



City of Tempe

**Water and Wastewater
Development Fees Report**

March 2014



Water and Wastewater Development Fees Report

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City of Tempe

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The development fees recommended in this report are based on the adopted Land Use Assumptions Plan for the water and wastewater utilities, which was prepared using data from the City of Tempe General Plan 2040 and is consistent with the Land Use Assumptions Plan for the City's general government services.

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Acronym List

ACS	American Community Survey
ADD	Average Day Demand
afy	Acre Feet per Year
ARS	Arizona Revised Statutes
AZ-SMART	Arizona's Socioeconomic Modeling, Analysis, and Reporting Toolbox
COG	Council of Government
EDU	Equivalent Dwelling Unit
GP 2040	Tempe General Plan Year 2040
gpd	Gallons per Day
IIP	Infrastructure Improvement Plan
LUA	Land Use Assumptions
MAG	Maricopa Association of Governments
MDPF	Maximum Day Peaking Factor
MFR	Multifamily Residential
mgd	Million Gallons per Day
MHPF	Maximum Hour Peaking Factor
MMF	Maximum Monthly Flow
MMPF	Maximum Month Peaking Factor
MPO	Metropolitan Planning Organization
POPTAC	Population Technical Advisory Committee
PUMS	Public Use Microdata Sample
PWWF	Peak Wet Weather Flow
SB	Senate Bill
SFR	Single Family Residential
SROG	Sub-Regional Operating Group
TAZ	Traffic Analysis Zone
UrbanSim	Urban Simulator
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

1. Executive Summary

1.1 Introduction

This report summarizes the water and wastewater development fees that were calculated and recommended for the City of Tempe (Tempe) based on Arizona enabling legislation. Development fees provide utilities with a mechanism for funding or recouping the cost associated with infrastructure improvements or facility expansions of the water and/or wastewater systems necessitated and attributable to new development. The fees are a one time, up front charge with the payment usually made at the time of building permit issuance. These development fees require each developer to pay its share of the cost of new capital facilities required to provide service to each respective development project.

Arizona's enabling act for municipalities to assess development fees is Arizona Revised Statutes (ARS) §9-463.05. In 2011, the legislature passed Senate Bill (SB) 1525. SB 1525 greatly revised ARS §9-463.05. SB 1525 was meant to ensure that new growth will only pay for its pro-rata share of necessary public improvements. Consistent with SB 1525 requirements, Red Oak calculated the following development fees by service category:

- Water System
- Wastewater System

1.2 Land Use Assumptions

The Land Use Assumptions (LUA) was adopted by City Council on February 27, 2014. The adopted LUA is included in Appendix A.

Future land use estimates are needed to calculate the development fees. These estimates were made based on certain future land use assumptions. These assumptions were based on current land use data from the Maricopa Association of Governments (MAG) databases, Tempe utility billing data and comprehensive long range planning conducted by the Tempe's Planning Department. The Tempe General Plan for Year 2040 consolidates this information into distribution of land use acreage and percentages, by category. Table 1-1 presents the service area land use distribution.

Table 1-1 Current and Projected Land Use Distribution

Existing Land Use	2013 Acres	2013 Percentage	2023 Acres	2023 Percentage	2040 Acres*	2040 Percentage
Single Family Residential	7,796	29.6%	7,453	28.3%	7,137	27.1%
Multifamily Residential	2,063	7.8%	2,228	8.5%	2,379	9.0%
Commercial	3,110	11.8%	2,633	10.0%	2,188	8.3%
Mixed Use	100	0.4%	1,028	3.9%	1,890	7.2%
Industrial	2,843	10.8%	3,201	12.2%	3,535	13.4%
Civic	4	<0.1%	41	0.2%	75	0.3%
Educational	890	3.4%	655	2.5%	440	1.7%
Open Space	1,536	5.8%	1,782	6.8%	2,011	7.6%
Water	682	2.6%	531	2.0%	389	1.5%
Private Open Space	5	<0.1%	55	0.2%	102	0.4%
Recreational/Cultural	697	2.6%	423	1.6%	171	0.6%
Town of Guadalupe	512	1.9%	512	1.9%	512	1.9%
County "Islands"	152	0.6%	152	0.6%	152	0.6%
Rights-of-way	5,311	20.2%	5,332	20.3%	5,347	20.3%
Vacant	627	2.4%	302	1.1%	0	0.0%
Total	26,328	100.0%	26,328	100.0%	26,328	100.0%

*Source: General Plan 2040 Table 1 Existing and Projected Land Use

Table 1-2 presents population and Equivalent Dwelling Units (EDU) projections for water and wastewater. Projected population for 2023 is interpolated using 2020 and 2030 population projections from MAG. Land use and customer data was collected and converted into EDU, the standard measure of demand expressed as water usage and wastewater discharge for an average household unit. Current number of EDUs was estimated by applying the appropriate 5/8-inch meter equivalency factor to the distribution of water meters by size. One 5/8-inch meter equivalent is equal to one EDU.

Table 1-2 Water and Wastewater Service Area Population and EDU Projections

Description	2013	2023	Change
Population	174,329	198,407	24,078
Water EDUs	97,862	103,027	5,165
Wastewater EDUs	89,995	94,745	4,750

The total water system demands for 2013 and 2023 was estimated using the current and future land use distribution, show in Table 1-1, and the water demand factors presented in Table 1-3.

