

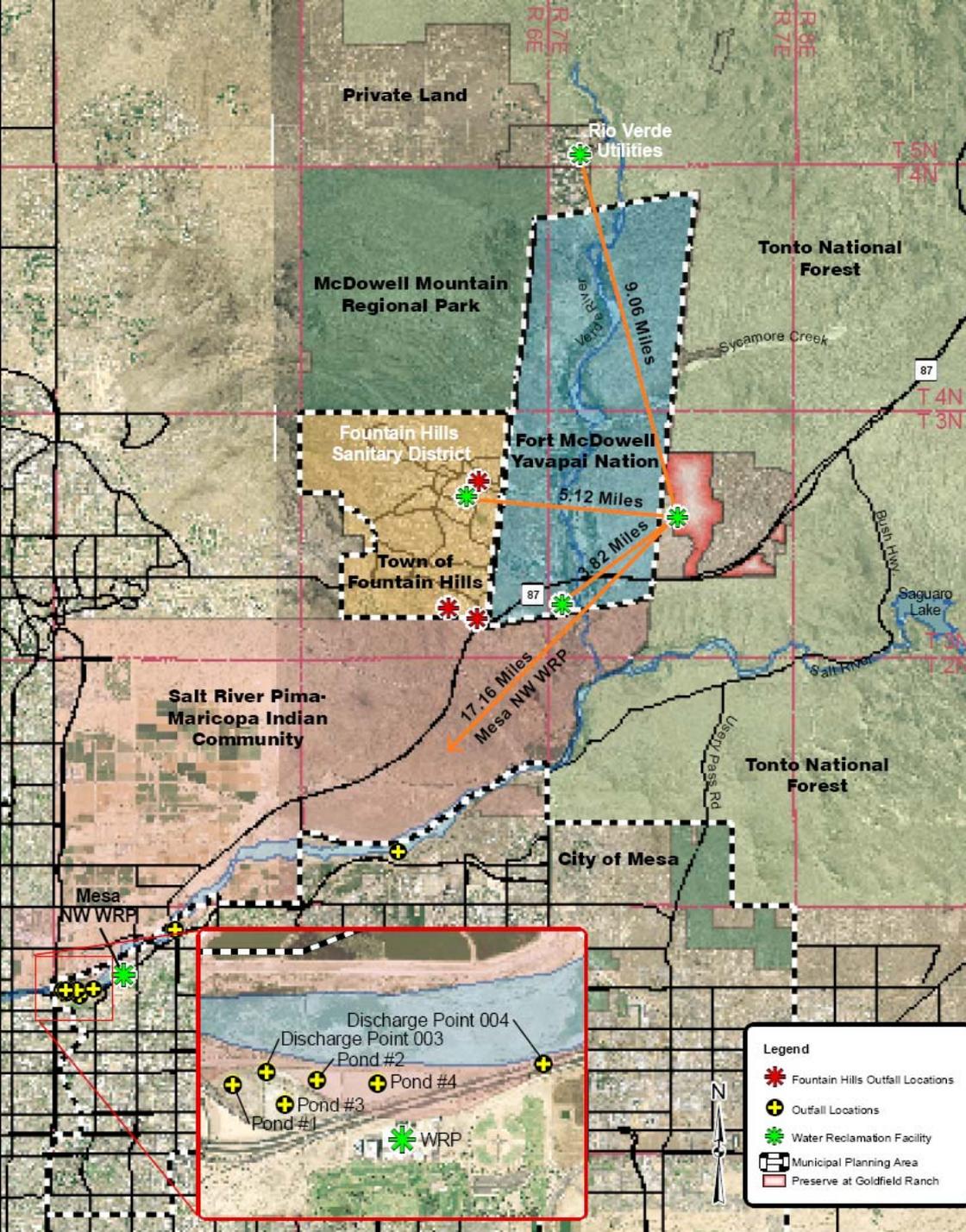


MAG 208 Water Quality Management Plan  
Small Plant Review and Approval  
for

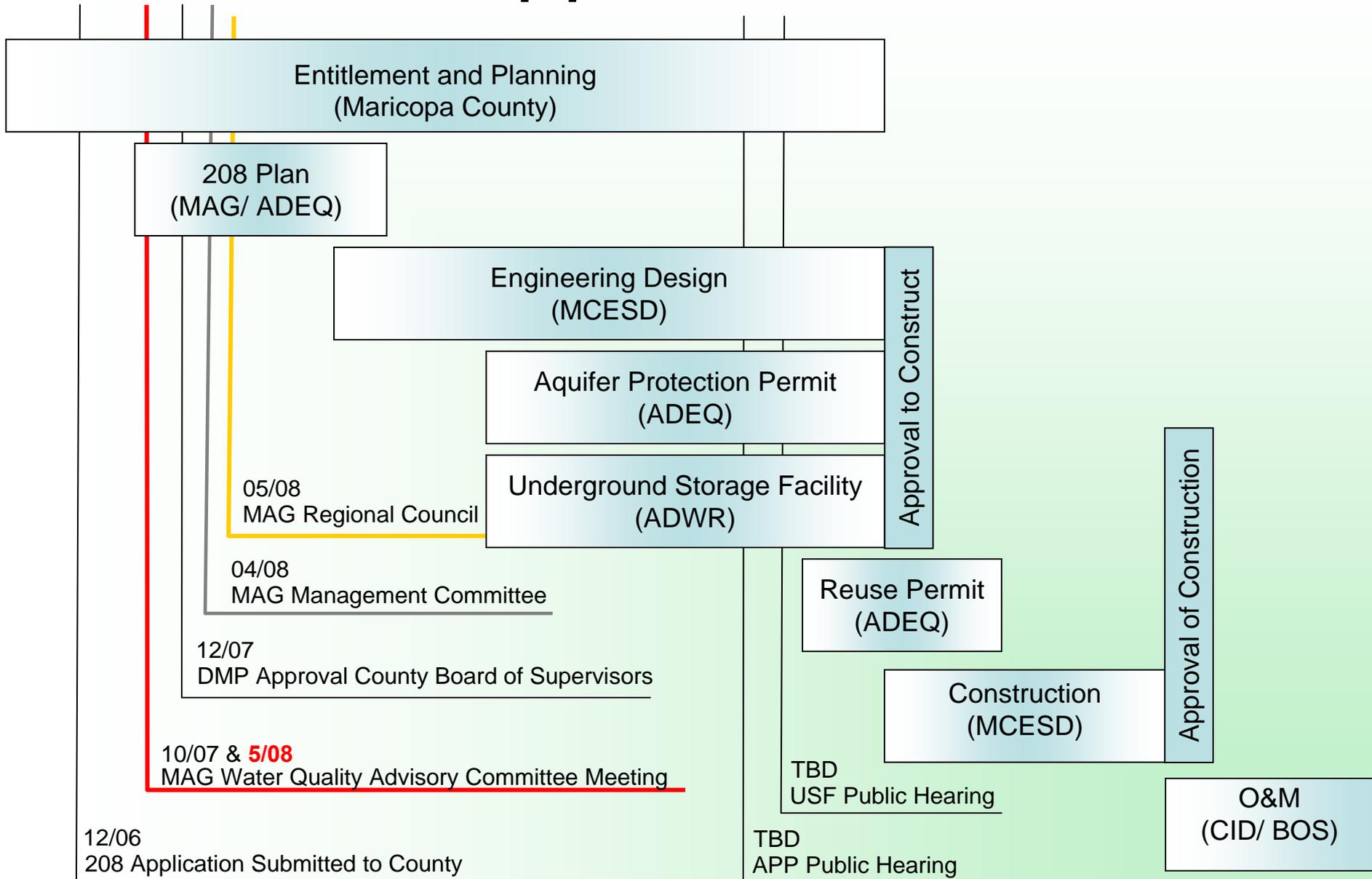
# The Preserve at Goldfield Ranch Water Reclamation Facility

May 22, 2008

# Expanded Proximity Map



# WRF Approval Process



# HDR Report **Issue** & **Response**

## **1.3.4 Potential Water Quality Impacts from Injection**

**Issue:** The SRP-MIC Report suggests that a hydrological connection may exist between two aquifers in the region. And, if such a connection exists, the production of Class A+ effluent water would not be sufficient to satisfy SRP-MIC concerns related to artificial recharge.

### **Response:**

- Although not required to do so, we commit to meet water quality standards for discharge to this segment of the Verde River (AAC R18-11-123).

# HDR Report **Issue** & **Response**

## 1.3.1 Plant Location and Local Features

**Issue:** Unimpeded wastewater overflows from the proposed plant could reach the river within 6 to 18 hours of plant failure and potential failure of the power source to the proposed lift stations.

