

# Marana Groundwater Treatment Campuses

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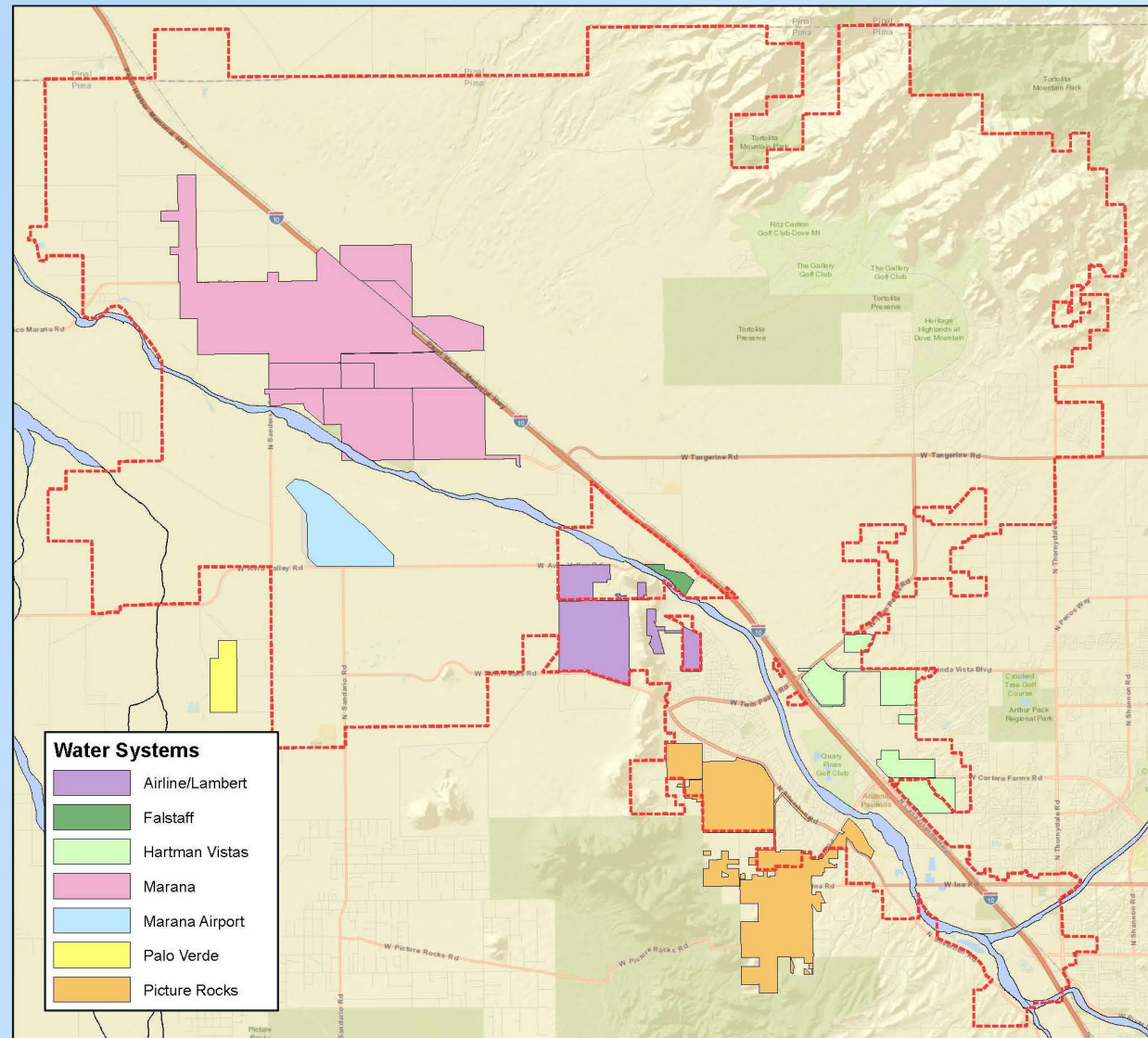
**WATER**  
OUR FOCUS  
OUR BUSINESS  
OUR PASSION



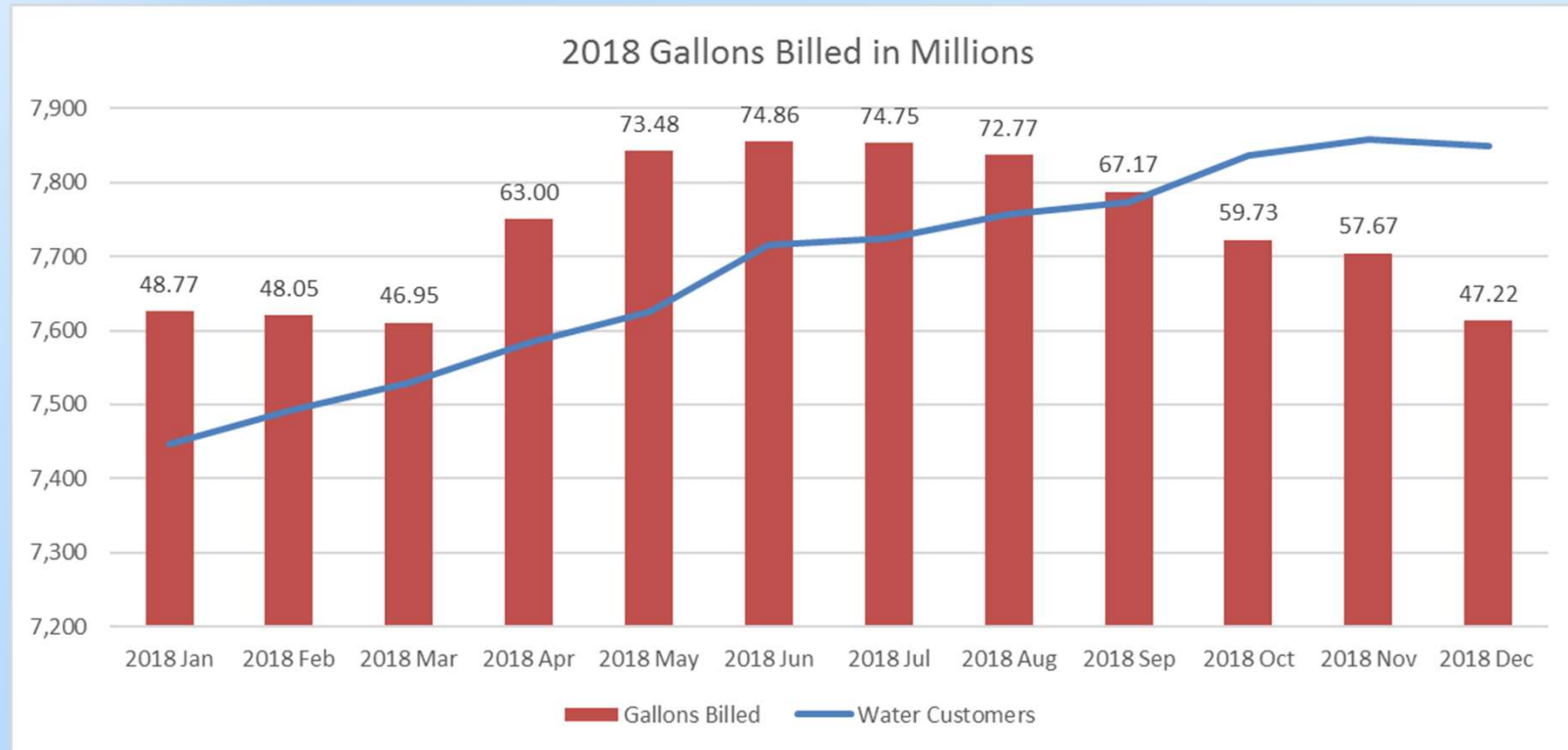
# Today's agenda

- Marana Water history
- Unregulated compound background
- Public outreach efforts
- Treated water operational targets & historical water quality
- Treatment options
- Design update
- Project funding