Table 1-3 Land Use Distribution

Land Use Category	Demand Factor¹	2013 Acreage	2013 Demand	2023 Acreage	2023 Demand
	(af/ac/yr)	(ac)	(af/yr)	(ac)	(af/yr)
Single Family	2.75	7,796	21,439	7,453	20,496
Multifamily	5.00	2,063	10,315	2,228	11,140
Commercial	3.00	3,110	9,330	2,633	7,899
Mixed Use	5.00	100	500	1,028	5,140
Industrial	3.00	2,843	8,529	3,201	9,603
Civic	3.00	4	12	41	123
Educational	3.50	890	3,115	655	2,293
Open Space	2.25	1,536	3,456	1,782	4,009
Water	0.00	682	0	531	0
Private Open Space	4.50	5	23	55	248
Recreational	3.50	697	2,439	423	1,480
Town of Guadalupe	2.45	512	1,254	512	1,254
County "Islands"	3.5	152	532	152	532
Rights-of-way	0.25	5,311	1,328	5,332	1,333
Vacant	0.00	627	0	302	0
Total		26,328	62,272	26,328	65,550

1. Water demand factor for open space reduced by 50% to eliminate direct delivery water that does not enter potable water system.
2. Water demand factor reduced to 0 because land in water category does not impact potable water system.

The current (2013) reserved water demand is 62,272 acre-feet per year (afy) or 55.6 million gallons per day (mgd). Therefore, one water EDU is equivalent to 568 gallons per day (gpd).

The projected 2023 reserved water demand, which was determined by applying the water demand factors from Table 1-3 to the estimated 2023 land use distribution, was 65,550 afy or 58.5 mgd. Assuming the reserved water demand per EDU remained constant at 568 gpd per EDU throughout the ten-year study period (2014-2023), the projected number of water EDUs for 2023 would be 103,027.

¹ The demand factors were obtained from City of Tempe staff.

Detailed reserved water demand projections are provided in Appendix A of the LUA.

The current number of wastewater EDUs was estimated using the number of water EDUs and the ratio of wastewater accounts to water accounts. For 2013, the estimated number of wastewater EDUs was 89,995. Wastewater flow projections were also estimated based on reserved water demands. It is assumed that the ratio of actual average daily water demand to current reserved water demand was the same as the ratio of actual average daily wastewater flow to current reserved average daily wastewater flow. The ratio of actual average daily water demand to current reserved water demand was 1.24. Actual average daily wastewater flow was assumed to be 18.5 mgd. Therefore, the current reserved average daily wastewater flow is 22.9 mgd.

Using the current reserved average daily wastewater flow and the number of EDUs, we calculate that one wastewater EDU is equivalent to 254 gpd. The projected number of wastewater EDUs in 2023 is based on the growth rate in water EDUs for the study period. Therefore, 94,745 EDUs are anticipated in 2023. Assuming the average daily wastewater flow per EDU is constant throughout the study period, the projected average daily wastewater flow for 2023 is 24.1 mgd.

Detailed wastewater flow projections are provided in Appendix A of the LUA.

1.3 Infrastructure Improvement Plan

The Infrastructure Improvement Plan (IIP) was adopted by City Council on February 27, 2014. The adopted IIP is included in Appendix B.

Tempe owns and operates an infrastructure-intensive system comprised of wells, treatment facilities, pumping stations, storage facilities, and pipelines that are continuously improved and expanded. The schedule for growth-related investments in the water and wastewater systems that will serve new development during the 2014 to 2023 study period is known as the IIP. Appendix A of the IIP provides a list of the Water Utilities Department's existing facilities and the value of each. A list of future IIP projects is also included in Appendix A of the IIP.

Projects included in the IIP can serve to rehabilitate and renew the system, enhance the system to improve efficiency and meet regulatory requirements, increase the system capacity, or achieve a combination of these objectives. However, only those projects required to provide capacity to serve new development during the 2014 to 2023 study period can be included in the development fee calculation. The IIP does not

include distribution and transmission lines; therefore, the capital costs associated with the distribution system, water storage and collection system are not included in the calculated development fee.

Table 1-4 provides the value of Water Utilities Department facilities that are eligible to be included in the calculation of the maximum water and wastewater development fees, as well as eligible financing costs associated with these facilities. ARS §9-463.05 allows municipalities to include projected interest charges and other finance costs if development fees are used for the payment of principal and interest on debt issued to finance construction of facilities included in the IIP. However, because Tempe typically uses development fee revenue to cash fund IIP projects or reduce the amount that will be financed with debt, Tempe is not including financing costs in the calculation of the development fees.

Table 1-4 Summary of 2014 - 2023 Eligible IIP Costs

	Existing Capacity		New IIP Capacity		Total Capacity	
	Value of Capacity	Value of Eligible Capacity	Value of Capacity	Value of Eligible Capacity	Value of Capacity	Value of Eligible Capacity
	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)
Water	204.5	6.2	19.0	2.4	223.5	8.6
Wastewater	219.1	5.5	7.1	0.8	226.2	6.3

1.4 Development Fees Calculation

Eligible capital costs for growth-related projects included in the IIP were divided by the projected number of service units to determine the calculated development fee per service unit. For the purpose of this study, a service unit is equal to one EDU. Table 1-5 presents the calculated development fees for water and wastewater service. The EDUs used in this calculation, as shown in Table 1-5, represent the incremental number of EDUs that will be served by the infrastructure.

