



# AGUA NUEVA

A New Benchmark in Water Reclamation

## Agua Nueva Water Reclamation Facility



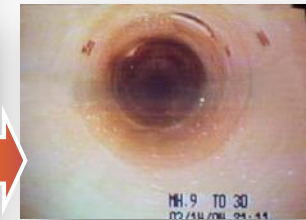
PIMA COUNTY

**CH2MHILL**<sup>®</sup>

# Complex Challenges

***Numerous challenges impeded Pima County's mission to provide quality service, renewable resources, and environmental stewardship:***

- **Regulatory**
  - Stringent/increasing environmental regulations
- **Rehabilitation**
  - Extensive repair/upgrade of aging infrastructure
- **Capacity**
  - Location of future population within the system
- **Funding**
  - \$2+ billion over 20 years
- **Affordability**
  - Significant increases in user/connection fees



# Regional Optimization Master Plan (ROMP)

*The \$720M ROMP addresses challenges—ensuring affordable, community friendly wastewater treatment.*



Laboratory Complex



Tres Rios WRF Upgrade & Expansion



Interconnect Pipeline



Biosolids and Biogas Utilization



Agua Nueva WRF



Roger Road WRF Decommissioning

# Agua Nueva WRF Objectives

***Agua Nueva WRF is a critical piece of ROMP.***

- Replaces aging Roger Road plant with new, state-of-the-art 32-mgd WRF
- Improves Santa Cruz River water quality
- Provides A+ reclaimed water quality for reuse
- Integrates good neighbor features and solves long-term odor problems
- Meets population service needs to 2030
- Conserves this desert community's natural resources



# ROMP Objectives

***ROMP objectives were translated into specific Agua Nueva WRF requirements.***

PROJECT CRITERIA	REQUIREMENT
Flow	32 mgd
Total Phosphorous	1 mg/L
Total Nitrogen	8 mg/L
Ammonia Nitrogen	1.75 mg/L
Odor control	< 7 D/T
E. Coli	ND 4 of 7 samples, Single Sample Max < 15
Total Chlorine Residual	< 4 µg/L
TTHM (Single Sample Max)	80 µg/L
Reclaimed water quality	Class A+
Schedule	August 2014 completion
Local business utilization	5% of DB Price Tucson-based businesses
Community relations	Good neighbor, attractive project

# Benchmark Results



*Sustainable, community-oriented solutions yield one of the world's most advanced WRFs:*

- Innovative process and technology solutions **advance the art of water reclamation**
- A winning partnership delivers **under budget and ahead of schedule**, with exceptional quality
- Good neighbor strategies **promote social and environmental stewardship**

