

2016 Arizona Water Summit

ANDY STAPLES, ASGCA
STAPLES GOLF DESIGN
JUNE 21, 2016





WATER

An architect's view on what's going on...

A person is seen from behind, carrying a large, flat, light-colored tray or basket balanced on their head. They are walking through a heavy rain. The background is a blurred green field, and the foreground shows grass. The overall scene is captured in a cinematic, low-angle perspective, emphasizing the texture of the rain and the person's movement.

Never has efficiency been so attainable than now, nor has it ever been so important.

Simon Sinek:

How great leaders inspire action

TEDxPuget Sound · 18:04 · Filmed Sep 2009

 43 subtitle languages 

 [View interactive transcript](#)





Median cost of all water for an 18-hole golf course, 2005 vs. 2013

Region	Total water cost/18-hole golf course (U.S. dollars)	
	2005	2013
North Central	3,991	1,734*
Northeast	4,643	7,202
Pacific	38,263*	159,730
Southeast	18,025*	28,854
Southwest	73,598*	140,301
Transition	11,357*	16,415
Upper West/Mountain	15,960	20,431
U.S.	13,645*	23,870

Table 7. Median cost (U.S. dollars) of all water for an 18-hole golf course in 2005 vs. 2013. Within each row, values in bold type with the lower value followed by an asterisk show a significant difference between the 2005 and 2013 values, at the 90% confidence level. Values that are not in bold type show no significant change from 2005 to 2013.

Median cost of all water for an 18-hole golf course, 2005 vs. 2013

2005	2013	% change
1,859,021	1,428,000	-23.7
198,041	158,000	-19.4
94,194	92,000	-0.6
548,524	350,000	-39.3
532,149	530,000	0.2
181,379	138,000	-25.4
197,548	188,000	-5.4

feet, 2005 vs. 2013.

CHAMPIONSHIPS ▾ RULES ▾ HAN



Golf's Use of Water: Conser

Water plays many important roles th



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Sustainability Case Study:
Paradise Valley

The No-Mow Experiment at
Hidden Falls

Photos: Sustainability
Practices at the Moorings
Village Country Club

GOLF & WATER

CASE STUDIES IN WATER STEWARDSHIP

AMERICAN SOCIETY OF GOLF COURSE ARCHITECTS

Palmer Z-Index

June, 2015

The amount the State of California

\$450 mil

Spent on water rebates in 2015



National Centers for
Environmental
Information

extreme
drought



-2.75
and
below

severe
drought



-2.00
to
-2.74

moderate
drought



-1.25
to
-1.99

mid-
range



-1.24
to
+0.99

moderately
moist



+1.00
to
+2.49

very
moist



+2.50
to
+3.49

extremely
moist



+3.50
and
above

An aerial photograph of an industrial facility, likely a power plant or refinery, with several tall smokestacks emitting thick plumes of white smoke. The facility is situated in a flat, open landscape under a clear sky. The text is overlaid on the image.

