

Water Resources and Utilities Enterprises

**2011 General Plan Committee
July 27, 2011**

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City of Prescott

Water Resources and Utilities Enterprises

I. State Groundwater Statutes

- 1980 Groundwater Management Act
- 1991 Groundwater Transportation Act
- Impact of 1998 Declaration of Groundwater Mining in Prescott AMA
- 2010 Groundwater Transportation Act Amendment

II. City as an Assured Water Provider; Water Management

- Assured Water Supply Designation
- Water Quality Standards
- Groundwater and Alternative (Renewable) Supplies
- Water Management Policy and Water Budget
- Water Conservation Program

III. The City's Water & Wastewater Enterprises

- Water, Wastewater, and Effluent Infrastructure
- Water and Wastewater Rates
- Impact Fees

IV. Big Chino Water Importation Project

- History
- Role of Imported Groundwater
- Project Scope and Estimated Costs

City of Prescott Water Resources

State Groundwater Statutes

1980 Groundwater Management Act

- Ensured completion of the CAP
- Created Active Management Areas
 - Established system of groundwater rights & permits
 - Set long-range water management goals
- Imposed “Safe Yield” Goal for certain AMAs, including Prescott AMA
- Well Registry & Well Construction Standards
- Established Arizona Department of Water Resources



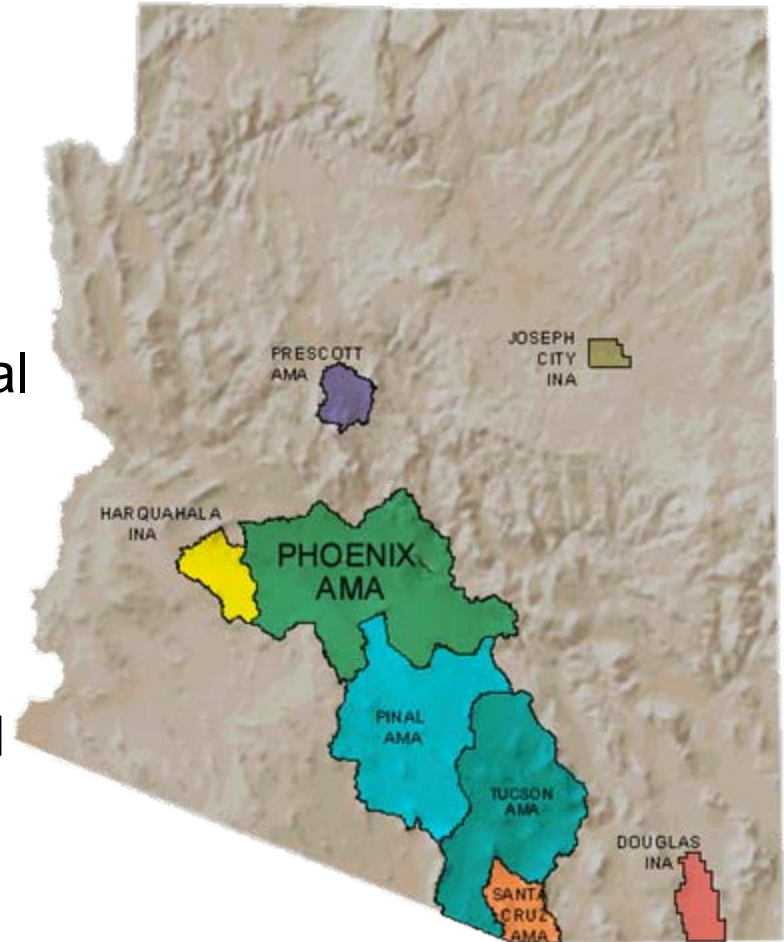
1980 Groundwater Management Act

Primary Goals of the Groundwater Management Act

1. Control severe groundwater overdraft occurring in many parts of the state
2. Provide a mechanism to allocate Arizona's limited groundwater resources to most effectively meet changing needs
3. Augment Arizona's groundwater resources through the development and utilization of alternative water supplies

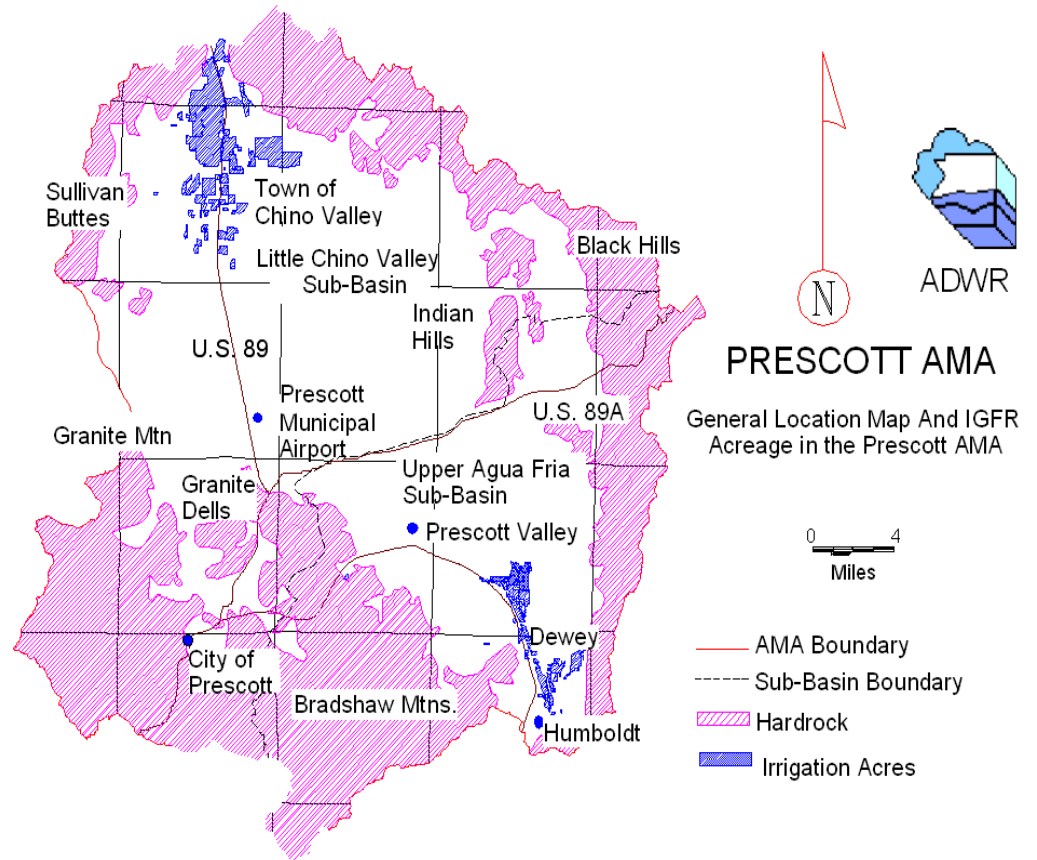
Active Management Areas (AMAs)

- AMAs comprise approximately
 - 80% of population
 - 75% of water consumption
 - 13% of land
- 4 of the 5 AMAs have a mandated goal of Safe Yield by 2025
- Banned new irrigation for agricultural purposes in AMAs & INAs after 1980
- Established local offices and instituted mandatory water conservation requirements



Prescott Active Management Area

- 485 square miles
- Elevation varies from 4400' to 7800'
- Precipitation from 13 to 25 inches per year
- Groundwater depth varies from land surface to 500 feet below land surface
- 2.9 million acre-feet in storage



1991 Groundwater Transportation Act

While the 1991 Transportation Act generally prohibited the transportation of groundwater across groundwater basin boundaries, the Act did authorize the transportation of groundwater from 5 basins to the 4 initial Active Management Areas.