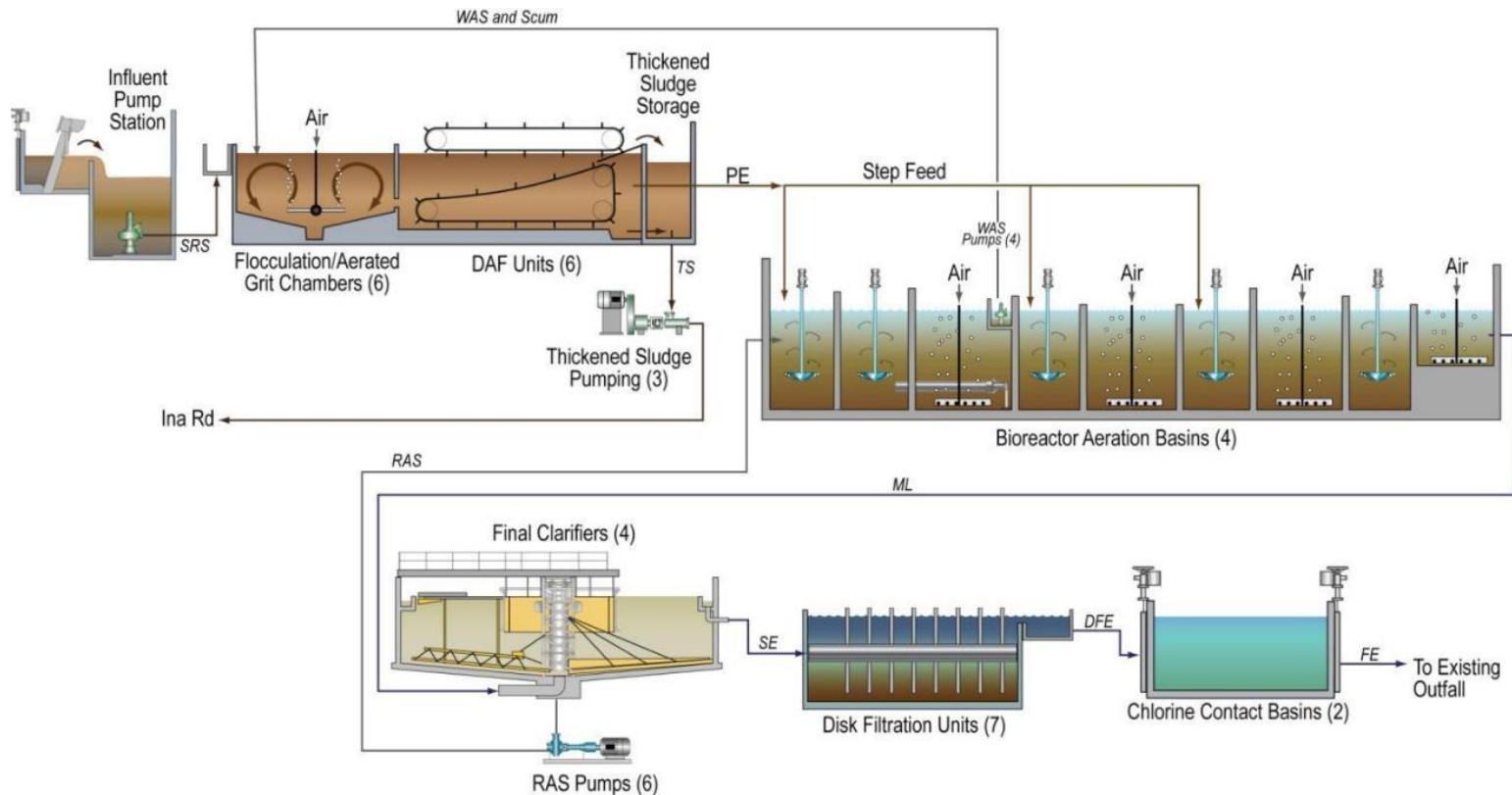


# Advancing the Art of Water Reclamation

# Innovative Treatment Process

***Innovative treatment process produces A+ reclaimed water quality.***

- New headworks/Influent pumping
- Combined flocculation/grit removal
- DAF primary treatment/sludge thickening
- 5-Stage Bardenpho/step-feed aeration
- Tertiary filtration
- Chloramine-based disinfection





# Improved Preliminary Treatment

*Combining multiple functions in the headworks simplifies O&M.*

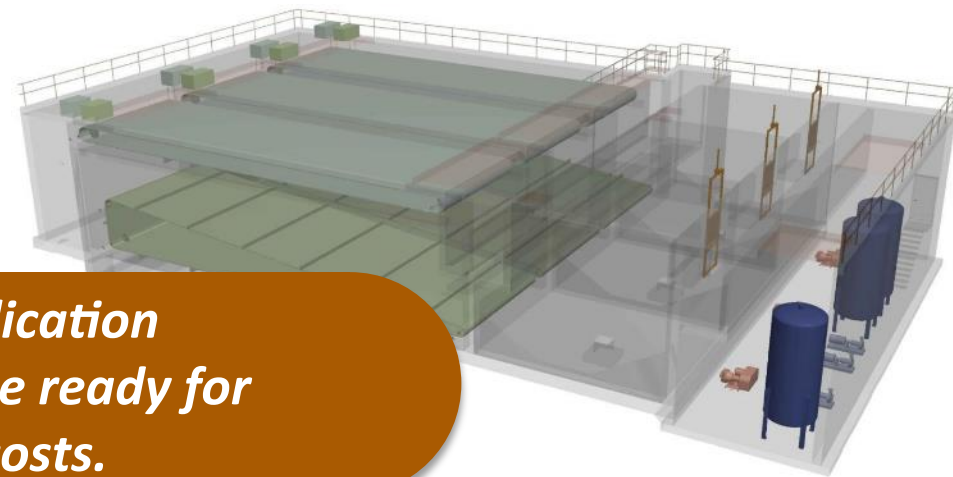
- Integrated residuals handling reduces O&M costs
  - Grit and screenings in same bin
  - Sludge pumping centralizes high-maintenance equipment
- DAF support systems