Amount the U.S. spends annually

\$4 Billion

on energy efficiency programs

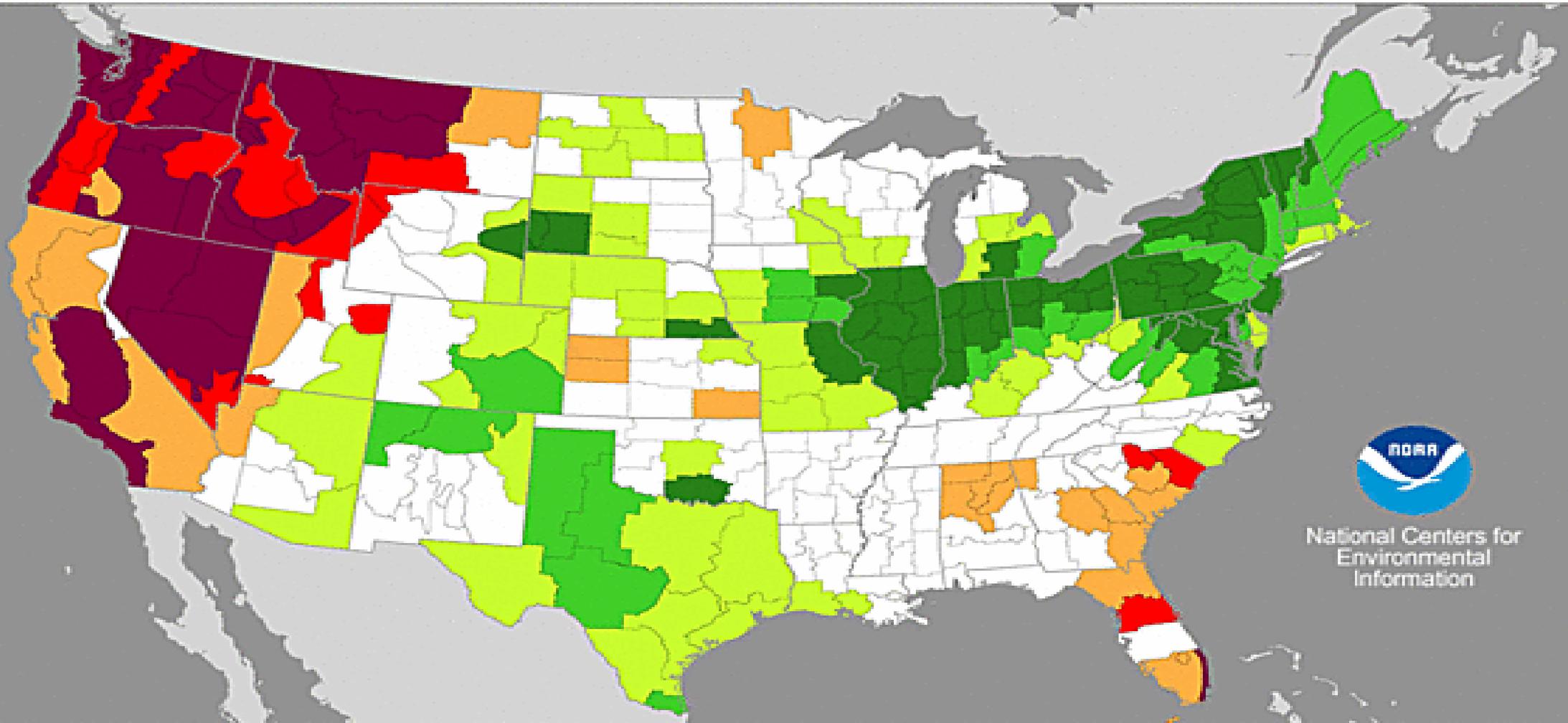




**It's the "WHY" in
what we do!**

Palmer Z-Index

June, 2015



National Centers for
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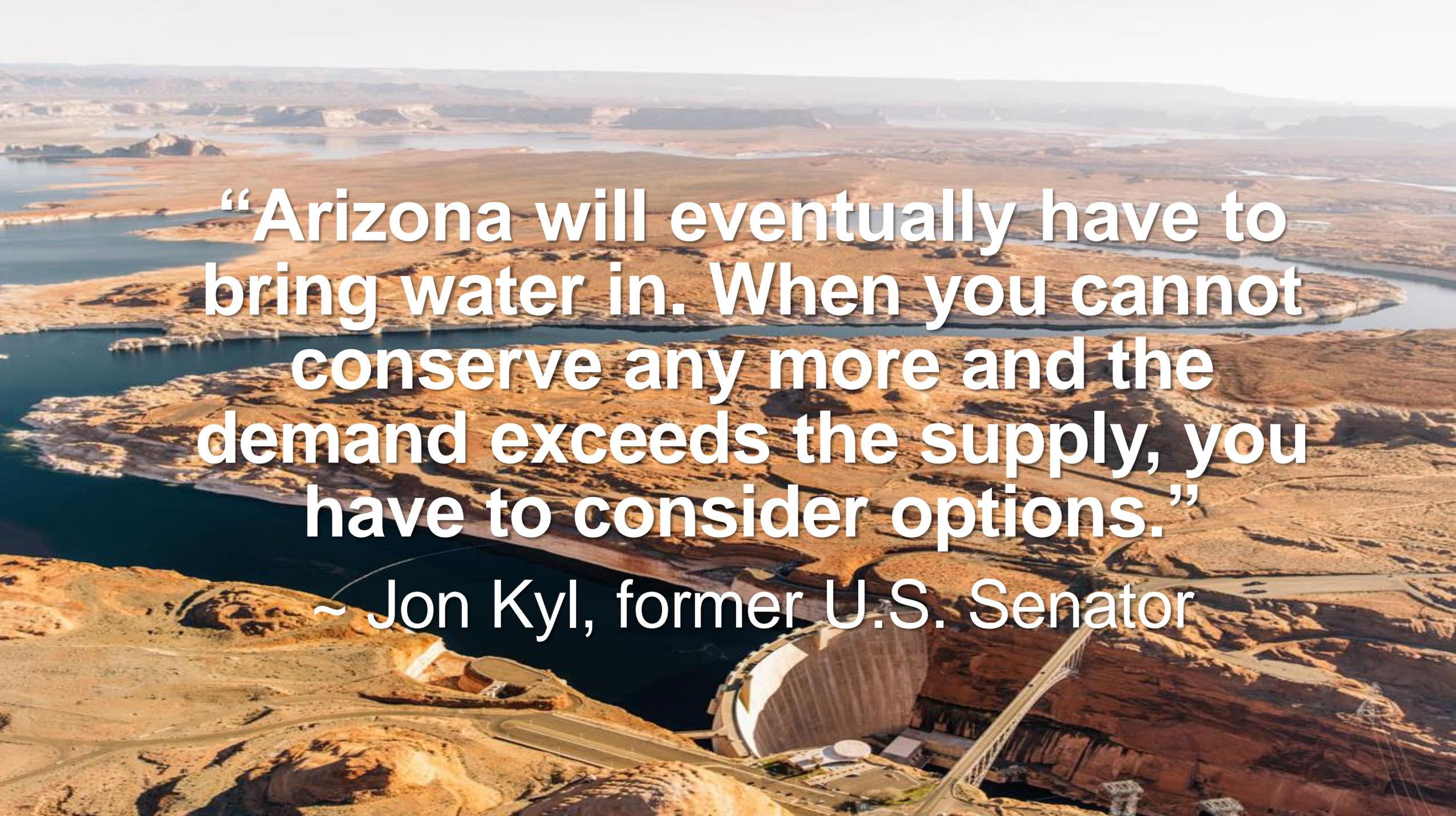


