

# Water Resources Development Fee Study

Prepared for:

**City of Surprise, Arizona**

November 27, 2006



Prepared by:

**TischlerBise**  
Fiscal, Economic & Planning Consultants

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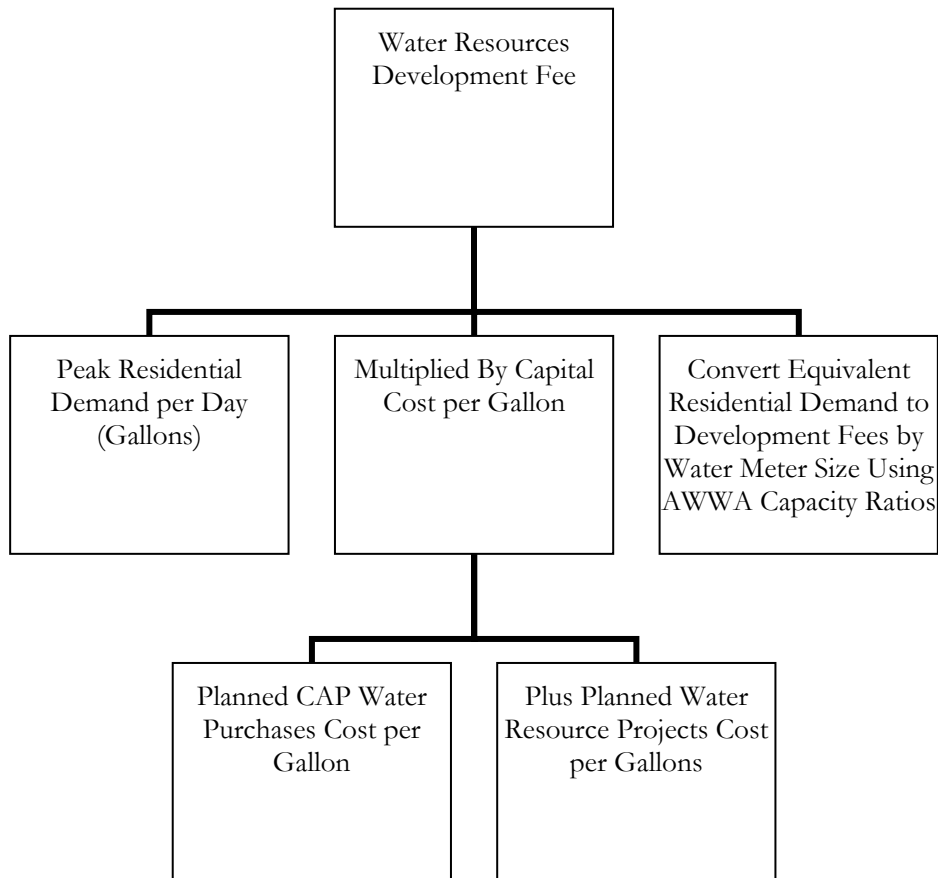
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Water Resources

**METHODOLOGY**

The Water Resources Development Fee is derived from a plan-based methodology that includes the cost of water rights and the construction of water resources projects. As shown in Figure 1, the net capital cost per gallon of capacity is multiplied by the peak daily residential demand in Surprise. Fees for meters larger than 0.75 inches are derived from capacity ratios published by the American Water Works Association (AWWA).

**Figure 1: Water Resources Development Fee Methodology Chart**



**COLLECTION & EXPENDITURE ZONES**

To better meet the demand, proportionality, and benefit requirements of the rational nexus test, TischlerBise recommends the City collect and expend the Water Resources Project component of the Water Development Fee as follows:

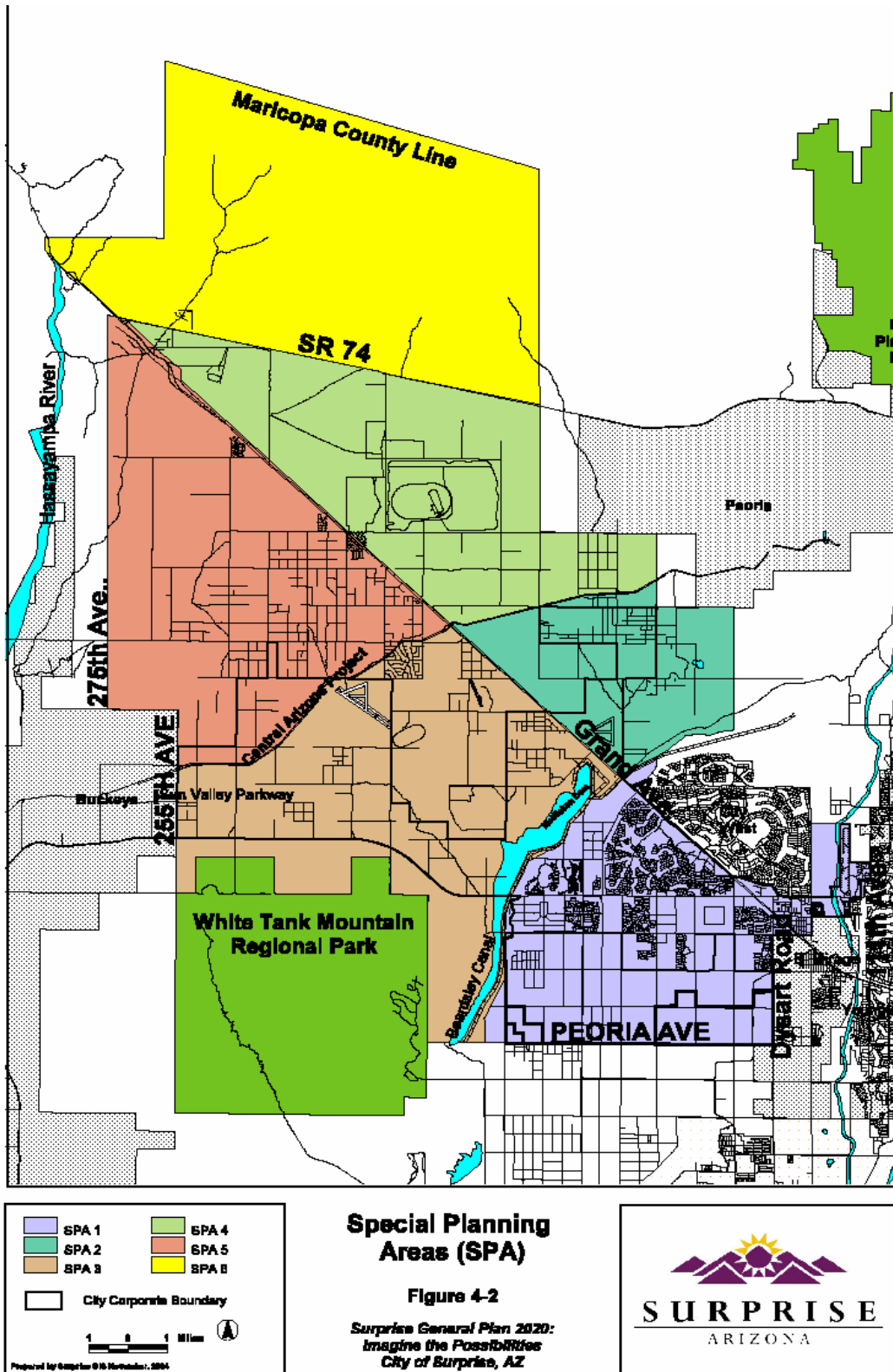
SPA 1

SPA 2-6

These zones are used to document where in the City the development fee revenues are coming from and where capital projects for new growth will be provided. The collection

and expenditures zone map in Figure 2 is provided to give the reader a general indication of the SPA boundaries. Larger, detailed maps will be maintained by the City.

Figure 2: Water Resource Development Fee Areas



**WATER DEMAND**

Figure 3 shows the peak daily water demand per day for residential development based on the City’s billing records from the City’s billing contractor, Arizona American.