# A New Twist on Primary Treatment

***Unlike other WW facilities, DAF is used at the beginning of the liquids train, rather than in solids—improving performance and drastically reducing power usage and operating costs.***

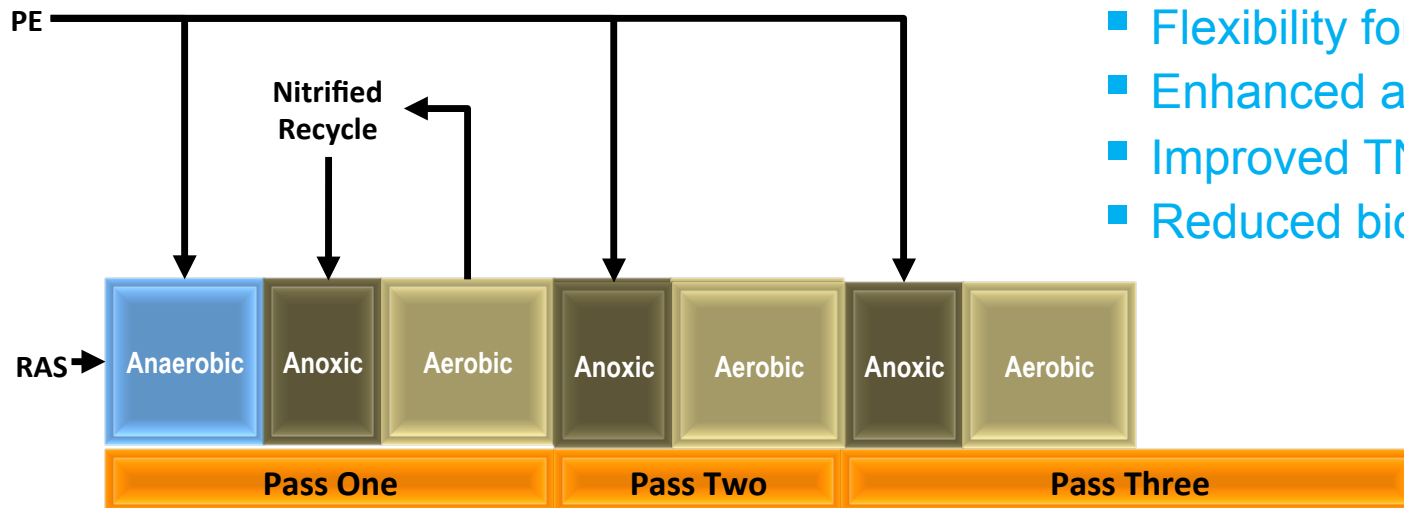
- Combines grit removal, flocculation, solids liquid separation, and solids thickening into a single step
- Primary solids removal reduces energy consumption and bioreactor size
- FOG removal improves downstream performance
- Small footprint minimizes odors and reduces site impacts



***This world-first large-scale DAF application provides an already thickened sludge ready for processing at significantly reduced costs.***

# Enhanced Secondary Treatment

***Enhancing 5-Stage Bardenpho treatment with step-feed aeration increases operational flexibility and reliability.***



- Flexibility for high flows/loads
- Enhanced ammonia control
- Improved TN removal
- Reduced bioreactor size

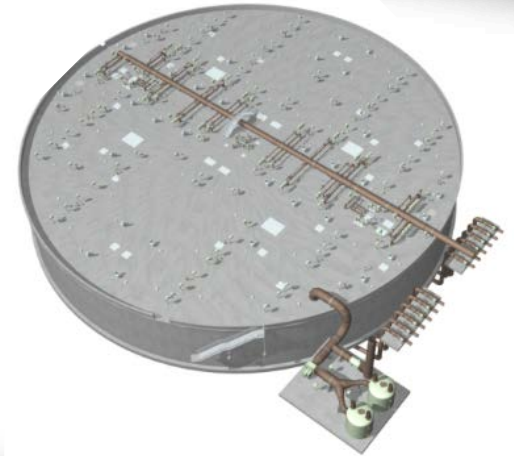
**The three-pass step-feed delivers primary effluent to two additional locations within the secondary process train.**