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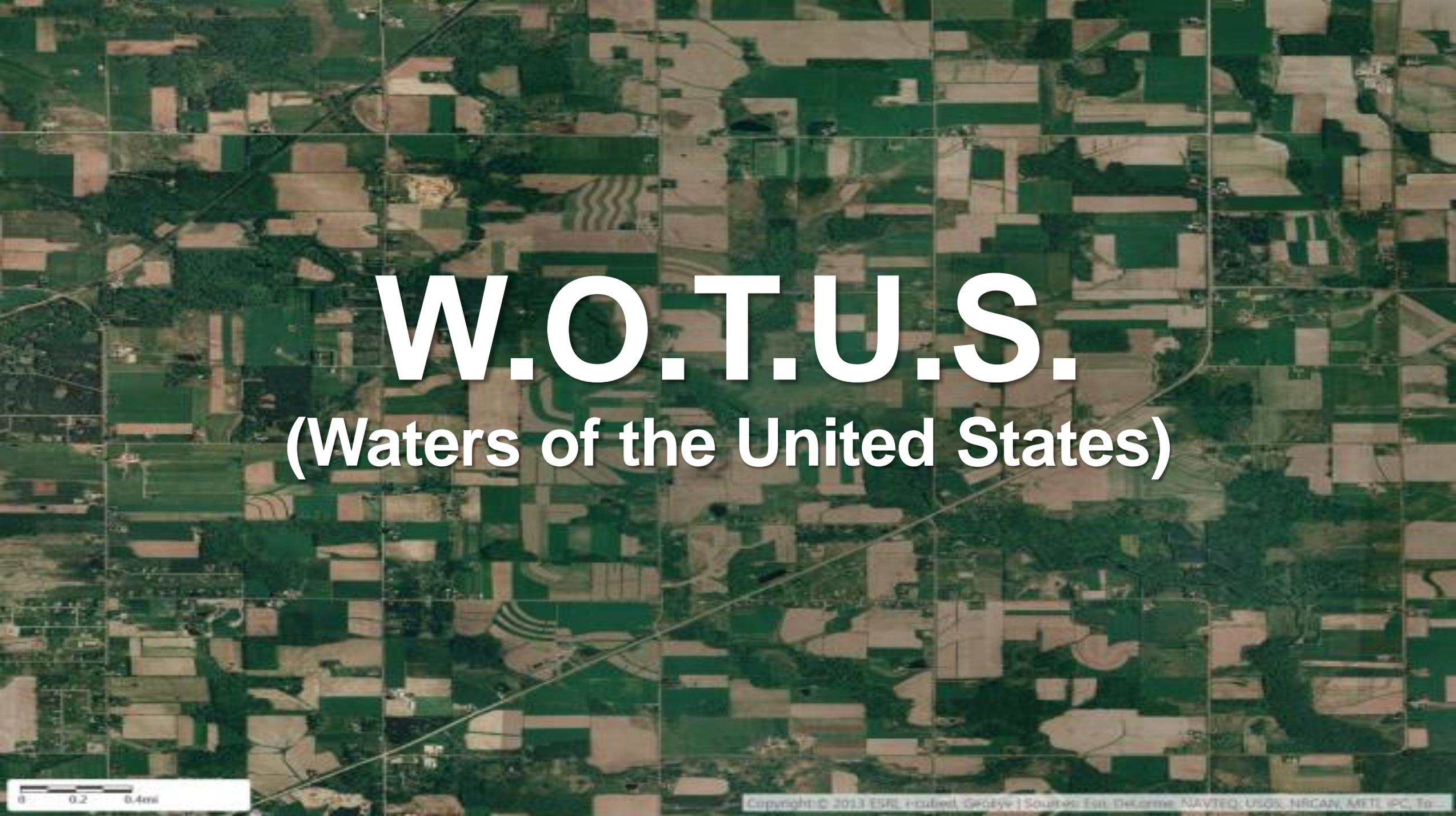


+3.50
and
above

An aerial photograph of a large dam and reservoir in a desert landscape. The reservoir is a deep blue color, contrasting with the surrounding brown and tan desert terrain. The dam is a large, curved concrete structure with a bridge-like walkway. In the background, there are more desert hills and a hazy horizon under a clear sky.

“Arizona will eventually have to bring water in. When you cannot conserve any more and the demand exceeds the supply, you have to consider options.”