**Figure 3: Peak Residential Water Demand per Weekday**

Peak Water Demand per City Residential Water Customer *	523 gallons/day
Lost Water Factor **	9.1%
Vacancy Factor ***	7.13%
TOTAL	607 gallons/day

\* Arizona American billing records for City of Surprise, August 2006.

\*\* Arizona American billing records for City of Surprise.

\*\*\* Figure A-5, Appendix A.

TischlerBise derived the following factors to project the future number of water customers and peak water demand. These factors are derived using data from Figure 3 above and the current demographic estimates from Appendix A.

**Figure 4: Residential and Nonresidential Water Projection Factors**

Current Total Housing Units Citywide	49,914
Current Residential Water Customers	11,455
Water Customers per Housing Unit	0.23
Peak Gallons per Residential Water Customer (day)	607
Current Nonresidential Water Customers	120
Current Nonresidential Square Footage Citywide	7,135,761
Nonresidential Square Feet per Water Customer	59,465
Peak Gallons per Nonresidential Water Customer (day)	10,487

Future projections of water customers and peak water usage by SPA are shown in Figure 5 below. These projections are derived using the data from Figure 4 and the development projections by SPA from Appendix A.

SURPRISE, ARIZONA WATER RESOURCES DEVELOPMENT FEE STUDY

**Figure 5: Projected Water Demand by SPA**

SPA 1	Fiscal Year =>	5 Year Intervals									
		2007	2008	2009	2010	2011	2012	2017	2022	2027	
Housing Units		44,510	47,624	50,957	54,524	58,342	61,589	64,151	64,833	64,833	
Projected Residential Water Customers		10,215	10,929	11,694	12,513	13,389	14,134	14,722	14,879	14,879	
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607	
Peak Residential Daily Demand Subtotal		6,200,397	6,634,196	7,098,474	7,595,377	8,127,207	8,579,567	8,936,491	9,031,423	9,031,423	
Nonresidential Square Footage (1,000's)		5,124	5,486	5,486	5,874	6,234	6,611	7,042	7,300	7,300	
Projected Nonresidential Water Customers		86	92	92	99	105	111	118	123	123	
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	
Peak Nonresidential Daily Demand Subtotal		903,695	967,539	967,539	1,035,905	1,099,428	1,165,927	1,241,842	1,287,456	1,287,456	
<b>TOTAL PEAK DAILY WATER DEMAND SPA 1</b>		<b>7,104,092</b>	<b>7,601,735</b>	<b>8,066,013</b>	<b>8,631,283</b>	<b>9,226,635</b>	<b>9,745,494</b>	<b>10,178,333</b>	<b>10,318,879</b>	<b>10,318,879</b>	
SPA 2	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027	
Housing Units		3,232	3,742	4,333	5,018	5,811	6,424	11,624	26,222	31,293	
Projected Residential Water Customers		742	859	994	1,152	1,334	1,474	2,668	6,018	7,182	
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607	
Peak Residential Daily Demand Subtotal		450,176	521,263	603,601	698,977	809,459	894,836	1,619,210	3,652,860	4,359,208	
Nonresidential Square Footage (1,000's)		187	217	230	268	309	357	578	1,057	1,370	
Projected Nonresidential Water Customers		3	4	4	4	5	6	10	18	23	
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	
Peak Nonresidential Daily Demand Subtotal		32,974	38,334	40,541	47,186	54,475	62,882	101,862	186,353	241,654	
<b>TOTAL PEAK DAILY WATER DEMAND SPA 2</b>		<b>483,150</b>	<b>559,597</b>	<b>644,142</b>	<b>746,162</b>	<b>863,933</b>	<b>957,718</b>	<b>1,721,073</b>	<b>3,839,213</b>	<b>4,600,862</b>	