Response:

- As a part of the APP process, we are committed to provide appropriate provisions of:
  - (i) redundant power and retention for the treatment facility and the sewage lifts stations throughout the community.
  - (ii) total plant holding capacity adequate to handle emergency loads equal to two times the average daily operating level of the plant.
- Maricopa County Subdivision Ordinance requires review of all lift station designs and requires a redundant power supply to convey flows.

# Emergency Plan & Redundancy

- Contingency plan required under Aquifer Protection Permit (AAC R18-9-A204)
  - Stormwater management (SWPPP) and Best Management Practices, such as erosion control, dust control, sediment control and good housekeeping/ materials management
  - Monitoring and sampling plan
  - Reporting requirements
  - Catastrophic failure contained onsite
- Redundancy factored into engineering design
  - Design operating capacity will be two times the average day flow
  - Redundant recharge wells
  - Standby generator

# HDR Report **Issue** & **Response**

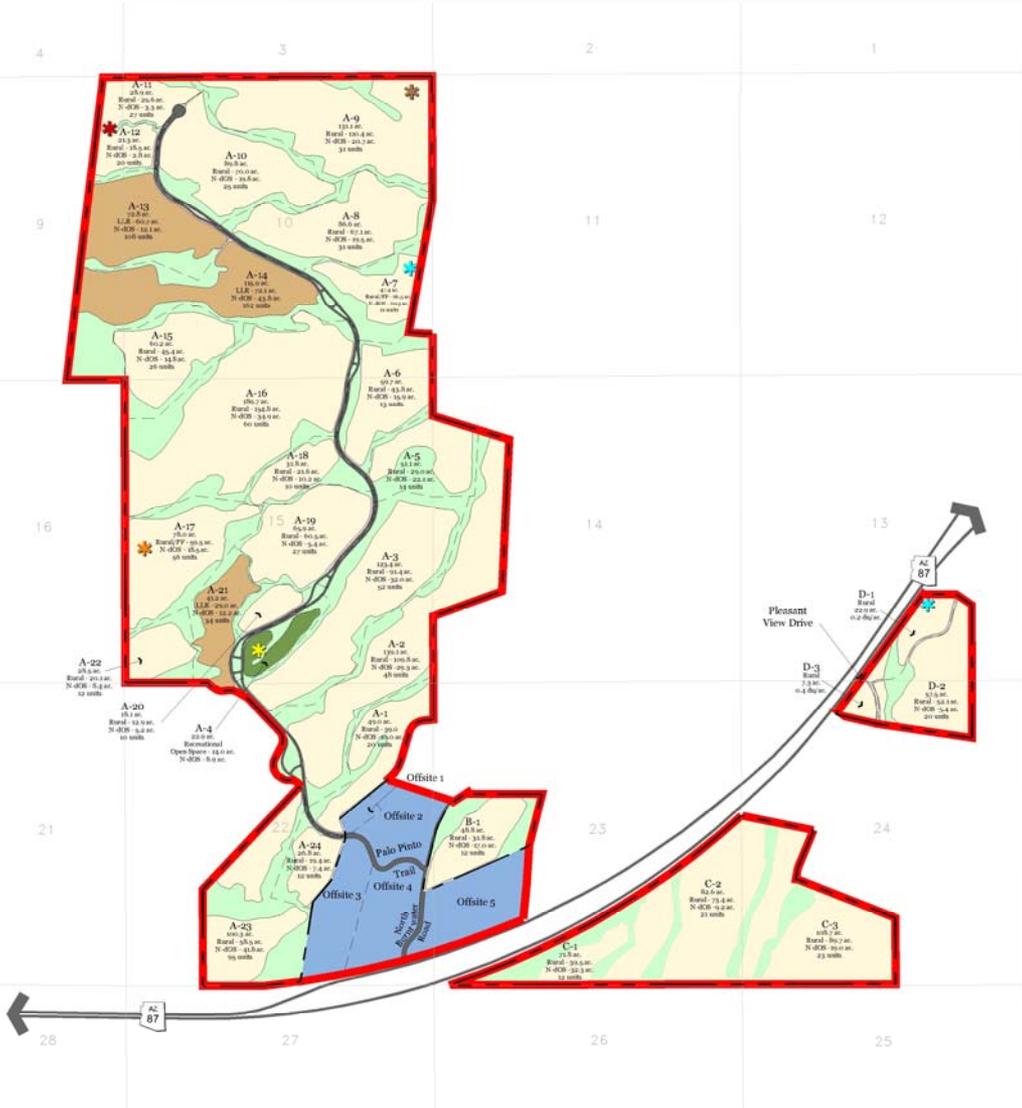
## **1.3.2. Service Area**

**Issue:** The SRP-MIC Report suggests the 208 Amendment Service Area may be eligible for expansion to serve the regional wastewater treatment needs of additional development within the entire area.

**Response:**

- The Service Area of the 208 Amendment will be expanded to include Parcels C and D.
- There is sufficient property both within and surrounding the plant site to accommodate an expansion.

# Responsive Modifications



- Increase in service area from 1,680 acres to 2,253 acres
- Population served of 3,392 persons
- Maximum WRF capacity of 0.4 MGD sufficient
- Effluent recharge and reuse to the maximum extent feasible

# Responsive Modifications

<b>Document</b>	<b>Gross Area (acres)</b>	<b>Dwelling Units</b>	<b>Population</b>	<b>Average Day Flow (MGD)</b>
MAG 208 Plan Amendment (October 2007)	1,679.6 (Parcel A only)	983 (with potential spa/resort)	3,146	0.392 (based on 100 gpcd* and gross acreage)
MAG 208 Plan Amendment (March 2008)	1,902.1 (Parcels A & B and offsite areas)	1,026 (with potential spa/resort)	3,283	0.367 (based on 100 gpcd* and net acreage)
MAG 208 Plan Amendment (May 2008)	2,252.9 (Parcels A, B, C & D and offsite areas)	1,060 (with potential spa/resort)	3,392	0.377 (based on 100 gpcd* and net acreage)

\* 80 gallons per capita per day (gpcd) used for pipeline design per AAC

\* 100 gpcd used for treatment plant design per County requirements

# HDR Report Issue & Response

## 1.3.3 On-Site Treatment

**Issue:** The SRP-MIC Report suggests that there is a high likelihood of the development of commercial property along Hwy 87 within the Parcels C and D and there is concern that such commercial property would be served by septic systems.

### Response:

- As referenced in the response to Issue 1.3.2, we have committed to include Parcels C and D within the 208 Amendment Service Area.
- Commercial uses are limited by the approved Amendment to the Development Master Plan.
- Maricopa County does not allow for the development of any commercial property on septic systems.

# HDR Report Issue & Response

## 1.3.5 Owner/Operator Financial Capability

Issue: The SRP-MIC Report suggests that the on-going operation and maintenance of the plant and related infrastructure will be “relatively expensive for a CID”. The SRP-MIC Report further acknowledges that while the Developer is responsible to supplement the financial security of the CID, the length of time for such an obligation has not been provided.

### Response:

- The Maricopa County Board of Supervisors, serving as the Board of Directors for the CID, will require financial assurances and supplements necessary to sustain operation and maintenance on an on-going basis.
- An operator will be hired who has proven experience associated with our treatment and injection recharge systems and will live within 3 hours of the plant site per the Maricopa County Health Code.

# 208 Small Plant Criteria for Technical Sufficiency

## Section 4.5.2(2) – Outside of Municipal Planning Area:

*To be approved for construction, a small wastewater treatment plant (2.0 MGD ultimate capacity or less) not otherwise mentioned in the MAG 208 Plan and located outside a Municipal Small Plant Planning Area must:*

- 1. Have the review and comment of any municipality whose Small Plant Planning Area is within three miles of the proposed plant location or service area;*
- 2. Not adversely affect the operation or financial structure of existing or proposed wastewater treatment plants;*
- 3. Be consistent with State and County regulations and other requirements;*
- 4. Be otherwise consistent with the MAG 208 Plan; and,*
- 5. Be evaluated and approved, or modified by Maricopa County Environmental Services Department (MCESD).*

*The Preserve*

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G O L D F I E L D R A N C H



Southwest Ground-water  
Consultants, Inc.