# Marana Water Service Area

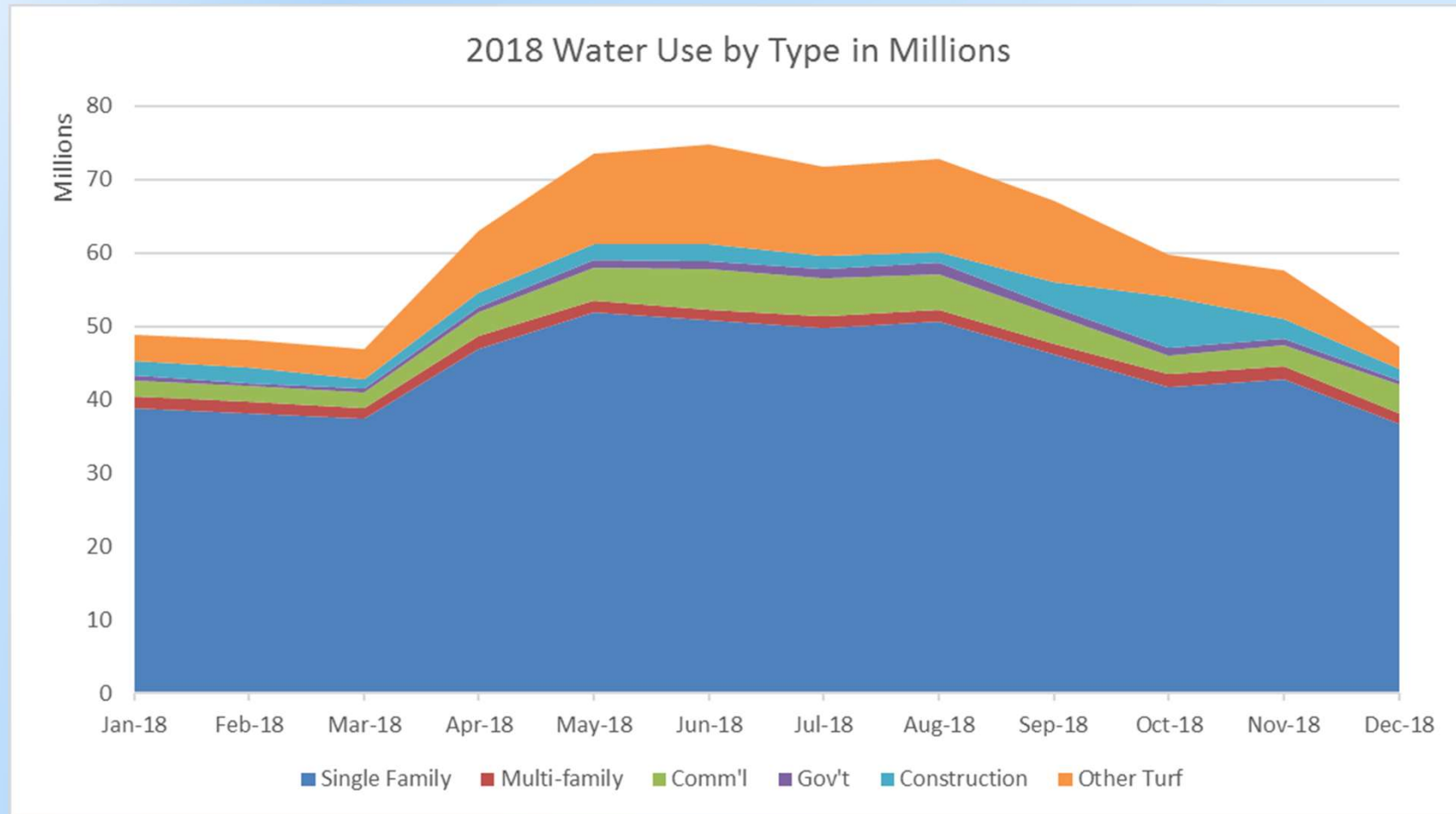


# Enterprise Management



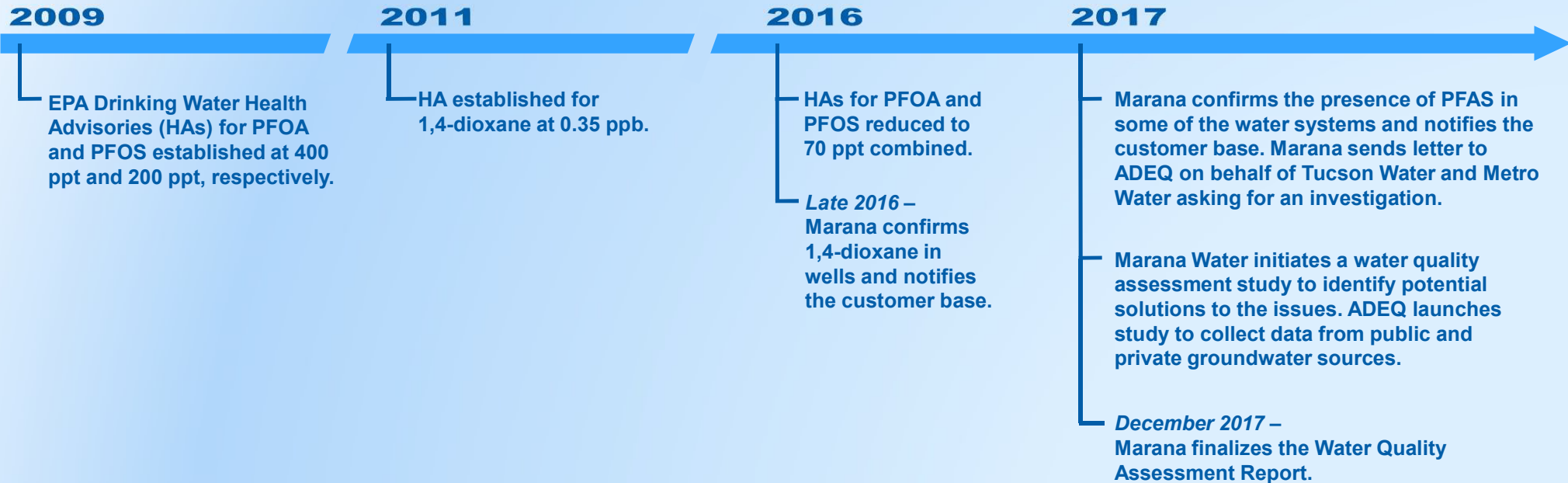
Gallons Billed 2018 – 742.59M

# Enterprise Management





# Marana Water's Unregulated Compound Background



#### NOTICE:

Water quality information for Marana Water systems.

