

Integrating Advanced Treatment for Potable Reuse into Outreach and Master Planning Bradley M. Hill, R.G., Director Erin Young, R.G., Water Resources Manager

Flagstaff's Future Water Needs

- Flagstaff's Future Demand
 - Still about 20 years from needing the next water supply
- Designation of Adequate Water Supply (2013)
- Future alternatives:
 - Red Gap Ranch purchased as a water ranch in 2005 (71% voter approval)
 - Additional Water Conservation measures
 - Other?







City's Adequate Water Supply Designation demonstrates need for an additional water supply





Recycled Wastewater at Your Tap? It Could Be Soon in Arizona

Arizona has been reusing treated sewage for more than 90 years. Now a new set of rules will allow highly treated wastewater to be plumbed directly into homes and businesses, explains hydrogeologist Chuck Graf.

WRITTEN BY PUBLISHED ON READ TIME Matt Weiser m March 7, 2018 Approx. 5 minutes	F

 Related Articles

 Image: State of the state o

"We know of no utilities out there that are waiting at the door to come in. The big thing, though, is by having this rule in place now, that utilities and communities can think about maybe this is something we could do in the future and start evaluating this." - Graf



Type here to search

2018 ADEQ Lifts Prohibition to Direct Potable Reuse



Is Potable Reuse a viable alternative for Flagstaff?

- The pieces are starting to fall into place
- City Council & some community members have asked staff for "cheaper" alternatives to Red Gap Ranch
- Expressed desire to remove unregulated Compounds of Emerging Concern from reclaimed water
- Water Services has requested funding from City Council to conduct several critical studies regarding viability of potable reuse

(~\$445,000 to date)





Path to Potable Reuse

- 2017 Carollo Potable Reuse Alternatives Study (outside the fence)
- 2018 Brown and Caldwell Potable Reuse Feasibility Study *(inside the fence)*
- 2019 Preliminary Aquifer Recharge testing *intentional DPR*
- 2019/20 upcoming Water Resources Master Plan
- 2018/19/20 Public Outreach and surveys
- Expand wastewater treatment process to align with Potable Reuse

Director's Goal

• 2020/21 Bring Water Supply Alternatives to City Council & Community

Each alternative conducted to a Class 4 engineering analysis (Capital / O&M) and quantify total Volume (AF/year) and Cost (\$/AF)

- Indirect Potable Reuse options with Advanced Treatment
- Direct Potable Reuse options with Advanced Treatment
- Red Gap Ranch groundwater importation
- Additional Water Conservation measures
- Funding alternatives through a separate Water/Reclaimed Water Rate Analysis



Steps towards Potable Reuse...2017 "outside the fence" study









Definition of Potable Reuse

Indirect Potable Reuse by Surface Water Augmentation



Indirect Potable Reuse by Groundwater Recharge



Definition of Potable Reuse



Steps towards Potable Reuse...2017 "outside the fence" study



City of Flagstaff Water Supplies Development

TECHNICAL MEMORANDUM -WATER SUPPLY ALTERNATIVES COSTS

FINAL | October 2017

Carollo

Growth Brings Additional Reclaimed Water Supplies











An Extensive Multi-Barrier Advanced Purification Process Is Proposed for *Direct* Potable Reuse



Potable Reuse Has Similar Cost to Other Options







Steps towards Potable Reuse...2018 "inside the fence" study



Treatment Options

Using Reverse Osmosis



• Using Ozone-Biological Filter



Alt 1: RO-Based Train



Rio De Flag / Process Treatment Alternative 1 Layout



Wildcat Hill / Process Treatment Alternative 1 Layout



Brown AND Caldwell

Brown AND Caldwell

RO Brine Disposal



Alt 2: Ozone BAF-Based Train



Rio De Flag / Process Treatment Alternative 2 Layout



Figure 2-5. 0₃/BAF-Based Treatment at Rio de Flag

Wildcat Hill / Process Treatment Alternative 2 Layout



Figure 2-6. O₃/BAF-Based Treatment at Wildcat Hill

Brown AND Caldwell

Brown AND Caldwell

Comparison





Stakeholder Interviews

Conducted by Katz and Associates May 2018

Groups Interviewed

- Az Segway and Pedal Tours/Flagstaff Sports Exchange
- City of Flagstaff Mayor
- City of Flagstaff, City Council
- City of Flagstaff Water Commission
- Coconino County District 1
- Coconino County Superior Court
- Economic Collaborative of Northern Arizona
- Friends of Flagstaff's Future
- Friends of the Rio de Flag
- Greater Flagstaff Chamber of Commerce
- Northern Arizona Leadership Alliance
- Northern Arizona Association of Realtors

Topics Covered

- Opinion of Adequacy of Water Supplies
- Awareness of planning for new water supplies
- ✓ Awareness of recycled water use
- Potential use of recycled water as source for drinking water
- Trusted sources of information regarding water issues

Stakeholder Interviews

Awareness of recycled water use

- Very aware of current uses
- Concerned there is not enough supply to maintain current use and potable reuse
- Concerns over water quality and effects on human health and the environment

Potential use of recycled water as source for drinking water

- Questions about pharmaceuticals and endocrine disruptors
- Preference for indirect potable reuse due to public perceptions
- Cost and energy efficiency
- Needs to be presented to public in an easily understandable way



Recycled Water Survey – Truck Questionnaire (n=78)

