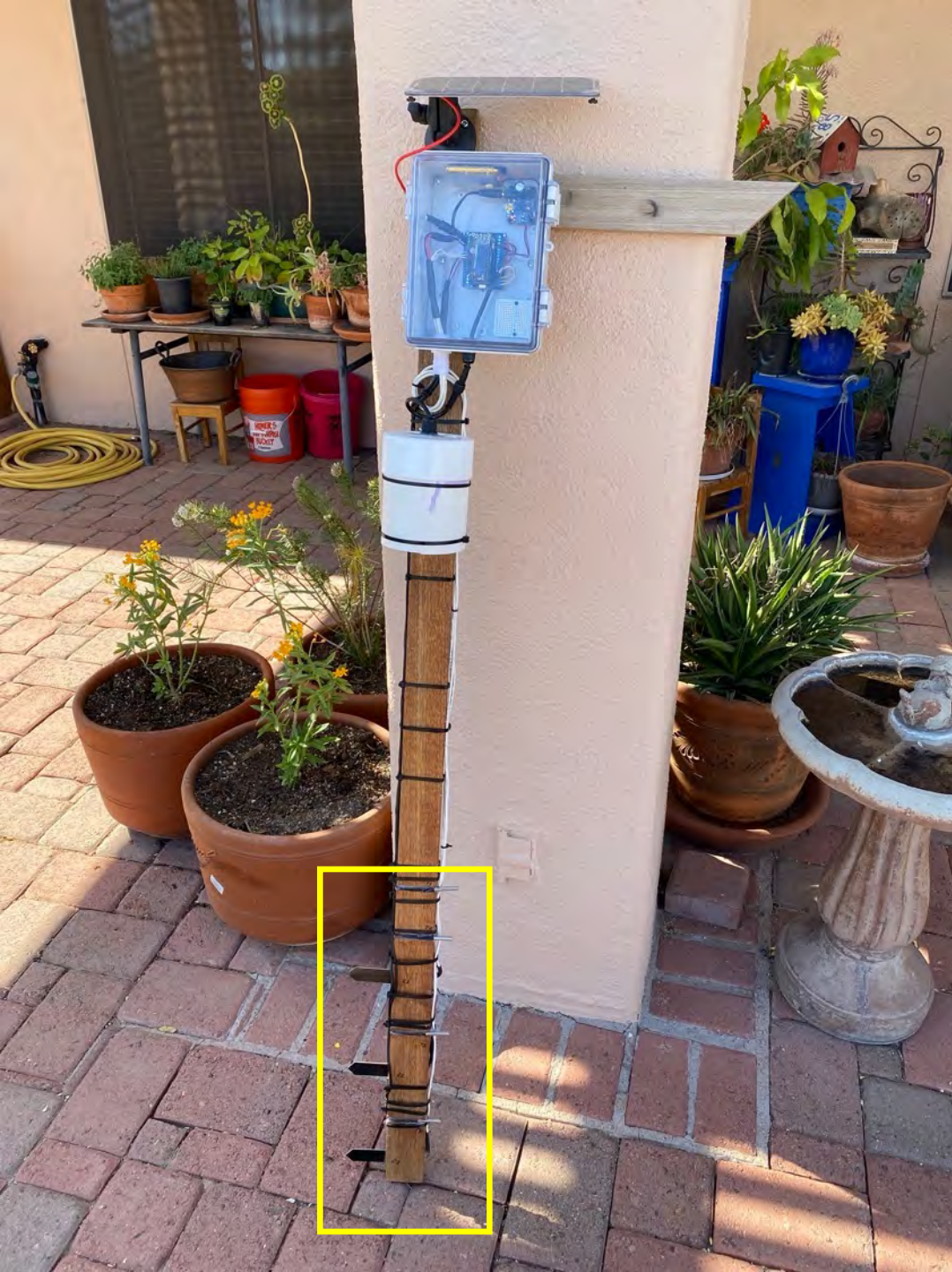
Based on experience and our soil type, volunteers shut the irrigation down when Agua Dulce witnesses 0.25 inches of rain within a 48-hour period.

In regard to monitoring rainfall depth, <https://rainlog.org/> provides publicly accessible rainfall-monitoring data for numerous rain gages installed within our community at no cost to the HOA. Check this link for local conditions maintained by an Agua Dulce resident living on Tombolo who updates rainfall totals daily: <https://rainlog.org/data/daily/ytd/1306> .

The irrigation is kept off for a *minimum of three* days in the summer, and one week in the winter. Reset cycles may be extended based on ground conditions. The cycle resets if we encounter another 0.25 inches of rain when the irrigation system is off.