Marana Water has recently detected unregulated compounds called PFOA and PFOS within the water systems #10-092 (Picture Rocks) and #10-138 (Airline/Lambert) at concentration above the lifetime health advisory level. Other Marana Water systems have detections below the lifetime health advisory level or have no detections of these compounds.

#### WHAT IS PFOA AND PFOS? HOW IS IT USED?

PFOA and PFOS are chemicals that were widely used in commercial products. They have a strong ability to repel other compounds so they were commonly used as stain protection on fabrics and clothing, non-stick cookware, furniture protection, paper packaging protection, as well as in firefighting foams. Most of the companies that use these compounds have phased out their use over the last ten years. However, because the compounds are highly stable and resistant to breakdown, they are commonly found in the environment.

#### WHAT IS AN UNREGULATED COMPOUND?

An unregulated compound means that the compound is not part of the mandatory water quality testing that the Marana Water Department is required to do per state and federal rules. The USEPA is currently examining PFOA and PFOS as potential drinking water contaminants, but has not created a maximum contaminant level regulation at this time. These compounds have been found across the nation and have the ability to remain in the environment for a long time. While PFOA and PFOS are being actively studied by the USEPA, they have issued a lifetime health advisory for drinking water systems to use as a benchmark. The current health advisory value set in 2016 for both compounds is 70 parts per trillion. Some of the Marana Water wells tested show concentrations that are above this lifetime health based advisory level. To give an idea of what a part per trillion means, it is like one second in 32,000 years or one square inch within 250 square miles.

#### IS THE QUALITY OF MY WATER OK?

All Marana Water systems meet the current required federal and state water quality standards for drinking water. However, as your local water professional, we also know that not every chemical compound or microbiological risk is regulated. By staying aware of our local environment and the environment of our nation, we can conduct additional voluntary water quality sampling to help us understand and identify potential issues before they become a drinking water regulated item. Activities like this sampling program will allow us to effectively plan for possible additional infrastructure and treatment options in a proactive, not reactive, manner.

#### HOW CAN PFOA AND PFOS IN THE WATER AFFECT MY HEALTH?

The USEPA is continuously testing and researching the likelihood that these compounds can be harmful in drinking water. While the research

continues, the USEPA has established per trillion for both compounds. This is a level of protection for all America's adverse health effects resulting from drinking water. The health advisory sensitive populations: fetuses during infancy. If you live in a water system greater than the health advisory, you avoid consumption of water direct works on the next steps to address water at home to reduce the level.

#### CAN I TREAT THE WATER AT HOME?

With respect to PFOA and PFOS, there have shown to be effective in reducing the water. These treatments a osmosis. Activated carbon filters or found at most grocery stores and these devices are filtering water pit of these devices has shown a pool PFOA and PFOS compounds, as the University of Arizona research show devices, visit [GoodHousekeeping.com](http://GoodHousekeeping.com)

#### WHAT ARE THE NEXT STEPS?

Marana Water will be scheduling a delivery system over the course of what is present in our environment compound is present in our region explore to mitigate any occurrence future steps may include building c from other sources or using advanced source. This research is ongoing. We and wastewater utilities in the area data to develop a complete picture additional information, we will provide through the Marana Water website

| PFOA/PFOS RESULTS      |             |
|------------------------|-------------|
| WATER SYSTEMS          | WELL NAME   |
| Picture Rocks 10-092   | Confined    |
|                        | Confined    |
| Airline/Lambert 10-138 | Saguaro     |
|                        | Airline     |
|                        | Lambert     |
|                        | La Puerta   |
| North Marana 10-180    | Gladden     |
|                        | Sandara     |
|                        | Honora      |
|                        | Honora      |
|                        | San Jacinto |
| Hartman Viejas 10-329  | Confined    |
|                        | Hartman     |
|                        | Cashin      |
| Airport 10-406         | Airport     |
|                        | Airport     |
| Palo Verde 10-136      | Palo Verde  |
|                        | Palo Verde  |
|                        | Palo Verde  |



### PROJECT WATER

Town Council approved Resolution No. 2018-091 on Tuesday, September 25 authorizing the creation of the Picture Rocks water treatment campus capital project and the Airline/Lambert water treatment campus capital projects.

[LEARN MORE](#)

### CONSUMER CONFIDENCE REPORTS

Each year Marana Water tests for, creates and mails a Consumer Confidence Report (CCR) for each of our water systems. These reports show the historic water quality results and how we meet the drinking water standards. Click below to access electronic versions of the 2018 reports.

[2018 REPORTS](#)

### UNREGULATED COMPOUNDS

To continue providing high quality service and product for our customers, we began a voluntary sampling program for unregulated compounds. Click below to learn more.

[LEARN MORE](#)

### FREQUENTLY ASKED QUESTIONS

Check out our FAQ page to learn more about water quality and other facets of our department.

[LEARN MORE](#)

## PROJECT WATER

Town Council approved Resolution No. 2018-091 on Tuesday, September 25 authorizing the creation of the Picture Rocks water treatment campus capital project and the Airline/Lambert water treatment campus capital projects. View the proposed project timeline here.

[Learn more about unregulated compounds.](#)

## RESIDENTIAL SERVICES SEARCH

### LEARN WHO PROVIDES WATER/WASTEWATER TO YOUR ADDRESS

Use the search bar below to determine which water provider serves your home. When searching for an address be sure to include the directional (N, S, E, W), for example 5100 W Ina Road, not 5100 Ina road.

Start typing an address

## UPDATES

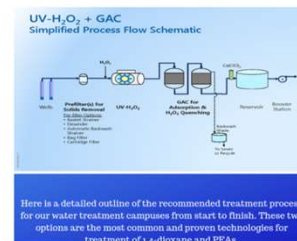
April/May 2019

### CONSTRUCTION PROCESS

During the past two months, our engineering consultant, Carollo Engineering, completed a draft preliminary design report (PDR). This report includes proposed site layouts, preliminary equipment sizing, and treatment process selection. The Marana Water team has reviewed the PDR and the overall project is moving toward 60% completed design. Additionally, as planned, in April interviews were conducted to select the construction manager for the project. After the competitive process, Archer Western Construction was selected as the most responsive and capable firm. Archer Western is a large construction firm with offices located throughout North America, and our team will be working out of the Phoenix office. They have completed several water treatment projects in the Tucson and Phoenix areas, and have experience working with Carollo Engineering. Finally, the contract for preconstruction services, which includes constructability review, value engineering, and cost modeling, is nearing completion. Constructability reviews allow the contractor to evaluate step-by-step construction methods necessary to build a facility alongside the design engineer, providing the opportunity for reduced costs. Value engineering is a term used to improve a product's value, or the ratio of its function to its cost. Some examples would be a substitution of materials that meet the specific requirements, but are available at a reduced cost, or the use of a different type of pump that operates at a higher efficiency, which could in turn generate operational savings over its lifetime. Archer Western has been working with Carollo and Marana Water to keep the project on schedule. Once the cost model is complete, it will be used to create the Guaranteed Maximum Price (GMP) process to get equipment that could take a long time to order and be delivered, ensuring these items are available for installation.