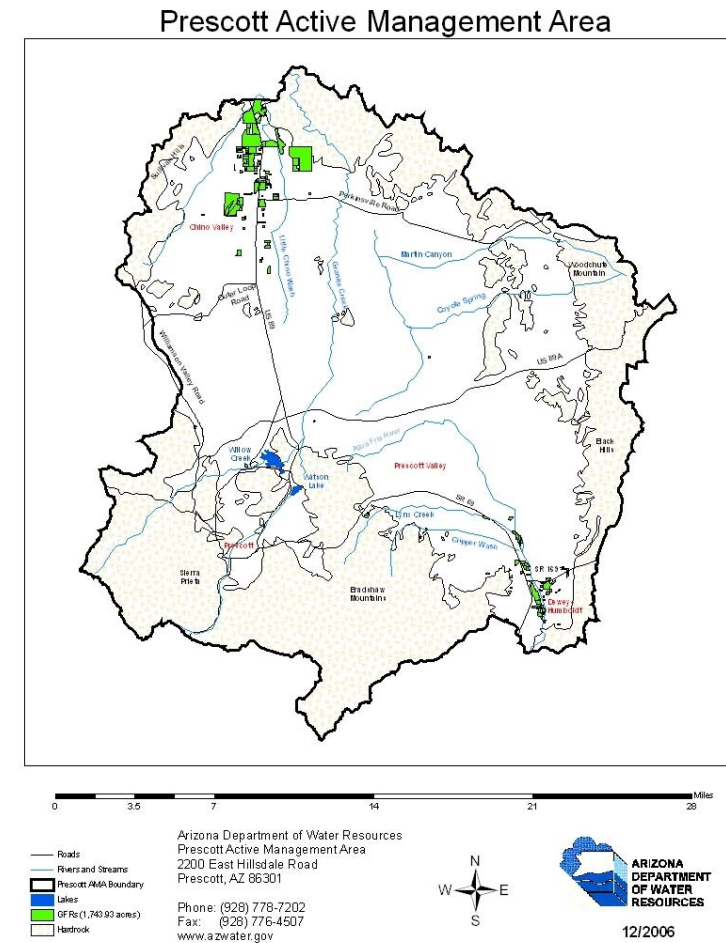
Open Basins for Transportation

- [Big Chino Sub-basin](#)
- Butler Valley
- Harquahala INA
- McMullen Valley
- Yuma Basin



1999 Declaration of Groundwater Mining in the Prescott AMA

- Assured Water Supply Rules implemented by ADWR in 1994
- ADWR declared that the Prescott AMA was no longer in a state of “Safe Yield” in 1999
- Full implementation of Assured Water Supply Program requirements on municipal water providers within PRAMA
- Imposed additional conservation practices and required renewable, extinguished or imported water supplies for new subdivision growth throughout AMA after 1999, severely restricting additional use of groundwater from within AMA



2010 Big Chino Sub-basin

Senate Bill 1445

- Approved by the Forty-ninth Legislature, Second Regular Session, and signed by Governor Brewer in April 2010, amended Section 45-555, Arizona Revised Statutes, the Groundwater Transportation Act, clarifying conditions for the importation of groundwater from the Big Chino Sub-basin, and rights of the City of Prescott under Title 45.
- Subsection E: A city or town in the Prescott Active Management Area may withdraw and transport eight thousand sixty-eight (8,068) acre-feet per year of groundwater from the Big Chino Sub-basin.
- Subsection F: A city or town may withdraw additional groundwater for use by an Indian tribe (YPIT) on its reservation pursuant to a federally approved water rights settlement.

City of Prescott Water Resources

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- City as an Assured Water Provider
 - Water Management

City as an Assured Water Provider

1. Assured Water Supply Designation

- Requires annual reporting of the amount of water pumped, sold, used, lost, treated, delivered, and recharged
- Requires demonstration of consistency with state water management goals including conservation
- Sets forth water available to Prescott in its "Water Portfolio"
- The City is currently operating under the 2005 ADWR Decision & Order; the City's 2008 modified designation was approved by ADWR but is still being litigated

2. Water Quality

- Drinking water standards – Annual Consumer Confidence Report
- Surface water quality – Aquifer Protection Permit Requirements

Water Conservation Program

Use these local websites and weather resource to determine water needs and evaluate rainfall.

<http://cals.arizona.edu/azmet/31.htm>
<http://www.cityofprescott.net/services/water/conservation.php>
<http://cals.arizona.edu/azmet/data/all-lwnh.htm>

Request Water Conservation Incentive
 1,440 square feet lawn out 2007
 1991

Need a rain gauge?
 Buy a Tri-Chek gauge here at Rainlog.org

Watering smart means using local weather conditions to help determine how much water your lawn and plants need to maintain healthy growing conditions.

Sewer Consumption -----> No sewer
 Average Monthly Cons-----> 7524

Class Code -----> SF- Single Family
 Sewer Code -----> 0- No Sewer
 Garbage Service -----> R-\$14.45+0.50
 Meter Number -----> 4448-7317
 Meter Make -----> S- Sensus
 Meter Size -----> 5/8- 5/8"
 Installed -----> Jan. 26, 1991
 Meter Location -----> 116-6-56w
 Number of Units -----> 1
 Meter Code -----> 5- Cubic Feet

<http://rainlog.org/users/html/main/mas.js>
<http://sq.arizona.edu/yavapai/arrhort/bug/index.html> Backyard Gardener UoA

Water Smart Chart	Monthly Avg	Annual Est.	3 Year avg
12 month Indoor use	8,364	100,367	Annual water use in gallons
6 month Outdoor Use	13,482	80,951	186,327
Summer month averages	21,846	GPCD	255