**Any modifications to irrigation should be communicated to contracted landscapers as well as the Common Area Chair- both when timers are shut down as well as turned back on!**

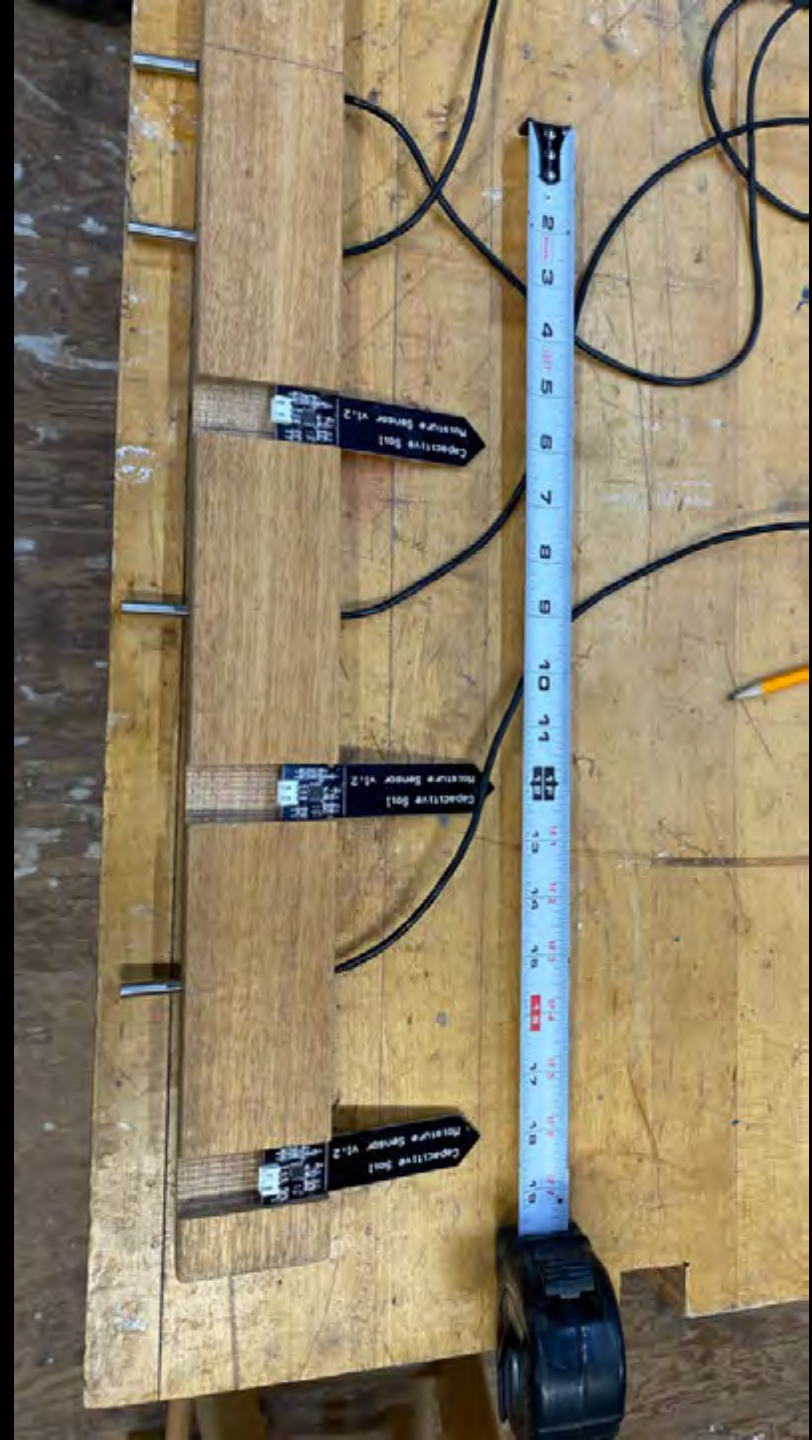




WIP

Open Source  
Inexpensive  
Customizable

STEM  
Xerocraft





*At the administrative local level (HOAs, business parks), what's next?*

- Improve common area watering visibility
- Improve technology for realizing irrigation efficiency
- Improve opportunities for volunteerism
- Memorialize the change and highlight the wins
- Link conservation to lower maintenance costs
- Link conservation to higher property values



Basins need to be maintained and mulched

Need proper spillways





Driplines need to be monitored





New opportunities for capturing stormwater







## SWEETWATER IN THE FOOTHILLS

(Logo courtesy of Dunbar Springs Desert Foresters - used with permission)





*At the administrative local level (HOAs, business parks), what's next?*

- Improve common area watering visibility
- Improve technology for realizing irrigation efficiency
- Improve opportunities for volunteerism
- **Memorialize the change and highlight the wins**
- Link conservation to lower maintenance costs
- Link conservation to higher property values





July, 2014





March 10, 2018







# ArcGIS StoryMaps

Create inspiring, immersive stories by combining text, interactive maps, and other multimedia content. Publish and share your story with your organization or everyone around the world.