***Provides biological phosphorus removal and highly efficient total nitrogen removal.***

# Complex Ammonia Control

***Four aeration basins configured in one bioreactor improves ammonia control and minimizes cost.***

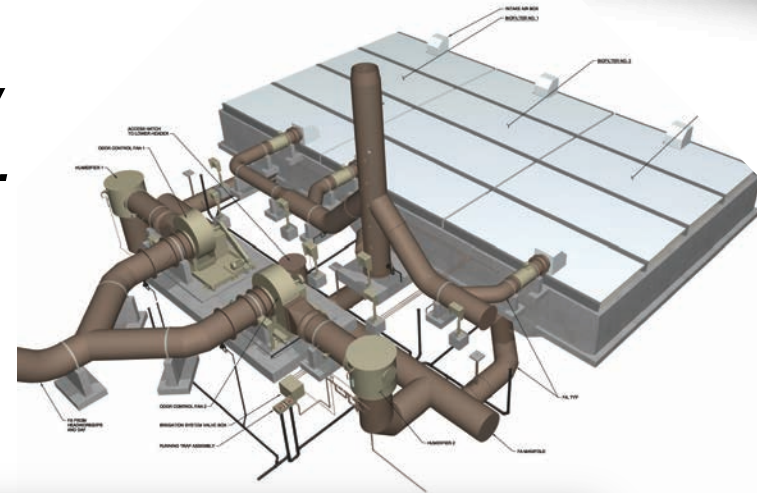
- Three step-feed points and DO control system controls effluent ammonia
- Simultaneous nitrification/denitrification reduces energy usage
- Shallow post-aerobic zone improves clarifier performance
- WAS surface wasting improves scum control



# Comprehensive Odor Control

***Advanced odor control system achieves low lifecycle costs and exceptional performance.***

- Centralized facilities streamline treatment
- Bioreactor captures odors for all unit processes
- Stack system removes remaining odors
- No additional chemicals and little-to-no maintenance