# HYDROSYSTEMS (HSI) REPORT

- Author is Steven Skotnicki R.G. – Also author of “Subsurface Geologic Investigation of Fountain Hills and the Lower Verde River Valley, Maricopa County, Arizona” AGS CR-030B
- Four basin-fill units (deepest to shallowest) – pgs 2 & 3
  - Needle Rock Formation (lower aquifer)
  - Pemberton Ranch Formation (aquiclude/confining layer)
  - Younger basin-fill sedimentary deposits (upper aquifer)
  - Quaternary stream/piedmont alluvium (upper aquifer)
- Units are comparable to the UAU, MAU and LAU in the East Salt River Valley basin and other southern AZ basins – pg 3

# HYDROSYSTEMS (HSI) REPORT

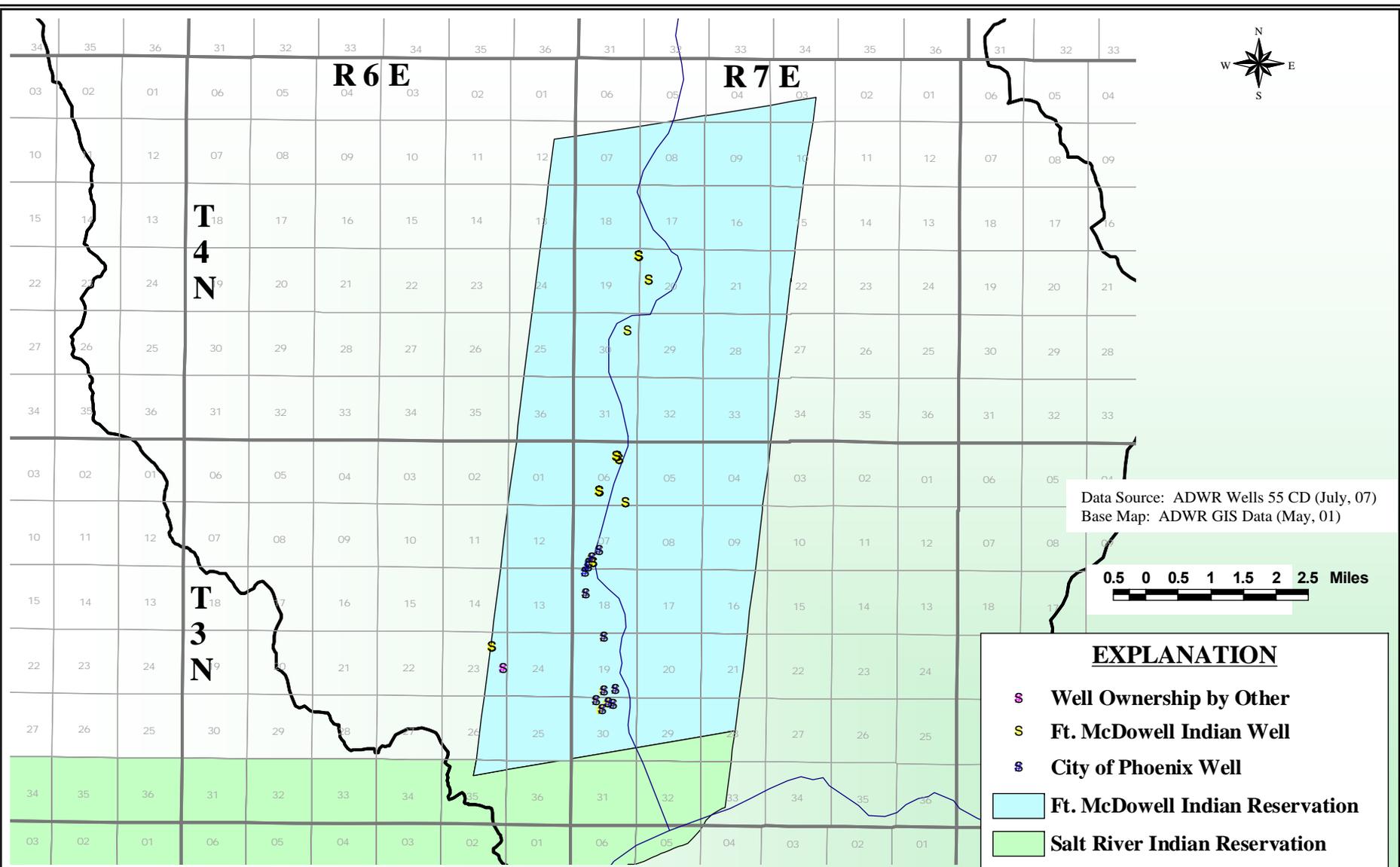
- Pemberton Ranch Formation behaves as an aquiclude and separates the lower and upper aquifer system throughout a large part of the basin, may be absent in the mountain front edges – pgs 2 & 6
- Pumping tests in Fountain Hills and at Goldfield Ranch indicate that the Needle Rock Formation (lower aquifer) is confined – pg 6
- Insufficient good-quality data to map Pemberton Ranch Formation within the study area (Goldfield Ranch) – only 3 wells – pg 7
  - There are now five wells with good-quality logs – all show the presence of the Pemberton Ranch Formation

# HYDROSYSTEMS (HSI) REPORT

- Recommend more drilling, pump testing and geophysical surveys on Goldfield Ranch to better define extent of Pemberton Ranch Formation – pg 8
  - Drilling and testing will be done for APP and USF
- Will storm water and irrigation (reuse) water contaminate the upper aquifer? – *Probably not, fine grained sediments will provide SAT* – pg 9
- Is the Fountain Hills subbasin in hydraulic connection with the East Salt River Valley subbasin (where the SRPMIC water wells are located)? – *No, it is not* – pg 9

# HSI REPORT SUMMARY

- Clay layer (Pemberton Ranch Formation) exists and is widespread, except perhaps near the mountain fronts
- Upper aquifer not likely to be contaminated by runoff or reuse water
- No hydrologic connection between Goldfield Preserve aquifer and SRPMIC water wells



**Southwest Ground-water**



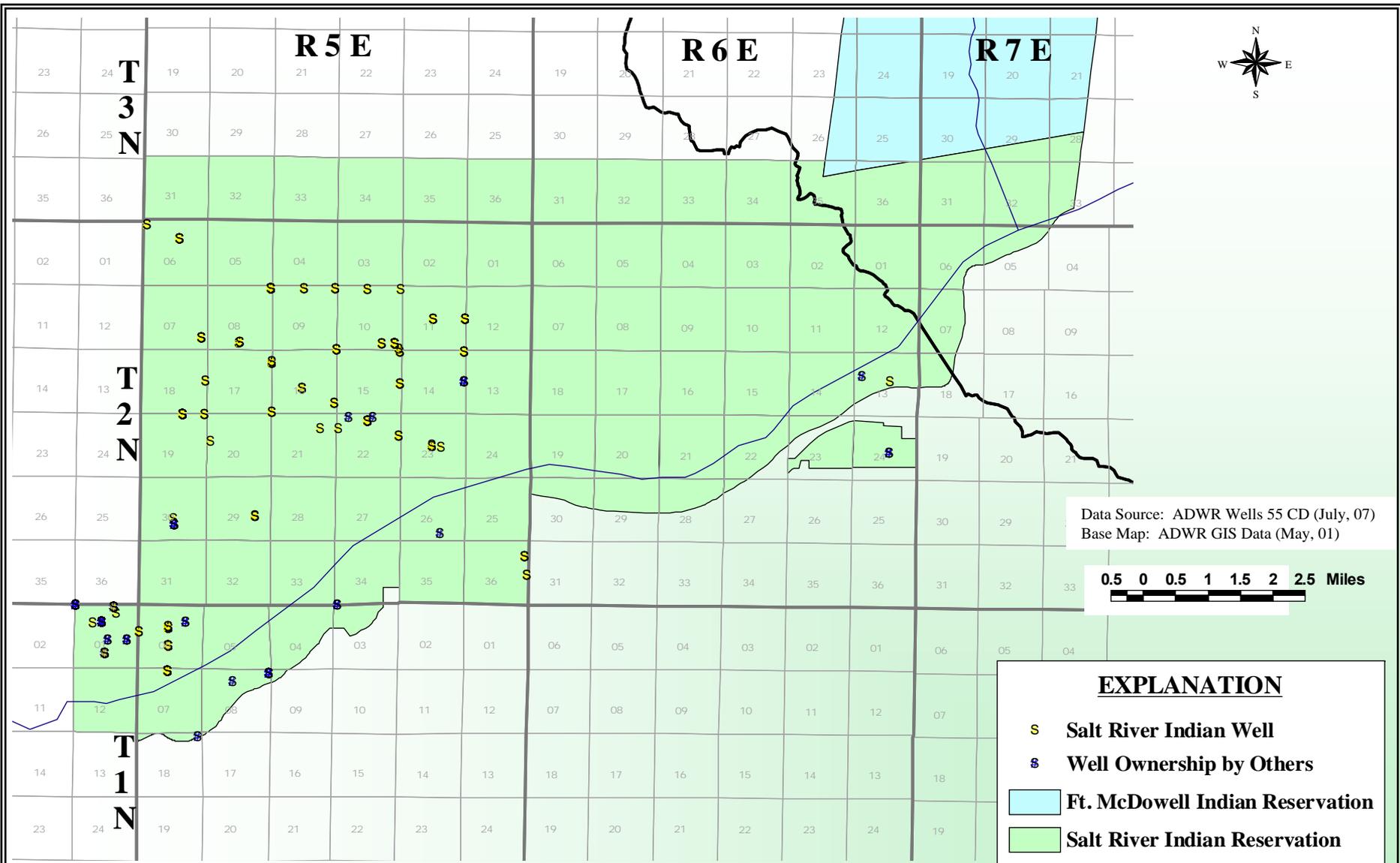
April 29, 2008    Project B.1193

## WELL LOCATION MAP

Ft. McDowell Indian Reservation, Maricopa County, Arizona

**Figure**

**18**



Southwest Ground-water



Consultants, Inc.

