AB 3172 – WWRP Facility Plan Update - July 2025

AGENDA

- Summary of plan
  - Capacity Analysis
  - PFAS Treatment Alternatives
  - Effluent Management Alternatives
- Effluent Management Options Evaluation
- Regulatory Update
- Utility Coordination
- Next Steps

WWRP Facility Plan Summary

Project Drivers

Capacity Analysis

Assess the WWRP's ability to treat flows through projected buildout

PFAS Treatment Alternatives

Evaluate alternatives given anticipated regulations

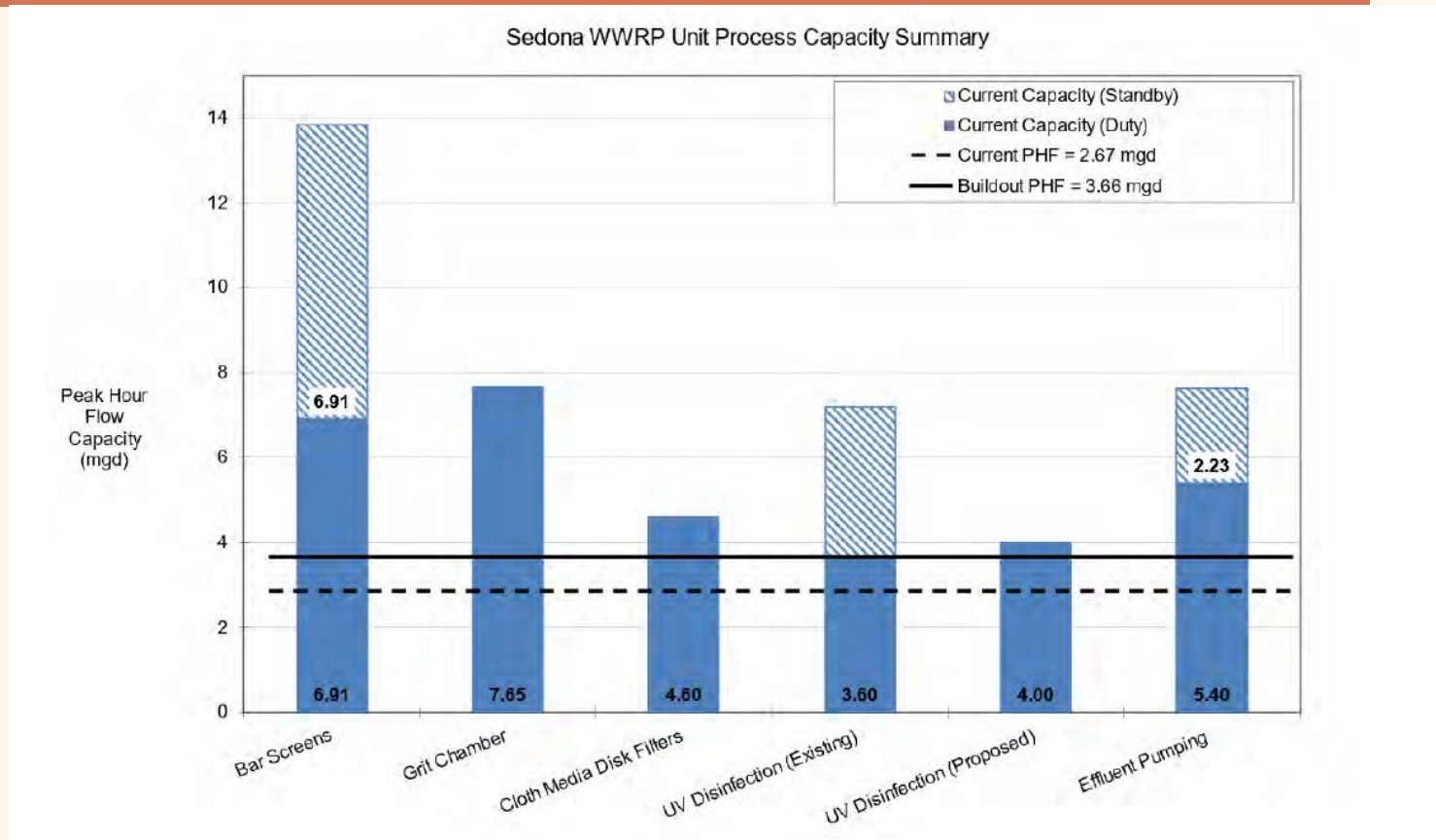
Effluent Management Alternatives

- Additional recharge wells
- Reclaimed water delivery to parks for irrigation
- Implement advanced water purification (AWP)