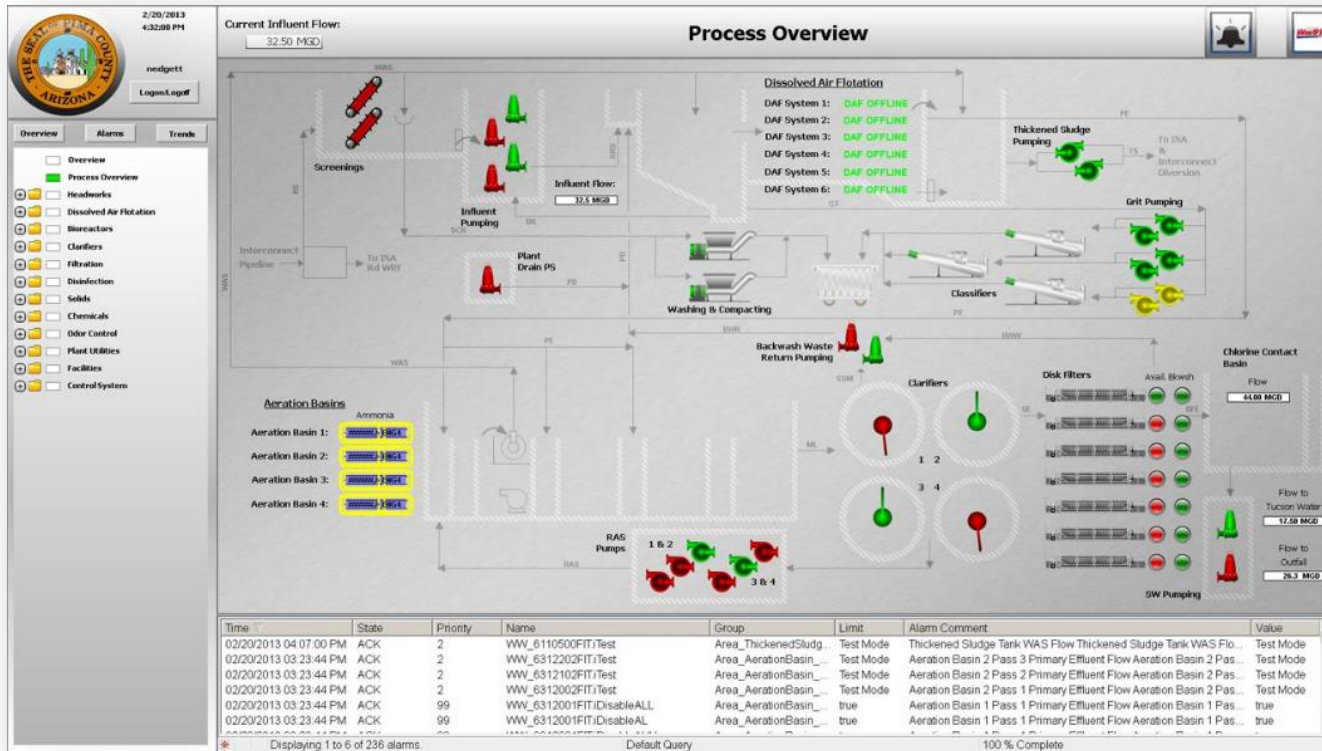


***Achieves less than 5 D/T at fence line and beyond, greatly improving air quality for surrounding communities.***

# Advanced Controls System

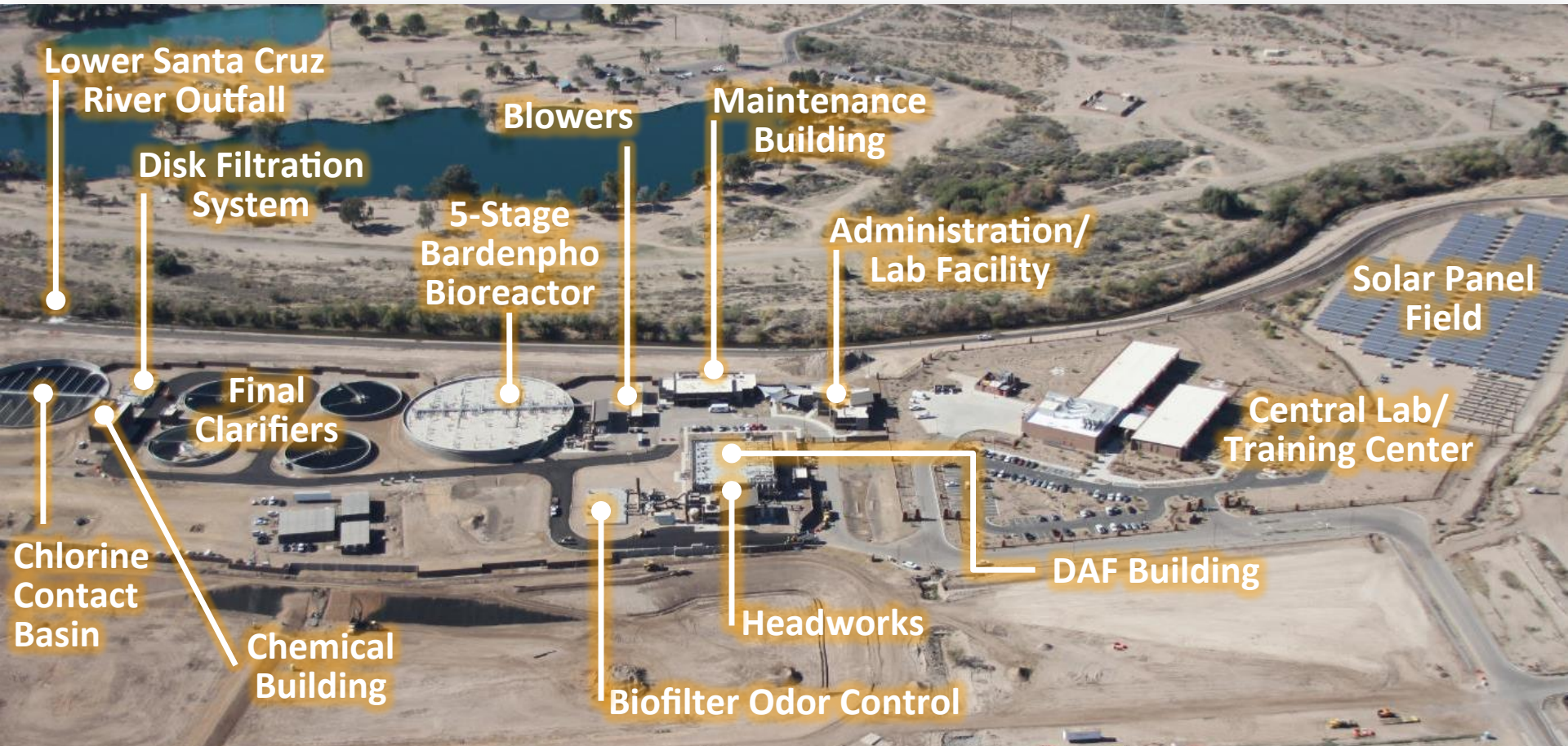
**Fully automated control system integrates complex treatment components into an efficient, easy-to-operate facility.**