April 29, 2008 Project B.1193

## WELL LOCATION MAP

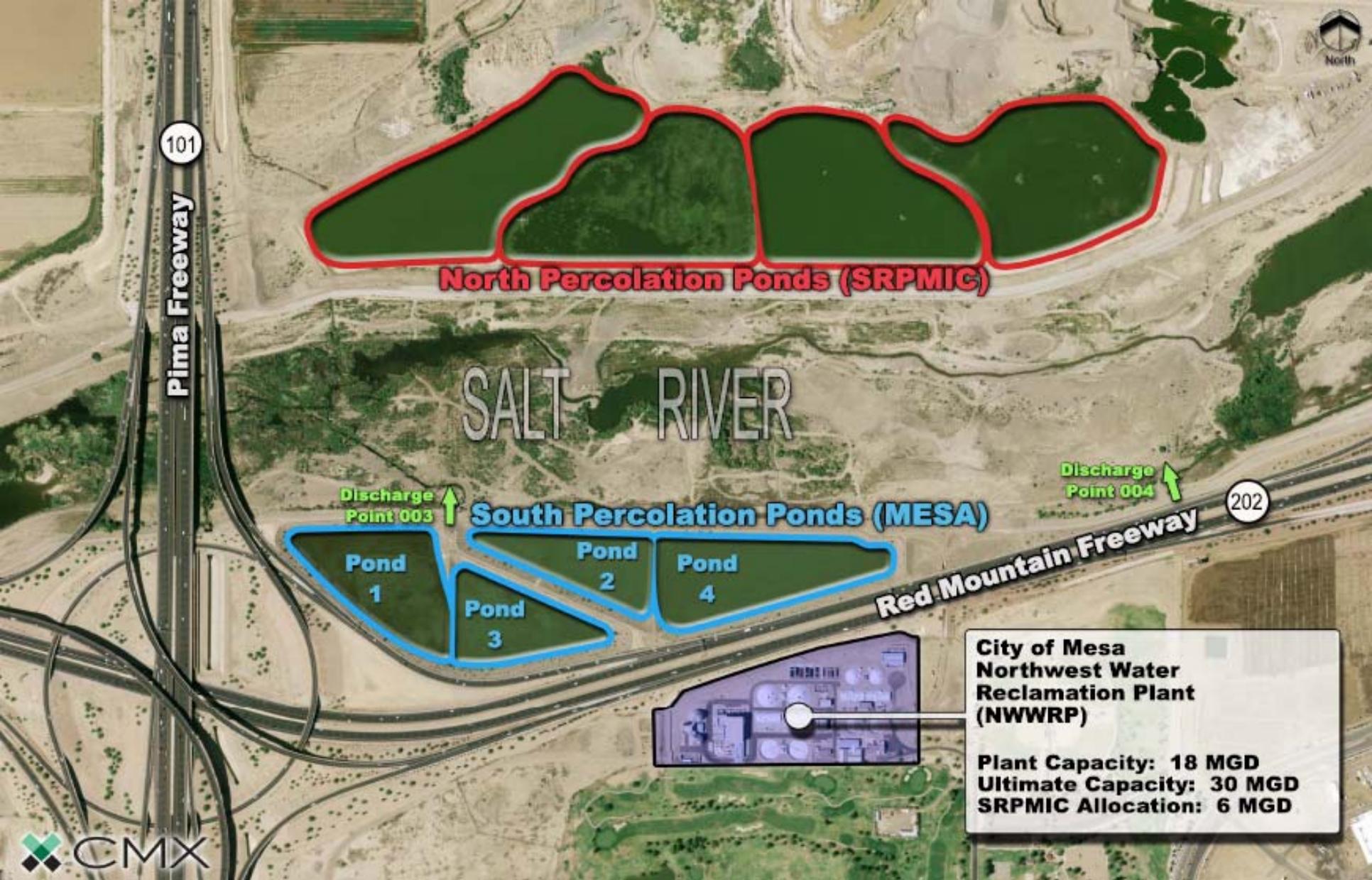
Salt River Indian Reservation, Maricopa County, Arizona