~ Jon Kyl, former U.S. Senator

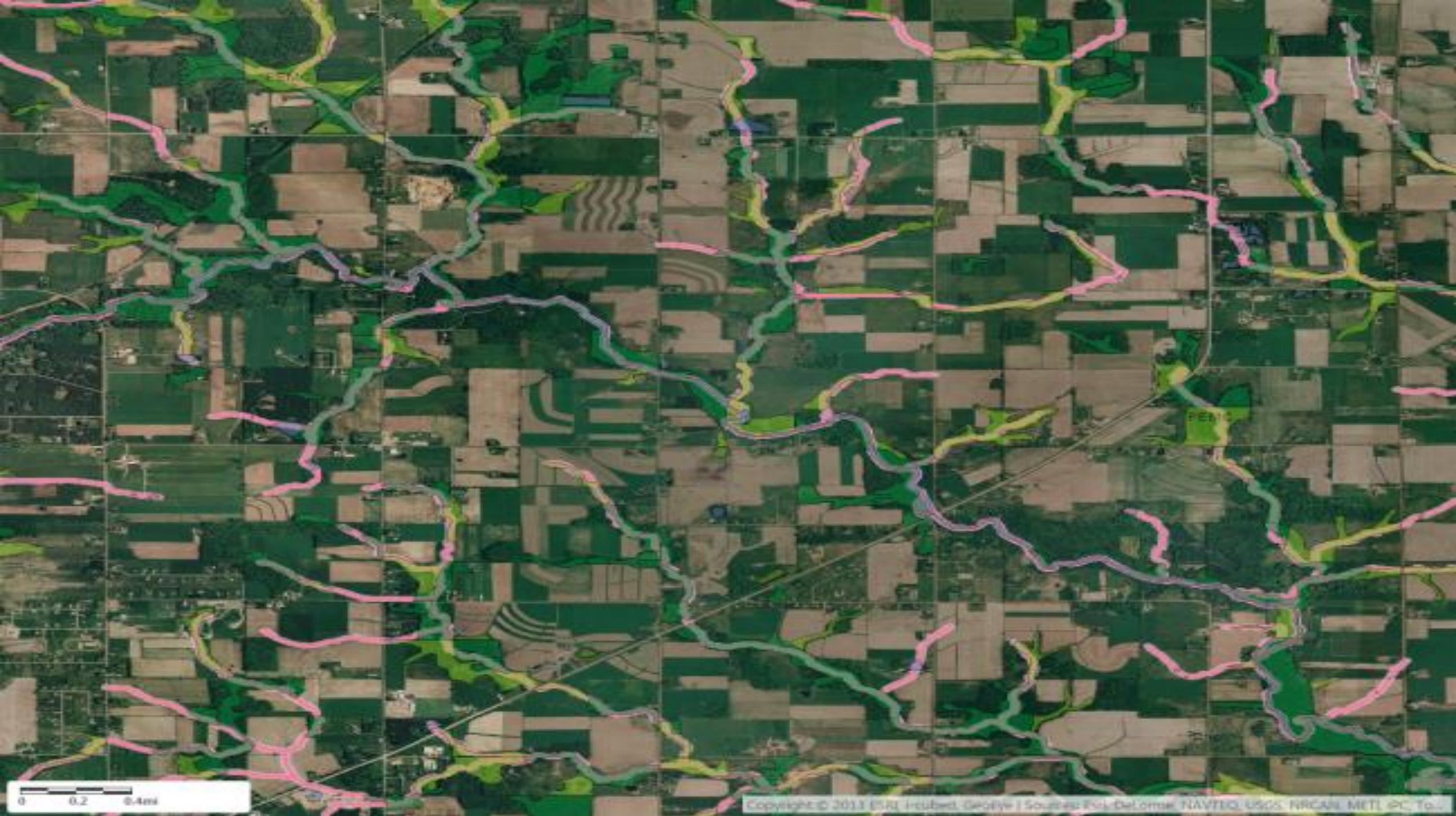
An aerial photograph showing a dense grid of agricultural fields in various shades of green and brown. A white grid is overlaid on the image. The text 'W.O.T.U.S.' is prominently displayed in the center in a large, white, sans-serif font. Below it, '(Waters of the United States)' is written in a smaller, white, sans-serif font.

W.O.T.U.S.

(Waters of the United States)