### TREATMENT PROCESS

To the right is an example of the recommended treatment process that we will use at the water treatment campuses. You can click on the image to enlarge it. First, water is pumped from wells through a series of filtration units to remove sediment or solids that are sometimes found in groundwater. Next, the unregulated compounds treatment process begins with an ultraviolet advanced oxidation process using hydrogen peroxide (UV AOP - H2O2). This means that hydrogen peroxide goes into the water ahead of a UV light. Once this water mixed with hydrogen peroxide passes through the UV light, hydroxyl radicals are generated. These radicals react with and break down the 1,4-dioxane to create harmless molecules of carbon dioxide and hydrogen. After the UV AOP process, the water moves to vessels filled with granular activated carbon (GAC). These GAC filters will absorb the PFAs and any remaining hydrogen peroxide from the UV AOP process. Finally, the water will be disinfected using chlorine and pumped into the reservoir and then the main distribution system for our customers. These two processes together are the most common and proven technologies



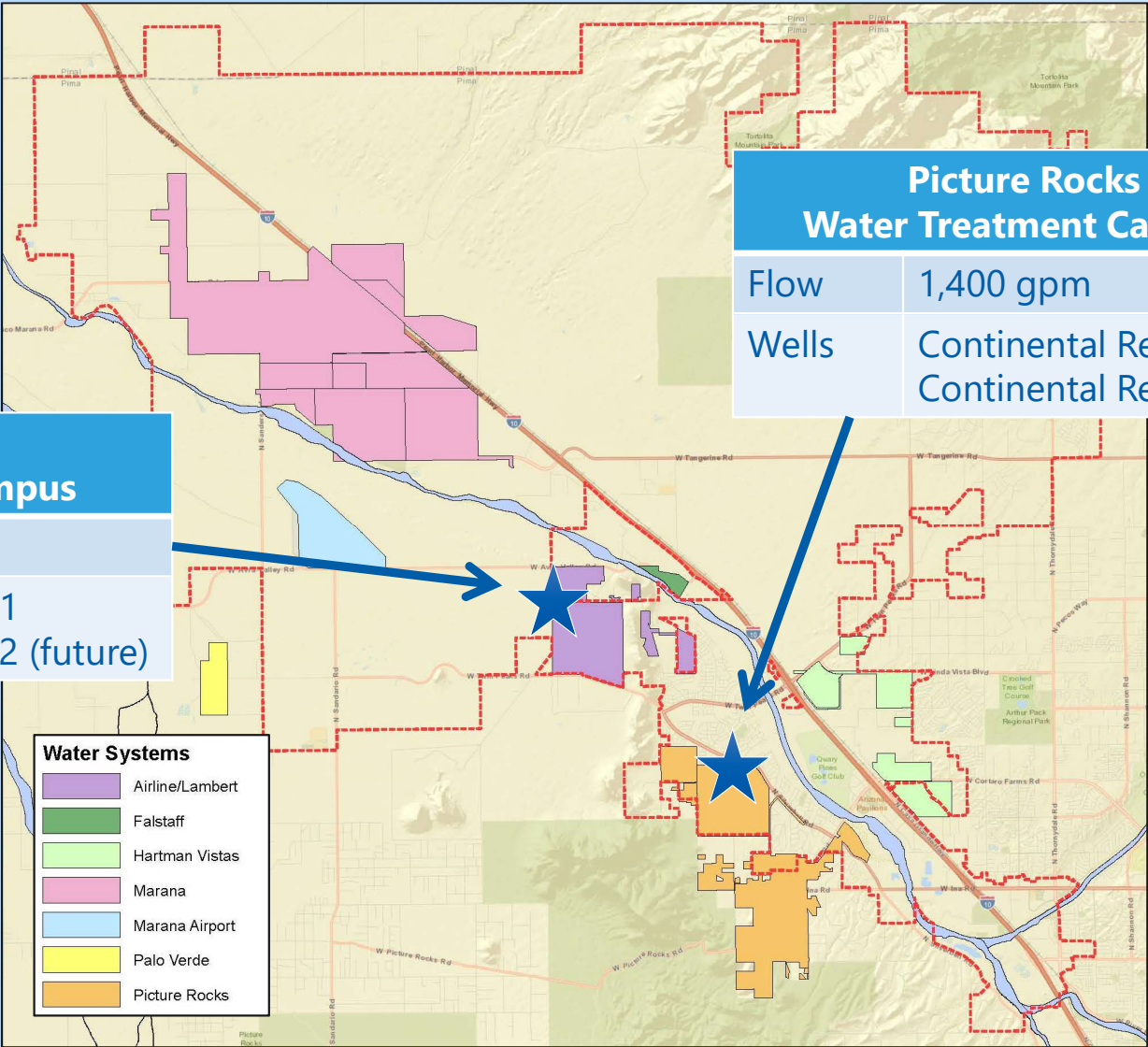
Here is a detailed outline of the recommended treatment process for our water treatment campuses from start to finish. These two options are the most common and proven technologies for treatment of 1,4-dioxane and PFAs.



# Marana Water Service Area

| Airline/Lambert Water Treatment Campus |   |
|--|---|
| Flow                                   | 1,000 gpm                                   |
| Well                                   | Saguaro Bloom 1<br>Saguaro Bloom 2 (future) |

| Picture Rocks Water Treatment Campus |  |
|--------------------------------------|--|
| Flow                                 | 1,400 gpm                                      |
| Wells                                | Continental Reserve 1<br>Continental Reserve 2 |