2005		2006		2007		2008					
Date	Read	Date	Read	Date	Read	Date	Read				
1/30/2005	82090	5,834	1/26/2006	12780	14,137	1/26/2007	42210	5,460	1/26/2008	56710	5,086
2/23/2005	82500	3,142	2/23/2006	14650	13,988	2/27/2007	42910	5,236	2/26/2008	57150	3,291
3/23/2005	83110	4,563	3/27/2006	16460	13,539	3/27/2007	43680	5,760	3/25/2008	57740	4,413
4/26/2005	85150	15,259	4/23/2006	17470	7,555	4/23/2007	44600	6,882	4/24/2008	58470	5,460
5/23/2005	88310	23,637	5/23/2006	20100	19,672	5/23/2007	46090	11,145	5/23/2008	59030	4,189
6/26/2005	92010	27,676	6/26/2006	24050	29,546	6/27/2007	48300	16,531	6/24/2008	60590	11,669
7/27/2005	96550	33,959	7/26/2006	28620	34,184	7/26/2007	50560	16,905	7/24/2008	62630	15,259
8/25/2005	98210	12,417	8/24/2006	33960	35,455	8/22/2007	52190	12,192	8/25/2008	66560	29,306
9/26/2005	3030	36,054	9/26/2006	37870	33,735	9/26/2007	53440	9,350			
10/27/2005	5790	20,645	10/25/2006	39390	11,370	10/26/2007	54610	8,752			
11/26/2005	7410	12,118	11/26/2006	40920	11,444	11/26/2007	55490	6,582			
12/28/2005	10890	26,030	12/23/2006	41480	4,189	12/26/2007	56030	4,039			
12 months use		221,334	12 months use		226,814	12 months use		108,834	8 months use		78,763
HH avg month use		18,445	HH avg month use		19,068	HH avg month use		9,070	HH avg month use		15,753
Gallons per person /day		307	Gallons per person /day		318	Gallons per person /day		151	Gallons per person /day		263
8 month comparison		126,487	8 month comparison		168,076	8 month comparison		80,111	8 month comparison		78,763

* Assumption of 2 persons per household
<http://www.cityofprescott.net/services/water/conservation.php>

□ Incentive Program

- Prescott offers various incentives to water customers
- 424 retrofit and credit participants in FY 2011
- From 2006-2010 water savings totaled 236 acre-feet

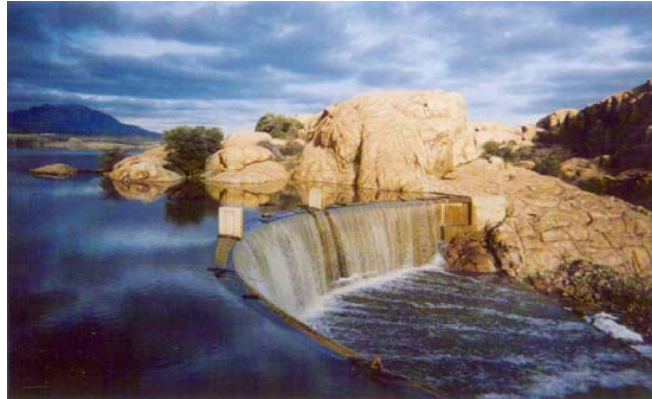


■ Education and Outreach



Water Management

City of Prescott Water Management Policy



2005-2010

Approved by Prescott City Council
October 25, 2005
Resolution #3712
Amendment #1 March 27, 2007
Resolution #3807
Amendment #2 December 14, 2010
Resolution #4058-1128

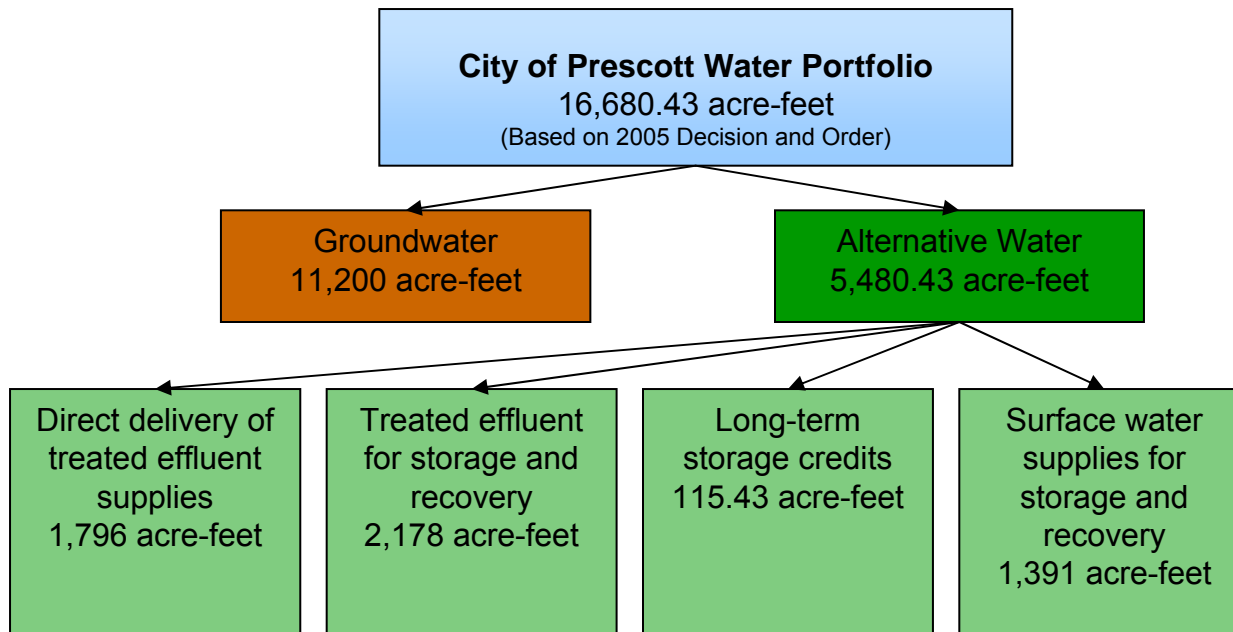
City of Prescott Water Management Policy

- ❑ 2005-2010 Water Management Policy extended through 2011
- ❑ Explains allocation of alternative water via water service agreements
- ❑ Allocation is most often for residential development
 - Single family 0.35 AF/dwelling unit
 - Multi-family 0.25 AF/dwelling unit
- Nonresidential does not receive a specific allocation unless the estimated demand > 5 AF/yr
- ❑ The opening balance (2005) was 1,000 AF
- ❑ In successive years the budget has been 200 AF/yr
- ❑ The balance remaining on January 1, 2011, was 421 AF
- ❑ Reservations of blocks of water have been made for specific agreements (e.g., CVID, annexations) and for unwatered vacant residential parcels within the current City limits
- ❑ Allocation is made at the time of site plan or plat approval
- ❑ No new golf courses

The City of Prescott's Water Portfolio

(as ADWR sees it)

- Groundwater = 11,200 AF (68%) - max GW allowance/currently 9,342 AF
- Alternative Water = 5,310 AF
 - Effluent recharge and recovery = 2,293 AF (13%)
 - Effluent for direct use = 1,796 (11%)
 - Surface water recharge and recovery = 1,391 (8%)



Actual and Net Groundwater Pumping

Average pumped in the last 10 years 7,605 AF	Average pumped in the last 10 years (adjusted for surface water recharge) 6,643 AF
Pumped in 2010 6821 AF	Net pumped in 2010 (adjusted for surface water recharge) 4,037 AF

The net quantity pumped in 2010 points out the importance of surface water storage and recharge from Watson and Willow Lakes to the alternative water category of the City's Water Portfolio.