SPA 3	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027	
Housing Units		2,026	2,727	3,672	4,944	6,656	7,842	13,964	22,277	26,061	
Projected Residential Water Customers		465	626	843	1,135	1,528	1,800	3,205	5,112	5,981	
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607	
Peak Residential Daily Demand Subtotal		282,168	379,911	511,512	688,699	927,264	1,092,410	1,945,204	3,103,255	3,630,359	
Nonresidential Square Footage (1,000's)		1,660	2,069	2,130	2,424	2,749	3,133	4,397	5,212	6,777	
Projected Nonresidential Water Customers		28	35	36	41	46	53	74	88	114	
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	
Peak Nonresidential Daily Demand Subtotal		292,692	364,861	375,677	427,479	484,749	552,501	775,521	919,261	1,195,111	
<b>TOTAL PEAK DAILY WATER DEMAND SPA 3</b>		<b>574,860</b>	<b>744,771</b>	<b>887,189</b>	<b>1,116,179</b>	<b>1,412,013</b>	<b>1,644,912</b>	<b>2,720,725</b>	<b>4,022,516</b>	<b>4,825,470</b>	
SPA 4	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027	
Housing Units		0	0	0	0	0	0	613	1,954	3,623	
Projected Residential Water Customers		0	0	0	0	0	0	141	448	832	
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607	
Peak Residential Daily Demand Subtotal		0	0	0	0	0	0	85,411	272,141	504,738	
Nonresidential Square Footage (1,000's)		0	0	0	0	0	0	76	1,289	2,053	
Projected Nonresidential Water Customers		0	0	0	0	0	0	1	22	35	
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	
Peak Nonresidential Daily Demand Subtotal		0	0	0	0	0	0	13,326	227,365	362,122	
<b>TOTAL PEAK DAILY WATER DEMAND SPA 4</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>98,737</b>	<b>499,506</b>	<b>866,860</b>	
SPA 5	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027	
Housing Units		147	264	360	512	785	1,233	2,193	3,900	6,003	
Projected Residential Water Customers		34	61	83	117	180	283	503	895	1,378	
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607	
Peak Residential Daily Demand Subtotal		20,444	36,762	50,203	71,278	109,328	171,811	305,503	543,226	836,293	
Nonresidential Square Footage (1,000's)		165	288	356	456	621	911	3,713	5,902	8,952	
Projected Nonresidential Water Customers		3	5	6	8	10	15	62	99	151	
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	
Peak Nonresidential Daily Demand Subtotal		29,097	50,868	62,810	80,471	109,461	160,665	654,738	1,040,871	1,578,831	
<b>TOTAL PEAK DAILY WATER DEMAND SPA 5</b>		<b>49,541</b>	<b>87,630</b>	<b>113,013</b>	<b>151,749</b>	<b>218,789</b>	<b>332,477</b>	<b>960,241</b>	<b>1,584,097</b>	<b>2,415,125</b>	

SURPRISE, ARIZONA WATER RESOURCES DEVELOPMENT FEE STUDY

SPA 6	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027
Housing Units		0	0	0	0	832	1,033	1,790	3,116	3,722
Projected Residential Water Customers		0	0	0	0	191	237	411	715	854
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607
Peak Residential Daily Demand Subtotal		0	0	0	0	115,908	143,945	249,420	434,068	518,517
Nonresidential Square Footage (1,000's)		0	0	0	0	0	19	29	46	61
Projected Nonresidential Water Customers		0	0	0	0	0	0	0	1	1
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487
Peak Nonresidential Daily Demand Subtotal		0	0	0	0	0	3,270	5,094	8,098	10,821
<b>TOTAL PEAK DAILY WATER DEMAND SPA 6</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>115,908</b>	<b>147,215</b>	<b>254,514</b>	<b>442,166</b>	<b>529,338</b>