Table 1-5 2014 - 2023 Development Fees per EDU

Development Fee	Eligible IIP Value	Number of EDUs	Calculated Development Fee per Service Unit
	(\$ mil)		(\$/EDU)
Water System	8.6	5,165	1,664
Wastewater System	6.3	4,750	1,334

1.4.1 Credit Calculation

ARS §9-463.05 requires municipalities to “forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and...include these contributions in determining the extent of the burden imposed by the development.” For Tempe, this contribution is based on the amount of projected future water and wastewater base charge and rate revenues expected to be generated by the new development and used to pay for capital improvements identified in the IIP. This credit provides an adjustment to new customers who will pay for IIP in both the development fee and their future utility bills. However, because Tempe uses its development fee revenue to cash fund a portion of its IIP projects, there is no credit to apply to the development fees.

1.4.2 Maximum Development Fees per EDU

The maximum fees per EDU were calculated and include both the existing value of infrastructure with capacity available to serve new development projected for the study period, 2014 through 2023, as well as the value of new water and wastewater capacity available to serve new development during the study period. Calculated development fees, rate credits, and maximum development impact fees are presented in Table 1-6. The maximum development fee represents the maximum cost-justified development fee calculated in accordance with the Arizona Statutes. It is recommended that the City adopt water and wastewater development fees that are no greater than the calculated fees. However, the City may elect to adopt development fees that are lower than the maximum calculated development fees, if desired.

Table 1-6 2014 - 2023 Maximum Water and Wastewater Development Fees per EDU

Development Fee	Eligible IIP Value	Calculated Development Fee/ EDU	Calculated Rate Credit per EDU	Maximum Development Fee per EDU
	(\$ mil)	(\$/EDU)	(\$/EDU)	(\$/EDU)
Water System	8.6	1,664	0	1,664
Wastewater System	6.3	1,334	0	1,334

Table 1-7 compares the maximum development fee per EDU to the current development fee per EDU.

Table 1-7 2014 - 2023 Maximum Development Fees per EDU versus Current Development Fees per EDU

Development Fee	Proposed Development Fee per EDU	Current Development Fee per EDU	Change	% Change
	(\$/EDU)	(\$/EDU)	(\$/EDU)	(%)
Water System	1,664	3,045	(1,381)	(45%)
Wastewater System	1,334	2,848	(1,514)	(53%)

2. Development Fee Calculations

2.1 Calculated Development Fee per EDU

The development fee was calculated by first determining the eligible capital costs for growth-related IIP, as presented in the adopted IIP in Appendix B. Those eligible capital costs were then divided by the projected increase in number of EDUs (EDUs) for the service area, which are presented in Table 1-3 of the adopted LUA in Appendix A, to determine the calculated development fee per EDU. Table 2-1 presents the calculated impact fees per EDU, which were calculated by dividing the eligible IIP value by the EDUs.

Table 2-1 Calculation of Development Fees

Development Fee	Eligible IIP	Incremental Service Units	Calculated Development Fee per EDU
Water	\$ 8,593,517	5,165	\$ 1,664
Wastewater	\$ 6,336,680	4,750	\$ 1,334

2.2 Credit Calculation

ARS §9-463.05 requires municipalities to “forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and...include these contributions in determining the extent of the burden imposed by the development.” For the City of Tempe, this contribution is based on the amount of projected future water and wastewater base charge and rate revenues expected to be generated by the new development and used to pay for capital improvements identified in the IIP. This credit provides an adjustment to benefit fee payers who will pay for IIP in both the development fee and their future utility bills.

These growth-related capital costs include debt service payments on outstanding debt for the existing available capacity that has been included in the eligible study period capacity and projected future principal and interest payments for future debt on eligible growth-related CIP. However, because Tempe uses its development fee revenue to cash fund a portion of its IIP projects, there is no credit to apply to the development fees.

2.3 Maximum Development Fees

2.3.1 Maximum Development Fees per EDU

The maximum development fees per EDU include both the value of existing infrastructure with capacity available to serve projected new development from 2014 to 2023 and the value of new capacity available to serve new development from 2014 to 2023. Table 2-2 shows the calculated development fees, rate credits and maximum development fees.

Table 2-2 Maximum Development Fees per EDU

Development Fee	Calculated Development Fee	Calculated Rate Credit	Maximum Development Fee
	(\$/EDU)	(\$/EDU)	(\$/EDU)
Water System	1,664	0	1,664
Wastewater System	1,334	0	1,334

Table 2-3 compares each of the maximum development fees per EDU with the current development fee per EDU.

Table 2-3 Comparison of Maximum Development Fees with Current Development Fees

Development Fee	Proposed Development Fee	Current Development Fee	Change	% Change
	(\$/EDU)	(\$/EDU)	(\$/EDU)	(%)
Water System	1,664	3,045	(1,381)	(45%)
Wastewater System	1,334	2,848	(1,514)	(53%)

2.3.2 Service Units

The development fee for each meter size was calculated by applying published meter capacity ratios. Since the 5/8-inch meter size is the most frequently used meter by the residential customer, it is equivalent to one service unit or 1.0 EDU, which represents 568 gallons per day of water usage and 254 gallons per day of wastewater discharge. The maximum development fee for meter sizes larger than 5/8-inch was determined by

multiplying the maximum development fee per EDU from Table 2-3 by the corresponding meter equivalent ratio. Table 2-4 presents the maximum development fees for water and wastewater for all meter sizes using the meter equivalent ratios². The maximum development fee represents the maximum cost justified development fee calculated in accordance with the Arizona Statutes. It is recommended that the City adopt water and wastewater development fees that are no greater than the calculated fees. However, the City may elect to adopt development fees that are lower than the maximum calculated development fees if desired.