Capacity Analysis

Hydraulic Capacity

- Possible bottleneck at build-out flows in new UV system
- Diminished UV redundancy at build-out flows
- Pipe size increase & additional UV units incorporated into new UV design
  - Cost: $386,000
  - Programmed into FY26 CIP Budget



Capacity Analysis

Concentration Capacity

- Increases in wastewater strength in last 10+ years
- Ability to treat increased strengths is sufficient, no modifications are recommended

Parameter	Unit	% Concentration Increase from 2012-2016 Dataset to 2022-2024 Dataset
Flow	mgd	4%
COD	mg/L	9%
TSS	mg/L	13%
VSS	mg/L	12%
NH_3-N	mg/L	24%

PFAS Treatment Alternatives

- Assume identical Maximum Contaminant Levels (MCL's) as the drinking water limits
- WWRP currently meets MCL's for A+ Reclaimed Water

Table 18 Water Quality Limits for PFAS Treatment

Parameter	Units	Value
A + Reclaimed Water		
Turbidty(1)	NTU	≤2
Turbidty(1)	NTU	≤5
Fecal Coliform(2)	organisms/100 mL	0
Fecal Coliform(2)	organisms/100 mL	≤23
TN(3)(4)	mg/L	≤10
PFAS MCLs		
PFOA	ppt	<4
PFOS	ppt	<4
PFHxS	ppt	<10
PFNA	ppt	<10
GenX	ppt	<10
HI(5)	--	1

Notes:
(1) Turbidity must be ≤ 2 NTU for a 24-hour average sample and ≤ 5 NTU for a 120-second average sample.
(2) Fecal coliform in four of the last seven samples must be non-detect and ≤ 23 for a single sample maximum.
(3) The TN limit is based on a five-sample rolling geometric mean. There is an alert level of 8 mg/L.
(4) TN = NO_3-N + NO_2-N + TKN.
(5) PFBS is included within the HI but does not have an individual MCL.

PFAS Treatment Alternatives

Compound	Units	Drinking Water MCL	Influent			Effluent		
			9/6/2023	8/14/2024	9/11/2024	9/6/2023	8/14/2024	9/11/2024
PFOA	ng/L	<4.0 ng/L	4.3	<7.5	<4.6	13	10.4	11.7
PFOS	ng/L	<4.0 ng/L	<4.0	<7.5	<4.6	<4.0	<4.5	1.2
PFBS	ng/L	<1.0 *HI	4.9	<7.5	<4.6	6.5	6	3.7
PFHxS	ng/L	<10.0 & <1.0 *HI	<1.5	<7.5	<4.6	<1.5	<4.5	1.2
PFNA	ng/L	<10.0 & <1.0 *HI	<3.0	<7.5	<4.6	<3.0	<4.5	<0.96
Gen X	ng/L	<10.0 & <1.0 *HI	<5.0	<30.0	<18.5	<5.0	<18.0	<3.8

- Sampling results indicated exceedances over MCL's in the effluent
- Planned continued sampling and testing for PFAS quarterly

PFAS Treatment Alternatives

- Two alternatives were evaluated
  - Granular Activated Carbon (GAC)
  - Ion Exchange (IX)
- Both were evaluated for current capacity (1.3 MGD) and build-out capacity (1.8 MGD)
- Includes conceptual capital investments and annual O&M costs
  - Estimated capital costs for PFAS treatment are in the 10-year CIP budget

PFAS Treatment Alternatives

Granular Activated Carbon (GAC)

- Well established
- More frequent media changeouts
- Larger footprint
- Greater flexibility for expansion to treat additional contaminants
- Less pretreatment required
- Spent media can potentially be regenerated
- Lower power requirements

Ion Exchange (IX)