Figure

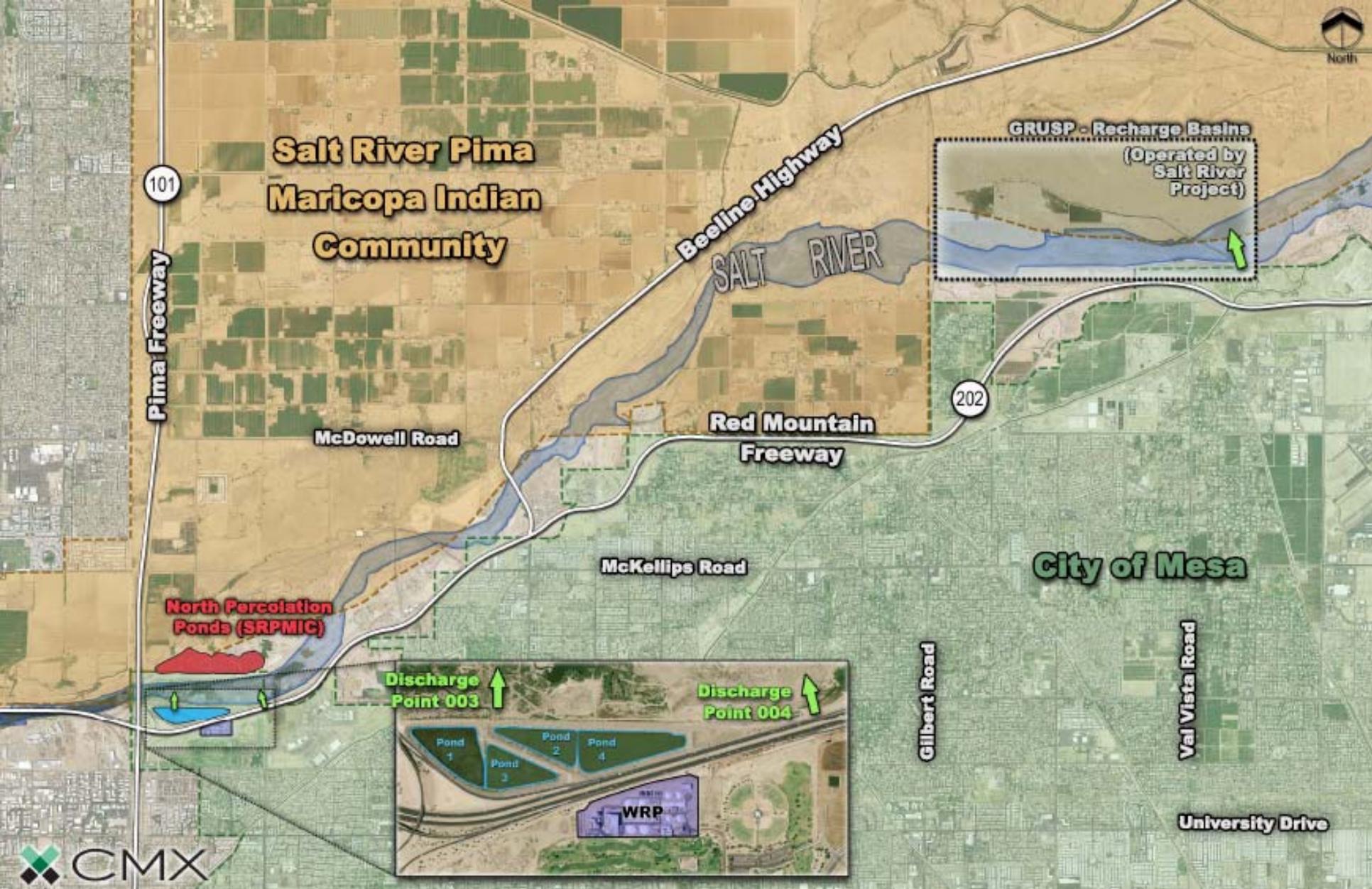
19



# Mesa & SRPMIC Percolation Ponds

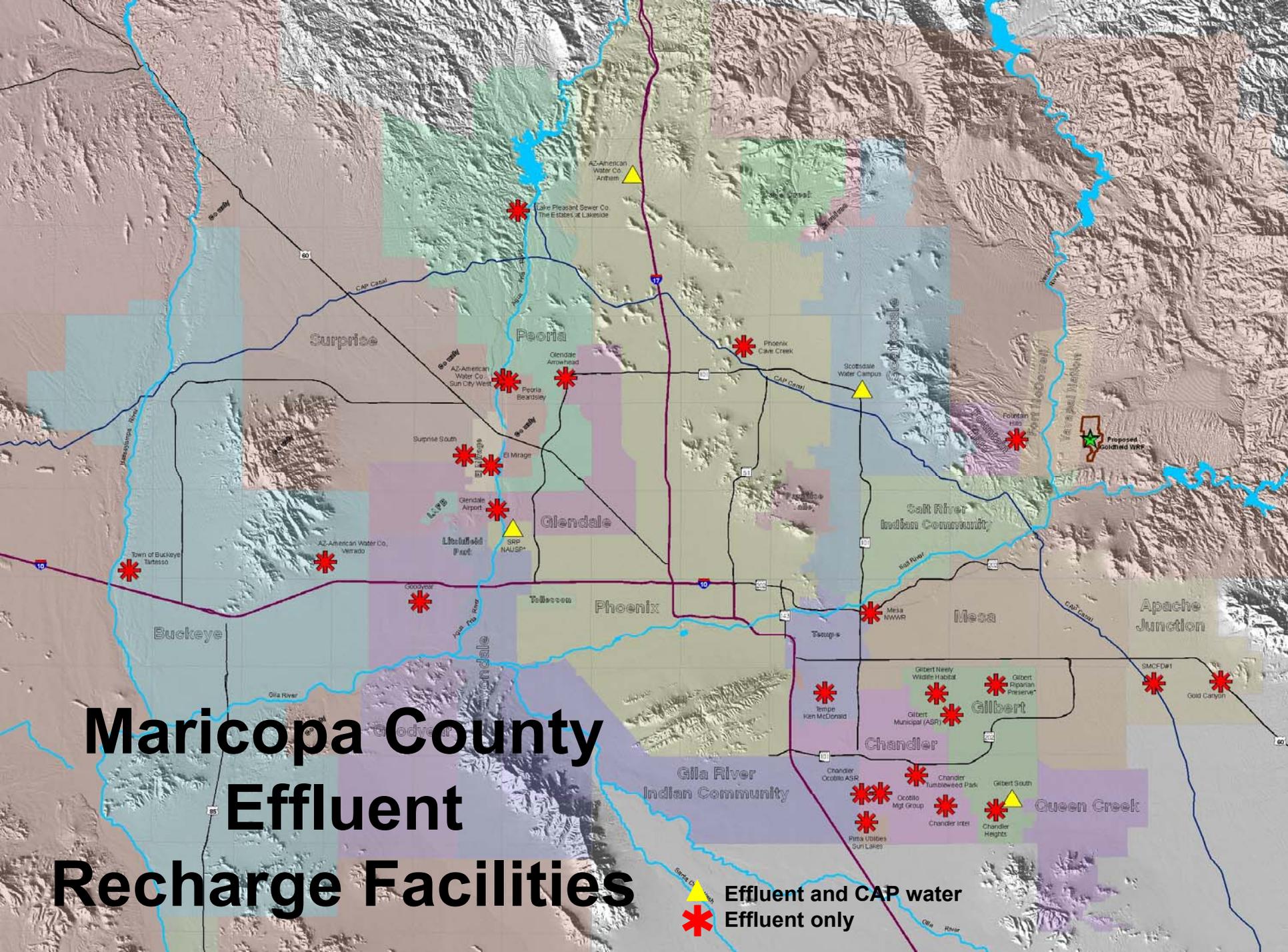


# NWWRP Plant & Percolation Ponds



# GRUSP Recharge Basins

# Maricopa County Effluent Recharge Facilities



 Effluent and CAP water  
 Effluent only

 Proposed Goldfield WRF

 AZ-American Water Co Anthem

 Lake Pleasant Sewer Co The Estates at Lakeside

 Phoenix Cave Creek

 AZ-American Water Co Sun City West

 Scottsdale Water Campus

 Surprise South

 Fountain Hills

 Glendale Airport

 SRP NAUSP

 Town of Buckeye Bartleso

 AZ-American Water Co, Yermado

 Goodyear

 Mesa NWWAR

 Buckeye

 Phoenix

 Apache Junction

 Tempe Ken McDonald

 Gilbert Nerey Wastel Habitat

 Gilbert Piparian Preserve

 Gold Canyon

 Chandler

 Chandler Municipal (ASR)