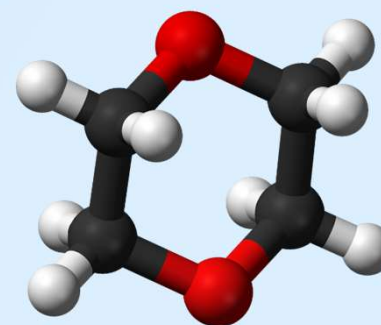




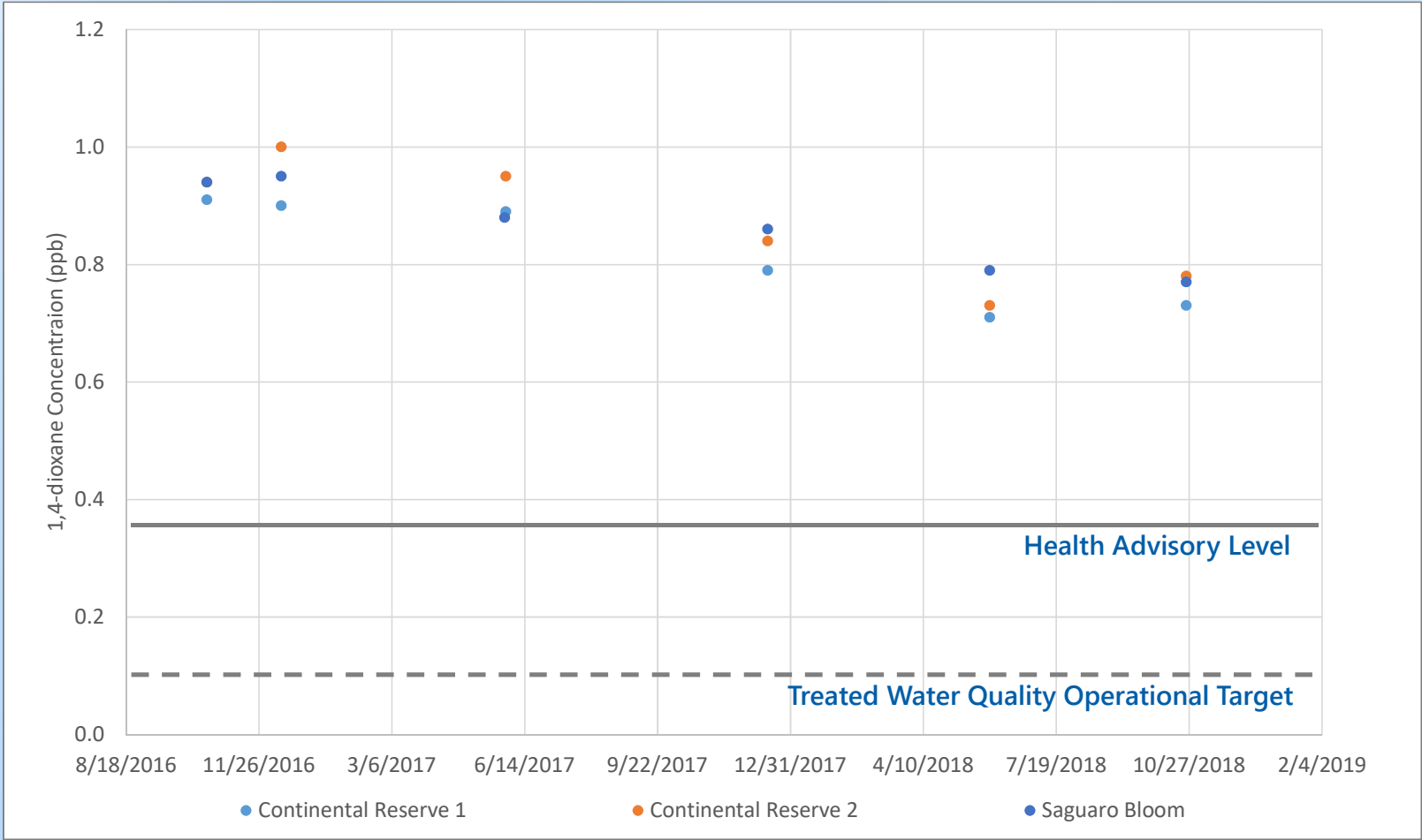
# 1,4-dioxane Water Quality Operational Target

|   | Units      | 1,4-dioxane |
|---|------------|-------------|
| 2011 Health Advisory<br>( $1 \times 10^{-6}$ excess estimated lifetime cancer risk) | ppb        | 0.35        |
| <b>Marana Treated Water Quality Operational Target</b>                              | <b>ppb</b> | <b>0.1</b>  |

1. Treated water goal is set at current method reporting limit for 1,4-dioxane. Design includes an engineering safety factor for consistency of operational performance.