- Well established
- Less frequent media changeouts
- Smaller footprint
- Less flexibility for expansion to treat additional contaminants
- Robust pretreatment required
- Spent media must be incinerated or disposed at permitted facility
- Higher power requirements

PFAS Treatment Alternatives

Table 29 PFAS Treatment Alternatives Conceptual Cost Opinions Summary ($ million)

	GAC		IX	
	Alternative 1	Alternative 2 - Buildout	Alternative 1	Alternative 2 - Buildout
Total Capital Cost	$30.4	$34.4	$28.3	$32.2
Annual O&M Cost	$0.7	$0.9	$0.6	$0.8
Present Worth of Annual O&M	$9.4	$12.0	$8.7	$11.0
Total Present Worth	$39.8	$46.4	$37.0	$43.2
Equivalent Annual Cost	$2.9	$3.4	$2.7	$3.2
$/1,000 gallons	$13.0	$17.8	$13.0	$17.8

Notes:
(1) Cost opinions shown in July 2024 dollars (Handy-Whitman Average Water Infrastructure Index equals 1311).
(2) Net present value calculations based on a 20-year term at a 4 percent discount rate.
(3) Total present worth represents the sum of capital costs and present worth of annual O&M.
(4) Assumes discount rate of 4 percent per year and term of 20 years and assumes design flow of each facility within each alternative operating all day, all year.

Further testing is recommended for a better comparison between GAC and IX

Effluent Management Alternatives

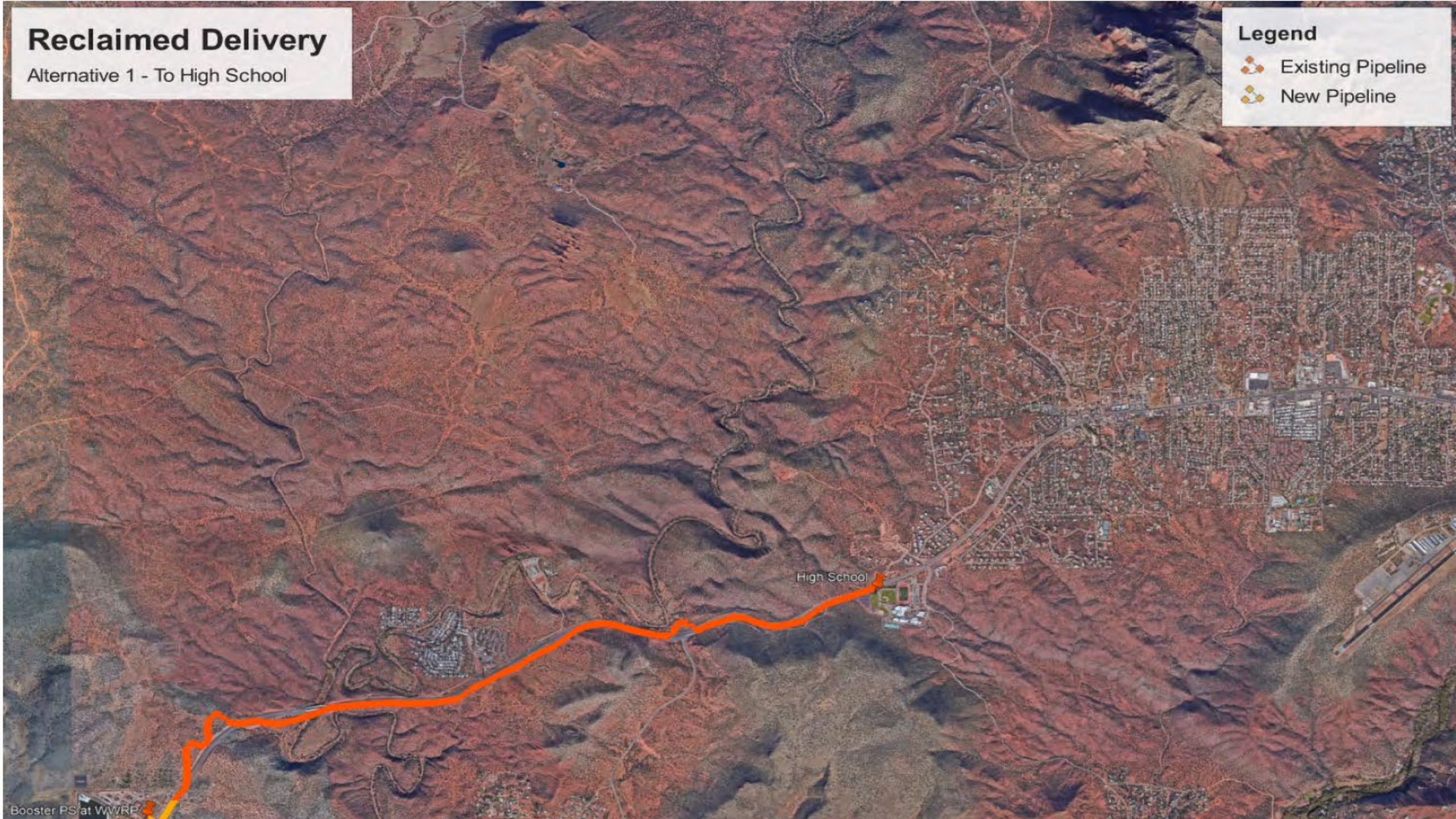
- 2013 Effluent Management Optimization Plan
  - Abandon 200 acres of irrigation, keep 27 acres of wetlands, and add a total of up to 6 recharge wells
  - 2 recharge wells were constructed in 2017
- WWRP Facility Plan – Additional Alternatives
  - Reclaimed water delivery
  - Advanced Water Purification