 Gilbert

 Gila River Indian Community

 Chandler Ocotillo ASR

 Chandler Tumbleweed Park

 Gilbert South

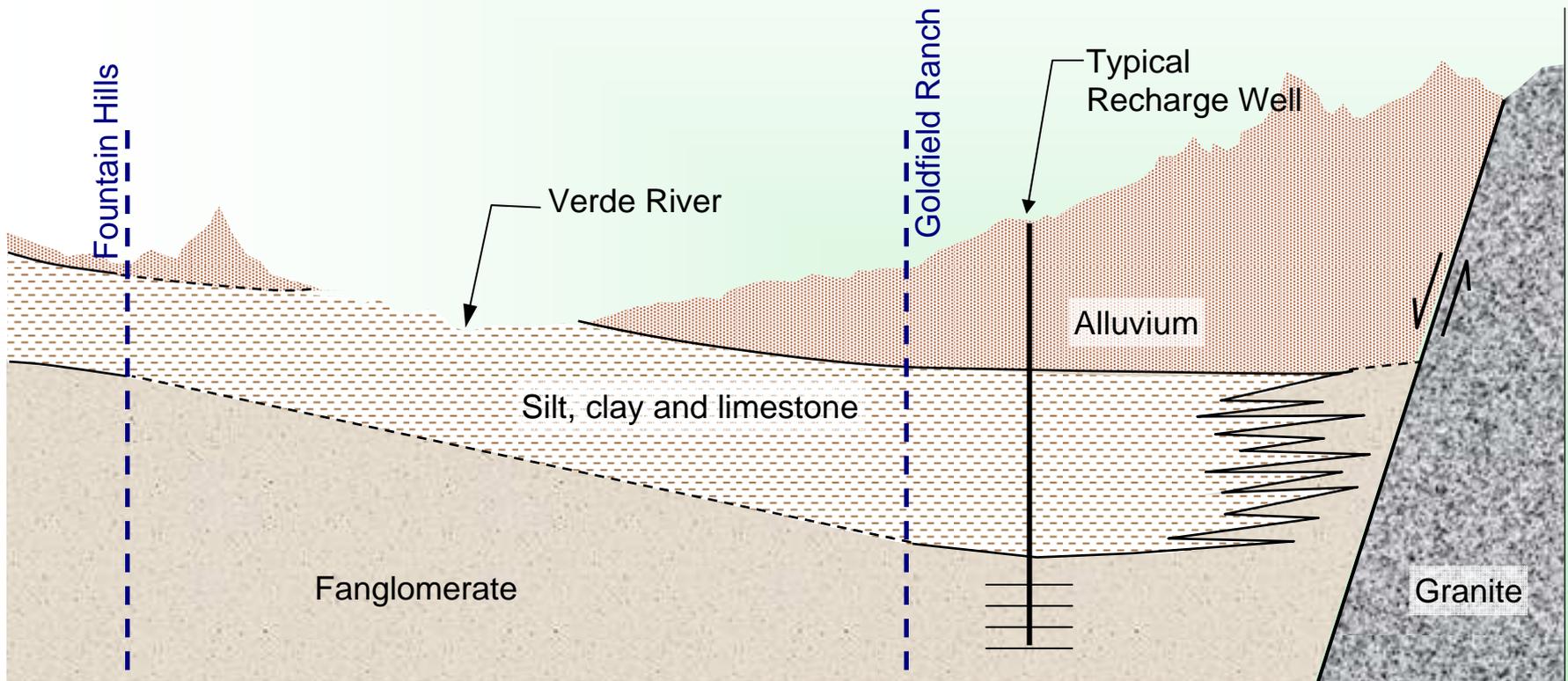
 Pinta Utilities Sun Lakes

 Chandler Inlet

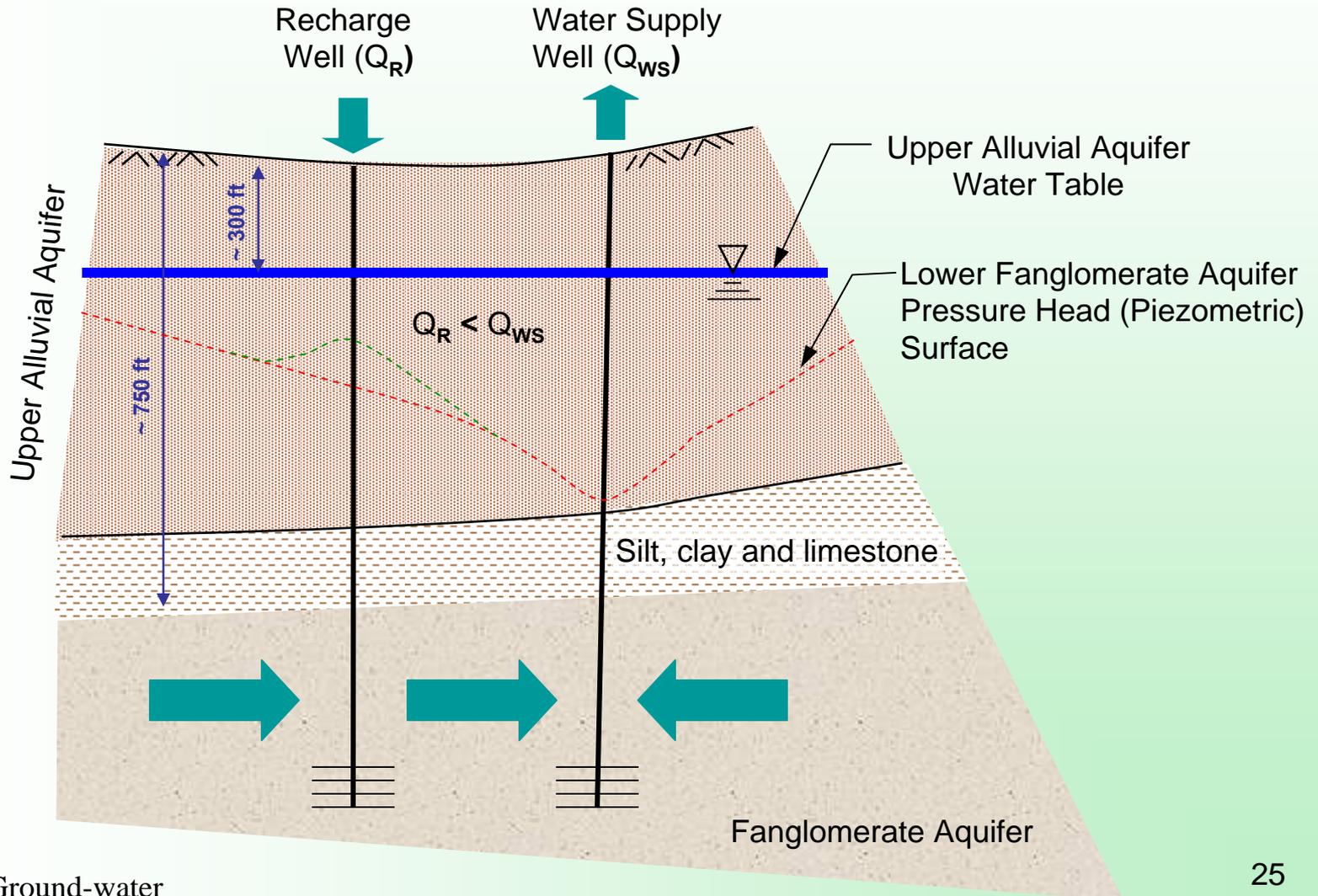
 Chandler Heights

 Queen Creek

# Hydrogeologic Cross-Section



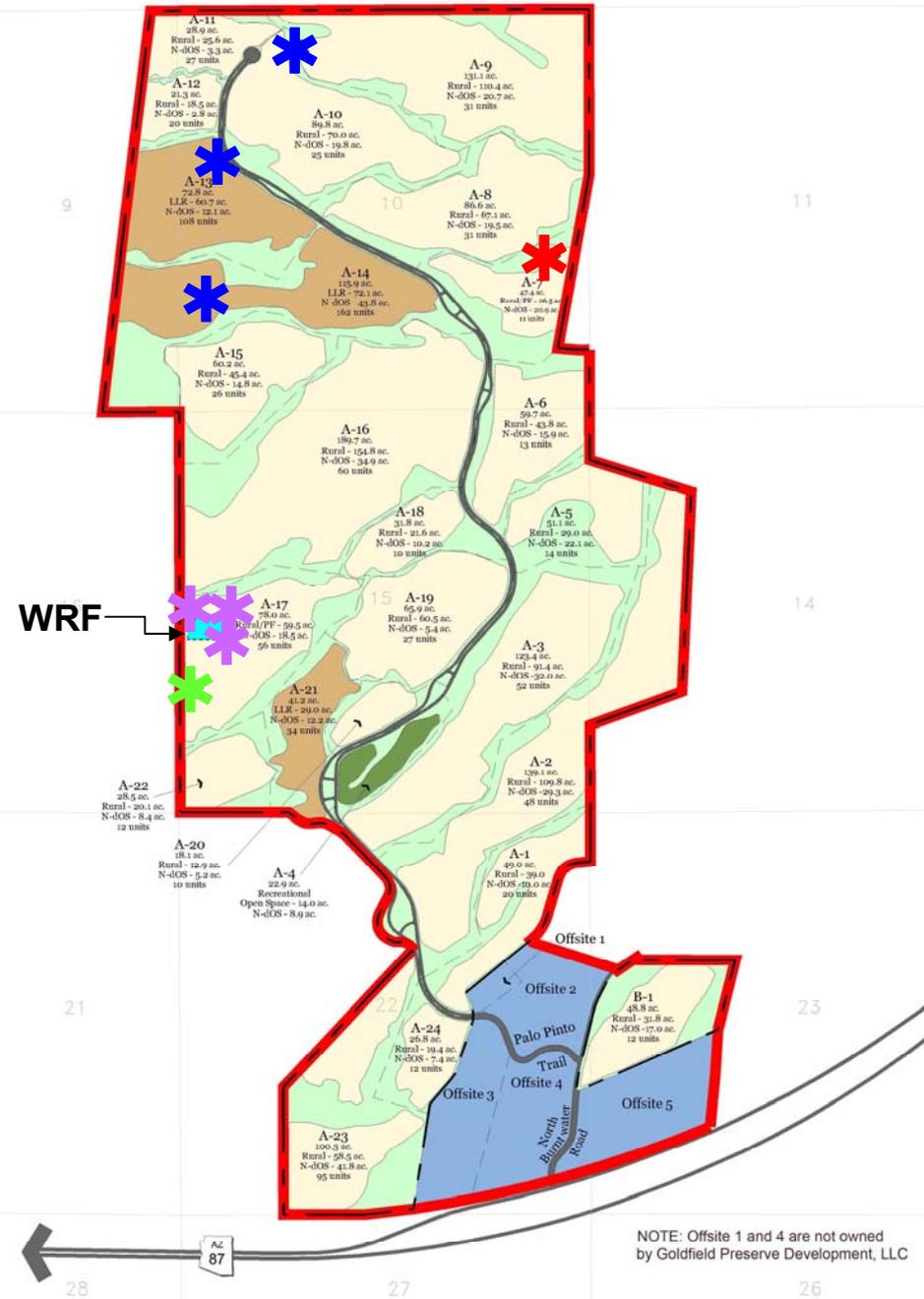
# Recharge and Production Aquifer Cross-Section



# Well Locations

- Separation between recharge wells and water supply wells is approximately 1 mile
- A monitoring well will be installed down-gradient of the recharge wells

-  Groundwater Well Site
-  Monitoring Well Site
-  Recharge Well Site
-  Water Campus