Table 2-4 Maximum Water Development Fees by Meter Size

Meter Size	EDU Factor	Water Development Fee		Wastewater Development Fee	
		Existing	Recommended	Existing	Recommended
		(\$/EDU)	(\$/EDU)	(\$/EDU)	(\$/EDU)
5/8"	1.0	3,045	1,664	2,848	1,334
3/4"	1.5	4,568	2,496	4,272	2,001
1"	2.5	7,613	4,160	7,120	3,335
1 1/2"	5.0	15,225	8,320	14,240	6,670
2"	8.0	24,360	13,312	22,784	10,672
3"	20.0	60,900	33,280	56,960	26,680
4"	40.0	121,800	66,560	113,920	53,360
6"	80.0	243,600	133,120	227,840	106,720
8"	190.0	578,550	316,160	541,120	253,460
10"	300.0		449,200		400,200

² Water Meters—Selection, Installation, Testing, and Maintenance (M6)



Appendix A

Adopted Land Use Assumptions



City of Tempe

**Water and Wastewater
Development Fees Study**

LAND USE ASSUMPTIONS

February 2014



Water and Wastewater Development Fees Study

LAND USE ASSUMPTIONS

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February 4, 2014

This Land Use Assumptions Plan for the water and wastewater utilities was prepared using data from the City of Tempe General Plan 2040, which is consistent with the basis for the Land Use Assumptions Plan for the City's general government services.

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Appendix A – Water and Wastewater Demand Projections	

Acronym List

ACS	American Community Survey
ADD	Average Day Demand
afy	Acre Feet per Year
ARS	Arizona Revised Statutes
AZ-SMART	Arizona's Socioeconomic Modeling, Analysis, and Reporting Toolbox
COG	Council of Government
EDU	Equivalent Dwelling Unit
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SB	Senate Bill
SFR	Single Family Residential
SROG	Sub-Regional Operating Group
TAZ	Traffic Analysis Zone
UrbanSim	Urban Simulator
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

1. Land Use Assumptions

1.1 Introduction

ARS §9-463.05 allows municipalities to assess development fees on new development to fund capital improvements necessary to serve that new development. This legislation requires a municipality to adopt a Land Use Assumptions (LUA) and Infrastructure Improvements Plan before assessing or collecting development fees. The IIP and maximum allowable development fees established therein must be based upon the adopted LUA.

The LUA incorporates the best information available to project future land use and demand for a service area in which a municipality intends to provide utility services. Land use assumptions are based on a ten-year period. These assumptions may be general and do not require detailed projections for specific tracts of land.

Tempe provides water and wastewater service to the entire City of Tempe, the Town of Guadalupe and Maricopa County “island” areas located within the City boundaries.

1.2 Methodology

1.2.1 Current Land Use

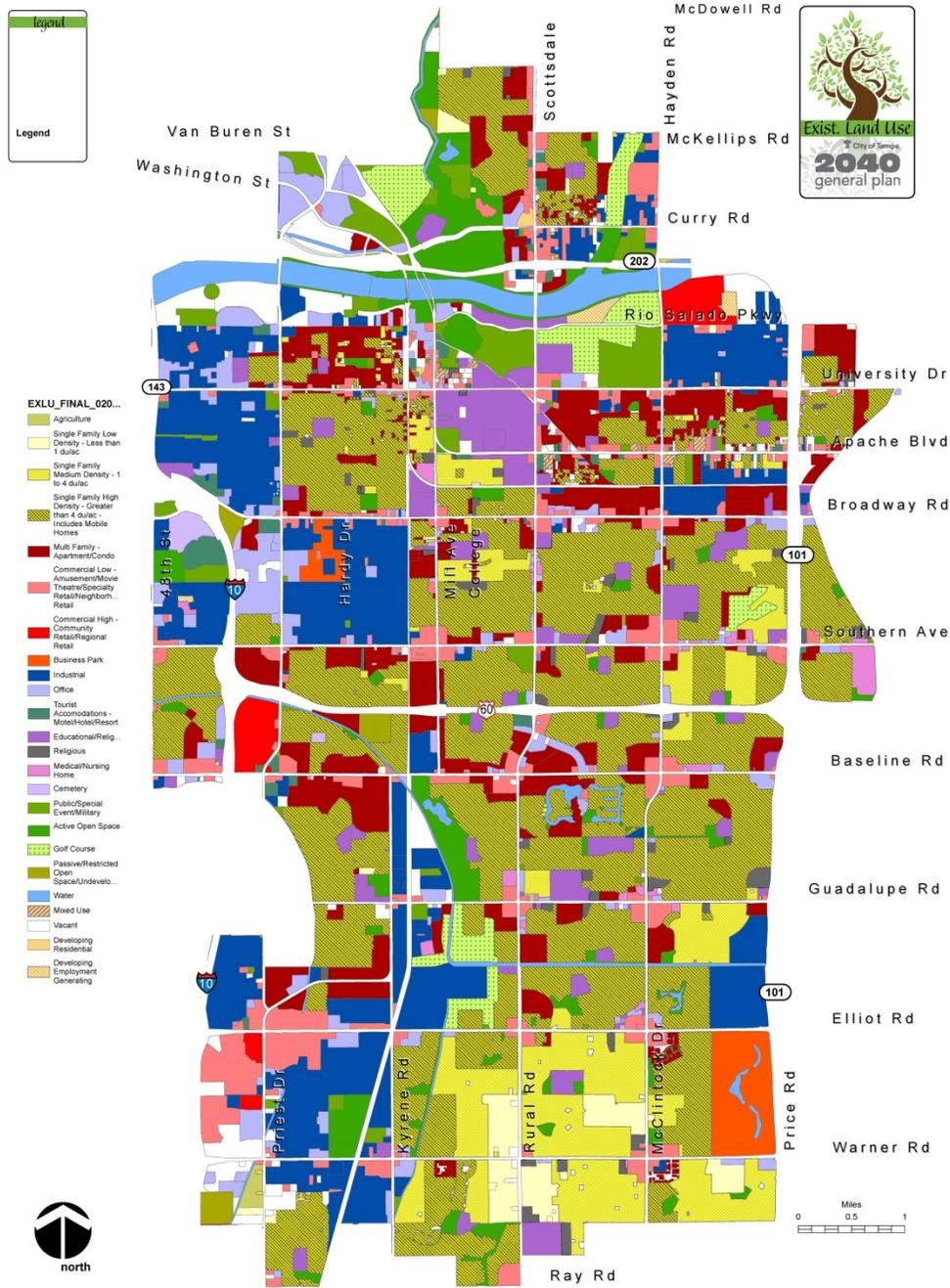
Land use assumptions for the future are based on current land use distribution patterns and categories. Current land use is primarily based on the City of Tempe’s General Plan for Year 2040 and is supplanted with data from the Maricopa Association of Governments (MAG). The current and projected land use distributions are provided in Table 1-1. Figure 1-1 shows the current land use distributions for Tempe.