CITYWIDE	Fiscal Year =>	2007	2008	2009	2010	2011	2012	2017	2022	2027
Housing Units		49,914	54,357	59,322	64,997	72,426	78,121	94,335	122,301	135,536
Projected Residential Water Customers		11,455	12,475	13,614	14,917	16,621	17,928	21,649	28,068	31,105
Peak Gallons per Residential Customer		607	607	607	607	607	607	607	607	607
Peak Residential Daily Demand Subtotal		6,953,185	7,572,132	8,263,790	9,054,331	10,089,166	10,882,570	13,141,240	17,036,973	18,880,538
Nonresidential Square Footage (1,000's)		7,136	8,061	8,202	9,022	9,912	11,030	15,833	20,806	26,514
Projected Nonresidential Water Customers		120	136	138	152	167	185	266	350	446
Peak Gallons per Nonresidential Customer		10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487	10,487
Peak Nonresidential Daily Demand Subtotal		1,258,459	1,421,602	1,446,567	1,591,042	1,748,113	1,945,246	2,792,382	3,669,404	4,675,995
<b>TOTAL PEAK DAILY WATER DEMAND</b>		<b>8,211,644</b>	<b>8,993,734</b>	<b>9,710,357</b>	<b>10,645,373</b>	<b>11,837,279</b>	<b>12,827,815</b>	<b>15,933,622</b>	<b>20,706,377</b>	<b>23,556,533</b>

## **CAP WATER PURCHASES**

Figure 6 lists the cost of water rights according to the City's subcontract for water from the Central Arizona Project (CAP) canal. These expenditures are the result of both new and existing development, thus the costs are allocated among the total projected Citywide water demand on an average weekday (from both new and existing development). Because this is a take-or-pay contract, the cost per gallon is higher in the early years when Surprise is not using its full allocation. To account for the time-value of money, the annual CAP payments are reduced by a net present value calculation, based on a discount rate of 5.5% (annual percentage rate). The projected demand for water over the next five years is taken from Figure 5 above.

**Figure 6: Planned CAP Water Purchases**

Fiscal Year	CAP Allocation*	Peak Gallons Per Day	Cost Per Gallon
2007	\$1,105,000	8,211,644	\$0.13
2008	\$1,105,000	8,993,734	\$0.12
2009	\$1,105,000	9,710,357	\$0.11
2010	\$1,105,000	10,645,373	\$0.10
2011	\$1,105,000	11,837,279	\$0.09

TOTAL	\$0.57
Discount Rate	5.5%
Net Present Value	\$0.49

\* City of Surprise, Capital Improvements Plan FY2007.

## **PLANNED WATER RESOURCES PROJECTS BY SPA**

Figure 7 lists the City's planned water resources projects for SPA 1 from the CIP. The projects shown at the top of Figure 7 are the result of both new and existing residential development. Thus the total peak water demand from SPA 1 in FY2011 (which includes both new and existing development) is used to calculate the cost per gallon. New growth

will pay for its share of these projects via the Water Resources Development Fee while existing growth's share will have to be funded from non-development fee sources. The projects listed at the bottom of Figure 7 are the result of new development only. The total peak capacity of the projects is used to calculate the cost per gallon for these projects. The development fees will be used to fund these projects.

The planned projects listed under the average approach will cost \$0.39 per gallon. This is calculated by dividing the total cost of \$3,800,000 by the projected total of peak gallons in SPA 1 in FY2011 of 9,226,635 gallons ( $\$3,800,000/9,226,635$  gallons = \$0.39 per gallon). The planned projects listed under the marginal approach will cost \$1.00 per gallon for recharge facilities and \$1.41 per gallon for wells. The cost per gallon for recharge facilities is calculated by dividing the total cost of \$6,245,000 by the projected 6,245,000 gallons of peak capacity of these projects ( $\$6,245,000/6,245,000$  gallons = \$1.00 per gallon). This calculation is repeated for wells resulting in a cost per gallon of \$1.57 ( $\$5,652,500/3,590,000$  gallons of capacity = \$1.57 per gallon).

The total cost per gallon for the planned water resources projects in SPA 1 is \$2.96 ( $\$0.39 + \$1.00 + \$1.57 = \$2.96$ ).

