2018 WATEREUSE

AWARDS FOR EXCELLENCE NOMINATION

CATEGORY: EXCELLENCE IN ACTION

City of Show Low

WASTEWATER TREATMENT PLANT UPGRADE PRODUCES HIGH-QUALITY EFFLUENT FOR PRESERVATION OF SHOW LOW WETLANDS

// CITY OF SHOW LOW

completes successful wastewater treatment plant upgrade achieving production of high-quality effluent for the preservation of the Show Low Wetlands

UNIQUE**PARTNERSHIP**

Unique partnership allows Show Low Wetlands to flourish through efficient effluent reuse supporting proactive environmental preservation

The City of Show Low (City) is the largest city in the White Mountains and is one of the fastest growing cities in northern Arizona. The city proper has a population of nearly 12,000 residents, but Show Low's trade area population numbers over 115,000. Seasonal spikes in the population from tourism activity and the second home market causes the trade area population to swell to well over 149,000. The area is famous for its world class hunting and fishing opportunities. Visitors and residents also can enjoy wildlife and outdoor recreation, trails and mountains, parks, skiing and much more. The City of Show Low is dedicated to the preservation of its history and environment. [1]

Show Low Wetlands

The Show Low Wetlands is operated and maintained through a cooperative agreement and Special Use Permit (SUP) between the City of Show Low, the U.S. Forest Service, and the Commission. These agencies place tremendous value on the Show Low WWTP effluent and have actively continued this partnership through a Memorandum of Understanding (MOU). The original MOU required a minimum of 500,000 gallons per day of treated effluent. In the 2010 renewal the USFS requested an increase to 600,000 gallons per day which speaks to the value that our partners place on this effluent.

The Show Low Wetlands partnership was established in 1970 when the U.S. Forest Service and the City discontinued the wastewater discharge directly into Show Low Creek. As an alternative disposal method; the City would convey the effluent two miles north to a natural depression called Telephone Lake. Later, when the effluent flows increased due to the population growth, the path for the flows was expanded to reach other natural depressions, known as Pintail and South Lake Marshes. The U.S. Forest Service then began creating inland wetlands to support waterfowl reproduction.[2]

Cormorants in the Trees Show Low Wetlands

In the mid-1980s, it became evident by deteriorating habitat quality and decreased waterfowl populations that the existing effluent quality was insufficient.[2] This realization sparked a driving commitment by the City to layout a long term plan to improve and maintain high-quality effluent production.

[1] City of Show Low. About Show Low. Available at https://showlowaz.gov/226/About-Show-Low.

[2] United States Environmental Protection Agency (EPA). Publication called "ShowLow, AZ - Pintail Lake and Redhead Marsh: Created Wetlands in Northern Arizona". National Service Center for Environmental Publications.

ENVIRONMENTAL**QUALITY**

Commitment to environmental quality for residents and visitors inspires City's objectives for the wastewater treatment plant upgrade

The City's future, residents and visitors are always considered when planning for and carrying out necessary improvements. The improvements to its wastewater treatment plant (WWTP) was no exception and created significant economic and environmental benefit to the community while solving performance issues. Prior to 2012, the City was operating its two-cell aerated lagoon WWTP, which is permitted to treat 2.46 MGD. The original lagoons were built in 1958 and were upgraded to a treatment volume of 11 MG each in 1985 with subsequent upgrades to the headworks in 1997 and to the aeration system in 2011. The existing WWTP process did not have the capabilities to meet stringent effluent requirements, especially for ammonia. In addition to the immediate effluent requirements, the City also considered that future, more stringent effluent requirements would require major improvements to the existing WWTP.

With the increased difficulty achieving effluent requirements, the City actively investigated its options to improve the WWTP and to continue its commitment to the preservation of the Show Low Wetlands. Preserving wetlands provides numerous benefits including furnishing fish and wildlife habitat and flood water trapping. Wetlands are also instrumental in driving local economies by influence in agriculture, recreation and fishing.