Table 1-1 Current and Projected Land Use Distribution

Existing Land Use	2013 Acres	2013 Percentage	2023 Acres	2023 Percentage	2040 Acres*	2040 Percentage
Single Family Residential	7,796	29.6%	7,453	28.3%	7,137	27.1%
Multifamily Residential	2,063	7.8%	2,228	8.5%	2,379	9.0%
Commercial	3,110	11.8%	2,633	10.0%	2,188	8.3%
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Open Space	1,536	5.8%	1,782	6.8%	2,011	7.6%
Water	682	2.6%	531	2.0%	389	1.5%
Private Open Space	5	<0.1%	55	0.2%	102	0.4%
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Town of Guadalupe	512	1.9%	512	1.9%	512	1.9%
County "Islands"	152	0.6%	152	0.6%	152	0.6%
Rights-of-way	5,311	20.2%	5,332	20.3%	5,347	20.3%
Vacant	627	2.4%	302	1.1%	0	0.0%
Total	26,328	100.0%	26,328	100.0%	26,328	100.0%

*Source: GP2040 Table 1 Existing and Projected Land Use

Figure 1-1 Tempe Current Land Use



1.2.2 Population and Projections

The population projections in this LUA are based upon the City of Tempe 2040 General Plan and area wide models run by MAG for assessing future transportation improvements. The models used are called the AZ-SMART and UrbanSim.

Arizona's Socioeconomic Modeling, Analysis, and Reporting Toolbox (AZ-SMART) is a modeling suite that supports socioeconomic activities at MAG, other Councils of Government (COG) and Metropolitan Planning Organizations (MPO), and elsewhere throughout the state. This modeling suite is a platform from which to build, calibrate, run, and analyze socioeconomic projections and projection models. It also integrates with third party models. The UrbanSim model is the major third party model used in the system. The models project allocated population within the study area (Maricopa County). The local modeling data inputs include existing land uses, household sizes and birthrates, employment numbers and types, future roads and developable land. The models project future households, population and employment based on common transportation and land use relationships as well as local demographic relationships based on the inputs.

Base data includes but is not limited to:

- Population and Housing: Census 2010
- Group Quarters (Institutional and Non-Institutional): Census 2010
- Detailed Population Characteristics: American Community Survey (ACS) Public Use Microdata Sample (PUMS)- 5-year data (2006-2010)
- Employment: July 1, 2010 base
- Residential Completions: April 1, 2010 to June 30, 2010, submitted and reviewed by MAG member agencies
- Existing Land Use: use current as of December 2010, reviewed by MAG Population Technical Advisory Committee (POPTAC)
- Built space: Maricopa County Assessor's data as of December 2010
- Future Plans: Current as of 2012 or later, reviewed by POPTAC
- Development Data: 2012 data, reviewed by MAG POPTAC
- TAZ system: TAZ2012

The review team tests for quality control of the data and provides guidance to account for local expected projects or trends that may affect specific areas. The projections are reviewed by five-year increments to ensure that the modeled growth rates look within reason. MAG projections are sometimes adjusted to reflect programs that the model

does not seem to project well. These are areas where the City Council is formulating growth or economic development policies.

The model outputs are population, households and employment by census tracts, as well as further allocations to smaller Transportation Analysis Zones (TAZ). Tempe projections are based on the best fit of the TAZ boundaries to the City boundary and a portion of the Town of Guadalupe.

Tempe provides water and wastewater service to the entire City of Tempe, the Town of Guadalupe and Maricopa County “island” areas located within the City boundaries.

1.2.3 Current EDU Calculations and Factors

For the LUA, the common measure used is an Equivalent Dwelling Unit (EDU). This is the standardized measure of demand expressed as water or wastewater flow for an average household unit. Current number of EDUs is estimated by applying the appropriate 5/8-inch meter equivalency factor to the distribution of water meters by size. One 5/8-inch meter equivalent equals one EDU.

The water EDU calculation is shown in Table 2-2 and is based on projected number of meters by size for 2013. The EDU to meter size ratio is provided by the American Water Works Association (AWWA). This shows that a 1-inch meter can have a flow 2.5 times that of a 5/8-inch meter.