Water Availability for Development

How many houses could be built within the current City limits using presently available or anticipated water resources?

1998 Plats - Grandfathered Groundwater

Final Plats	3,398 lots
Preliminary Plats	3,456

Reservation for Residentially Zoned Unwatered Tracts 1,920

Current Alternative Water Balance (421 AF) 1,142

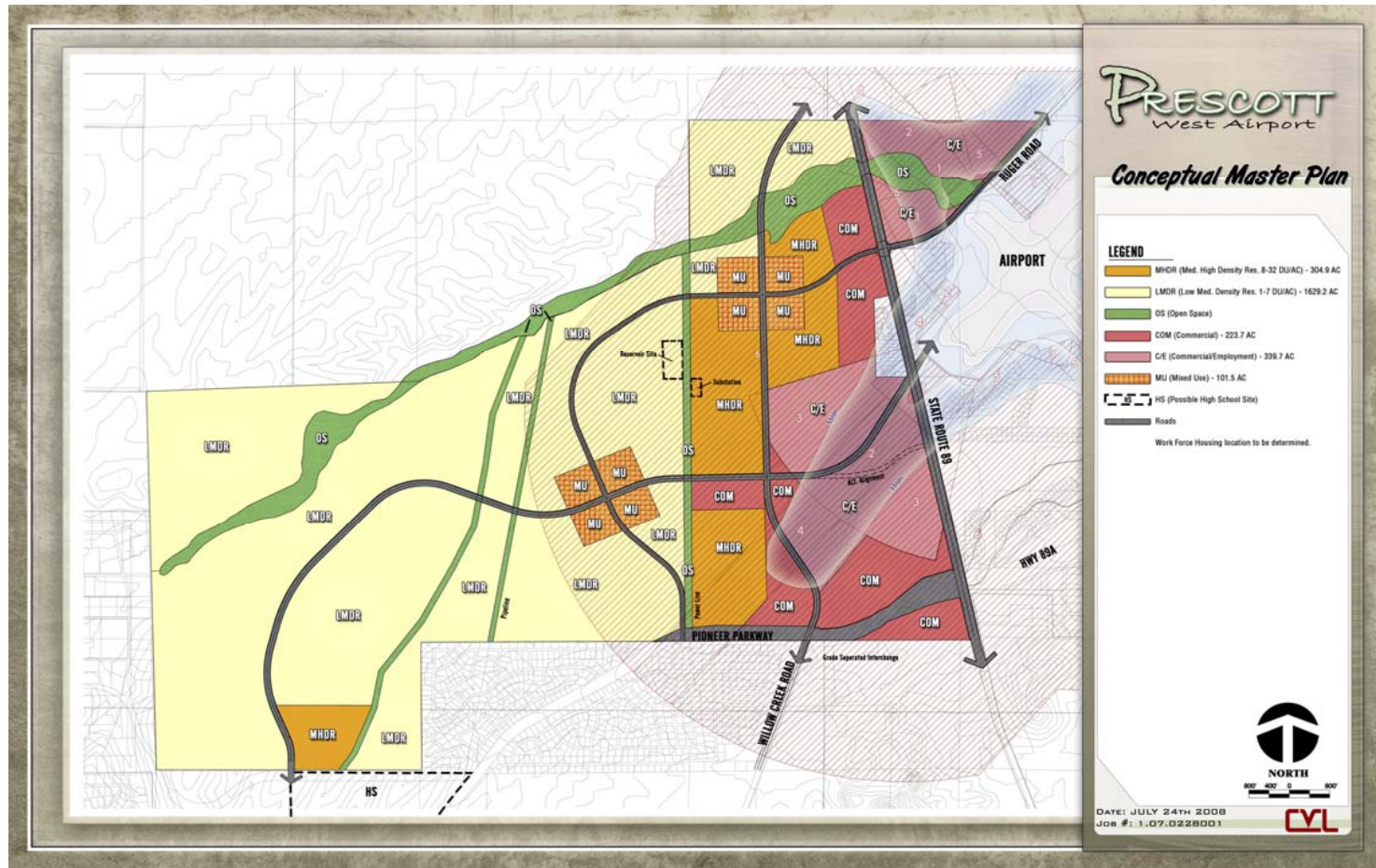
Pending 2008 Decision & Order

Alternative Water (1,153 AF additional)	3,294
Big Chino Importation Project (4,364 AF)	12,500

The Fine Print - Assumptions/Factors Which Will Affect These Estimates

- For analysis all units were assumed to be single-family dwellings
- Any/all significant nonresidential demand approved will reduce the number of units
- Alternative water available will be reduced if quantities of treated effluent and surface water actually recharged are less than projected

Visualizing the Scale of a Development Area Which Could Completely Consume the City's Quantity of Water from the Big Chino Importation Project (4,364 AF)



Estimated Water Demand = 3,000 to 5,000 AF

Conclusion - Water and Development of the City

The legal, physical, and economic availability of water from sources which are known or can be reasonably anticipated, including the costs of water rights and infrastructure to access and deliver it, will constrain future development of the City, whether through major infill redevelopment or annexations.

Even with strong market demand, the availabilities of water and capital will be key determinants in the long term growth of the City.

City of Prescott Water Resources

The City's Water & Wastewater Enterprises

Utilities Infrastructure

Why spend time looking at the City's utilities systems in the context of a General Plan update? Because the infrastructure has to be there for future development to occur, adequate and affordable for existing and new customers.