**Figure 7: Planned Water Resource Projects SPA 1**

**SPA 1**

*AVERAGE APPROACH*

<i>Project</i>	<i>FY2007</i>	<i>FY2008</i>	<i>FY2009</i>	<i>FY2010</i>	<i>FY2011</i>	<i>TOTAL</i>
SPA 1 DTIC Groundwater Savings Facility	\$0	\$200,000	\$0	\$0	\$0	\$200,000
SPA 1 Recharge Facility - Basin Expansion	\$0	\$0	\$3,600,000	\$0	\$0	\$3,600,000
TOTAL						\$3,800,000

Projected Total Peak Daily Gallons in SPA 1 FY2011 9,226,635

Cost per Gallon \$0.39

*MARGINAL APPROACH*

**RECHARGE FACILITIES**

<i>Project</i>	<i>FY2007</i>	<i>FY2008</i>	<i>FY2009</i>	<i>FY2010</i>	<i>FY2011</i>	<i>TOTAL</i>
SPA 1 Surprise Center Recharge Facility - Phase 2	\$515,000	\$0	\$0	\$0	\$0	\$515,000
SPA 1 Surprise Center Recharge Facility - Phase 3	\$0	\$1,530,000	\$0	\$0	\$0	\$1,530,000
SPA 1 Surprise Center Recharge Facility - Phase 4	\$0	\$30,000	\$2,170,000	\$0	\$0	\$2,200,000
SPA 1 Surprise Center Recharge Facility - Phase 5	\$0	\$0	\$2,000,000	\$0	\$0	\$2,000,000
TOTAL						\$6,245,000

Peak Gallons of Capacity 6,245,000

Cost per Gallon \$1.00

**WELLS**

<i>Project</i>	<i>FY2007</i>	<i>FY2008</i>	<i>FY2009</i>	<i>FY2010</i>	<i>FY2011</i>	<i>TOTAL</i>
SPA 1 Ashton Ranch Well 2	\$0	\$150,000	\$1,350,000	\$0	\$0	\$1,500,000
SPA 1 Mountain Gate/Kenly Well	\$0	\$150,000	\$1,350,000	\$0	\$0	\$1,500,000
SPA 1 Mountain Vista Ranch Well 2	\$0	\$2,152,500	\$0	\$0	\$0	\$2,152,500
SPA 1 Surprise Center Well Construction	\$500,000	\$0	\$0	\$0	\$0	\$500,000
TOTAL						\$5,652,500

Peak Gallons of Capacity 3,590,000

Cost per Gallon \$1.57

City of Surprise, *Capital Improvements Plan FY2007*.

Figure 8 lists the City's planned water resources projects for SPA's 2 - 6 from the CIP. These projects are the result of new development only. The total peak capacity of the

projects is used to calculate the cost per gallon for these projects. The development fees will be used to fund these projects.

The planned projects listed under the marginal approach will cost \$0.82 per gallon for recharge facilities. The cost per gallon for recharge facilities is calculated by dividing the total cost of \$2,200,000 by the projected 2,695,000 gallons of peak capacity of these projects (\$2,200,000/2,695,000 gallons = \$0.82 per gallon).

**Figure 8: Planned Water Resource Projects SPA’S 2-6**

**SPA 2-6**  
MARGINAL APPROACH  
RECHARGE FACILITIES

Project	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012-2016	TOTAL
SPA 3 Recharge Facility - Phase 1	\$0	\$100,000	\$1,000,000	\$0	\$0	\$0	\$1,100,000
SPA 4 Recharge Facility - Phase 1	\$0	\$0	\$0	\$0	\$100,000	\$1,000,000	\$1,100,000
TOTAL						TOTAL	\$2,200,000

Peak Gallons of Capacity 2,695,000

Cost per Gallon \$0.82

City of Surprise, *Capital Improvements Plan FY2007*.

**DEVELOPMENT FEE STUDY**

The City should update its development fees every three years to ensure the methodologies, assumptions, and cost factors used in the calculations are still valid and accurate. As we do with many of our Arizona development fee clients, TischlerBise has included the cost of preparing the current Water Resources Development Fee in the fee calculations in order to create a source of funding to conduct this regular update. This cost (\$12,900) is allocated to the projected increase in peak gallons over the next three years. This results in a development fee study cost per demand unit of \$0.01 per gallon (\$12,900/2,433,729 gallons).