Table 2-2 Current Water EDU Calculations and Factors

Meter Size (in.)	Meter Count	EDUs/Meter Factor	Number of EDUs
5/8	28,927	1.0	28,927
3/4	5,377	1.5	8,066
1	3,995	2.5	9,988
1 ½	1,465	5.0	7,325
2	2,737	8.0	21,896
3	405	20.0	8,100
4	83	40.0	3,320
6	72	80.0	5,760
8	22	190.0	4,180
10	1	300.0	300
12	0	375.0	0
Total	43,082		97,862

Current number of wastewater EDUs is estimated using the number of water EDUs and the ratio of wastewater accounts to water accounts. For 2013, the estimated number of wastewater EDUs is 89,995.

$$\begin{aligned} & \text{2013 water EDUs} * \text{2013 wastewater accounts} / \text{2013 water accounts} = \text{2013} \\ & \qquad \qquad \qquad \text{wastewater EDUs} \\ & \text{97,862 EDUs} * \text{39,618 accounts} / \text{43,082 accounts} = \text{89,995 EDUs} \end{aligned}$$

1.2.4 Future EDU Calculations

The water system design average day demand (ADD) is based on the projected acreage for each land type presented in Table 1-1 and the land use water demand factors presented in Table 1-2.

Table 1-2 Land Use Distribution

Land Use Category	Demand Factor	2013 Acreage	2013 Demand	2023 Acreage	2023 Demand
	(af/ac/yr)	(ac)	(af/yr)	(ac)	(af/yr)
Single Family	2.75	7,796	21,439	7,453	20,496
Multifamily	5.00	2,063	10,315	2,228	11,140
Commercial	3.00	3,110	9,330	2,633	7,899
Mixed Use	5.00	100	500	1,028	5,140
Industrial	3.00	2,843	8,529	3,201	9,603
Civic	3.00	4	12	41	123
Educational	3.50	890	3,115	655	2,293
Open Space ¹	2.25	1,536	3,456	1,782	4,009
Water ²	0.00	682	0	531	0
Private Open Space	4.50	5	23	55	248
Recreational	3.50	697	2,439	423	1,480
Town of Guadalupe	2.45	512	1,254	512	1,254
County "Islands"	3.5	152	532	152	532
Rights-of-way	0.25	5,311	1,328	5,332	1,333
Vacant	0.00	627	0	302	0
Total		26,328	62,272	26,328	65,550

1. Water demand factor for open space reduced by 50% to eliminate direct delivery water that does not enter potable water system.
2. Water demand factor reduced to 0 because land in water category does not impact potable water system.

The current (2013) reserved water demand is 62,272 acre-feet per year (afy) or 55.6 million gallons per day (mgd). Therefore, one water EDU is equivalent to 568 gallons per day (gpd).

$$\begin{aligned} \text{Current reserved average daily water demand} / \text{2013 EDUs} &= \text{Reserved average} \\ &\text{daily demand per EDU} \\ 55.6 \text{ mgd} / 97,862 \text{ EDUs} &= 568 \text{ gpd per EDU} \end{aligned}$$

The projected 2023 reserved water demand, which is determined by applying the water demand factors from Table 1-2 to the estimated 2023 land use distribution, is 65,550 afy or 58.5 mgd. Assuming the reserved water demand per EDU remains constant at 568 gpd per EDU throughout the ten-year study period, the projected number of water EDUs for 2023 is 103,027.

$$\begin{aligned} \text{2023 projected reserved average daily water demand} / \text{Reserved average daily} \\ \text{demand per EDU} &= \text{2023 projected EDUs} \\ 58.5 \text{ mgd} / 568 \text{ gpd} &= 103,027 \text{ EDUs} \end{aligned}$$

The projected number of wastewater EDUs in 2023 is based on the growth rate in water EDUs for the study period. Therefore, 94,745 EDUs are anticipated in 2023.

$$\begin{aligned} \text{2013 wastewater EDUs} * \text{2023 water EDUs} / \text{2013 water EDUs} &= \text{2023 wastewater} \\ &\text{EDUs} \\ 89,995 \text{ EDUs} * 103,027 \text{ EDUs} / 97,862 \text{ EDUs} &= 94,745 \text{ EDUs} \end{aligned}$$

Table 1-3 summarizes the change in EDUs for Tempe's water and wastewater systems during the study period.

Table 1-3 Current and Projected EDUs

System	Number of EDUs		
	2013	2023	Change
Water	97,862	103,027	5,165
Wastewater	89,995	94,745	4,750



Appendix A

Reserved Water and Wastewater
Demand Projections

City of Tempe, AZ
Water and Wastewater Development Fee Study
Water Demand Components (afy)