[Sign in](#)





# Agua Dulce Walkthrough

## Historical Imagery For Visualizing Landscape Change

Prepared by the Agua Dulce Water Harvesting and Erosion Control (WHEC) Volunteers  
November 15, 2022

-  **July, 2021**  
Stormwater contributing to walking path erosion and a downstream headcut is now...
-  **July, 2021**  
Stormwater-induced erosion along Pallasite where the path is acting as a conduit for...
-  **July, 2021**  
Erosion on the wash-side of Pallasite resulting from stormwater contributed by...
-  **April, 2014**  
Rockwork installed along a wall footer to slow down drainage from adjacent proper...
-  **June, 2015**  
Common areas used to be routinely sprayed with herbicide and pre-emergent. These...
-  **June, 2015**  
Common area court strips are still treated with herbicide and pre-emergent in our...
-  **July, 2021**  
We've been experimenting with coarse gravel to fill in an erosional features...
-  **August, 2022**
















## July, 2021

Stormwater-induced erosion along Pallasite where the path is acting as a conduit for drainage and contributing to another downstream headcut. A basin and swale has since been installed upstream to relieve pressure on this stretch.

Agua Dulce Walkthrough

-  **July, 2021**  
Stormwater contributing to walking path erosion and downstream headcut is now...
-  **July, 2021**  
Stormwater-induced erosion along Pallasite where the path is acting as a conduit for...
-  **July, 2021**  
Erosion on the wash-side of Pallasite resulting from stormwater contributed by...
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Healthy palo verde; sunburned, dying and sappy open wound pruning results.



Lion-tailed mesquites-Tombolo; lion-tailed palo verdes representative of long-term pruning.





Natural hopbush with seeds; on path @ Magnetite.

Raggedly chopped yet far off path.



Native birds utilize hopbush for nesting, and the leaves provide cooling mulch for the soil.





Whitethorn acacia trying to recover; desert willow trying hard; Texas ebony open to infection. Desert trees WANT to grow, despite poor pruning. Proper technique will save trees and \$\$.



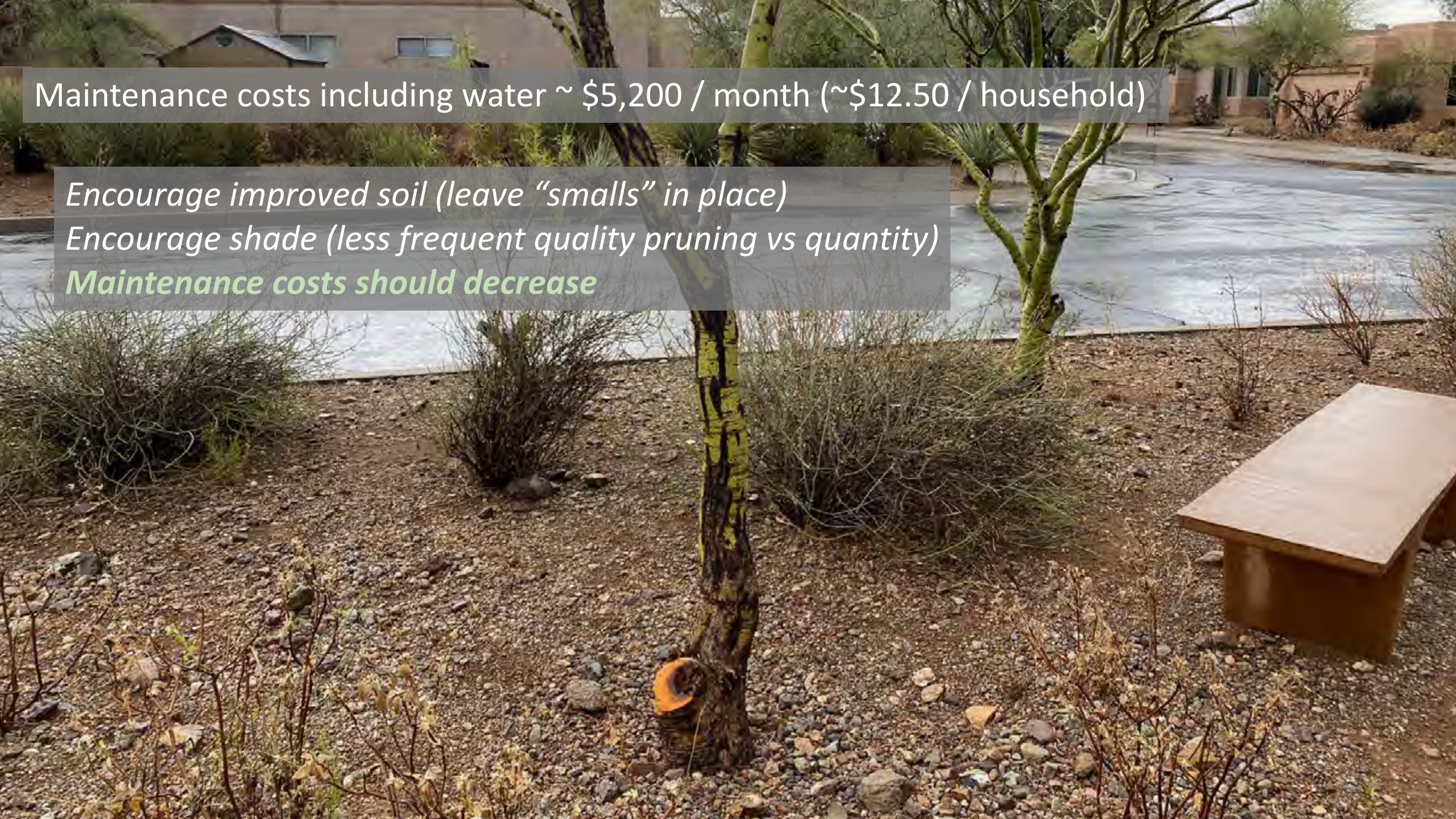
Blooming asclepia/milkweed.