**WATER RESOURCES DEVELOPMENT FEE**

Figures 9 and 10 provide a summary of the variables used to calculate the Water Resources Development Fee. Future revenue credits have been considered to avoid potential double payment for capital facilities and no such credit is needed for this fee category. Developers may be eligible for site-specific credits or reimbursements only if they provide system improvements that have been included in the Water Resources Development Fee calculation schedule. Specific policies and procedures related to site-specific credits for system improvements are addressed in the ordinance that establishes the City’s fees. Project improvements normally required as part of the development approval process are not eligible for credits against development fees.

**Figure 9: Water Resources Development Fee Cost Summary SPA 1**

<i>Cost Summary</i>		<i>Standards:</i>
Peak Gallons per Day per Residential Connection		607
Planned CAP Cost per Gallon		\$0.49
Planned Resource Projects - Average Approach Cost per Gallon		\$0.39
Planned Resource Projects - Marginal Approach Cost per Gallon		\$2.57
Development Fee Study Cost per Gallon		\$0.01
Net Capital Cost per Gallon of Peak Capacity		<b>\$3.46</b>

**Figure 10: Water Resources Development Fee Cost Summary SPA'S 2-6**

<i>Cost Summary</i>		<i>Standards:</i>
Peak Gallons per Day per Residential Connection		607
Planned CAP Cost per Gallon		\$0.49
Planned Resource Projects - Marginal Approach Cost per Gallon		\$0.82
Development Fee Study Cost per Gallon		\$0.01
Net Capital Cost per Gallon of Peak Capacity		<b>\$1.31</b>

A capacity ratio by meter size was used to convert the residential equivalent fee for a 0.75-inch meter into a proportionate fee for larger meter sizes. The capacity ratios by meter size are from the American Water Works Association (AWWA). For a one-inch meter, Surprise will use a conservative, typical-service ratio (see AWWA Manual 1, page 24). For all other meter sizes, Surprise will use ratios that assume 33% of maximum capacity, indexed to 0.75” meter (see AWWA Manual 6). If a large-scale development submits an independent engineering analysis, the Water Resources Development Fee may be based on the net capital cost per gallon of peak capacity for each SPA and the peak daily demand for the particular development

**Figure 11: Water Resources Development Fee Schedule SPA 1**

*Development Fees*

<u>All Development</u>			
<i>Meter Size (inches)</i>	<i>Type</i>	<i>Capacity Ratio</i>	<i>Per Meter</i>
0.75	Displacement	1.0	\$2,100
1.00	Displacement	1.3	\$2,673
1.50	Displacement	3.3	\$6,933
2.00	Displacement	5.3	\$11,085
3.00	Compound	10.7	\$22,403
3.00	Turbine	12.0	\$25,125
4.00	Compound	17.0	\$35,685
4.00	Turbine	20.5	\$43,045
6.00	Compound	33.0	\$69,328
6.00	Turbine	41.2	\$86,538
8.00	Compound	53.3	\$112,013
8.00	Turbine	60.2	\$126,360

**Figure 12: Water Resources Development Fee Schedule SPA'S 2-6**

*Development Fees*

<u>All Development</u>			
<i>Meter Size (inches)</i>	<i>Type</i>	<i>Capacity Ratio</i>	<i>Per Meter</i>
0.75	Displacement	1.0	\$796
1.00	Displacement	1.3	\$1,013
1.50	Displacement	3.3	\$2,628
2.00	Displacement	5.3	\$4,202
3.00	Compound	10.7	\$8,493
3.00	Turbine	12.0	\$9,525
4.00	Compound	17.0	\$13,528
4.00	Turbine	20.5	\$16,318
6.00	Compound	33.0	\$26,282
6.00	Turbine	41.2	\$32,806
8.00	Compound	53.3	\$42,464
8.00	Turbine	60.2	\$47,903