

**Riverfront Water Reclamation Facility**  
**Aquifer Protection Permit #511220**  
**Place ID #143789, LTF #66121**  
**SIGNIFICANT AMENDMENT**

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. This document gives pertinent information concerning the issuance of the permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). The purpose of BADCT is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology); to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer; or to prevent pollutants from reaching the aquifer.

## I. FACILITY INFORMATION

### Name and Location

Name of Permittee:	City of Cottonwood
Mailing Address:	1480 W Mingus Avenue Cottonwood, AZ 86326
Facility Name and Location:	Riverfront Water Reclamation Facility 1083 East Riverfront Drive Cottonwood, Arizona, 86326

### Regulatory Status

This significant amendment application was received on May, 16, 2018. An Individual APP was issued on April 27, 2017 to construct a new 0.3 mgd wastewater treatment plant.

### Facility Description

The permittee is authorized to operate Riverfront WRF, a scalping plant with an average monthly flow of 0.3 million gallons per day (mgd). The treatment plant consists of headworks with a rotating belt screen, a manually cleaned bar screen and a compactor, an Aero-Mod biological treatment system including a selector tank, two trains of aeration basins and clarifiers, a sand

filter, post equalization tank, two UV disinfection units, a reclaimed water pump station and a 500,000 gallon reclaimed water storage tank.

The treatment plant will have nitrification-de-nitrification capability using Aero-Mod treatment system. The solids from screenings will be hauled off-site for disposal in accordance with state and federal regulations. Waste activated sludge will be removed from the treatment plant by pumping mixed liquor suspended solids from the aeration basins and will be discharged to the City of Cottonwood WWTP #101434 via lift station #3 for further treatment.

The WRF produces reclaimed water meeting Class A+ Reclaimed Water Standards (A.A.C. R18-11, Article 3). The WRF will also be equipped with a chemical feed system. Effluent will be used for beneficial purposes under a valid reclaimed water permit (A.A.C. R18-9 Article 7) or will be recharged through an injection well (IW-1) located at the Fairground Park.

In addition to the APP conditions pertaining to treatment and disposal of sewage sludge, the permittee must also comply with the requirements for any sewage sludge disposal in 40 Code of Federal Regulations (CFR) Part 503 and 18 A.A.C. Ch. 9, Art. 10.

### **Amendment Description**

ADEQ reviewed and approved the following:

- Changed the number of sand filters from two sand filters to one sand filter.
- Changed the location of the injection well from the facility site to the Fairgrounds Park.
- Changed the location of POC #1 and POC# 2 wells.

## **II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY**

The treatment facility shall be designed, constructed, operated, and maintained to meet the treatment performance criteria for new facilities as specified in A.A.C. R18-9-B204. The facility shall meet the performance requirement for industrial pre-treatment as per A.A.C. R18-9-B204(B)(6)(b). The treatment facility shall not exceed a maximum seepage rate of 550 gallons per day per acre for all containment structures within the treatment works.

## **III. HYDROGEOLOGIC SETTING**

The Riverfront WRF is located within the Verde Valley and is underlain by a sequence of nearly horizontal sedimentary rocks which are overlain in places by volcanic rocks and alluvium. Rock units in the Verde Valley are grouped by age into four major groups: Precambrian rocks, Paleozoic rocks, Tertiary and Quaternary rocks and Tertiary and Quaternary basin-fill alluvium. The regional aquifer is comprised of the alluvium along the Verde River, the Verde Formation, Coconino Sandstone, Schnebly Hill Formation, Supai Group, Redwall Limestone and Tapeats Sandstone. The rock units of the regional aquifer are hydraulically connected and groundwater flows from one unit to the next as it moves down-gradient.

The lithology at the Fairground Injection Well location based upon information obtained during drilling of the POC well location is as follows:

- 0-30 feet – Gravel with Sand and Silt (unconsolidated) Gravel and Sand are sub-rounded to sub-angular and polyolithic in composition. Gravel is poorly sorted, sand is fine to very-coarse. Fines consist of primarily silt.
- 30-130 feet – Gravelly Sand Clay/Silt (unconsolidated) Gravel is poorly sorted up to 7 mm, angular to sub-rounded, and polyolithic. Sand is moderately sorted, medium to fine grained, angular to sub-rounded, and polyolithic. Fines are primarily silt.
- 130-150 feet – Gravel with Sand (unconsolidated) Gravel is up to 3 mm and well sorted, angular to sub-rounded, and polyolithic. Sand is well sorted, primarily coarse, angular to sub-rounded, and polyolithic.
- 150-800 feet – Verde Formation (consolidated) consists of inter-bedded lacustrine deposits of clay, sandstone, shale, siltstone, and marlstone.