Year	Residential (SF)	Residential (MF)	Guadalupe	Commercial	Mixed Use	Industrial	Civic	Educational	Open Space	Water	Private Open Space	Recreational /Cultural	County Islands	Rights of Way	Vacant	TOTAL
2012	7,830	2,047	512	3,157	8	2,807	-	913	1,511	697	-	724	152	5,311	659	26,328
2013	7,796	2,063	512	3,110	100	2,843	4	890	1,536	682	5	697	152	5,311	627	26,328
2014	7,762	2,079	512	3,063	192	2,879	8	867	1,561	667	10	670	152	5,311	595	26,328
2015	7,728	2,095	512	3,016	284	2,915	12	844	1,586	652	15	643	152	5,311	563	26,328
2016	7,694	2,111	512	2,969	376	2,951	16	821	1,611	637	20	616	152	5,311	531	26,328
2017	7,660	2,127	512	2,922	468	2,987	20	798	1,636	622	25	589	152	5,311	499	26,328
2018	7,626	2,143	512	2,875	560	3,023	24	775	1,661	607	30	562	152	5,311	467	26,328
2019	7,592	2,159	512	2,828	652	3,059	28	752	1,686	592	35	535	152	5,311	435	26,328
2020	7,558	2,177	512	2,777	746	3,093	29	727	1,707	576	40	507	152	5,326	401	26,328
2021	7,523	2,194	512	2,729	840	3,129	33	703	1,732	561	45	479	152	5,328	368	26,328
2022	7,488	2,211	512	2,681	934	3,165	37	679	1,757	546	50	451	152	5,330	335	26,328
2023	7,453	2,228	512	2,633	1,028	3,201	41	655	1,782	531	55	423	152	5,332	302	26,328
2024	7,418	2,245	512	2,585	1,122	3,237	45	631	1,807	516	60	395	152	5,334	269	26,328
2025	7,383	2,262	512	2,537	1,216	3,273	49	607	1,832	501	65	367	152	5,336	236	26,328
2026	7,348	2,279	512	2,489	1,310	3,309	53	583	1,857	486	70	339	152	5,338	203	26,328
2027	7,313	2,296	512	2,441	1,404	3,345	57	559	1,882	471	75	311	152	5,340	170	26,328
2028	7,278	2,313	512	2,393	1,498	3,381	61	535	1,907	456	80	283	152	5,342	137	26,328
2029	7,243	2,330	512	2,345	1,592	3,417	65	511	1,932	441	85	255	152	5,344	104	26,328
2030	7,212	2,343	512	2,293	1,687	3,457	66	491	1,957	422	91	231	152	5,342	72	26,328
2031	7,205	2,347	512	2,283	1,707	3,465	67	486	1,962	419	92	225	152	5,341	65	26,328
2032	7,198	2,351	512	2,273	1,727	3,473	68	481	1,967	416	93	219	152	5,340	58	26,328
2033	7,191	2,355	512	2,263	1,747	3,481	69	476	1,972	413	94	213	152	5,339	51	26,328
2034	7,184	2,359	512	2,253	1,767	3,489	70	471	1,977	410	95	207	152	5,338	44	26,328
2035	7,177	2,363	512	2,243	1,787	3,497	71	466	1,982	407	96	201	152	5,337	37	26,328
2036	7,170	2,367	512	2,233	1,807	3,505	72	461	1,987	404	97	195	152	5,336	30	26,328
2037	7,163	2,371	512	2,223	1,827	3,513	73	456	1,992	401	98	189	152	5,335	23	26,328
2038	7,156	2,375	512	2,213	1,847	3,521	74	451	1,997	398	99	183	152	5,334	16	26,328
2039	7,149	2,379	512	2,203	1,867	3,529	75	446	2,002	395	100	177	152	5,333	9	26,328
2040	7,137	2,379	512	2,188	1,890	3,535	75	440	2,011	389	102	171	152	5,347	-	26,328

City of Tempe, AZ
Water and Wastewater Development Fee Study
Wastewater Average Daily Flow Projections

Year	Wastewater Demand Avg Daily (mgd)	Max Daily (mgd)	Max Monthly (mgd)
2013	22.9	27.4	25.1
2014	23.0	27.6	25.3
2015	23.1	27.7	25.4
2016	23.2	27.9	25.5
2017	23.3	28.0	25.7
2018	23.5	28.2	25.8
2019	23.6	28.3	25.9
2020	23.7	28.4	26.1
2021	23.8	28.6	26.2
2022	23.9	28.7	26.3
2023	24.1	28.9	26.5
2024	24.2	29.0	26.6
2025	24.3	29.2	26.7
2026	24.4	29.3	26.9
2027	24.6	29.5	27.0
2028	24.7	29.6	27.1
2029	24.8	29.8	27.3
2030	24.9	29.9	27.4
2031	24.9	29.9	27.4
2032	25.0	30.0	27.5
2033	25.0	30.0	27.5
2034	25.0	30.0	27.5
2035	25.0	30.1	27.6
2036	25.1	30.1	27.6
2037	25.1	30.1	27.6
2038	25.1	30.2	27.6
2039	25.2	30.2	27.7
2040	25.2	30.2	27.7

18.5 actual wastewater treated (mgd)

24% Unused capacity reserved for existing customers



Appendix B

Adopted Infrastructure Improvements
Plan



City of Tempe

**Water and Wastewater
Development Fees Study**

**INFRASTRUCTURE
IMPROVEMENTS PLAN**

February 2014



**Water and Wastewater
Development Fees Study**

**INFRASTRUCTURE
IMPROVEMENTS PLAN**

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Acronym List

ACS	American Community Survey
ADD	Average Day Demand
afy	Acre Feet per Year
ARS	Arizona Revised Statutes
AZ-SMART	Arizona's Socioeconomic Modeling, Analysis, and Reporting Toolbox
COG	Council of Government
EDU	Equivalent Dwelling Unit
GP 2040	Tempe General Plan Year 2040
gpd	Gallons per Day
IIP	Infrastructure Improvement Plan
LUA	Land Use Assumptions
MAG	Maricopa Association of Governments
MDPF	Maximum Day Peaking Factor
MFR	Multifamily Residential
mgd	Million Gallons per Day
MHPF	Maximum Hour Peaking Factor
MMF	Maximum Monthly Flow
MMPF	Maximum Month Peaking Factor
MPO	Metropolitan Planning Organization
POPTAC	Population Technical Advisory Committee
PUMS	Public Use Microdata Sample
PWWF	Peak Wet Weather Flow
SB	Senate Bill
SFR	Single Family Residential
SROG	Sub-Regional Operating Group
TAZ	Traffic Analysis Zone
UrbanSim	Urban Simulator
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

1. Infrastructure Improvements Plans

1.1 Introduction

The Infrastructure Improvements Plan (IIP) establishes the engineering basis for the capital projects included in the water and wastewater development fee calculations.