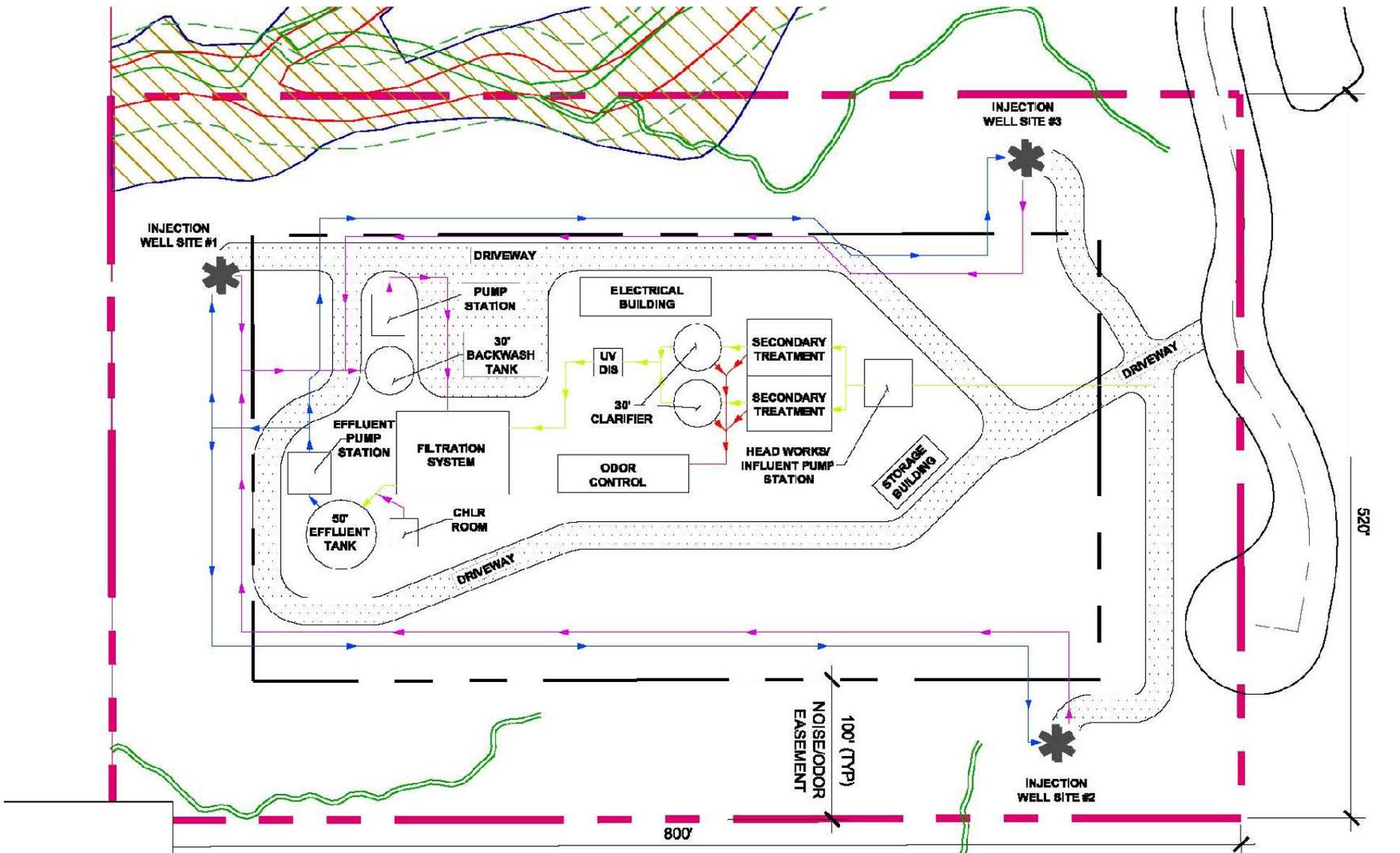


# Groundwater Management Act

## Safe Yield by 2025

[A] groundwater management goal which attempts to achieve and thereafter maintain a long-term balance between the annual amount of groundwater withdrawn in an active management area and the annual amount of natural and artificial recharge in the active management area. ARS §45-561(12).

*Responsible development  
dictates recharge*



# WRF Conceptual Site Plan

# Sludge Treatment

- Alternatives for sludge treatment include:
  - Haul undigested sludge
  - Sludge digesting (equipped with aeration)
  - Sludge thickening (belt press)
  - Regulated by ADEQ under the Aquifer Protection Permit  
(AAC R18-9-1001 *et seq.*)

# Anticipated Commercial Wastewater

- Wastewater flow from potential restaurant less than 1 or 2 percent of total flow to WRF
- Grease trap anticipated as part of WRF design
- Grease trap anticipated at restaurant
- Wastewater flow from potential resort/spa including restaurant less than 13 percent of total flow to WRF
- Removal of detergents part of facility design
- Anticipated influent water quality consistent with MCESD comments due to low flow fixtures

# Comparison of Financial Documentation in Approved 208 Plan Amendments

		<b>Financial Statement Provided</b>	<b>Financial Backing by Municipality</b>	<b>WWTP Construction Funding</b>	<b>WWTP Operation Funding</b>
<b>2002</b>	<b>Quintero Golf and Country Club</b>	No – Text statement indicating developer funding construction	Yes	Developer	City of Peoria (user fees)
<b>2003</b>	<b>Desert Oasis</b>	Yes, but not for entity funding WWTP – Equity Assets \$20,594,000	No	Developer	Arizona-American Water Company (user fees collected by City of Surprise)
<b>2004</b>	<b>Ruth Fisher School WWTP</b>	No – Letter from school indicating sufficient capital	No	Developer	Contracted Certified Operator
<b>2006</b>	<b>Estates at Lakeside</b>	Yes – Equity Assets \$100,000	Yes	Developer	City of Peoria (user fees)
<b>2007</b>	<b>Scorpion Bay WWTP</b>	Yes – Letter from M&I Bank funding 80% of construction	No	Developer	Owner (user fees)
<b>2008</b>	<b>Preserve at Goldfield Ranch WRF</b>	Yes – Equity Assets \$ 4,862,255	No	Developer	Contracted Certified Operator (user fees)

# Comparison of Operation & Maintenance Costs in Approved 208 Plan Amendments

	MAG 208 Plan	WRF Capacity (MGD)	Annual Operation & Maintenance Cost	Cost per gallon
2002	Quintero Golf and Country Club	0.15	\$210 (cited in report as \$1.40/1,000 gallons)	\$0.0014
2003	Desert Oasis	0.35	Not Provided	Unknown
2004	Ruth Fisher School WWTP	0.042	\$93,260	\$0.0061
2006	Estates at Lakeside	0.12	Not Provided	Unknown
2007	Scorpion Bay WWTP	0.035	\$121,500 at Year 5 (buildout)	\$0.0095
2008	Preserve at Goldfield Ranch WRF	0.40	\$250,000-\$300,000	\$0.0017-\$0.0021

Note: The impact of different treatment technologies, location, terrain and presence of existing facilities are not factored into this comparison.

# Mounding & Biological Clogging

## – Mounding

- Premise of USF permit is demonstration of no unreasonable harm
- USF permit application requires mounding analysis to estimate area of potential impact
- Quarterly measurement and reporting of water levels including alert levels
- Mounding is an issue when water levels approach within 10 to 20 feet of the ground surface
- Depth to groundwater is approximately 300 feet
- Recharge will be to lower, confined aquifer

## – Biological clogging

- Minimized through filtration, disinfection and proper operation and maintenance (including backwash)
- Common practice – Fountain Hills, Scottsdale, Chandler, et al. recharge

# Target Effluent Concentrations

	Required Effluent Concentration <small>(AAC Title 18, Chapters 9 and 11)</small>	Design Goal Effluent Concentration
Total suspended solids (TSS), mg/L	30	10
Biological oxygen demand (BOD), mg/L	30	10
Total nitrogen, mg/L as N	10	5
Total phosphorus, mg/L as P	NA	1 (85% efficiency)

# Requirements for Individual Aquifer Protection Permit

- Technical engineering design documents (AAC R18-9-A202)
- Financial capacity demonstration (AAC R18-9-A203)
- Contingency plan (AAC R18-9-A204)
- Alert levels, discharge limitations and acceptable quality levels (AAC R18-9-A205)
- Monitoring requirements (AAC R18-9-A206)
- Reporting requirements (AAC R18-9-A207)
- Compliance schedule (AAC R18-9-A208)
- Temporary cessation, closure and post-closure (AAC R18-9-A209)

# Requirements for Underground Storage Facility Permit

- Technical capability to construct and operate the USF
- Financial capability demonstration
- Hydrological feasibility
- Project will not cause unreasonable harm
- Requires Aquifer Protection Permit
- A.R.S. § 45-811.01(C)

# Requirements of Aquifer Protection Permit – Individual Permits

Slide 1 of 9

- Technical engineering design documents (AAC R18-9-A202)
- Financial capacity demonstration (AAC R18-9-A203)
- Contingency plan (AAC R18-9-A204)
- Alert levels, discharge limitations and acceptable quality levels (AAC R18-9-A205)
- Monitoring requirements (AAC R18-9-A206)
- Reporting requirements (AAC R18-9-A207)
- Compliance schedule (AAC R18-9-A208)
- Temporary cessation, closure and post-closure (AAC R18-9-A209)

# APP Technical Requirements

(AAC R18-9-A202)

Slide 2 of 9

- Topographic map
- Facility site plan
- Facility design documents
- Proposed facility discharge activities
- Best Available Demonstrated Control Technology (BADCT)
- Contingency plan
- Hydrogeologic study – define discharge impact area
- Alert levels, discharge limitations, monitoring requirements, compliance schedules and temporary cessation
- Closure and post-closure plans
- Additional information as required by ADEQ

# APP Financial Requirements

(AAC R18-9-A203)

Slide 3 of 9

- Financial capability for:
  - Construction
  - Operation and maintenance
  - Closure
  - Post-closure care
- Proof of financial assurance mechanism
- Permit amendment required if financial assurance changes
- Maintain recordkeeping

# APP Contingency Plan Requirements

(AAC R18-9-A204)

Slide 4 of 9

- Contingency plan includes:
  - Actions to be taken if a discharge violation occurs
  - 24-hour emergency response measures
  - Name of emergency response coordinator
  - Contact persons
  - Procedures, personnel and equipment to mitigate unauthorized discharges

# APP Alert Levels, Discharge Limitations and Acceptable Quality Levels

(AAC R18-9-A205)