Effluent Management Alternatives

Reclaimed Water Delivery – 3 Alternatives (Phases)

ALTERNATIVE 1

Deliver to high school only


Reclaimed Delivery
Alternative 1 - To High School
Legend
Existing Pipeline
New Pipeline
High School
Booster PS at WWRP

Effluent Management Alternatives

Reclaimed Water Delivery – 3 Alternatives (Phases)

ALTERNATIVE 2

Deliver to high school only

Deliver to high school and Sunset Park


Reclaimed Delivery
Alternative 2 - To High School and Sunset Park
Legend
Existing Pipeline
New Pipeline
High School
Sunset Park

Effluent Management Alternatives

Reclaimed Water Delivery – 3 Alternatives (Phases)

ALTERNATIVE 3

Deliver to high school only	Deliver to high school and Sunset Park	Deliver to high school, Sunset Park, Jameson Park, Posse Grounds Park & West Sedona School

Reclaimed Delivery

Alternative 3 - To High School, Sunset Park, Jamison Park, Posse Grounds Park, and West Sedona School

Effluent Management Alternatives

Reclaimed Water Delivery – Conceptual Costs

Table 32 Reclaimed Delivery Alternatives Cost Summary

Cost	Alternative 1	Alternative 2	Alternative 3
Delivery Locations	High School	High School, Sunset Park	High School, Sunset Park, Jamison Park, Posse Ground Park, West Sedona School
Total Capital Cost(1) ($ million)	$14.5	$21.0	$28.6
Annual O&M Cost ($ million)	$0.2	$0.3	$0.4
Present Worth of Annual O&M(2) ($ million)	$2.3	$3.5	$5.6
Total Present Worth(3) ($ million)	$16.8	$24.6	$34.2
Equivalent Annual Cost ($ million)	$1.2	$1.8	$2.5
$/1,000 gallons	$16.1	$14.8	$13.0

Notes:
(1) Cost opinions shown in July 2024 dollars (Handy-Whitman Average Water Infrastructure Index equals 1311).
(2) Net present value calculations based on a 20-year term at a 4 percent discount rate.
(3) Total present worth represents the sum of capital costs and present worth of annual O&M.

Effluent Management Alternatives

Advanced Water Purification (AWP) – 3 Alternatives

0.9 MGD	1.3 MGD	1.8 MGD
Keep 2 existing recharge wells	Keep 2 existing recharge wells	Abandon existing recharge wells
Current flows	Increased flows	Build-out flows

Effluent Management Alternatives

AWP – Conceptual Capital Costs

Table 36 AWP Treatment and Delivery Capital Cost Summary ($ million)

Parameter	AWP Alternatives		
	Alternative 1	Alternative 2	Alternative 3 - Buildout
Total Direct Cost	62.1	67.3	75.8
Total Direct Cost with Contingency	80.8	87.5	98.6
Total Indirect Cost	24.2	26.2	29.5
Total Construction Cost	104.9	113.7	128.1
Total Capital Costs ($ million)	132.2	143.1	161.1

Notes:
(1) Construction cost includes total direct cost with 30 percent contingency and total indirect costs.
(2) Total capital cost includes total construction costs and Engineering and Administration of 25 percent.