❑ Water

- Chino Valley Water Production Facility
- Water Transmission & Distribution System

❑ Wastewater

- Wastewater Collection System
- Wastewater Treatment (Water Reclamation) Plants

❑ Effluent

- Underground Storage (Recharge) Facility
- Effluent Delivery

-
- Water Production & Distribution - a highly complex system
 - 6 Wells in Chino Valley + 1 at Airport
 - 40 Booster Stations
 - 30 Water Tanks & Reservoirs
 - 85 Pressure Zones
 - 40 Booster Stations

 - 21,500 water/17,500 wastewater customers

Water Production



Water Distribution

- 500 miles of water mains
- Over 2,100 fire hydrants
- Over 20,000 mainline valves
- Backflow Prevention Program
- Water infrastructure Blue Staking

Water Distribution



Wastewater Collection

- More than 400 miles of sewer mains
- Over 8,200 manholes
- 64 lift stations
- Backwater Valve Program
- Routine maintenance and cleaning



Wastewater Collection



Wastewater Collection



Wastewater Treatment

- Sundog and Airport Reclamation Plants
 - Average 4,000 AF inflow per year
 - Treat an average of 3.3 million gallons each day



Effluent Production

❑ Underground Storage Facility

- Recharge average 2,200 AF effluent each year
- Surface Water recharge also sent to facility

❑ Direct Use

- Three golf courses and aggregate materials producer use effluent
- Average 1,700 AF direct use per year



Infrastructure Capital Improvement Program

- ❑ Six-year CIP developed each year as part of budget process
- ❑ Ten-year program developed and adopted as part of impact fee study
- ❑ Consists of existing deficiency upgrades and replacements and capacity for new development
- ❑ The CIP is the minimum required to:
 - Operate and maintain safe, reliable City water and wastewater systems
 - Meet contractual commitments pertaining to certain projects
 - Provide additional increments of capacity to remedy existing deficiencies and accommodate some growth in certain strategic areas (e.g., Airport)
 - Synch with street improvement projects (replace old lines in the streets)

Capital Improvement Program from 2010 Rate Study

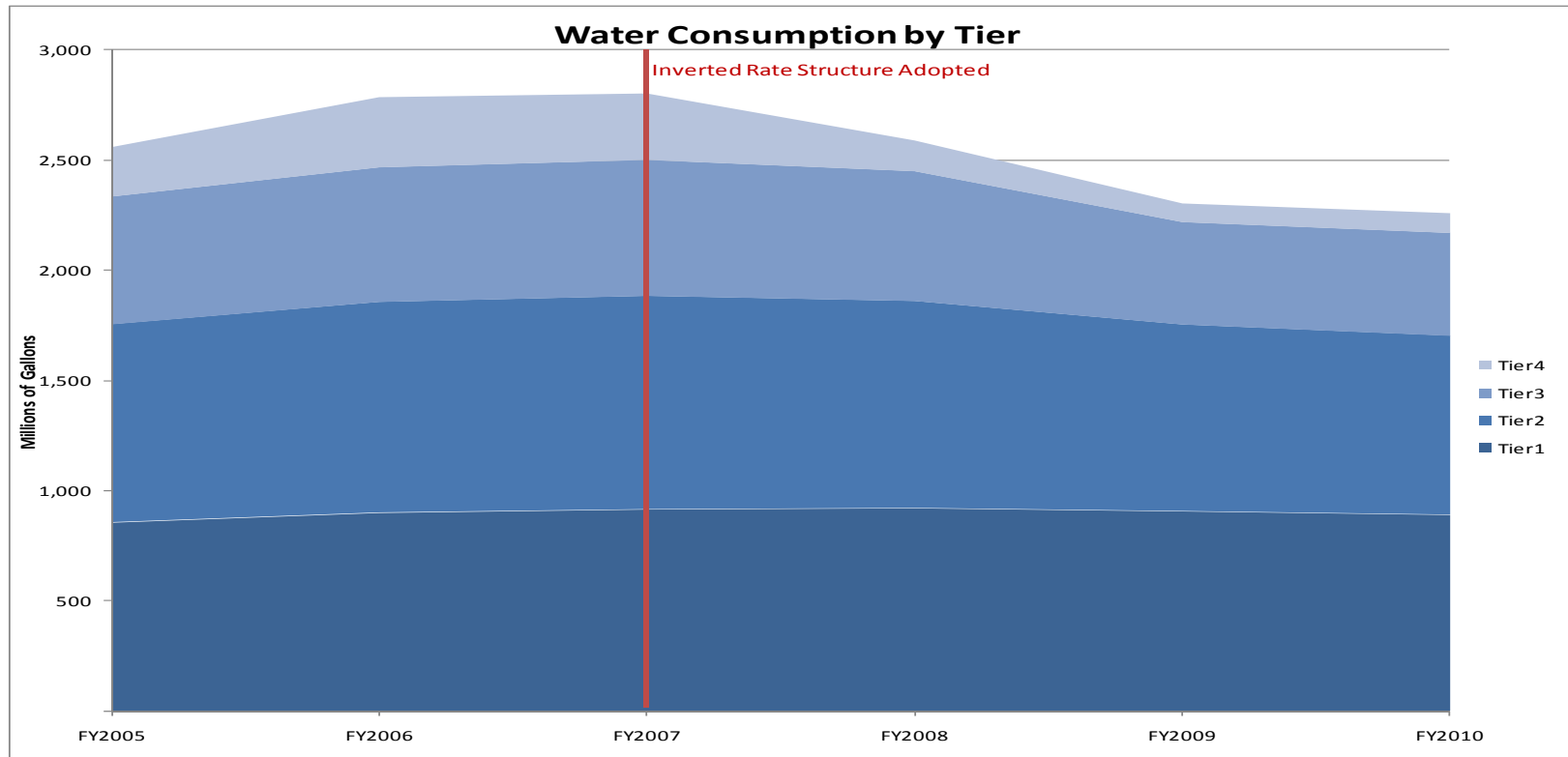
Needed Capital Projects and Anticipated Debt Issues

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016
Water CIP	\$ 30,645,948	\$25,865,750	\$ 8,371,250	\$ 4,176,250	\$10,252,250	\$ 3,050,250
Wastewater CIP	8,912,961	20,463,000	33,759,000	9,648,000	5,473,000	9,797,000
Total CIP	\$ 39,558,909	\$46,328,750	\$42,130,250	\$13,824,250	\$15,725,250	\$12,847,250
Water Debt	\$ 18,238,668	\$13,712,000	\$ 5,774,000	\$ 1,403,000	\$ 7,092,000	\$ -
Wastewater Debt	35,200,000	-	21,478,000	8,085,000	3,859,000	8,056,000
Total Anticipated Debt Issues **	\$ 53,438,668	\$13,712,000	\$27,252,000	\$ 9,488,000	\$10,951,000	\$ 8,056,000

Note : ** Debt is issued at the beginning of a project even though the expenditures are shown in the year they are projected.