# Concentrations of 1,4-dioxane

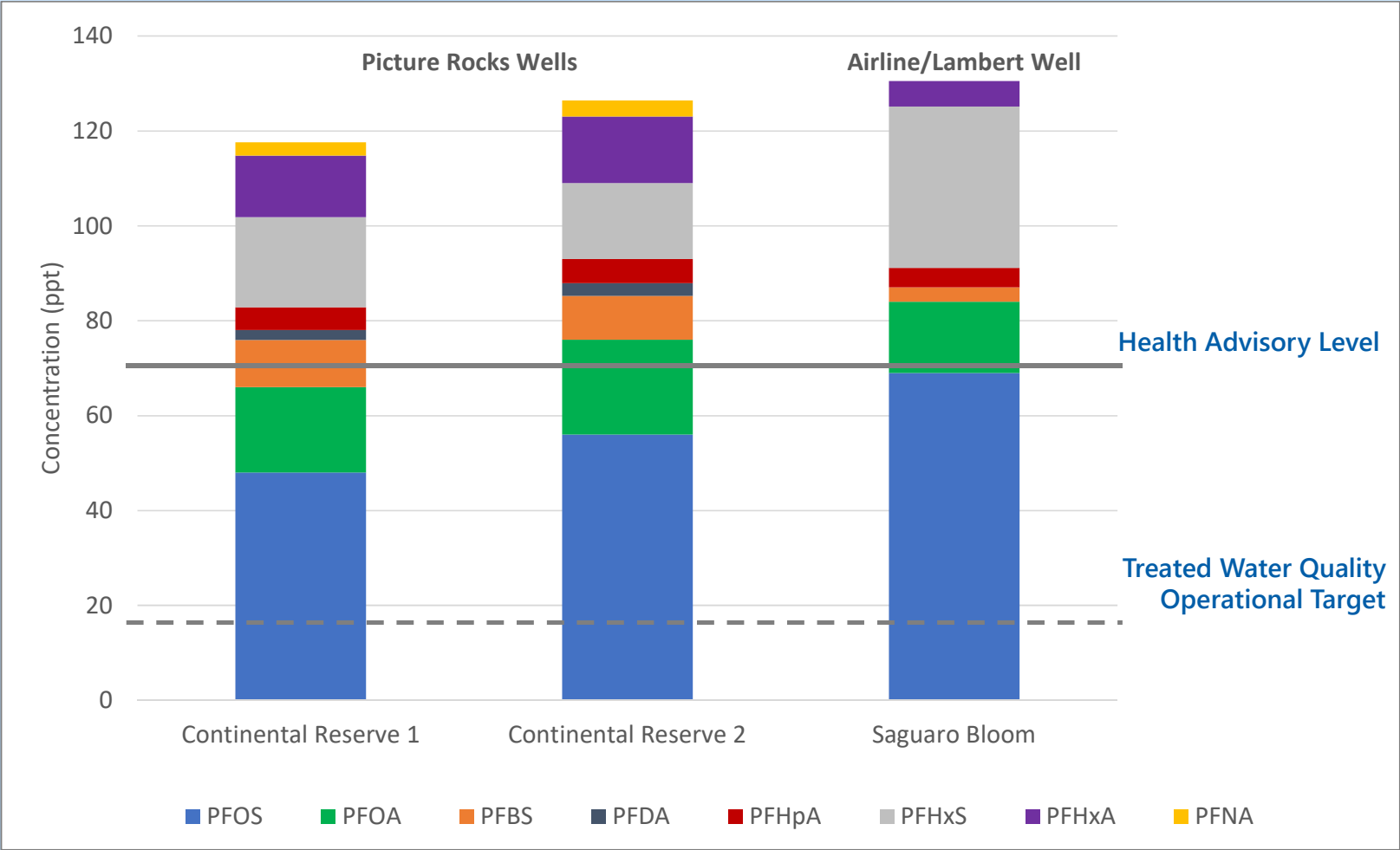


# PFAS Water Quality Operational Target

|  | Units      | PFOA                   | PFOS               | PFHxS              | PFNA               |
|--|------------|------------------------|--------------------|--------------------|--------------------|
| 2009 USEPA Provisional Health Advisory   | ppt        | 400                    | 200                |                    |                    |
| 2016 USEPA Health Advisory <sup>(1)</sup>  | ppt        | 70 (combined)          |                    | --                 | --                 |
| 2018 Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Level (MRL) | mg/kg/day  | $3 \times 10^{-6}$     | $2 \times 10^{-6}$ | $2 \times 10^{-5}$ | $3 \times 10^{-6}$ |
| Equivalent Value based on ATSDR MRL <sup>(2)</sup>                                     | ppt        | 11                     | 7                  | 74                 | 11                 |
| <b>Marana Treated Water Quality Operational Target<sup>(3)</sup></b>                   | <b>ppt</b> | <b>17.5 (combined)</b> |                    |                    |                    |

1. When both PFOA and PFOS are present in drinking water, combined levels are not to exceed 70 ppt.
2. Equivalent values calculated using the ATSDR MRLs and the same methodology that was used to determine the 2016 Health Advisory levels for PFOA and PFOS.
3. When both PFOA and PFOS are present in drinking water, combined levels are not to exceed 17.5 ppt. Operational target is set at 25% of the current health advisory for PFOA and PFOS.

# Concentrations of PFAS





# What treatment options do we have for PFAS and 1,4-dioxane?

## PFAS



Ion Exchange  
(IX)



Carbon Adsorption  
(GAC)



Reverse Osmosis  
(RO or NF)

Brine  
disposal

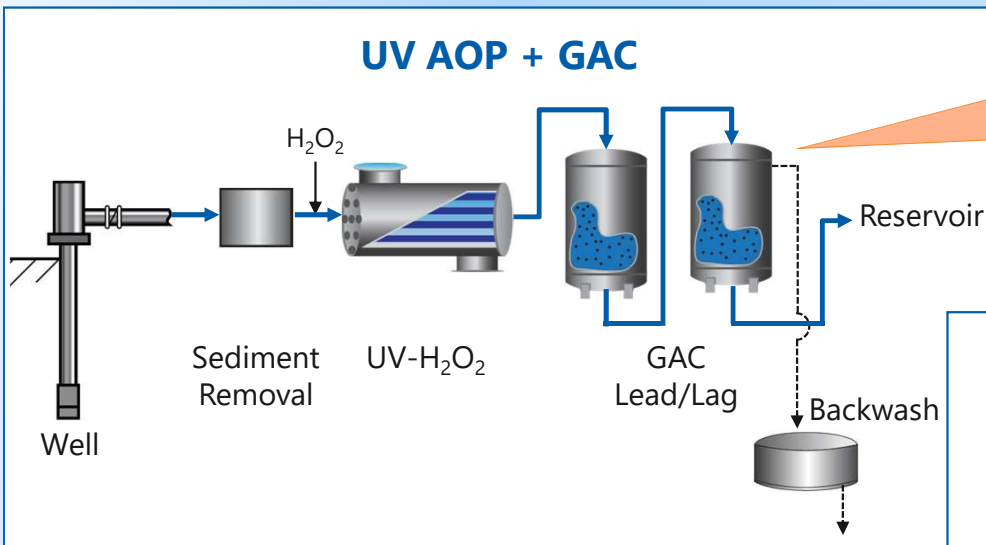
## 1,4-dioxane



Advanced Oxidation  
Process (UV-H<sub>2</sub>O<sub>2</sub>)