Effluent Management Alternatives

AWP – Conceptual O&M Costs

Table 37 AWP Treatment and Delivery Annual O&M Cost Summary ($ million)

Parameter	AWP Alternatives		
	Alternative 1	Alternative 2	Alternative 3 - Buildout
Media and Filter Replacements	0.96	1.39	1.92
Power	0.45	0.65	0.89
Staffing	0.87	0.87	0.87
General Equipment Maintenance	0.40	0.44	0.49
Potable Delivery	0.15	0.24	0.32
Total Annual O&M Costs ($ million)	2.83	3.58	4.50

Effluent Management Options Evaluation

Ranking & Scoring

Alternative 1	• Keep existing irrigation, wetlands , & recharge wells – add 2 new recharge wells for future capacity
Alternative 2	• Abandon 200 acres of irrigation – add 2 new recharge wells now & 2 additional wells for future capacity
Alternative 3	• Keep existing irrigation, wetlands, and recharge wells – deliver reclaimed water to parks
Alternative 4	• Abandon 200 acres irrigation, keep wetlands & recharge wells – deliver reclaimed water to parks & add 2 recharge wells for capacity
Alternative 5	• Abandon 200 acres irrigation, keep wetlands & recharge wells – implement AWP & potable water delivery

Evaluation Criteria

- Pairwise rankings
- Team of 5 evaluators
  - 2 Carollo engineers
  - 3 City staff members

Table 40 Definitions of Evaluation Criteria

Evaluation Criterion	Description	Weighting Factor
Capital Cost	Capital cost	7%
Operational Cost	Operational cost	6%
Life Cycle Cost	20-year life cycle cost	9%
Environmental	Beneficial use of effluent, water quality	9%
Economic	Land use, tourism, potential revenue	4%
Water Resource	Aquifer sustainability, water resiliency	11%
Effluent Management Dependability	Consistent effluent disposal, operational complexity	10%
Health and Safety	For the public and plant staff	10%
Public Perception	How the general public views and understands	7%
Infrastructure	Conveyance infrastructure requirements	6%
Land Required	Treatment facility footprint	1%
Implementation Time	Length of time to construct /implement each scenario	2%
Ease of Future Tie-ins	Ability of this scenario to tie into future upgrades	4%
O&M Considerations	Operational complexity, ease of maintenance/repairs for each scenario	9%
Personnel Requirements	Staffing needs, operator certifications, and training	5%

Final Ranking of Alternatives

	Alternative 2	Alternative 4	Alternative 5	Alternative 3	Alternative 1
	Abandon 200 acres irrigation, add recharge wells	Abandon irrigation, add 2 recharge wells, deliver reclaimed water to parks	Abandon irrigation, implement AWP and potable water delivery	Keep irrigation & recharge wells - deliver reclaimed water to parks	Keep existing irrigation, add 2 new recharge wells
Final Ranking Score (out of 10)	7.66	7.51	6.14	5.92	5.70
Capital Cost	$22M	$39.6M	$161M	$28.6M	$11M

Regulatory Update

Regulatory Updates

- AWP rules finalized – March 2025
- Rulemaking for PFAS treatment in wastewater anticipated within 1 year.
  - Removed the Hazard Index requirement for PFAS removal in potable water

Utility Coordination

October 2024 - Joint Meeting

- Arizona Water Co presented Water Resources Strategy
  - Regional/local water resource planning efforts
  - Current pumping demand for the Sedona Service Area
  - Future demand analysis

Arizona Water Company - Pumping

Sedona Service Area:

2023	3,021 AF	or	2.70 MGD
2022	3,095 AF	or	2.76 MGD
2021	3,268 AF	or	2.92 MGD
2020	3,178 AF	or	2.84 MGD
2019	2,960 AF	or	2.64 MGD
Avg.	**3,104 AF**	**or**	**2.77 MGD**