Water Rates, Sales, and Revenue

- In 2007 an "inverted tier" water rate structure was adopted; the cost per gallon increases in tiers (ranges of gallons used)
- The combination of this rate structure, an active water conservation program, and recessionary economy have reduced water use, sales and revenue over 20%



Tiered Water Rates

Water Consumption Charge (per 1,000 gallons)

	<u>Current</u>	<u>3/1/2011</u>	<u>1/1/2012</u>	<u>1/1/2013</u>	<u>1/1/2014</u>	<u>1/1/2015</u>	<u>1/1/2016</u>
INCREASE		0%	7%	5%	5%	5%	5%
Residential Single Family							
Tier1	\$ 2.86	2.86	3.06	3.21	3.37	3.54	3.72
Tier2	4.30	4.30	4.60	4.83	5.07	5.32	5.59
Tier3	6.45	6.45	6.90	7.25	7.61	7.99	8.39
Tier4	12.90	12.90	13.80	14.49	15.21	15.97	16.77
Residential Multi-Family							
Tier1	\$ 2.30	2.30	2.46	2.58	2.71	2.85	2.99
Tier2	3.46	3.46	3.70	3.89	4.08	4.28	4.49
Tier3	5.19	5.19	5.55	5.83	6.12	6.43	6.75
Tier4	10.39	10.39	11.12	11.68	12.26	12.87	13.51
Non-Residential							
Tier1	\$ 2.61	2.61	2.79	2.93	3.08	3.23	3.39
Tier2	3.92	3.92	4.19	4.40	4.62	4.85	5.09
Tier3	5.88	5.88	6.29	6.60	6.93	7.28	7.64
Tier4	11.76	11.76	12.58	13.21	13.87	14.56	15.29

Sample Utilities Bill Calculations

	<u>Usage</u>	<u>Current</u>	<u>3/1/2011</u>	<u>1/1/2012</u>	<u>1/1/2013</u>	<u>1/1/2014</u>	<u>1/1/2015</u>	<u>1/1/2016</u>
Residential								
Water	5,000	27.03	31.28	34.08	36.44	38.25	40.21	42.24
Wastewater	5,000	26.09	30.02	34.53	39.72	43.68	45.88	48.18
Total		53.12	61.30	68.61	76.16	81.93	86.09	90.42
% Inc.			15.4%	11.9%	11.0%	7.6%	5.1%	5.0%
Water	25,000	190.53	195.78	211.08	222.54	233.75	245.56	257.94
Wastewater	15,000	53.19	61.22	70.43	81.02	89.08	93.58	98.28
Total		243.72	257.00	281.51	303.56	322.83	339.14	356.22
% Inc.			5.4%	9.5%	7.8%	6.3%	5.1%	5.0%
Non-Residential								
Restaurant 1 1/2" Meter								
Water	130,000	565.00	577.60	624.60	658.10	692.10	727.10	763.50
Wastewater	120,000	768.78	770.30	771.97	773.81	775.83	776.94	779.31
Total		1,333.78	1,347.90	1,396.57	1,431.91	1,467.93	1,504.04	1,542.81
% Inc.			1.1%	3.6%	2.5%	2.5%	2.5%	2.6%
School/College 4" Meter								
Water	450,000	1,888.20	1,927.60	2,085.10	2,196.60	2,310.30	2,427.20	2,548.70
Wastewater	124,000	497.54	547.42	602.41	662.53	729.03	766.10	804.47
Total		2,385.74	2,475.02	2,687.51	2,859.13	3,039.33	3,193.30	3,353.17
% Inc.			3.7%	8.6%	6.4%	6.3%	5.1%	5.0%

Impact Fees

Financing of Infrastructure for Growth

- Water Impact Fees
 - Assessed by meter size
 - Two fees: (1) System Impact; and (2) Water Resource
- Wastewater Impact Fees
- Funding new development component of capital projects
- Current Legislature-imposed moratorium through June 30, 2012
- In recent legislative sessions impact fees have been repeatedly targeted for reduction, restriction, or elimination
- What funding source will replace impact fees, enabling cities to provide utilities infrastructure in advance of/to facilitate development?

Water and Wastewater Systems & Funding

Summary Points

- The inverted tier water rate structure has done what it was designed to do - reduce consumption in the upper tiers and overall
- The water and wastewater enterprise funds require funding adequate for ongoing operations & maintenance, repair and rehabilitation, contractual commitments, and providing limited new capacity in specific areas
- The increases identified in this rates update were anticipated in previous rate studies, and are still needed
- The effect of the City's very complex water and wastewater systems on rates cannot be overemphasized - it is simply a fact of life that utilities services in Prescott will be higher than in many other cities
- The ages and conditions of the City's utilities infrastructure, added to and compounded by this complexity, are directly driving funding requirements
- The cost of treated effluent made available for direct use will be reviewed with formulation of the Long Term Water Management Policy. No change is proposed at this time.
- Funding of infrastructure to facilitate development will be more challenging.
- Increasing density throughout the existing developed areas of the City will require additional capital improvements to upgrade utilities capacities.