# Water Quality Assessment Report (2017) evaluated two treatment options for the Water Treatment Campuses

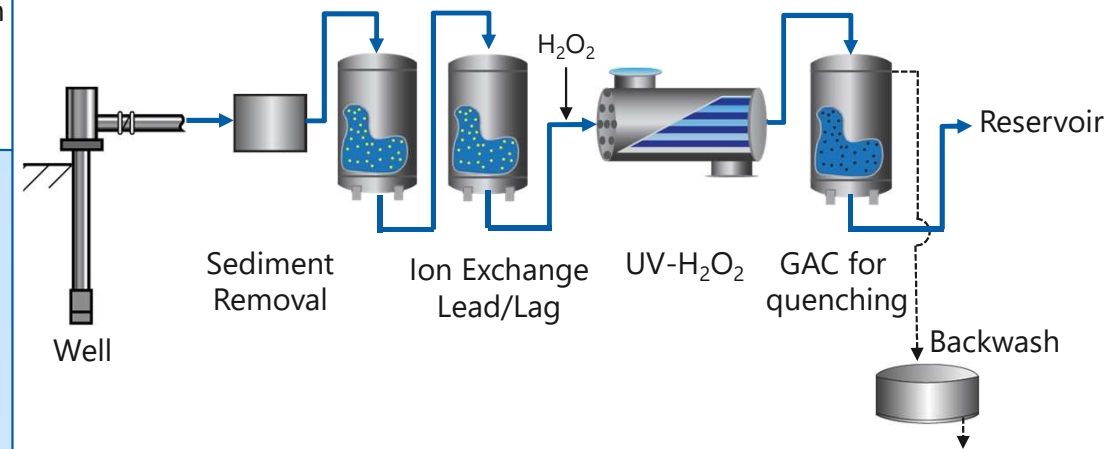
## UV AOP + GAC



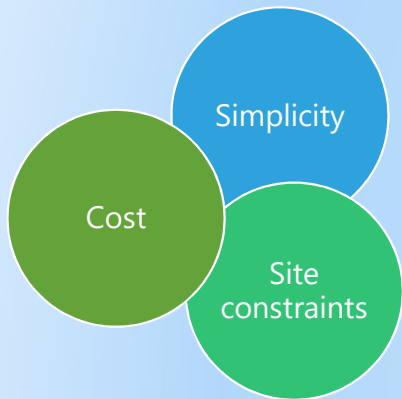
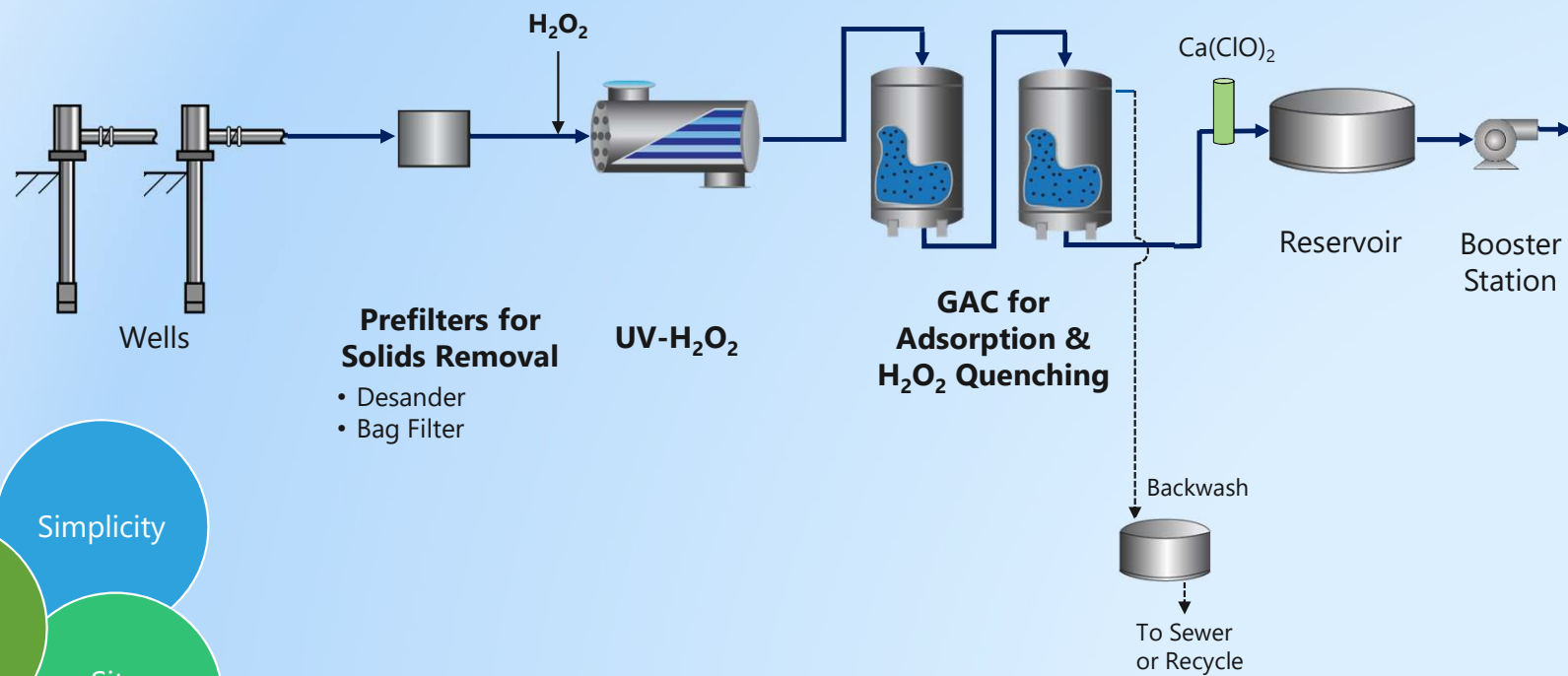
GAC quenches excess  $H_2O_2$  and removes PFAS

IX placed upstream of UV AOP to remove PFAS

## IX + UV AOP + GAC



# UV AOP and GAC selected for full-scale treatment



# UV AOP Design Criteria

| Parameter                    | Units     | Picture Rocks | Airline/Lambert |
|------------------------------|-----------|---------------|-----------------|
| Flow                         | gpm (mgd) | 1,400 (2.0)   | 1,000 (1.4)     |
| UV AOP                       |           |               |                 |
| Log Reduction of 1,4-dioxane | --        | 1.25          | 1.25            |
| UV Transmittance             | %         | 97            | 97              |
| Number of Duty Trains        | No.       | 1             | 1               |
| Peroxide Dose                | mg/L      | 11-20         | 5-8             |