0 0.2 0.4mi

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0 0.2 0.4mi

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FEMC

FEMC

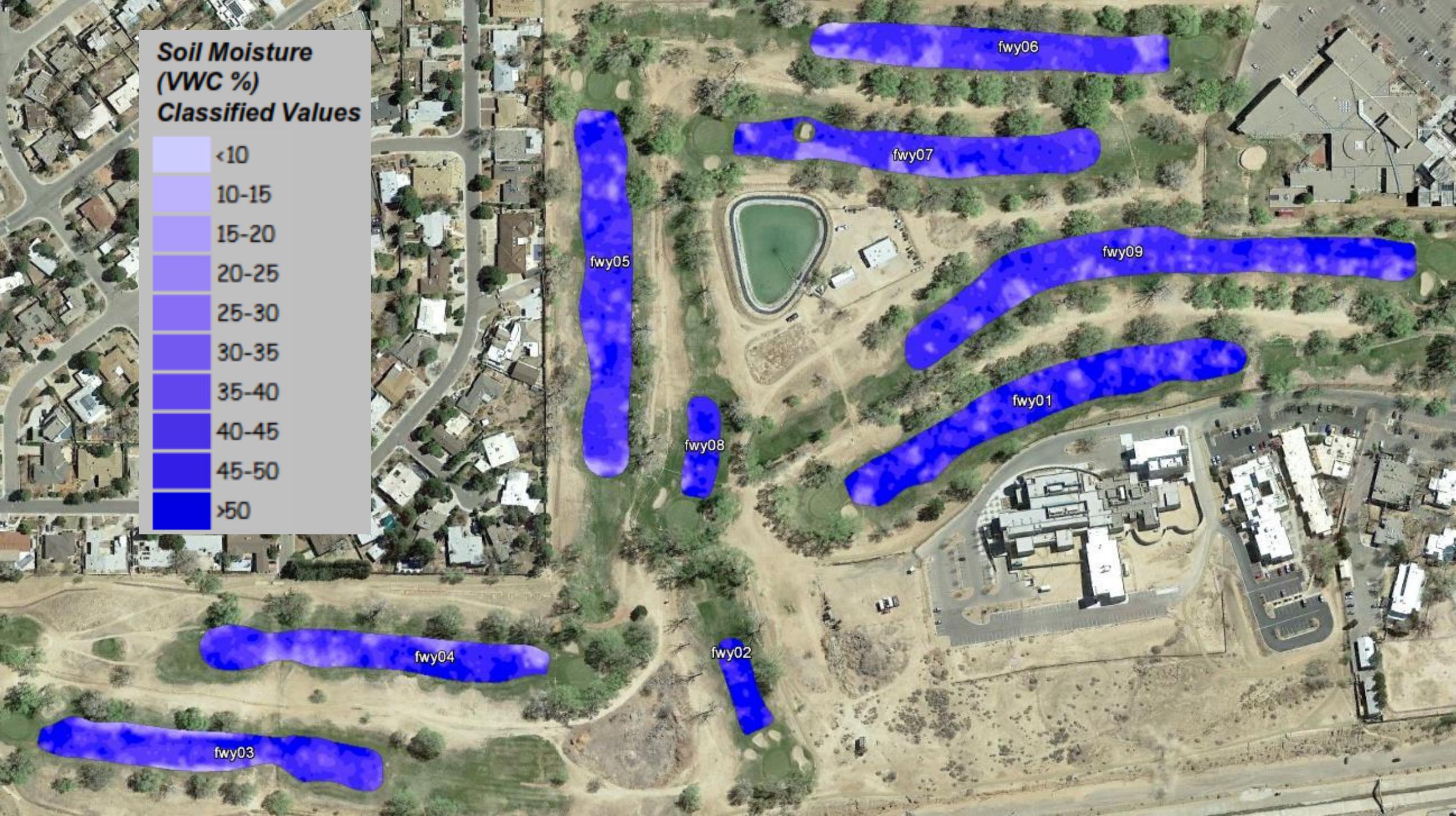


A green rectangular sign with rounded corners and a white border is mounted on two wooden posts. The sign features the text "Welcome To The Future" in white, bold, sans-serif font. The background is a bright blue sky filled with scattered white cumulus clouds.

Welcome To
The Future

**Soil Moisture
(VWC %)
Classified Values**

<10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
>50





USGA Resource Management Tool

Jim Moore
Director, Green Section Education

USGA[®]











Thanks!



2016 Arizona Water Summit

GARY BRAWLEY, AMERICAN SOCIETY OF GOLF COURSE ARCHITECTS
GARY BRAWLEY GOLF DESIGN
JUNE 21, 2016





GOLF & WATER in ARIZONA

HISTORY

- Pre 1980/1984
- Post 1984

Prior to 1980 No Law to Govern Water Use

1980 Arizona Legislature Passed a Comprehensive Groundwater Management Act.

- ▶ **Established Active Management Areas in the primary Population and Agricultural Areas which included Phoenix and Tucson.**
- ▶ **Involved some of my predecessors as well as other golf industry representatives.**
- ▶ **Any golf course constructed Post 1984 would be required to meet these new requirements .**



GOLF & WATER in ARIZONA

HISTORY

- Pre 1980/1984
- Post 1984

Conservation requirements for new regulation 18 hole golf courses in Phoenix AMA

Constructed post 1984 and minimum of 6,200 yards in length

Example calculation for maximum annual allotment based on 18 holes:

LANDSCAPE TYPE	MAX ACRES	MAX ACRE-FEET
Turf Acres	5 acres/hole	441 af
Additional Turf And Low Water Use Acres:	5 a-f/hole	90 af
Lake Acres	0.14 acres/hole	15.62 af
TOTAL ALLOTMENT		546.62 a-f/yr

▶ Acre-Foot Definition

- Amount of water needed to cover 1 acre 1 foot deep
- 1 acre-foot = 325,851 gallons
- 1 acre-foot is enough water for approximately 8 individuals per for a year

▶ Maximum application rates

- Turf = 4.9 a-f/acre
- Low water use landscape = 1.5 a-f/acre



GOLF & WATER in ARIZONA

HISTORY

TODAY

Public Perception in a water crisis is that ALL golf courses should be closed.



In the Phoenix AMA Golf Courses only use ~5% of the Total Water

The WATER issue today as it relates to the golf industry is NOT just about turf reduction on golf courses, but CONSERVATION and EFFICIENCIES that are going to bring AWARENESS to the public that we as an industry are sustainable users of water and in many cases are LEADING the way for everything in the green industry.



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

Water Conservation Example #1

- Turf Conversion to Low Water Landscape
 - Built 1970
 - 36 Holes (18 Regulation / 18 Executive) and Driving Range
 - Currently 230 Acres of Turf