Most of the groundwater is obtained from the limestone and sandstone facies. The groundwater flow direction near the Riverfront WRF generally flows southeast, in a parallel direction to flow in the Verde River. The depth to groundwater is approximately 21.5 feet below land surface (ft bls).

Information on the injection well is as follows:

<b>Injection Well</b>	<b>ADWR Number</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Open Hole Interval (ft bls)</b>
Fairgrounds Park Injection Well (IW)	55-227884	34° 44' 01.74" N	112° 00' 57.10" W	260 to 800

**Pollutant Management Area (PMA)**

The Pollutant Management Area (PMA) for the Fairgrounds Park IW will be the area around the recharge wellhead. The PMA is located entirely within Yavapai County Parcel 406- 42-097C which is owned by the City of Cottonwood.

**Discharge Impact Area (DIA)**

The Discharge Impact Area (DIA) is defined by statute as “the potential aerial extent of pollutant migration...as a result of a discharge from a facility” (Arizona Revised Statutes §49- 201.14). A DIA analysis was performed using the following equation for horizontal linear velocity:

$$v = (K * i) / n_e$$

Where K is the hydraulic conductivity in feet per day (ft/day), *i* is the hydraulic gradient expressed as a fraction, and *n<sub>e</sub>* is the effective porosity expressed as a percent. The effective porosity differs from the total porosity in that it only accounts for interconnected pores that contribute to groundwater flow. The following values were used in the DIA calculation:

- The hydraulic conductivity is about 2.1 ft/day based on aquifer test results from the Fairgrounds Park Injection Well,
- The effective porosity is estimated to be 5 percent. This was estimated based upon the materials encountered during the drilling of the test injection well. The lower portion of the borehole is within consolidated materials of the Verde Formation which consists of inter-bedded lacustrine deposits of clay, sandstone, shale, siltstone, and marlstone. Typical porosity values for un-cemented coarse sand range from 26 to 53 percent, and from 25 to 38 percent for fine gravel. Cementation reduces both the overall porosity and effective porosity of a material by filling some of the pore space with cement. An effective porosity for sandstone typically ranges from 1 to 10 percent. The median value of sandstone is 5 percent, this value was used as a conservative estimate of effective porosity at the Fairgrounds Park IW site.
- There is a local groundwater depression to the west of the Fairgrounds Park IW. Because there is a local groundwater elevation low near the Fairgrounds Park IW, simple gradient addition could not be used. Instead, surface grid math was used to determine gradients around the Fairgrounds Park IW to define the DIA. The analytical model grid generated for the mounding analysis was combined with the groundwater elevation grid developed from the 2008-2012 ADWR GWSI database.
- The resulting gradient produces an asymmetric mound around the Fairgrounds Park IW. The component gradient for each cardinal direction (north, south, east, and west) was calculated to determine the maximum range for each.
- The direction of the DIA is to the north, south, east, and west reflecting the local groundwater gradients. The 20-year DIA extends about 1,400 feet to the north, 2,900 feet to the east, 2,180 feet to the southeast, and about 3,400 feet to the southwest.

**Point of Compliance**

POC #1 (FP-POC-1) is a monitor well located near the injection well, IW-1. The POC well is designed to monitor groundwater in the same portion of the aquifer as the injection well and is located based upon a southeast groundwater flow direction. POC #2 is designated as a conceptual POC location downgradient of the WRF.

The POC for this facility is designated at the following location:

POC#	POC Locations	Latitude	Longitude	ADWR #
1 (FP-POC-1)	Downgradient of the Fairgrounds Park Injection Well	34° 43' 59.00" N	112° 00' 55.49" W	55-604220
2 (DMW-1) (Conceptual)	Immediately downgradient of the WRF	34° 44' 45.96" N	112° 00' 52.63" W	55-225185

Groundwater monitoring is required at POC #1 upon permit issuance. The Director may amend this permit to designate additional POCs if information on groundwater gradients or groundwater usage indicates the need.