Ready for summer blooms; stem tops trimmed.





A photograph of a desert landscape. In the foreground, there is a tree with a thick, textured trunk and a cut stump at its base. The ground is covered in gravel and sparse, dry vegetation. In the middle ground, a swimming pool is visible, surrounded by a concrete deck. In the background, there are some buildings and more trees. The sky is clear and blue.

Maintenance costs including water ~ \$5,200 / month (~\$12.50 / household)

*Encourage improved soil (leave “smalls” in place)*

*Encourage shade (less frequent quality pruning vs quantity)*

***Maintenance costs should decrease***



Instructions and General Information

1. **Services:** Agua Dulce Homeowners Association (HOA) is issuing a Request for Proposal (RFP) for Basic Landscape Maintenance Services to include Irrigation Systems.

2. **Contact:** The sole point of contact for this RFP is listed below:

**Manager:** Cadden; Jose Becerra

**Address:** Agua Dulce Homeowners Association  
c/o Cadden Community Management  
5225 West Massingale Road  
Tucson, AZ 85743

**Contact:** Phone: 520-297-0797      FAX: 520-742-2618  
Email: (Cadden will provide)

3. **Definitions:**

- **Bidder:** is an individual or business submitting a proposal to the Homeowners Association through their managing agent.
- **The contractor:** is one who is licensed, bonded in the State of Arizona to perform work or furnish materials in accordance with a contract.
- **Common Area:** grounds/areas including entrances to the community that encompasses Agua Dulce Homeowners Association per community map.



# LANDSCAPE MAINTENANCE SPECIFICATIONS

## GENERAL MAINTENANCE

It is the Agua Dulce community's goal to maintain a healthy, attractive Sonoran Desert xeriscape in the common areas to complement that of the surrounding natural open space. The ultimate goal is to ensure a safe and healthy environment in harmony with its natural surroundings.

### “General Maintenance” Scope of Work:

- Service areas will include natural areas at the front entrance, areas immediately adjacent to street curbs, court strips, gravel pathways and vegetation outside and within the fenced pool area. Natural open space/washes are specifically EXCLUDED in line with Pima County guidelines which must be strictly adhered to. Please reference or use **“Service Area Map Overview”** for further details. Areas that are to be maintained are shown in transparent green, and areas that off limits are shown in transparent red.

Service Area Map Overview





*Example of maintained path:*



2 to 1 visits per week  
Saved HOA \$10.7 K / year

- Little pruning or no pruning is required on slow-growing bushes.
  - Creosote and hobbrush/dodonea are not to be pruned, unless seriously encroaching on pathway or roadway.
  - Jojoba is preferably hand pruned to thin, reduce and naturally shape only those areas encroaching on street or pathway.







## Concise Landscape Reference for Agua Dulce

Thank you for helping keep Agua Dulce Sonoran Desert Community Natural and Beautiful!

If there are ever any questions, please consult with Santa Rita Management for clarification. The goal is to keep our common areas **NATURAL** but **NEAT**, echoing the desert around us.