	Purification/ Direct Potable Reuse?
60% of survey respondents are very comfortable with	
ou sulvey respondents are very connortable with	Not Informed Very Informed
purified recycled water	How comfortable are you with purified recycled water, which meets all state and federal drinking water standards, being incorporated into the drinking water supply?
Concerns regarding Advanced Water	Not Comfortable Very Comfortable
Purification/Potable Water Reuse	Do you have any concerns regarding Advanced Water Purification/Potable Water Reuse?
Safety: 17 None: 38	Safety 🗆 Taste 🗆 Yuck Factor 🗆 None 🗆
Taste: 10 Other: 9	Other:
Vuele Factory 9	*
YUCK Factor: 8	How do you stay up to date on issues regarding water or water supply in the region? (Check all that apply).
	□ Newspaper □ Social Media □ Radio □ Word of Mouth
8/1% confidence rating in Elegstaff Water Services	□ Television □ Email
64/6 connuence rating in Flagstan Water Services	Other:
Division's ability to develop and implement a	How confident are you in the Flagstaff Water Services Division's
WATER potable reuse project	provide additional driving water supplies for the public?
SERVICES	
WATER RESOURCES & CONSERVATION	No Confidence Highly Confident

COLUMN ST

out a suspense

Recycled Water Survey – Online (n=96)







Participants' Concerns:

*Environmental contamination *Risks to human health *Capital costs *Infrastructure development *Energy intensity *Reduced natural filtration *Damage to the aquifer or riparian habitats *Taste of drinking water

Ranked Priority Options:

Release Class A+ Recycled Water into natural drainages



Inject Advanced Treated Recycled Water (potable quality) into the ground

Add Class A+ Recycled Water to Upper Lake Mary





Goals

 Ensure water supply meet demands tied to Flagstaff Regional Plan land uses







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 Ensure water supply meet demands tied to Flagstaff Regional Plan land uses



SOURCE: Arizona Department of Administration, Office of Employment and Population Statistics *Flagstaff and FMPO projected populations based on slowly increasing percent of County population including NAU students





Goals

 Ensure water supply meet demands tied to Flagstaff Regional Plan land uses City of Flagstaff Water Infrastructure Master Plan

Figure 1: Scenario D (High Density Scenario) Additional Water Demand



Goals

- Ensure water supply meet demands tied to Flagstaff Regional Plan land uses
- Integrate Council Goals, City Policies & Plans

NOV CITY OF FLAGSTAFF 2018 CLIMATE ACTION & ADAPTATION PLAN

Goals

- Ensure water supply meet demands tied to Flagstaff Regional Plan land uses
- Integrate Council Goals, City Policies & Plans

What is Flagstaff going to do about it? This Climate Action and Adaptation Plan will guide the Flagstaff community in preparing for climate risks, reducing greenhouse gas emissions, and protecting

This cumate Action and Adaptation Plan will guide the Plagstan community in preparing for climate risks, reducing greenhouse gas emissions, and protecting the wellbeing of residents for decades to come.

OUR GOALS

Make sure that our neighborhoods, resources and economy are more resilient to climate change impacts. Address climate change impacts in a manner that **prioritizes those most impacted**.

Goals

- Ensure water supply meet demands tied to Flagstaff Regional Plan land uses
- Integrate Council Goals, City Policies & Plans

Relationship to Other City Plans

The list below presents other City plans that inform or could be informed by the Climate Action and Adaptation Plan. Some of these documents already emphasize climate solutions described in this plan, while others will need to be updated to integrate climate change and climate action. Where linkages are clear, this plan highlights "levers" in existing plans and programs and brings them together to address a common goal.

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The Rethink Waste Plan outlines initiatives toward achieving the City's waste prevention and recycling goals.

The City is currently developing a Water Conservation Strategic Plan to set water conservation targets and identify and prioritize actions to achieve

those targets. The Flagstaff Regional Plan 2030 presents a comprehensive, long-term plan for the Flagstaff community.

The Management Plan for Legally-Designated Open Space Properties seeks to restore watershed health, forest structure, native plant communities, and rare habitat types, among other goals.

The Coconino County Multi-Jurisdictional Hazard Mitigation Plan includes an assessment of drought, flood, and wildfire risks and strategies to reduce those risks.

The Coconino County Emergency Operations Plan is a guide for disaster response activities and includes hazards such as floods, flash floods, severe weather, and wildfire.

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- Integrate Council Goals, City Policies & Plans
- Maintain Designation of Adequate Water Supply

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- Integrate Council Goals, City Policies & Plans
- Maintain Designation of Adequate Water Supply
- Introduce One Water concept

One Water = One Value

Goals

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- Economic Value per Gallon

((A+B+C)-D) / (E-R) = Economic Value per Unit of Net Water Demand

where:

- A = Direct Economic Benefits or Revenues
- B = Indirect Economic Benefits or Revenues
- C = Commercial Development Benefits or Revenues
- D = City Costs or Expenditures
- E = Water Demand
- R = Reclaimed Water Quantity

City of Peoria Integrated Infrastructure Master Plan Update

PRINCIPLES OF SOUND WATER MANAGEMENT – ECONOMIC VALUE OF WATER MODEL

February 2015

Goals

- Ensure water supply meet demands tied to Flagstaff Regional Plan land uses
- Integrate Council Goals, City Policies & Plans
- Maintain Designation of Adequate Water Supply
- Introduce One Water concept
- Economic Value per Gallon
- Address Climate Change

FLAGSTAFF WATER SERVICES Flagstaff's climate vulnerability assessment looked at how key resources and sectors could be impacted by identified climate risks:

COF, Climate Action Adaptation Plan, 2018

2018 WateReuse AZ Program of the Year

QUESTIONS?

Director Brad Hill accepted the award

COF Reclaimed Water Team with WRA President, John Kmiec, at the 2018 symposium