- Ammonia control/chloramination
- Odor control
- Clarification efficiency
- Flocculation/grit removal integration



# Highly Compact Site Layout

*Site layout optimizes operations and future development options.*





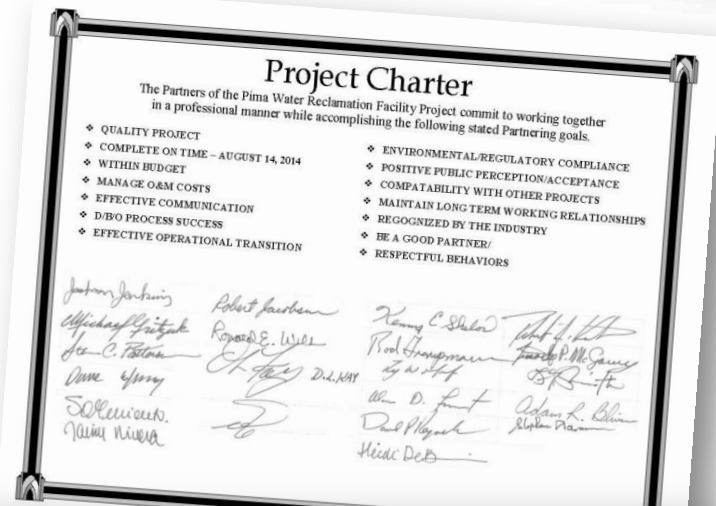
## A Winning Partnership



# Innovative Public-Private Partnership

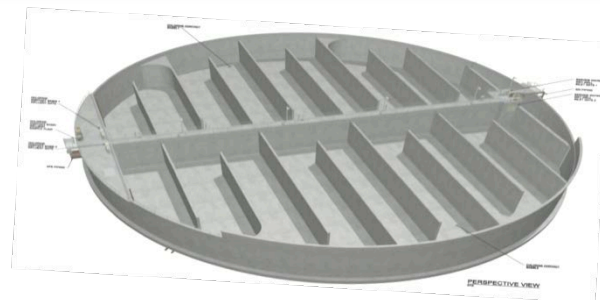
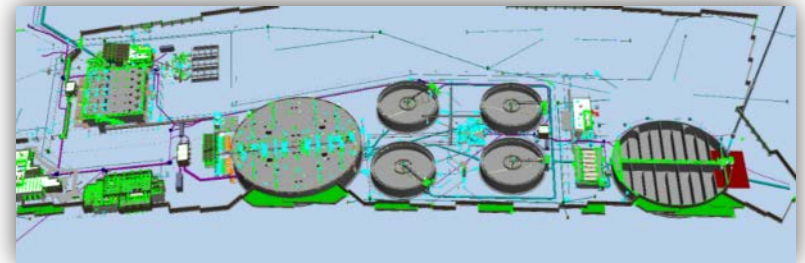
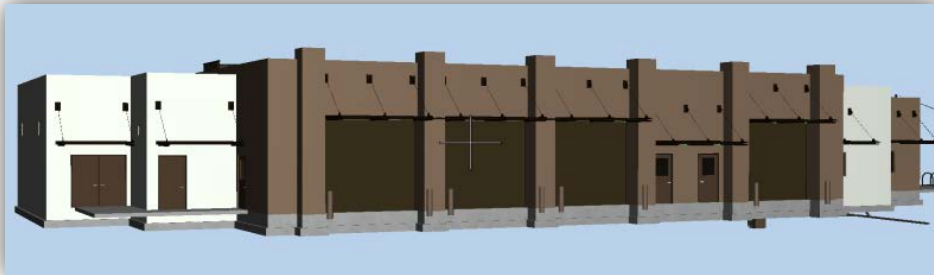
**Formal partnering was an integral part of the project from Day 1.**