City of Prescott Water Resources

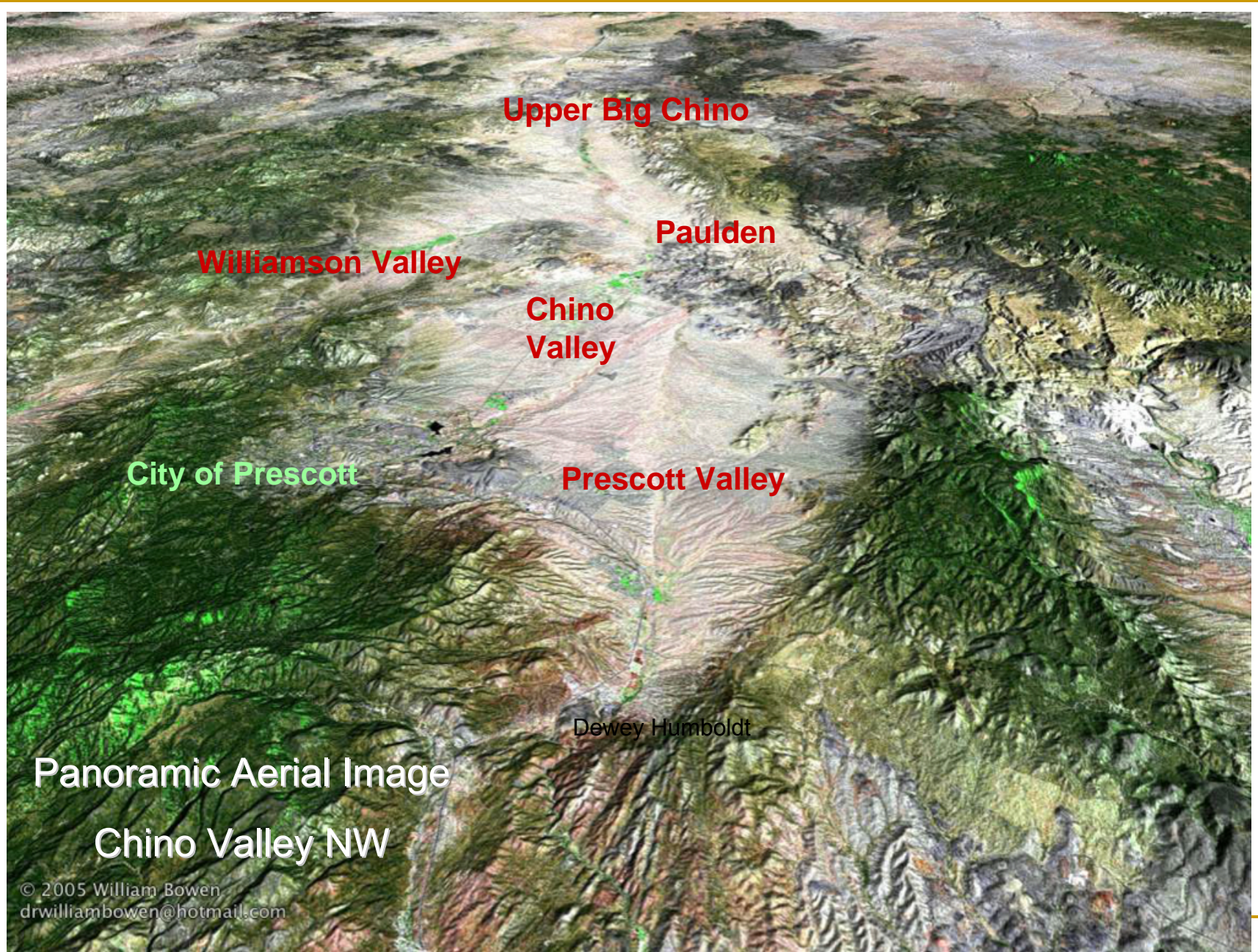
Big Chino Water Importation Project

Given the substantial number of dwelling units which could be built without the Big Chino Water Importation Project, why construct it?

- Safe Yield (Prescott AMA Third Management Plan contemplates imported water as a key resource in achieving safe yield)
- Flexibility to be able to respond to long term market demand - which properties will actually be developed? Those within the existing City limits? Those with grandfathered groundwater?

Big Chino Water Importation Project

- The purpose of the Big Chino Water Ranch Project is to develop and convey groundwater from the City's Big Chino Water Ranch, located approximately 20 miles northwest of Paulden, to the City's existing Water Production Facility located in Chino Valley. Water will be conveyed to the City utilizing existing infrastructure and to its partner, the Town of Prescott Valley, utilizing a new transmission main.
- Components of the BCWR Project include:
 - Well field
 - Big Chino Water Delivery Pipeline
 - Pumping Facilities
 - Prescott Valley Pipeline