AF = acre-feet
MGD = million gallons per day

Buildout Demand Summary

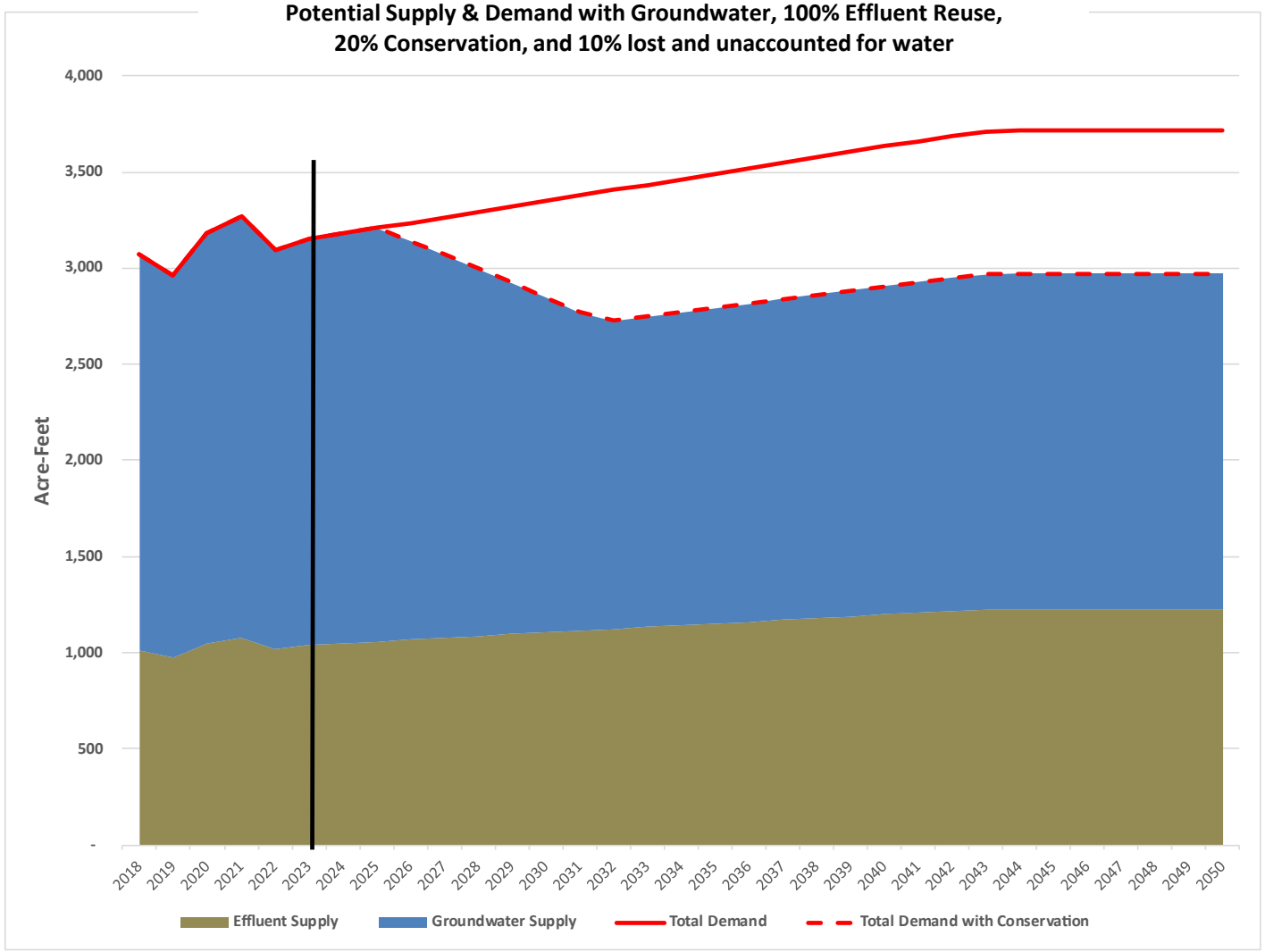
Lot Sizes	Minimum AFA/Lot	Maximum AFA/Lot	Average AFA/Lot	Total Lots	Vacant	Water Use 2020 (AF)	Water Use 2021 (AF)	Water Use 2022 (AF)	Buildout Demand AFA
Small	0	0.95	0.24	3711	505	818	813	773	895
Medium	0	1.23	0.38	1702	393	508	508	496	645
Large	0	1.20	0.58	323	94	135	133	133	188
				5736	**992**	**1461**	**1455**	**1402**	**1727**
SINGLE FAMILY OUTSIDE SUBDIVISION									
Medium			0.48	703	33	320	323	309	321
Multi Family				602	7	188	204	196	197
Commercial				244	12	417	455	433	441
Temporary Lodging				60	0	447	497	485	485
Commercial Irrigation						176	189	167	167
TOTAL DEMAND						**3009** *	**3123** *	**2991** *	**3339** *