The weekly work is basic and always includes:

- Emptying the trash bins along the path
- Raking the paths and sweeping off the concrete path approaches
- Picking up any trash seen and disposing of animal scat on path areas
- Blowers may be used on the street **ONLY** and as needed only.
  - Dirt areas are **NOT** to be blown off as it removes valuable mulch
  - Out of place rocks edging the path may be placed back into the rock border
  - Remove large deadfall noticed from trees along the path (> 6").
- LIVE BRANCHES ON TREES ARE **NOT TO BE CUT**. If the crew feels a tree is affecting visibility or the path, bring it to the attention of a SRL manager. The reason is our trees are in recovery mode in line with independent recommendations from two ISA-Certified Arborist. This is very important to our community.
- Watch for irrigation problems and bring them to SRL management's notice ASAP.
- STRING TRIMMERS can easily damage other plants, we greatly discourage their use:
  - Hula hoes and quick raking is the preferred way to cleanup small spring plants
  - We do **NOT** want areas left bare of plants and the natural mulch from plants
- Please **DO NOT DISTURB** our desert perennials such as DESERT MARIGOLD, MILKWEED, TRAILING DALEA, SENNA or CREOSOTE. Small 'volunteer' plants must be left to grow with the exception of Desert Broom or recognized invasives. Please ask for direction if a plant is unfamiliar. When in doubt please do **NOT** trim or cut.
- BRITTLEBUSH may be trimmed of spent blooms and gently shaped only if needed but **NOT** cut to the ground. AD wants our common areas to reflect natural desert.
- GLOBEMALLOW may be trimmed of blooms with 4-6" of stalk left, **NOT** at ground level.
- Bushes such as JOJOBA, DODONEA & SAGE may be hand-pruned ONLY in late Winter and after Monsoon. **NO PRUNING** in May or June until the rains start or they get stressed. If a bush has a visibility issue, contact a SRL manager **FIRST**. Natural shapes **ONLY**, always.
- **Very little pruning is needed and ONLY in season**. Hand pruners are the preferred tool.

Weekly work will mostly be keeping the community neat and pruning vegetation rarely and at the right time of year with the right tool. We value our plants and trees and our local wildlife counts on them as well. **Thank you for helping us meet our goals! It is appreciated!**

## Referencia Concisa Para Agua Dulce

¡Gracias por ayudarnos mantener la Comunidad de Agua Dulce bello y en su forma natural! Cualquier pregunta, favor de comunicarse con administración de Santa Rita para clarificación. La meta es de mantener las zonas comunes de forma natural y prolijo de acuerdo al desierto con nos rodea.

Las visitas semanales siempre incluyen:

- Vaciar los botes de basura a lo largo de caminos comunales
- Rastrillar los caminos comunales y barrer los accesos de concreto
- Disponer de basura o mierda en o a lo largo de los caminos comunales
- Sopladores se deben usar solamente en las calles, y solamente cuando se necesita
  - Los caminos y suelo no se soplarán ya que remueve mantillo valioso
- Rocas fuera de lugar a lo largo de los caminos se pueden localizar de manera apropiada
- Recoger grandes ramas muertas caídas a lo largo de caminos (> 6")

RAMAS VIVAS EN LOS ARBOLES **NO SE DEBEN CORTAR**. Si el equipo considera que ramas están impactando calles y/o los caminos comunales, favor de comunicar la necesidad con su gerente. La razón es que nuestros arboles están en moda de recuperación de acuerdo a recomendaciones independientes de dos Arboristas certificados. Esto es muy importante para nuestra comunidad.

Favor de estar atento y reportar cualquier tema al respecto de irrigación y reportar a su gerente lo más pronto posible.

Bordeadoras, desmalezadoras, y/o podadoras de orilla no se recomiendan dado el daño que pueden realizar a plantas cercanos.

- Uso de "Hula Hoes" y rastrillo es preferido para limpiar pequeñas plantas de primavera
- **NO QUEREMOS** que el suelo quede vacío de materia orgánica o mantillo de plantas

Favor de **NO MOLESTAR** la vegetación perenne como Calendula del Desierto, Jumete, Oregano Cimarron, Hojasen, Ejotillo, Té de Senna, o Chaparral. Plantas pequeñas voluntarios se deben dejar crecer con la excepción es "Desert Broom" o invasivos que si se debe remover. Favor de solicitar dirección si hay duda. Si no están seguros, favor de **NO** cortar.

Se puede cortar las flores muertas de Incienso (Yerba de vaso, Rama blanca) y dar forma solo si lo necesitan, pero no cortarlos hasta el suelo. Agua Dulce quiere que la comunidad refleje el desierto natural.

Se puede cortar Mal de Ojo si se deja 4-6" de tallo, pero **NO** hasta el suelo.