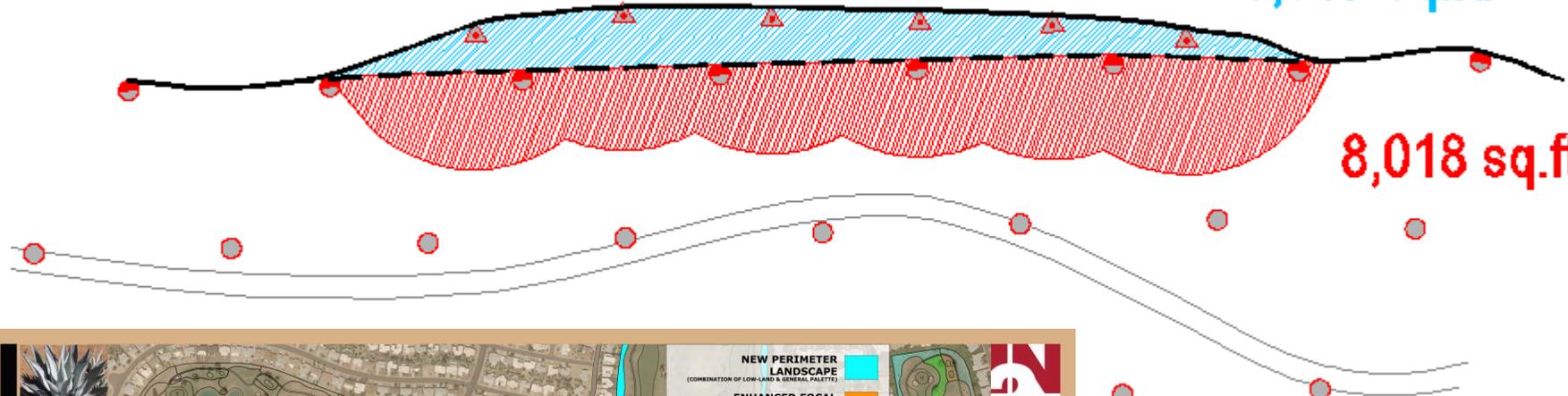
- 76 - Acres to Low-Water Use Landscape Plants
- 258 a-f / year – Water Conservation
- 2,067 – Number of Individuals able to sustain annually



Water Conservation Example #1

3,967 sq.ft.

8,018 sq.ft.



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

NEW PERIMETER LANDSCAPE
(COMBINATION OF LOW-LAND & GENERAL PALETTE)

ENHANCED FOCAL LANDSCAPE
(ENHANCED PALETTE)

NEW INTERIOR LANDSCAPE
(GENERAL EXPANSION PALETTE)

GENERAL EXPANSION PALETTE

ENHANCED PALETTE

LOW - LAND PALETTE

WillowCreek
Conceptual Turf Conversion to Landscape Plan

SCALE 1:200
JANUARY 26, 2016

GARY BRAWLEY GOLF DESIGN

IN2IT Studio, LLC

- 148,497 gallons / 0.45 a-f wasted per year in over watering.



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

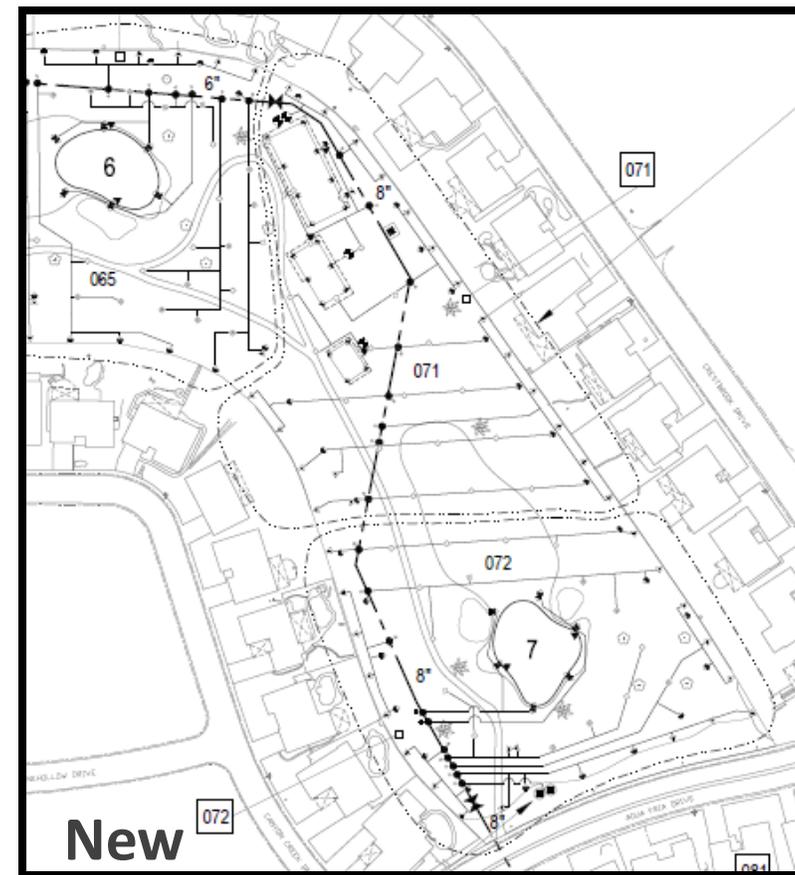
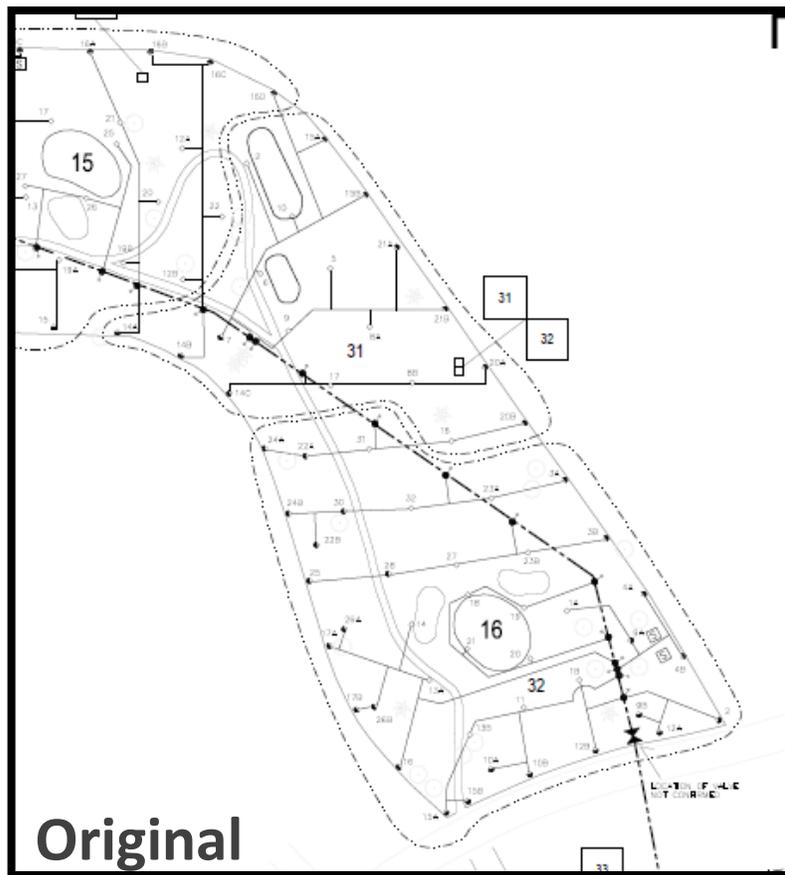
Water Conservation Example #2