* Does not include lost and unaccounted for water

- Single Family Residential – Usage by lot size
- Multi-Family – Usage by number of units
- Commercial – Usage by size of lots
- Temporary Lodging – Usage by number of units
- Commercial Irrigation – Usage by total

3,339-acre feet/year =
2.98 million gallons per day

Demand Projection to 2050



Water Resource Partnerships

- Partnerships are key to long term water resource planning
- Continued discussions on what the partnership will look like
  - Cost sharing
  - Who will be responsible for each phase of the treatment and delivery process

Next Steps

- *Direction on preferred approach*
- *Incorporate direction into the upcoming rate study*
- *Expand partnerships with Arizona Water Company*
- *Timeline – January 2026*

Thank you!

Effluent Management Options - Evaluation Criteria	
Evaluation Criteria	**Description**
Cost-Effectiveness	Capital, operational and life cycle cost
Environmental	Beneficial use of effluent, water quality
Economic	Land use, tourism, potential revenue
Water Resource	Aquifer sustainability, water resiliency
Effluent Management Dependability	Consistent effluent disposal, operational complexity
Health and Safety	For the public and plant staff
Public Perception	How the general public views and understands
Infrastructure	Conveyance infrastructure requirements
Land Required	Treatment facility footprint
Implementation Time	Length of time to construct /implement each scenario
Ease of Future Tie Ins	Ability of this scenario to tie into future upgrades
O&M Considerations	Operational complexity, ease of maintenance/repairs for each scenario
Personnel Requirements	Staffing needs, operator certifications and training

Effluent Management Options - Ranking							
Evaluation Criteria		**Importance Factor (Pairwise Ranking)**	**Ranking (1-10) 1= Lowest Benefit and/or Highest Cost 10=Highest Benefit and/or Lowest Cost**				
			Keep existing irrigation Add recharge wells for needed capacity	Abandon 200 acres of irrigation Add 2 new recharge wells now. 1-2 additional wells for needed capacity.	Reclaimed Water Delivery (With Irrigation)	Reclaimed Water Delivery (With Wells)	Advanced Water Purification (AWP)
Capital Cost	Capital Cost	7%	10	9	8	7	1
Operational Cost	Operational Cost	6%	8	9	7	8	7
Life Cycle Cost	20 Year Life Cycle Cost	9%	9	8	8	7	5
Environmental	Beneficial use of effluent, water quality	9%	1	9	5	10	10
Economic	Land use, tourism, potential revenue	4%	1	6	4	8	7
Water Resource	Aquifer sustainability, water resiliency	11%	1	9	5	10	10
Effluent Management Dependability	Consistent effluent disposal	10%	3	6	3	6	5
Health and Safety	For the public and plant staff	10%	10	8	9	9	8
Public Perception	How the general public views and understands	7%	5	4	6	6	4
Infrastructure	Conveyance infrastructure requirements	6%	5	7	4	6	6
Land Required	Treatment facility footprint	1%	1	7	1	7	7
Implementation Time	Length of time to construct /implement each scenario	2%	8	4	6	3	2
Ease of Future Tie Ins	Ability of this scenario to tie into future upgrades	4%	2	5	3	6	7
O&M Considerations	Operational complexity, ease of maintenance/repairs for each scenario	9%	9	9	8	8	5
Personnel Requirements	Staffing needs, operator certifications and training	5%	10	9	5	4	2
Score			**5.70**	**7.66**	**5.92**	**7.51**	**6.14**