Arbustos como Jojoba, Tarachicho, y Cenizo se deben podar a mano **SOLAMENTE** en finales de invierno y después del Monsoon. **NO PODAR** en Mayo o Junio hasta que las lluvias empiezan o se estresan. Si un arbusto esta creando problema de visibilidad, favor de contactar su Gerente **PRIMERO**. **SOLAMENTE** y **SIEMPRE** podar forma natural.

No se necesita podar mucho y **SOLAMENTE** en la estación apropiada. Podar a mano es la manera preferida.

La meta del trabajo semanal es de mantener la comunidad prolija y podar vegetación infrecuentemente y al momento adecuada con la herramienta apropiada. Le damos mucho valor a nuestras plantas y árboles dado su beneficio a la vida silvestre de la comunidad. ¡Gracias por ayudarnos cumplir con estas metas-- se lo agradecemos!











*At the administrative local level (HOAs, business parks), what's next?*

- Improve common area watering visibility
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National  
Wildlife  
Federation

CERTIFIED

COMMUNITY  
WILDLIFE  
HABITAT

Agua Dulce

S



**PROJECT NAME: AGUA DULCE**  
PROJECT TYPE: RESIDENTIAL ■ Subdivision ■ Retrofit

Tucson, AZ



Low Impact/ Green Infrastructure  
LID/ GI DEVELOPMENT



<b>DATA</b>	<b>LOCATION</b>	N Palaske Dr. west of Robins K-8 school on W Sweetwater Dr.
	<b>ACRES</b>	HOA subwatershed encompasses ~160 acres
	<b>CLIENT</b>	Agua Dulce / Sweetwater in the Foothills Home Owners Association
	<b>CONTACT</b>	Hans Huth, agudulcehans@gmail.com
	<b>DESIGNED BY</b>	Watershed Management Group Agua Dulce Water Harvesting and Erosion Control Committee
	<b>COMPLETED</b>	WMG Contract ended 2/15/2018, but volunteer maintenance is ongoing

**REGULATORY:** Not applicable

**STAKEHOLDERS:** The Agua Dulce Homeowners Association is committed to protecting and enhancing community common areas in a way that is sensitive to the environment and fiscally responsible. In an effort to minimize costs, the HOA created the Water Harvesting and Erosion Control (WHEC) Committee to oversee and maintain water harvesting features installed by volunteers. Regular maintenance addresses problems early while reducing costly repairs later. WHEC addresses and eliminates flooding along pathways, directs stormwater runoff to planting areas, stabilizes soil using native plantings, and regularly monitors the drip irrigation system for leaks and immediate repairs.

**PROJECT RECOGNITION:** Our HOA was the first in Arizona to be certified as Community wildlife habitat by the National Wildlife Foundation; referenced by the Water Resource Research Center and Watershed Management Group via posting of project summary on respective websites (<https://youtu.be/wfZ3cgYva0>)

**PERFORMANCE MEASURES:** We maintain a spreadsheet to track water and money savings relative to baseline conditions referenced in 2016. Through the close of 2022, our HOA has saved a total 4.6M gallons of water which translates to a cost savings of \$19K in billing at a time when Lake Mead is facing a Tier 2A shortage and Tucson water rates are increasing.

<b>COST</b>	<b>ESTIMATED COST</b>	\$3,367.73
	<b>FUNDING SOURCE</b>	Agua Dulce / Sweetwater in the Foothills HOA
	<b>ACTUAL COST</b>	Watershed Management Group Contract and Workshops: \$2005.90 Design, project management, and rip rap for pool area stabilization: \$1,361.83 Landscape Tools for Water Harvesting Committee: \$200 Mulch: Free from Finest Trees Total: \$3,567.73 to date
	<b>MAINTENANCE</b>	Water Harvesting and Erosion Control Committee (WHECC) comprised of neighborhood volunteers
	<b>COMPARE TO CONVENTIONAL</b>	Relief from chronic repairs to common area walkways billed by contracted landscaper; high common area water bills.
	<b>TIME TO BUILD</b>	2 days, not including ongoing maintenance by volunteers

**FINISHED PROJECT DESCRIPTION:** Details including economic, social, and environmental metrics are captured and routinely updated to this video playlist: <https://youtube.com/playlist?list=PLq5k4cakypz8wuAfe8rqzb7b24tc0>

**SUMMARY**

**DESIGN FEATURES:** Passive water harvesting (berms and basins) installed along gravel pathways and downstream of paved parking areas put stormwater to beneficial use; zuni bowls for grade control in areas impacted by street runoff; rip rap to control erosion associated with pool backflush; integration of native plants for water management/erosion prevention as well as landscaping/aesthetic purposes.