Panoramic Aerial Image

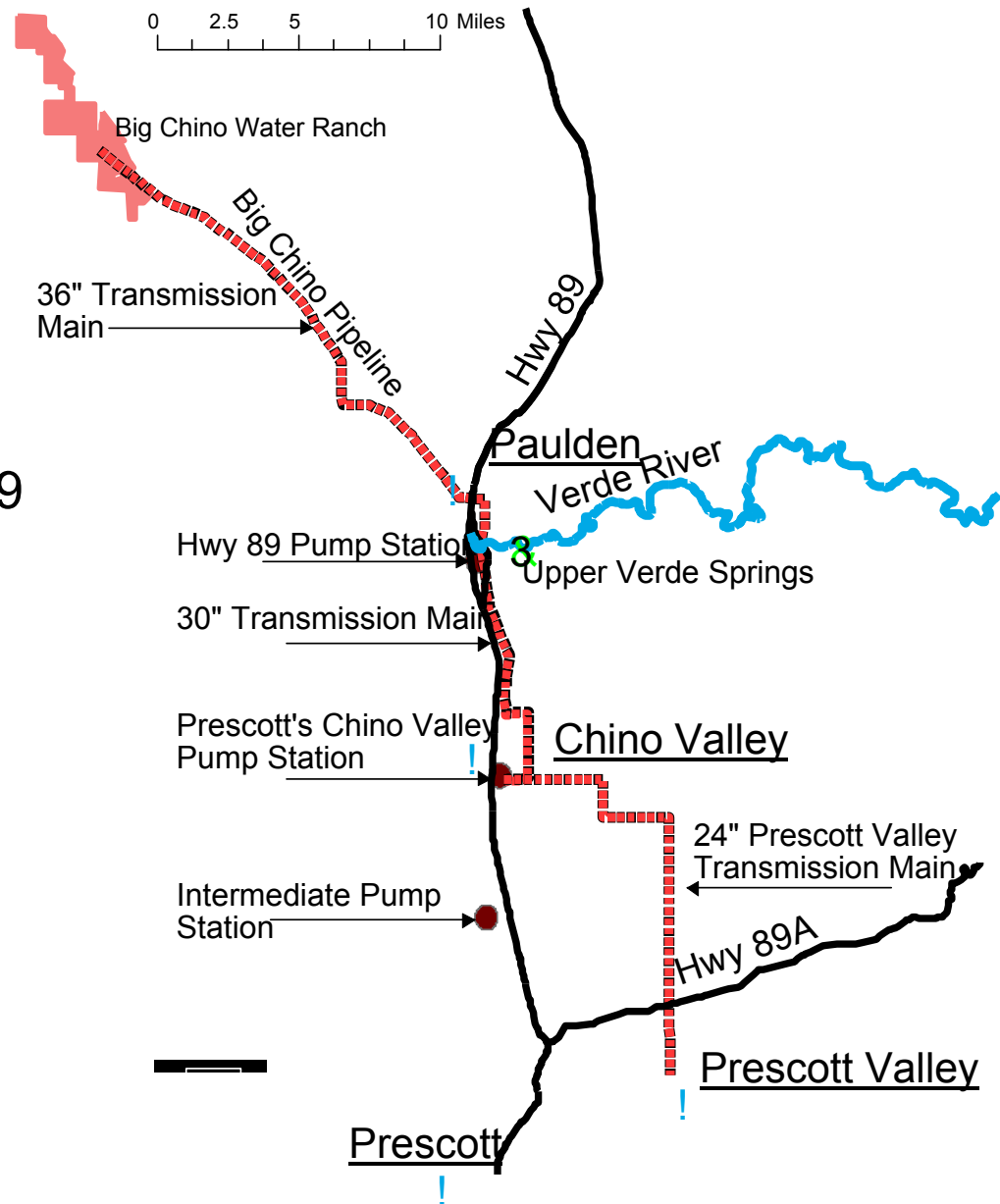
Chino Valley NW

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drwilliambowen@hotmail.com

BCWR Project

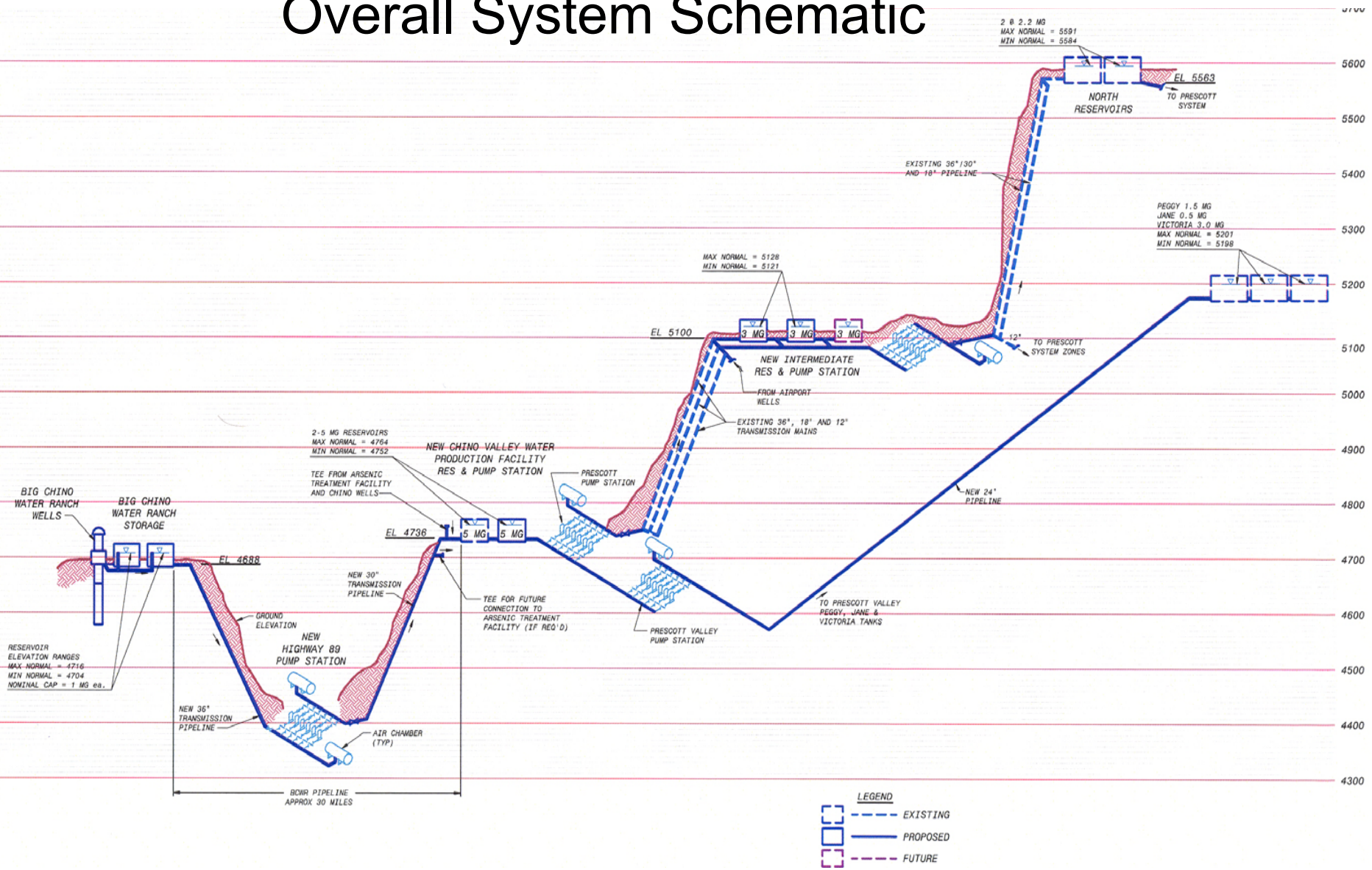
Project Elements

- BCWR 9 wells and 2-one mil gal reservoirs
- 23 miles 36" gravity pipeline from BCWR to new Highway 89 PS
- Highway 89 PS 7 pumps, 17 MGD capacity
- 7 miles 30" pipeline to CVWPF
- Reconstructed CVWPF PS 11 pumps, 23 MGD capacity, 1 additional five mil gal reservoir
- 15 miles 24" pressurized pipeline from CVWPF to Prescott Valley
- IRPS 5 pumps, 31 MGD, 3-three mil gal reservoirs



Big Chino Water Importation Project

Overall System Schematic



Chronology of Big Chino Sub-basin Activities

A History Which Relates to a Future Source of Water

- 1977 Comprehensive Water Resource Availability Study for City of Prescott-Gookin & Assoc
- 1980 Groundwater Management Act
- 1983 Authorization of CAP Allotment for City of Prescott & Yavapai Prescott Indian Tribe
- 1991 Groundwater Transportation Act & Title 45-555 Authorization Access to Big Chino Sub-basin for PrAMA Communities and City of Prescott
- 1994 Yavapai Prescott Indian Tribe Water Rights Settlement Act-Prescott Relinquishes CAP allocation to be replaced by Big Chino Sub-basin Groundwater

Chronology of Big Chino Sub-basin Activities (cont'd)

- 1999 ADWR Declares PrAMA Groundwater Mining Status
- 2004 Prescott & Prescott Valley Purchase Portion of JWK Ranch through IGA, and rename as the Big Chino Water Ranch
- 2005 Prescott Initiates Additional Upper Big Chino hydrological investigations
- 2008 ADWR issues Decision & Order recognizing 8,067.4 AF of Big Chino groundwater in Prescott's designation (still being litigated)
- 2010 A.R.S Title 45 amended strengthening Prescott's right to Big Chino groundwater

Role of Imported Groundwater for AMA Safe-yield Goal and Growth

- Safe-yield defined - [a] groundwater management goal which attempts to achieve and thereafter maintain a **long term balance** between the amount of groundwater withdrawn in an AMA and the amount of natural and artificial recharge in the AMA.

Achievement of the safe-yield goal by 2025, as characterized in *The Third Management Plan for the Prescott AMA 2000-2010*, is based on four conditions:

1. Significant on-going water conservation by cities, towns, and private water companies
2. Reduction of groundwater use by turf facilities and increased use of effluent
3. Use of other renewable supplies
4. Reliance upon imported groundwater from the Big Chino Sub-basin

“Achievement of the safe-yield goal without a source of imported water supply is doubtful, if not impossible, given groundwater requirements to meet the needs of current residents in addition to the groundwater commitments extended to pre-declaration subdivisions that are still to be built.” (ADWR 2004)

Big Chino Water Importation Project

Expenditures to Date	
Big Chino Water Ranch	\$ 23,408,000
Hydrology	\$ 2,039,000
Engineering & Design	\$ 7,969,000
Easement Acquisition	\$ 315,000
Legal Services	\$ 889,000
In-house Personnel FY05-FY09	\$ 759,000
Other	\$ 13,000
Total (June 2009)	\$ 35,392,000
Total (current July 2011)	\$ 36,000,000

Big Chino Water Importation Project

Estimated Costs Forward (3-09)

Well Field	\$16,732,000
Pipeline	\$55,540,000
Highway 89 Pump Station	\$6,906,000
CVWPF Pump Station	\$18,820,000
SCADA/Communications	\$287,000
APS Substation Infrastructure	\$417,000
Access Requirements	\$1,296,000
General Requirements	\$8,394,000
Design & Construction Services	\$12,800,000
Power Improvements	\$5,895,000
Easement & Site Acquisition	\$5,535,000
Permitting	\$21,000
Total Cost	\$ 132,643,000