Same number of UV reactors  
and duty trains at each site

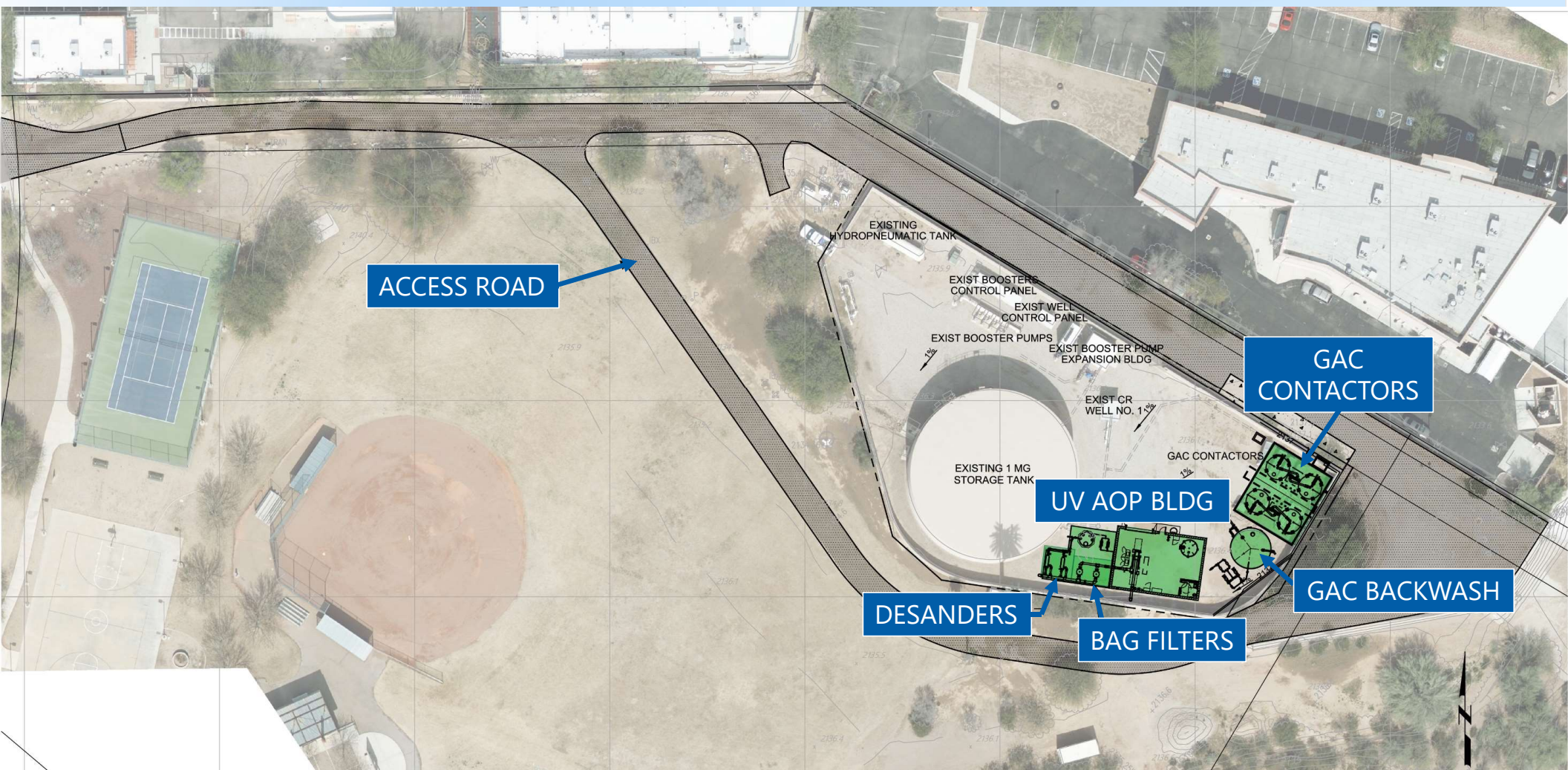


# GAC Design Criteria

| Parameter                      | Units               | Picture Rocks             | Airline/Lambert           |
|--------------------------------|---------------------|---------------------------|---------------------------|
| Flow                           | gpm (mgd)           | 1,400 (2.0)               | 1,000 (1.4)               |
| GAC                            |                     |                           |                           |
| Media Type                     | --                  | Re-agg. bit. coal-derived | Re-agg. bit. coal-derived |
| Number of Trains               | No.                 | 2                         | 2                         |
| Number of Contactors per Train | No.                 | 2                         | 2                         |
| Total Number of Contactors     | No.                 | 4                         | 4                         |
| Contactor Diameter             | ft                  | 12                        | 12                        |
| Liquid Loading Rate            | gpm/ft <sup>2</sup> | 6.2                       | 4.4                       |
| Total EBCT per Train           | min                 | 14.2                      | 20.0                      |

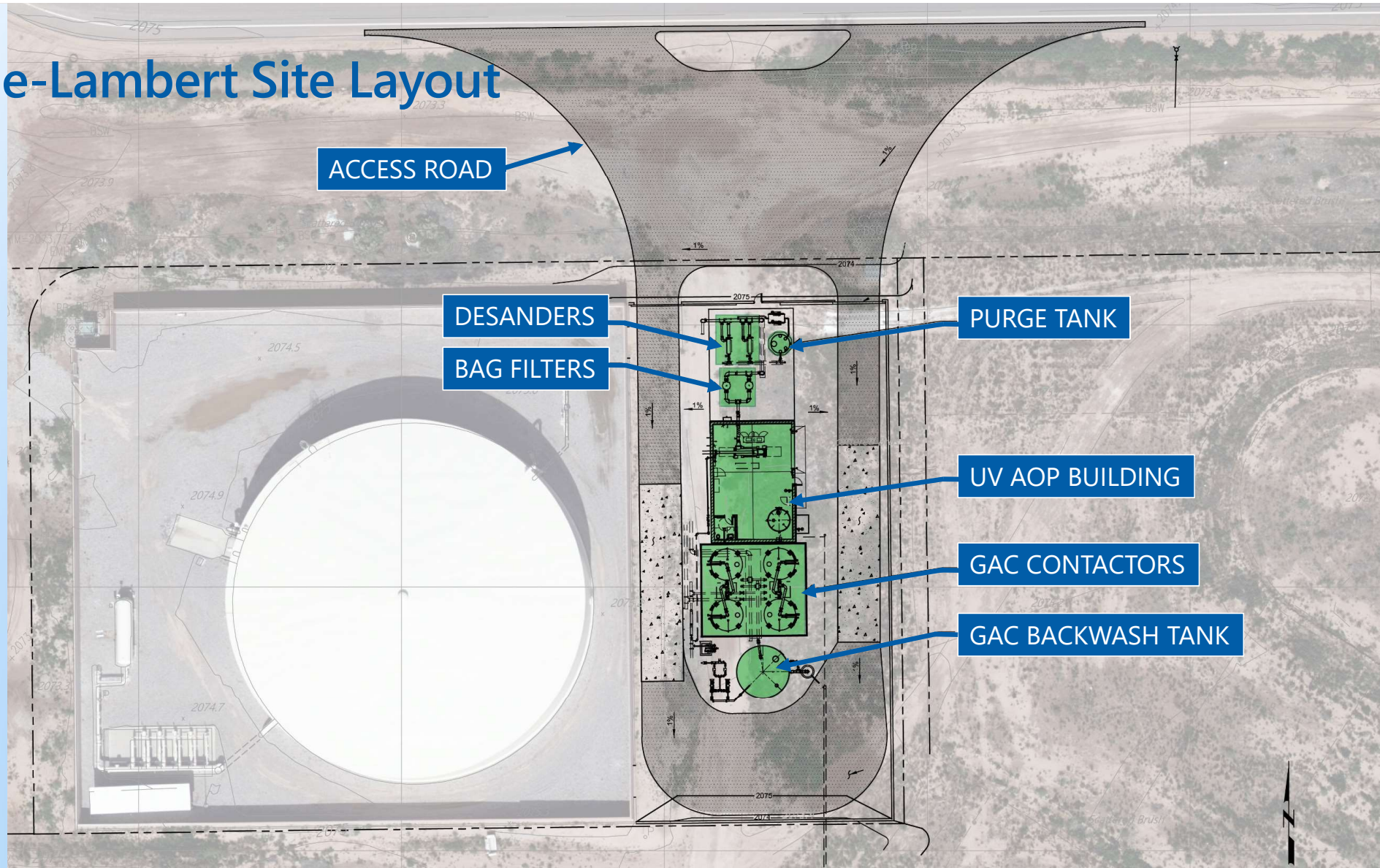
Same number of trains and GAC contactors at each site

# Picture Rocks Site Layout





# Airline-Lambert Site Layout



# Project Funding

ESTIMATED  
\$15M FOR  
BOTH SITES



## *Excise Tax*

Added to overall Town pledged revenue requirements. Might limit other Town projects.

## *Utility Revenue Obligations*

Not enough capacity in current system revenues

## *Grants and similar*

Likely not enough cash flow

## *Internal fund transfers*

Currently obligated for other Town projects

## *CIP reallocation*

Likely not enough cash flow; impact to other projects

## *Water Infrastructure Financing Authority Loan*

External funding; federal requirements



# Debt Repayment Options



## LEGAL SETTLEMENT

Unknown if/when might occur



## REVENUE SAVINGS

Too volatile for annual use



## SALES TAX REDISTRIBUTION

Allocate a portion of current rate to the project. Restricted to this project only.



## SALES TAX INCREASE

Increase the current rate as a dedicated resource for ongoing revenues

# Questions