Slide 5 of 9

- ADEQ prescribes:
  - Aquifer Water Quality Standards
  - Acceptable Quality Levels
  - Discharge limitations
  - Permit conditions
  - Alert levels
  - No endangerment to the public health or environment

# APP Monitoring Requirements

(AAC R18-9-A206)

Slide 6 of 9

- Monitoring requirements to be determined by ADEQ
- In depth recordkeeping of each sample
- Monitoring record for each measurement made
- Maintain monitoring records for a minimum of 10 years

# APP Reporting Requirements

(AAC R18-9-A207)

Slide 7 of 9

- Notification – within 5 days of any permit violation
- Written report to ADEQ – within 30 days
- Notification – within 5 days of bankruptcy or other federal or state environmental violations

# APP Compliance Schedule Requirements

(AAC R18-9-A208)

Slide 8 of 9

- Compliance schedule considers:
  - Character and impact of discharge
  - Nature of construction
  - Number of persons potentially affected by discharge
  - Current state of treatment facility
  - Age of the facility

# APP Temporary Cessation, Closure and Post-closure Requirements

(AAC R18-9-A209)

Slide 9 of 9

- Temporary Cessation
  - Notify ADEQ before cessation of 60 days or more
  - Conditions specified
- Closure
  - Notify ADEQ of intent to cease operations
  - Extensive closure plan
- Post-Closure
  - Detailed post-closure monitoring and maintenance plan

# Requirements of Underground Storage Facility Permit

Slide 1 of 8

- USF Site and Facility Characteristics (Section III-B)
- Unreasonable Harm and Hydrologic Feasibility Analysis (Section III-C)
- Technical Capability (Section III-D)
- Financial Capability (Section III-E)
- Legal Access (Section III-F)

# USF Site and Facility Characteristics

(Section III-B)

Slide 2 of 8

- USF site characteristics
  - Narrative description
  - Regional map
  - Location site map
- Facility characteristics
  - Description of wells
  - Description of recharge basins
  - Description of trenches
  - Description of managed and constructed in-channel recharge
  - Define multiple use project, if necessary
  - Description of source water and delivery system
  - Facility map
  - Description of design contingencies

# USF Site and Facility Characteristics

(Section III-B) continued

Slide 3 of 8

- Geology
  - Geologic characteristics
  - Subsurface geology
  - Available geologic and well driller logs within 1 mile of the site
  - Geophysical logs and boring logs
- Hydrogeology
  - Demonstrate aquifer underlying the recharge site
  - Vertical and horizontal extent, thickness and lithology
  - Vadose zone vertical and horizontal extent, thickness, lithology and potential perching units
  - Current water levels
  - Water level changes – current and historic

# USF Unreasonable Harm and Hydrologic Feasibility Analysis

(Section III-C)

Slide 4 of 8

- Maximum area of impact and mounding analysis
  - Calculate the maximum area of impact of a one-foot water level rise
  - Perform mounding analysis of the maximum water storage volume
  - Graph anticipated rate of groundwater rise
  - Map one-foot water level rise
  - Narrative supporting maximum area of impact and mounding analysis
- Land and water use inventory
  - Inventory wells within one mile
  - Inventory of structures, land uses, conditions and facilities within the maximum area of impact
- Water quality
  - Project required to comply with APP permit

# USF Unreasonable Harm and Hydrologic Feasibility Analysis

(Section III-C) continued

Slide 5 of 8

- Unreasonable harm analysis
  - USF design, construction and operation
  - Demonstrate that the maximum amount of water that could be in storage at any one time will not cause unreasonable harm to the land or other water users
  - Water storage at the USF governed by an APP and will not cause or contribute to a violation of state aquifer water quality standards
- Hydrologic feasibility
  - Facility designed, maintained, monitored and operated for optimal recharge efficiency
  - No insurmountable barriers to recharge
  - Storage of the maximum amount of water that could be in storage at anyone time is hydraulically feasible

# USF Unreasonable Harm and Hydrologic Feasibility Analysis

(Section III-C) continued

Slide 6 of 8

- Monitoring plan
  - Monitor wells
  - Measure water levels and water quality (both source water and groundwater)
  - Alert levels indicate need for a quick response to avoid the potential for unreasonable harm
  - Operational prohibition limit above alert level indicates that recharge activity must stop
  - Action plan for alert levels and operational prohibition limits for both water levels and water quality
  - Water quality monitoring plan
- Operation and maintenance plan

# USF Technical Capability

(Section III-D)

Slide 7 of 8

- Demonstration of technical expertise:
  - Licenses, certifications and resumes for persons principally responsible for USF construction and operation

# USF Financial Capability

(Section III-E)

Slide 8 of 8

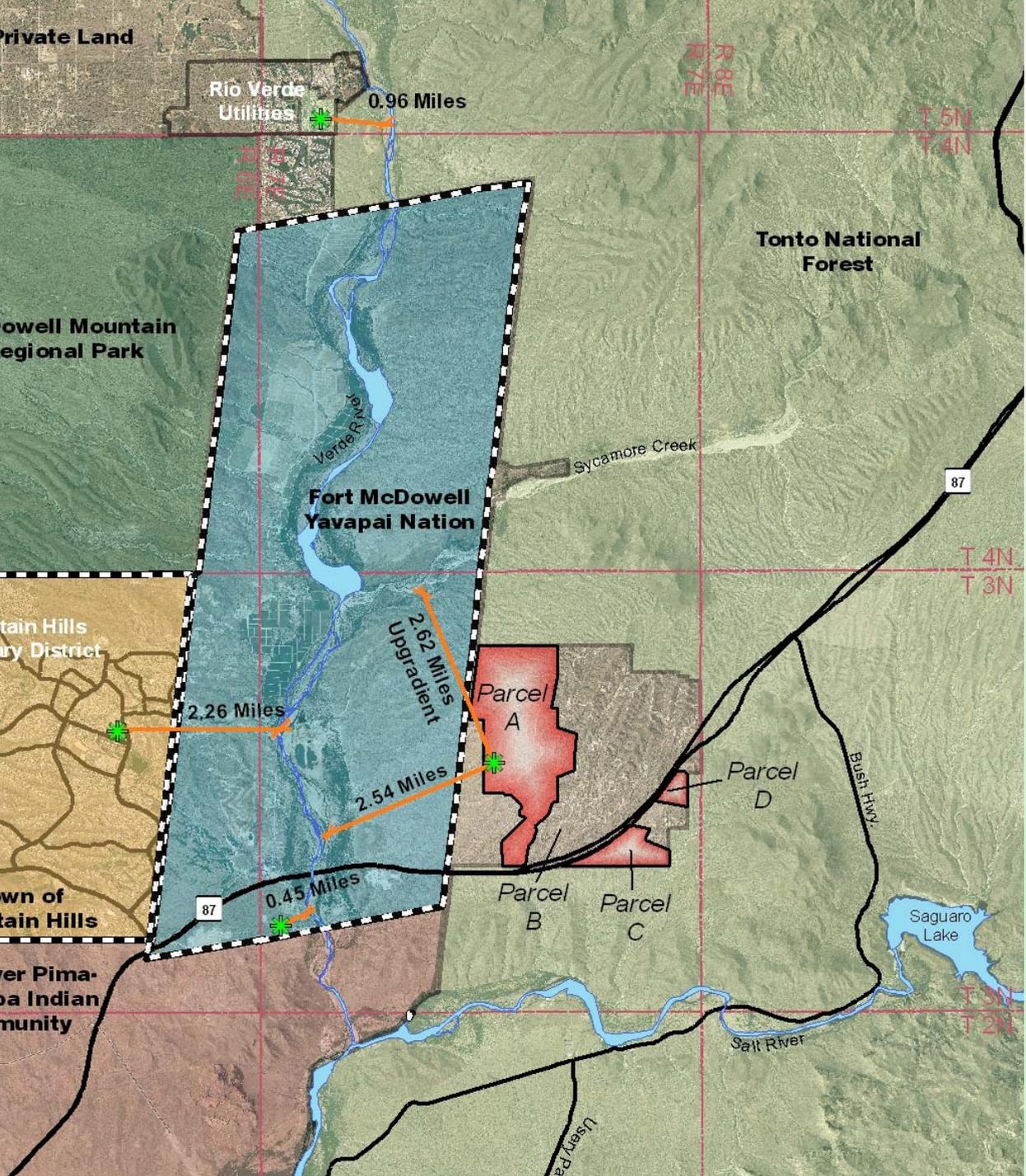
- Construction, operation, regulatory compliance and maintenance costs
- Certify adequate existing financial resources for construction and operation

# USF Legal Access

(Section III-F)

- Legal access to the proposed site for construction and operation

# Proximity to Waterways



# Site Facilities

-  Groundwater Well Site
-  Monitoring Well Site
-  Recharge Well Site
-  Water Campus
-  Lift Station