- RFP identified partnership as key goal for DBO team
- Project charter established 14 partnering goals
- Continuous chartering facilitated team integration
- RWRD staff fully engaged throughout project



# Integrated Design

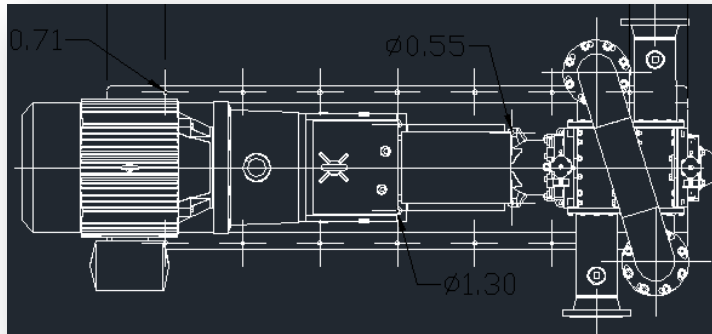
***3-D modeling aided early partnership development, promoting integrated design and review.***



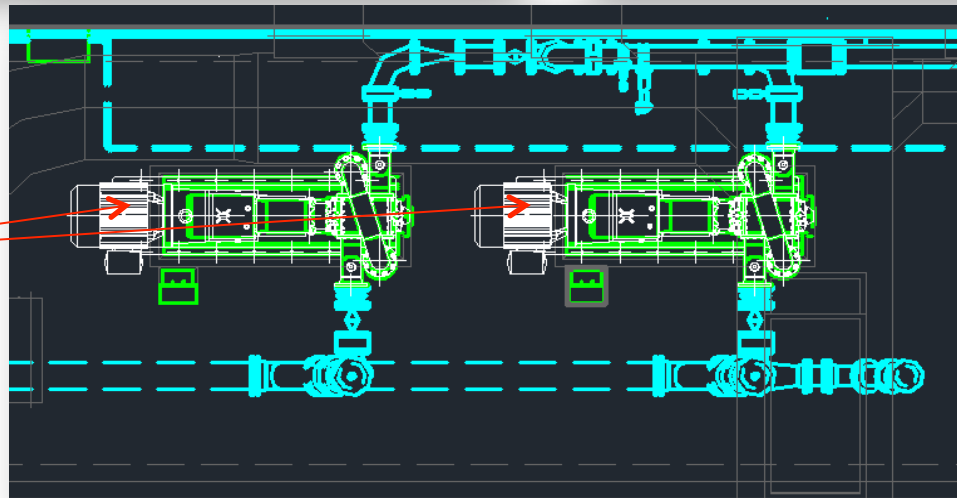
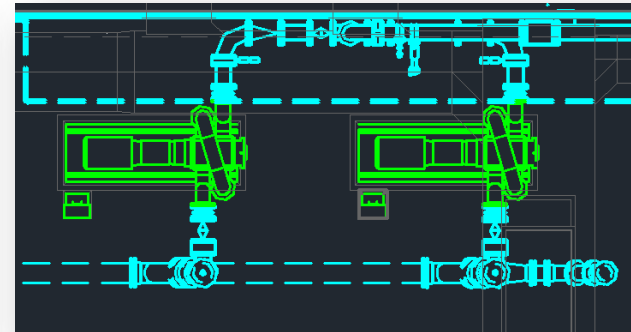
# Early Issue Resolution

***Using BIM in the field extended partnership, preventing problems before they occurred.***

*Vendor CAD Drawing*



*Contract CAD Drawing*



**Motors extend well past the skid on the original contract drawings.**

*Vendor CAD drawing OVERLAYED on contract CAD drawing to identify differences, collisions, & issues*

# Streamlined Monitoring & Inspection

*Tablet technology maintained partnership, rapidly communicating issues.*

Model being reviewed and checked against field installation.



