

Effluent Supplies

This category of source water supply refers to the utilization of reclaimed water developed by the collection and treatment of sewage through the City's wastewater service area. The City estimates that the effluent component of its assured water supply will equal 5,159 acre-feet per year in the 20th year of the projection period.

Effluent as defined in ARS. 45-101.4 "...means water that has been collected in a sanitary sewer for subsequent treatment in a facility that is regulated pursuant to title 49, chapter 2. Such water remains effluent until it acquires the characteristics of groundwater or surface water."

Prescott owns three wastewater treatment plants regulated by Title 49, Chapter 2; the Sundog Wastewater Treatment Plant, and the Airport Water Reclamation Facility, and the Hassayampa Village Wastewater Treatment Plant. Note: Hassayampa is operated privately, City Contract 1999-059. Data has been developed for monthly inflows into each facility for the years 2011 through 2020. Monthly inflows are summed into annual volumes and converted to acre-feet and are displayed in Table 1.

Table 1 (Values in Acre Feet)				
Year	Sundog WWTP	Airport WRF	Hassayampa WRP	Total Inflows
2011	2605.7	1320.4	176.8	4102.9
2012	2361.0	1221.1	249.9	3832.0
2013	2673.3	1235.3	151.0	4059.5
2014	2729.5	1250.1	151.9	4131.6
2015	2702.4	1543.3	187.0	4432.8
2016	2664.9	1544.9	170.9	4380.7
2017	2961.8	1615.8	187.1	4764.7
2018	2379.3	2119.9	241.2	4740.4
2019	1539.4	3071.2	241.2	4782.9
2020	1448.1	2554.9	281.2	4284.2

Wastewater inflows to treatment plants are primarily derived from sewage production resulting from interior water use from the City's potable water distribution system. Additional inflows may result from the capture of storm water runoff. However, since storm water is an unpredictable water supply source, it has been discounted in this assured water supply analysis. All potable water supplies do not necessarily result in sewage return flow. For example, Prescott provides water service to many customers who utilize private septic systems. Others are connected to the Town of Chino Valley wastewater system. Prescott also serves many customers such as parks and homeowners associations who only use water for outdoor landscaping irrigation. Also,

water pumped but then undelivered due to transmission losses does not result in effluent returns. Therefore, in order to prepare an accurate estimate of future effluent production it is necessary to compare historic effluent production to historic potable water deliveries. This analysis was prepared using the Water Resources Management Model which tracks potable water deliveries to each customer for the years 2011 through 2020. Table 2 displays the potable water deliveries for the primary use categories of Single Family (SF), Multi-family (MF) and Non-residential (NR).

	SF	MF	NR	Total
2011	3448.4	665.1	2101.7	6215.1
2012	3373.8	664.1	2079.0	6117.0
2013	3263.6	674.2	2055.9	5993.7
2014	3315.3	753.0	2101.0	6169.3
2015	3315.3	666.3	2133.0	6114.6
2016	3243.8	636.2	2084.5	5964.5
2017	3375.0	647.6	2140.7	6163.3
2018	3658.5	672.9	2180.1	6511.5
2019	3413.8	622.2	2170.0	6206.0
2020	3872.0	645.3	2250.0	6767.3

Table 3 compares the volume of potable water delivered to the volume of effluent inflow to the wastewater treatment facilities.

	Delivered	Returned	% Returned
2011	6215.1	4102.9	66%
2012	6117.0	3832.0	63%
2013	5993.7	4059.5	68%
2014	6114.6	4131.6	68%
2015	5879.7	4432.8	75%
2016	5964.5	4380.7	73%
2017	6163.3	4764.7	77%
2018	6511.5	4740.4	73%
2019	6206.0	4782.9	77%
2020	6767.3	4282.2	63%
Average			70%

While this analysis indicates that a 70% return flow rate is justified, the City believes that a 65% rate is more prudent for this assured water supply estimates. Historic values including those values exceeding 70% are likely to include storm water runoff which would inflate the return flow percentages. While these water supplies actually exist, they are difficult to predict and can vary greatly between years depending upon precipitation

patterns. The City believes that sewage returns from potable use is a highly reliable resource and therefore the lower value of 65% will result in a much more reliable estimate for projection purposes.

As explained in the Demand Estimate portion of this application, the City has assumed that an average annual increase of 450 new accounts will be added to the potable system over the next twenty years. Table 4 depicts the estimated total potable demand for each year of the 20-year projection period for the three categories that will produce effluent; SF, MF, and NR. In order to make an appropriate comparison to the historic data listed in Table 3, the lost and unaccounted portion of potable demand is not included in Table 4. Each year's estimated demand volume is then multiplied by 65% to determine the estimated effluent supply that would inflow to the wastewater treatment plants. Following treatment that supply would be available for either direct delivery to non-potable customers or would be transported to the Airport Recharge Facility to be recharged to the aquifer. The amount of water used for non-potable direct use will likely vary year to year as it is primarily related to golf course irrigation demands. Any portion that is not used directly will be recharged. A component of the effluent associated with the return flow from land subject to the Reasonable Growth Initiative - Proposition 400, now City Charter Article 1 Section 4. b., will be recharged but will not be counted as an assured water supply. Proposition 400 requires that the effluent generated from that land be used for "permanent recharge." Table 4 shows the estimated deduction from the supply for this category. The volume of water associated with this provision is currently fairly small but will build up over the twenty-year period since much of the anticipated growth during that time frame is associated with subdivisions subject to the Proposition 400 requirements. Finally, a reduction is made in the estimated supply to account for losses associated with the recharge process. The final column represents the projected volume of effluent available for assured water supply purposes. The 20th year volume of 5,159 acre-feet per year is used as the projected available supply in this application. As growth in potable demand increases in the years after the 20th year, the volume of effluent available as a water supply will continue to grow and exceed the 5,159 acre-feet estimate. The City's Recharge Facility has the capacity to recharge more water than the volume estimated in this application. Based on the estimated build-up in non-potable current, committed and projected demand, the 5,159 acre-feet of supply is sub-totaled as 2,093 acre-feet for direct delivery and 3,066 acre-feet to be stored and recovered.

Table 4 - 20 Year Effluent Supply Estimate

Year	SF (AF)	MF (AF)	NR (AF)	Total (AF)	Effluent Return to Treatment Plants 65% (AF)	Proposition 400 Deduction	Recharge Process Losses (AF)	Effluent Available for Assured Water Supply (AF)
1	4011	646	2294	6951	4518	47	31	4440
2	4102	647	2326	7075	4599	49	31	4519
3	4187	656	2354	7196	4678	68	32	4578
4	4270	665	2382	7317	4756	90	33	4633
5	4352	676	2409	7437	4834	115	33	4685
6	4433	687	2436	7556	4911	144	34	4734
7	4513	700	2462	7675	4989	175	35	4779
8	4591	715	2487	7793	5065	213	35	4817
9	4669	730	2512	7910	5142	251	36	4855
10	4744	747	2535	8027	5218	296	36	4886
11	4819	766	2559	8143	5293	343	37	4913
12	4893	784	2582	8259	5369	390	38	4940
13	4968	803	2605	8375	5444	438	38	4968
14	5042	821	2628	8492	5519	485	39	4995
15	5117	839	2652	8608	5595	533	40	5023
16	5191	858	2675	8724	5670	580	40	5050
17	5265	876	2698	8840	5746	628	41	5078
18	5340	895	2721	8956	5821	675	41	5105
19	5414	913	2745	9072	5897	722	42	5133
20	5489	932	2768	9188	5972	770	43	5159