- 16 year old system
- Uses existing spacing
- Replaced all heads and satellites
- Each head placed on individual station
- New Programming
- SAVINGS – 5%
 - 26 a-f / year – Water Conservation
 - 212 – Number of Individuals able to Sustain Annually



Water Conservation Example #3

- Complete New Irrigation System
 - Original - 1700 Heads; 75 – 100 foot spacing
 - New - 3200 Heads; 60 foot spacing



GOLF & WATER
in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

Water Conservation Example #3

- Complete New Irrigation System
 - Original - 1700 Heads; 75 – 100 foot spacing
 - New - 3200 Heads; 60 foot spacing
- SAVINGS ~10%
 - 53 a-f / year – Water Conservation
 - 424 – Number of Individuals able to Sustain Annually



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

Water Conservation Example #4

- Using smaller irrigation heads to irrigate only tee surface during cool season (overseed) when surrounds are being left dormant.



- 3,174 sq.ft. – area of tee surface to be irrigated.



GOLF & WATER in ARIZONA

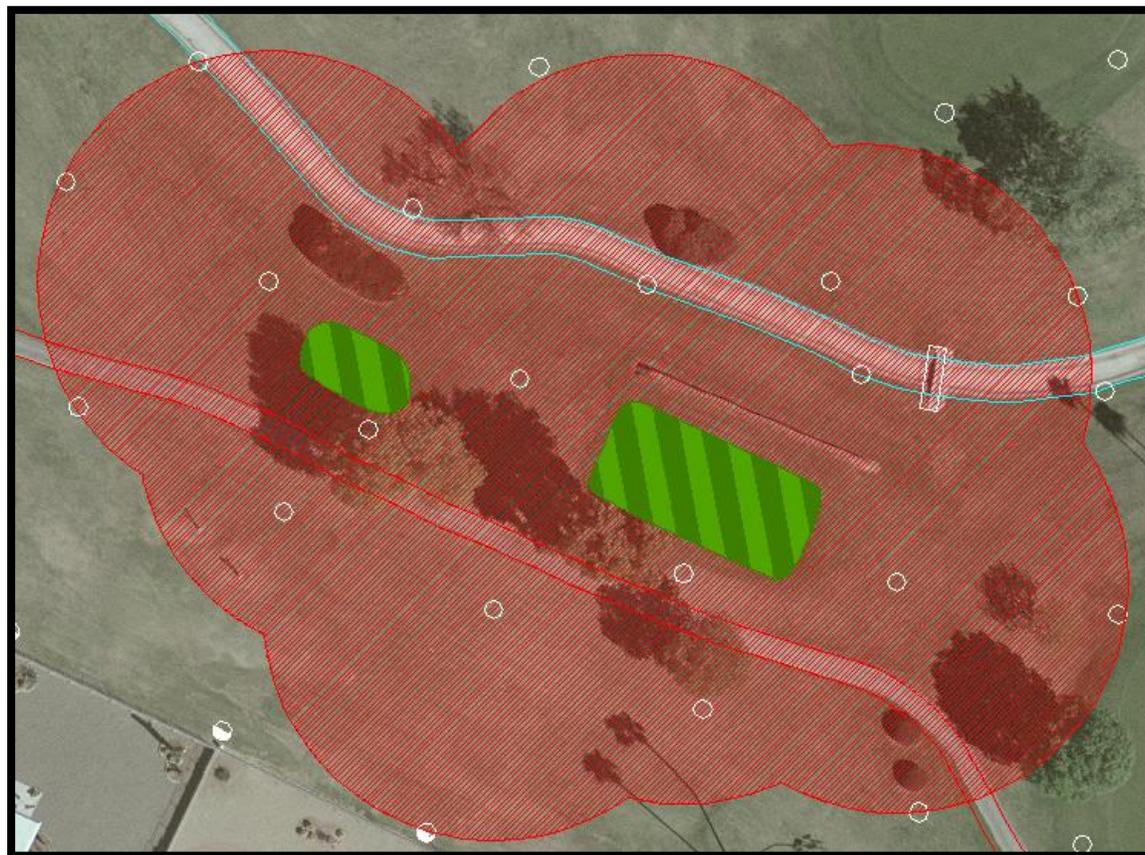
HISTORY

TODAY

CONSERVATION EXAMPLES

Water Conservation Example #4

- Using smaller irrigation heads to irrigate only tee surface during cool season (overseed) when surrounds are being left dormant.