#### **IV. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS**

##### **Monitoring and Reporting Requirements**

To ensure that site operations do not result in violation of Aquifer Water Quality Standards at the point of compliance, representative samples of the effluent shall be collected from the downstream end of the UV disinfection unit. The permittee shall monitor the effluent daily for *E.coli*, monthly for total nitrogen, quarterly for metals, and semi-annually for VOCs (see Section 4.2, Table IA in the permit).

To ensure that site operations do not result in violation of Reclaimed Water Quality Standards for the beneficial use of Class A+ reclaimed water, the permittee shall monitor the reclaimed water at the same effluent sampling point as indicated above. The permittee shall monitor the reclaimed water daily for *E.coli* and turbidity and monthly for total nitrogen (see Section 4.2, Table IB in the permit).

To ensure that Aquifer Water Quality Standards will be met at the POC in the aquifer, representative samples of the groundwater will be collected from POC #1 and will be sampled monthly for total coliform, total nitrogen, nitrate-nitrite as N, total Kjeldahl nitrogen (TKN), quarterly for metals, and semi-annually for volatile and semi-volatile organic compounds.

Facility inspection and operational monitoring shall be performed on a routine basis (see Section 4.2, Table III in the permit).

#### **V. SURFACE WATER CONSIDERATIONS**

The Verde River is located about 1,400 feet north of the Riverfront WRF. Cottonwood Ditch is located immediately to the south of the Riverfront WRF. The WRF is located in Zone X which is the area outside the 0.2% annual chance floodplain. The WRF site is adjacent to the 100-yr flood zone. The Verde River 500-yr flood elevation at the plant location is 3297.5 ft MSL. The WRF treatment units will be constructed at an elevation of 3300 ft MSL. The WRF is protected from 100-yr flood event.

The Flood Insurance Rate Map (FIRM) for this area prepared by the Federal Emergency Management Agency (FEMA) indicates the new location of the injection well and the POC well are not near the 100-year floodplain.

#### **VI. COMPLIANCE SCHEDULE**

The compliance schedule items included in the permit requires submittal of the installation report for the Injection Well, submittal of installation report for an injection well, the ambient groundwater monitoring for POC #1, submittal an amendment application to set alert levels

(ALs) and aquifer quality limits (AQLs) at POC #1 and commencement of routine groundwater monitoring at POC #1.

## **VII. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT**

### **Technical Capability**

The City of Cottonwood has demonstrated the technical competence necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B).

The permit requires that appropriate documents be sealed by an Arizona-registered Geologist or Professional Engineer. This requirement is a part of an on-going demonstration of technical capability. The permittee is expected to maintain technical capability throughout the life of the facility.

### **Financial Capability**

The City of Cottonwood has demonstrated the financial responsibility necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A203(B)(1) and (2). The estimated dollar amount demonstrated for financial capability is \$271,292. The permittee is expected to maintain financial capability throughout the life of the facility.

### **Zoning Requirements**

The Riverfront WRF has been properly zoned for the permitted use and the permittee has complied with applicable zoning ordinances in accordance with A.R.S. § 49-243(O) and A.A.C. R18-9-A201(B)(3).

## **VIII. ADMINISTRATIVE INFORMATION**

### **Public Notice (A.A.C. R18-9-108(A))**

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft permit or other significant action with respect to a permit or application. The aquifer protection program rules require that permits be public noticed in a newspaper of general circulation within the area affected by the facility or activity and provide a minimum of 30 calendar days for interested parties to respond in writing to ADEQ. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit application or permit.

### **Public Comment Period (A.A.C. R18-9-109(A))**

The Department shall accept written comments from the public prior to granting the significant amendment. The written public comment period begins on the publication date of the public

notice and extends for 30 calendar days. After the closing of the public comment period, ADEQ is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

### **Public Hearing (A.A.C R18-9-109(B))**

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if the Director determines there is a significant amount of interest expressed during the 30-day public comment period, or if significant new issues arise that were not considered during the permitting process.

A public hearing was deemed to be unnecessary for this permit application.

### **IX. ADDITIONAL INFORMATION**

Additional information relating to this permit may be obtained from:

Arizona Department of Environmental Quality  
Water Quality Division - APP Unit  
Attn: Monica Phillips  
1110 W. Washington Street, Mail Code 5415B-3  
Phoenix, Arizona 85007  
Phone: (602) 771-4465