When time came to make improvements, the City demonstrated its commitment through action. Awareness of ever-changing environmental guidelines and a long-term savings plan provided a reasonable available budget when the upgrade was necessary. Actively seeking information on current technology granted the City confidence in its ability to make informed decisions.

THE CITY'S OBJECTIVES FOR THIS UPGRADE PROJECT WERE TO:

- Achieve high-quality effluent, meeting state and federal requirements, to continue the preservation of the Show Low Wetlands,
- Embrace new technology to ensure a long-term solution versus just fixing the immediate issues, and
- Maximize value of the project without sacrificing quality

INNOVATIVE**DESIGN**

Innovative design improves effluent water quality at a cost of less than $4/gallon

Planning efforts by the City focused on proactively seeking the most efficient (both operationally and environmentally) and most cost effective option for the upgrade endeavor. The City employed an innovative approach that applies the following strategies:

- Understanding treatment goals and permitting requirements
- Identify any treatment processes that can reuse the existing infrastructure
- Identify energy efficiency opportunities by considering newer advance treatment systems and equipment
- Employ value engineering and cost-control measures
- Consider construction delivery method that compliments design

IMPROVEMENT FEATURES

- Modified treatment process from a 2.46 MGD two-cell aerated lagoon process to a 2.5 MGD Extended Aeration Activated Sludge (EAAS) Process utilizing Parkson's Biolac® mixing and aeration process to produce a higher quality effluent
- Effluent quality that consistently meets AZ Title 18 BADCT effluent standards
- Improved water quality to support the constructed wetland system
- Final total cost of less than $4/gallon

Value Engineering Maximizes Value

A previous engineering report recommended constructing a 1.75 MGD Biolac®-type wastewater treatment facility on the existing lagoon site to meet the flow projection of 1.72 MGD required for the next 20 years. The City employed a separate engineering firm to perform a detailed biological and process treatment evaluation. This new evaluation confirmed the use of the EAAS Biolac® process but also identified that the City can expand the treatment capacity to 2.5 MGD for the almost the same cost as the 1.75 MGD capacity, while providing operational redundancy up to 1.5 MGD. In addition, it identified site and operational constraints, such as shallow perched groundwater, site drainage and operational issues during construction. With this recommendation, the City moved on the implementation for this expansion project.

The new WWTP utilizes an Extended Aeration Activated Sludge (EAAS) process to produce effluent quality that can meet AZ Title 18 BADCT effluent limits for Total Nitrogen (TN) of <10 mg/L. The construction of the facility was completed in early Spring of 2016, and the facility has consistently produced effluent with TN level of less than 3 mg/L (and at times <1 mg/L). In addition to the new treatment process, a key component to meeting and maintaining consistent effluent quality is the WWTP process control. The new

WWTP utilizes a network of PLCs and Supervisory Control and Data Acquisition (SCADA) to controls of the treatment process with minimum onsite supervision. The PLC network allows for process isolation and redundancy, whereas if one process loses communication, it does not affect the entire control system. As a matter of fact, that process can operate independently of the entire s¬ystem, if needed. Hand-in-hand with the PLC network, the SCADA system provides the operator with system control, monitoring and alarming of the treatment process. The SCADA system also allows the operator to monitor and control the process at remote locations, such as at home, through the dedicated laptops and secure internet connections to the facility.

Before Upgrade

EXISTING PLANT ELEMENTS

- 2.46 MGD aerated lagoons
- Existing medium screen mechanical bar rake headworks system
- Existing effluent pump station
- Small operator office and lab
- Chlorine building
- No standby generator
- No SCADA or remote system controls

After Upgrade

UPGRADE PLANT ELEMENTS

1. Effluent and Disinfection
2. Aeration and Dewatering Bldg
3. West Clarifier
4. East Clarifier
5. Vactor Dump Station
6. RAS and WAS Pump Station
7. MLSS Structure
8. Secondary Process / Biolac Basins
9. Influent Splitter Box
10. Headworks Fine Screen / Grit Removal
11. Coarse Screen Headworks
12. South Lagoon
13. Storage and Lab