- 3,174 sq.ft. – area of tee surface to be irrigated.
- 66,650 sq.ft. – amount of area covered by irrigation when only tee surface needs irrigation.
- 3.3 a-f – amount of water wasted during period of cool season.



GOLF & WATER in ARIZONA

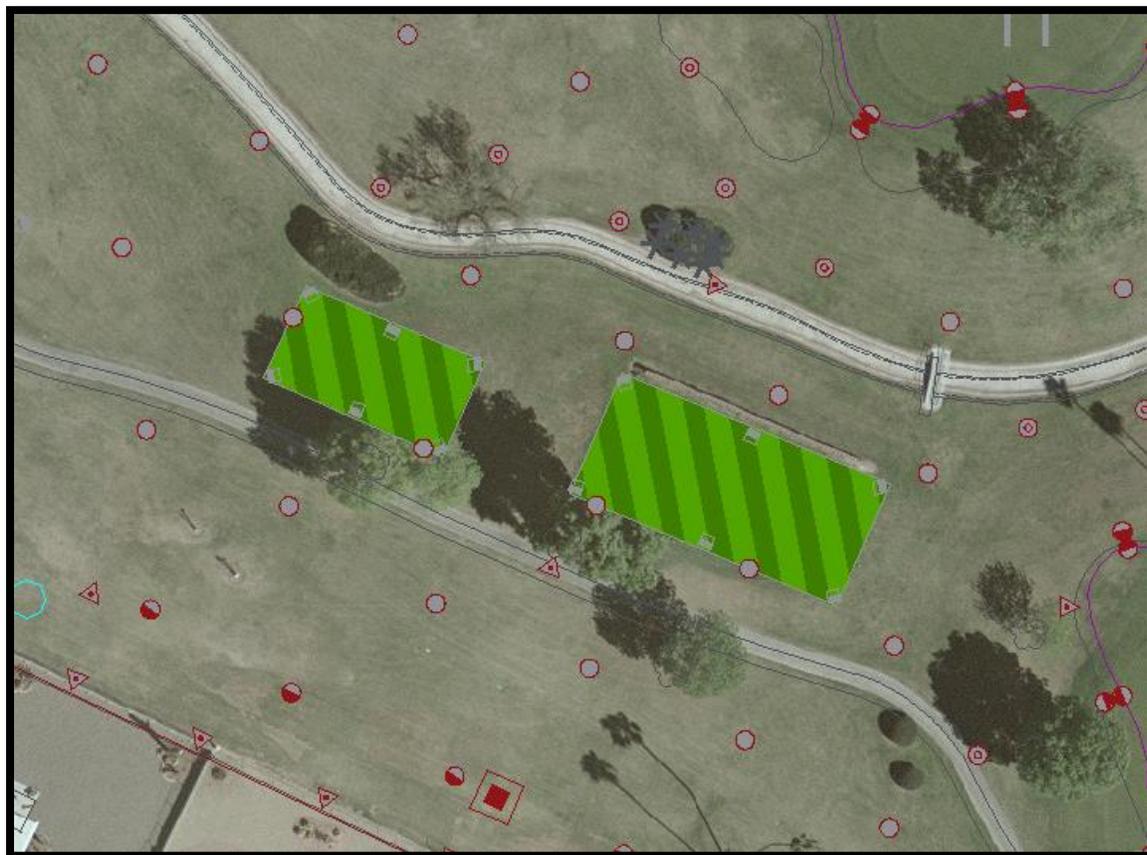
HISTORY

TODAY

CONSERVATION EXAMPLES

Water Conservation Example #4

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GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

Other Water Conservation Efforts Currently Taking Place

- Using MP Rotors on Tees Instead of Sprays
 - More Efficient / Less Runoff
- Tee Construction Methods – Subsurface Irrigation (in trial)
 - Drip Systems / Soaker Hose
 - Capillary Concrete (2” layer below 6” layer of tee sand).
- Irrigation Lake Renovations (increase depth / new liners).
- Water Recycling / Rain Water Harvest
 - Comprehensive Drainage Approach for Water to Be Available for Irrigation
- Turf Grasses
 - U of A Turfgrass Research (both for play and out of play areas).
- Soil Moisture Testing
 - Optimal Levels / EFFICIENCY



GOLF & WATER in ARIZONA

HISTORY

TODAY

CONSERVATION EXAMPLES

SUMMARY

SUMMARY

200 – Approximate Number of Golf Courses in Phoenix Metro Area

18,000 – Total Number of Irrigated Turf Acres on Golf Courses

88,200 – Acre Feet of Water Used Annually by Golf Courses for Turf

10% - Target CONSERVATION by Every Golf Course

70,560

Number of Individuals the Golf Industry would be able to sustain annually from a targeted 10% water conservation effort.

QUESTIONS & ANSWERS

2016 Arizona Water Summit

ANDY STAPLES & GARY BRAWLEY