LOCATION MAP

**LESSONS LEARNED**

**SOMETHING TO BE PROUD OF:** Community-based model of ecological planning and active maintenance of green infrastructure systems. Preventative planning measures to ensure long-term sustainability and safety in their neighborhood. Utilizing systems-based green infrastructure approach and ecologically sound methods to address common landscape issues by putting stormwater to beneficial use. Significant cost savings to the community with respect to water billing

**SOMETHING TO BE DONE DIFFERENTLY:** As with all volunteer projects, sustainability is a concern. On average, we have been relying on four volunteers to maintain this work in a community of over 400 homes. In response, we are memorializing years of institutional knowledge in a "Landscape Background and Procedural Guidance" document that is revised every six months to ensure lessons learned are not lost to future volunteers. We also prepare an annual report so that water and cost savings are formally documented. Finally, we maintain an ESRI Story Map with before-and-after photos of landscape conditions acknowledging volunteer efforts.

PHOTOS - (Before)



PHOTOS - (After)



Agua Dulce Story Map: <https://arcg.is/1WWGmb>

- April, 2014: Berms and basins installed
- July, 2021: Rip rap installed
- July, 2021: Landscaping completed
- July, 2021: Final project review

**PROJECT TYPE: RESIDENTIAL**  
■ Subdivision  
■ New

**PROJECT NAME: AGUA DULCE**



This site absorbs the rain and stormwater to preserve the natural resources of our desert environment



**Resiliency Leader**

City of Tucson/Pima County Low Impact Development and Green Infrastructure Case Study Site

## Certificate of Excellence

Proudly awarded to

Agua Dulce

City of Tucson/Pima County LID Case Study site for demonstrating practices that capture rain and stormwater to preserve the natural resources of our arid southwest.

April 6, 2023



LOW IMPACT DEVELOPMENT/  
GREEN INFRASTRUCTURE  
WORKING GROUP

*Adelita S. Grijalva*

ADELITA GRIJALVA, Supervisor Chair District 3

*Regina Romero*

REGINA ROMERO, City of Tucson Mayor









# Homeowners Associations (HOAs)

Water Conservation Strategies  
Successes, Challenges, What's Next











**Hans and Anne Huth**

5 days ago • Apr 28, 2023 1:28 pm



## Santa Rita Contacted for Cleanup

Santa Rita was contacted today and confirmed they also saw an unaffiliated individual driving throughout the community cutting trees and shrubs. Santa Rita observed some trees were improperly pruned. Sandra is working with Santa Rita to clean up what was cut and repair where we can. Rest assured this was NOT the work of Santa Rita or any volunteers we know based on the shared description of the individual. This was most inappropriate, but we'll get past it. Thanks for your patience.

5 Replies

▼ [Show 3 More Replies](#)



**Hans and Anne Huth** Again, if anyone has a concern, please don't take matters into your own hands. I've tested this form myself and can confirm you will get a response: <https://engage.goenumerate.com/s/aguadu...?qid=57300> . Thank You.



5 days ago • Apr 28, 2023 1:46 pm



**Barb Kunkel (Resident Admin)** \$300 cost to association.



5 days ago • Apr 28, 2023 2:58 pm





# Agua Dulce

Modest Maker

Public

8 videos • 90 views • Last updated on Jan 31, 2023



▶ Play all

🔀 Shuffle

Background on volunteer activities supporting soil and water conservation in a Tucson Mountains foothill community.

Sort



**HOAs - An Overlooked Water Sustainability Opportunity in the Desert**

Modest Maker • 1K views • 3 years ago

23:31



**Water Savings Opportunities in HOAs- What's Next**

Modest Maker • 164 views • 7 months ago

27:00



**Water Harvesting - Arizona Hydrological Symposium Presentation 2021**

Modest Maker • 382 views • 1 year ago

22:41



**Agua Dulce Water Harvesting and Erosion Control - July, 2022**

Modest Maker • 129 views • 9 months ago

13:03



**Agua Dulce Tree Maintenance Pre-Bid Visit**

Modest Maker • 105 views • 6 months ago

8:30



**Irrigation Challenges**

Modest Maker • 14 views • 7 months ago

1:15



**Demonstration of ICV and Backflow Valve Manual Control**

Modest Maker • 16 views • 8 months ago

3:11



**Buying, Programming, and Testing Capacitance Soil Moisture Sensors**

Modest Maker • 4.8K views • 4 months ago

10:44



## ARBORIST MEETING UPDATE

Hello Neighbor!

The HOA has received a final report with recommendations for our common area trees moving forward. Of greatest significance, AD allow the inner canopy of our trees to develop. Inner canopy is critical for food production thus can make our trees healthier and more stable in high winds protecting trees from sunburn. As such, you may see trunks that are not being maintained. This is intentional, healthy, vigorous, and recuperating.