## Construction Quality Management Plan

- Verified compliance with plans and specs
- Documented quality processes
- Included pre-installation readiness review meetings
- Involved design team during construction
- Identified quality issues early with swift resolution

# Exceptional Quality

*Winning partnership delivered world-class results.*

- Delivered \$77M under ROMP's \$240M design-build budget
- **Reduced O&M budget by \$2M**
- RWRD operators staffed all available O&M positions
- **Delivered 8 months early**
- and 1 year ahead of compliance schedule
- 150+ workforce delivered **860,000+ hours with no lost time injuries**





# Good Neighbor Strategies

# Economic and Social Advancement

***Delivery approach promoted economic and social advancement.***

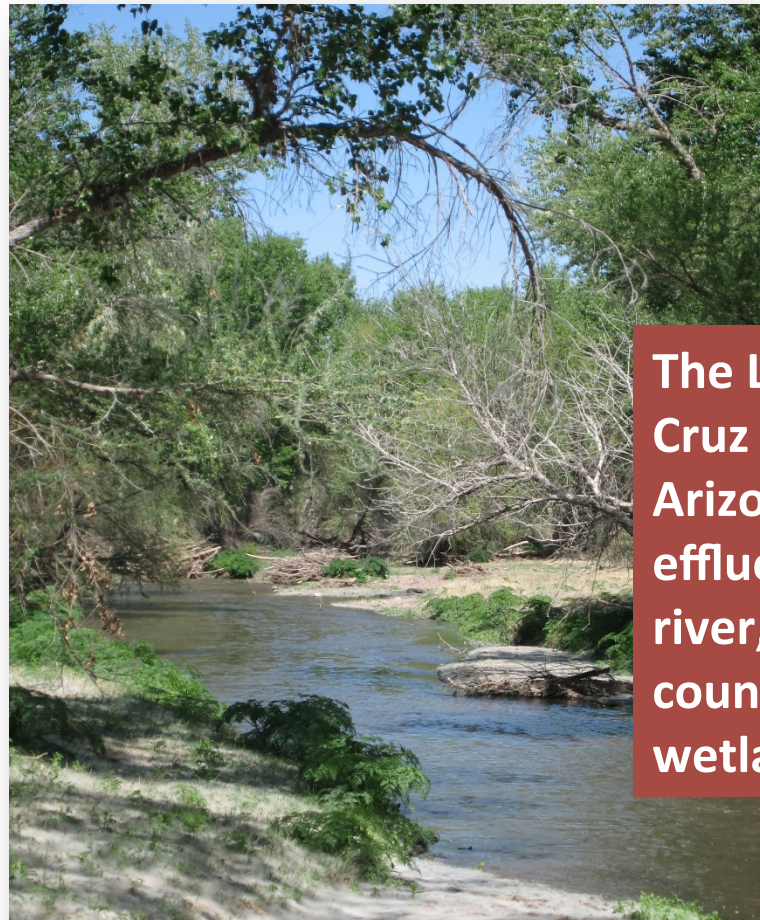
- Staff reduction by attrition or reassignment
- Transferred operators guaranteed equal or better salary and benefits
- Cost savings avoided significant rate hikes
- Local team included double the required small business participation



# Environmental Stewardship

*Agua Nueva's 'new water' protects natural resources.*

- Dramatically improves reclaimed water quality
- Maximizes reuse potential
- Decreases water diversion from sensitive habitats
- Restores Lower Santa Cruz River water quality
- Provides wetlands benefits



The Lower Santa Cruz River is Arizona's longest effluent-dependent river, creating the county's principal wetland habitat.

Photo by [Sonoran Desert NPS](#)



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# Community Enhancement

***Creative design enhances the local community.***



**Agua Nueva provides an attractive, odor free environment that conserves the region's scarce desert resources.**

- Architectural theme captures Sonoran desert environment
- Landscaping promotes aesthetic impact while reducing cost/maintenance
- Odor control eliminates decades-long odor issues
- LEED® Silver-certified administration building promotes sustainability

# Social Responsibility



**Raised money to buy 3,000 pounds of Turkey for Salvation Army Thanksgiving**

**“Chefs for Day” cooked dinner at the Ronald McDonald House**



**Provided ‘Adopt a Family’ Christmas Gift Bags for 21 children at Tucson Medical Center**

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