October 28, 2022



## LANDSCAPE UPDATE AND VOLUNTEER OPPORTUNITIES

**BY HANS HUTH**

On the landscape front, Complete has finished rehabilitating the drip system along Pallasite from the community entrance through Magnetite. Per ISA-certified arborist recommendations, Complete has also removed the first 7 of 15 impaired trees at locations along Pallasite, Magnetite, and Tombolo.

While Complete addresses these tasks, volunteers have been raking paths, removing dead wood from healthy trees, and maintaining erosion control features. Needless to say, volunteerism can be a spiritually fulfilling activity that not only supports the HOA but offers opportunities for new friendships. These opportunities also get





# Agua Dulce Landscape Background and Guidance

Revision 1.04  
Last Updated: 2/3/2023



Prepared for the Association by Landscape and Community Volunteers

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Agua Dulce Landscape Operational Guidance Document  
Requested Revision for Release 1.04

Name:

Street Address:

Date:

Page / Paragraph in Question:

Recommended text to be changed, added, or deleted:

Reason for requested change:

Please return this form to Cadden Management's Association Community Manager:  
Mr. Jose Bacerra ([JBacerra@cadden.com](mailto:JBacerra@cadden.com)) for appropriate routing.

Revision History

The initial release (revision 1.00) was shared with the Association Common Area Chair on 1/3/2023. It captures most of the requirements outlined in our current request for proposal (RFP) template used for evaluating prospective landscape contractors while also echoing contractual obligations. Respective requirements were approved by the Association Landscape Committee and discussed during an open meeting on December 2, 2022. As such, this guidance may be shared with our community and landscapers to provide additional insight on our Associations practices and needs while ensuring community transparency. The initial release also captures additional details specific to common area needs not covered under contract.

Edits and revisions will be tracked in this section explaining dates and reasons for amendments or deletions.

Revision 1.00 published 1/6/2023

- Initial release prepared by Hans Huth and Mary Graf for the Association reflecting approved RFP requirements as well as professional and open-meeting discussions.
- Initial release shared with Common Area Chair

Revision 1.01 published 1/17/2023

- Updated water consumption and cost graphs with last-quarter data for year 2022 (missing in revision 1.00). This will assist in budgeting future costs and/or identifying outliers in water consumption moving forward. Additional details will be summarized during an open meeting scheduled for 1/21/2023.
- Documented the existing online work order system established by the Association through Cadden Management to help volunteers respond to common area concerns and requests. This existing protocol is meant to ensure the Association is properly informed of challenges while also easing pressure on diligent volunteers in responding to issues.
- Updates shared with Common Area Chair



# WHEC-Landscaping Annual Report



Prepared by Hans Huth  
2/15/2023

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## WATER HARVESTING AND EROSION CONTROL

### COMMITTEE CHARTER

Agua Dulce Homeowners Association

#### **Committee responsibilities and duties:**

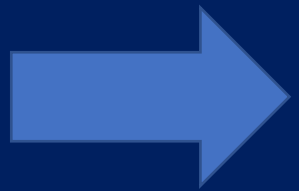
- Gently contouring common areas to channel rainwater away from paths where runoff may contribute to erosion, and promoting infiltration of runoff in areas where it can be put to beneficial use.
- Identifying bare areas that may be seeded or planted with native vegetation (per CC&Rs approved plant palette), to help promote erosion control while improving the natural aesthetic of the community.
- Coordinating water harvesting training and/or volunteer events for the community at large.
- Surveying the common area drip system for leaks or problems.

With the goal of ensuring both the safety and sustainability of common areas, WHECC activities requiring the movement of more than 1-cubic yard of rock, soil, or mulch at a single site must be approved by the Board before executing the same.



# Major Takeaways

- Highlight the cost savings (\$\$\$)
- Start by coordinating on drip irrigation timing
- Be transparent (establish a committee, volunteer recognition, procedures)
- Memorialize the change
- Recognize your landscapers
- Point to Agua Dulce as an example and/or for resources (Google Drive Index)



aguadulcehans@gmail.com

<https://docs.google.com/document/d/1rt5LUr6nwuzFvFLMt2rSwZLkthOgt7aw/>



A gravel path winds through a lush garden with various trees and bushes. The path is bordered by a low wall of stones. In the background, a paved road curves to the right, with a stop sign visible. The sky is blue with some clouds.

Thank You!

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Q&A







*24.3% of emissions result from CAP*

*Navajo Power Generating Station*





# St. Francis H2O Consumption



9/20 – 4/21

4/21 – 4/22

4/22 – 4/23

Year-Year Savings:  
~ 130,000 gallons  
~ \$800



Overflow Basin 2

Basin 1

Overflow Basin 3

Wide and shallow berm