Development fees provide Tempe with a mechanism for funding or recouping the cost associated with capital improvements or facility expansions of the municipal water and wastewater systems necessitated by and attributable to the new development, as necessary to accommodate growth in the identified service areas from 2014 through 2023 (the study period). Tempe owns and operates an infrastructure-intensive system comprised of water production facilities, pumping stations, storage facilities, pipelines, and wastewater treatment facilities and that are continuously improved and expanded. The schedule for future growth-related investments in the water and wastewater systems that will serve new development during the 2014-2023 study period is known as the Infrastructure Improvements Plan. The eligible IIP includes capital project descriptions and cost estimates as developed by combined efforts of Tempe staff, other consultants, and Red Oak.

This report includes a description of the basis for establishing which Tempe water and wastewater facilities are eligible to be included in the development fee calculation. First, the facilities required to accommodate growth during the 10-year study period, as defined in the Land Use Assumptions (LUA), are identified. Then the development fee per equivalent dwelling unit (EDU) is calculated using the value of the eligible capital facilities and the projected increase in EDUs from the LUA. The final development fee per EDU is then calculated by subtracting statutory credits for the estimated capital costs to be included in future rates that will be charged to the new EDUs.

1.2 Capacity Criteria

This section of the report discusses the capacity of those facilities that are eligible for inclusion in the calculation of the development fees. The only capacities that are considered for inclusion are existing available capacities and the increases in capacities to serve growth projected to occur during the study period.

Section 1.2.1 describes those growth-related capacities for the water facilities considered for inclusion in the water development fees. The water facilities category is subdivided into water production, water resources, pumping stations, and water storage. Section 1.2.2 describes those growth-related capacities for wastewater

facilities considered for inclusion in the wastewater development fees. The wastewater facilities category is subdivided into wastewater treatment and Sub-Regional Operating Group (SROG) interceptors.

1.2.1 Water Infrastructure Capacity Criteria

The water infrastructure capacity criteria are based on the average day demand (ADD) calculated from the water demand factors in the LUA. The water system maximum day peaking factor (MDPF) is 1.6, and the maximum hour peaking factor (MHPF) is 2.24. These peaking factors were provided by City of Tempe staff based on the current design criteria used.

1.2.1.1 Water Resources

The City of Tempe has several sources of water supply that can be used to provide sufficient potable water to its customers. Water resources projects are typically measured in acre feet per year and designed to meet the ADD. The 2013 and 2023 ADDs are presented in the LUA. The projected study period increase in ADD for water resources projects is 3,278 afy:

$$\begin{aligned}\text{ADD increase} &= \text{2023 ADD} - \text{2013 ADD} \\ \text{ADD increase} &= 65,550 \text{ afy} - 62,272 \text{ afy} = 3,278 \text{ afy}\end{aligned}$$

1.2.1.2 Water Production

Water production facilities include wells and water treatment plants. These facilities are designed to meet the maximum day demand (MDD). Using the system ADD, MDPF and the number of EDUs from the LUA, the estimated 2013 MDD for Tempe's water system is 88.9 mgd:

$$\begin{aligned}\text{MDD} &= \text{ADD} * \text{MDPF} * \text{No. of EDUs} \\ \text{2013 MDD} &= 568 \text{ gpd} * 1.6 * 97,862 \text{ EDUs} / 1,000,000 \\ \text{2013 MDD} &= 88.9 \text{ mgd}\end{aligned}$$

Similarly, the estimated 2023 MDD for the water system is 93.6 mgd:

$$\begin{aligned}\text{2023 MDD} &= 568 \text{ gpd} * 1.6 * 103,027 \text{ EDUs} / 1,000,000 \\ \text{2023 MDD} &= 93.6 \text{ mgd}\end{aligned}$$

The projected study period increase in MDD for water production facilities is 4.7 mgd:

$$\begin{aligned} \text{MDD increase} &= 2023 \text{ MDD} - 2013 \text{ MDD} \\ \text{MDD increase} &= 93.6 \text{ mgd} - 88.9 \text{ mgd} = 4.7 \text{ mgd} \end{aligned}$$

1.2.1.3 Water Pumping

Water pumping requirements are based on design maximum hour demand (MHD). Using the water system ADD, MHPF and the number of EDUs from the LUA, the estimated 2013 MHD for the Tempe system is 124.5 mgd:

$$\begin{aligned} \text{MHD} &= \text{ADD} * \text{MHPF} * \text{No. of EDUs} \\ 2013 \text{ MHD} &= 568 \text{ gpd} * 2.24 * 97,862 \text{ EDUs} / 1,000,000 \\ 2013 \text{ MHD} &= 124.5 \text{ mgd} \end{aligned}$$

The estimated 2023 MHD for Tempe is 131.1 mgd:

$$\begin{aligned} 2023 \text{ MHD} &= 568 \text{ gpd} * 2.24 * 103,027 \text{ EDUs} / 1,000,000 \\ 2023 \text{ MHD} &= 131.1 \text{ mgd} \end{aligned}$$

The expected increase in MHD due to growth during the study period is 6.6 mgd:

$$\begin{aligned} \text{MHD increase} &= 2023 \text{ MHD} - 2013 \text{ MHD} \\ \text{MHD increase} &= 131.1 \text{ mgd} - 124.5 \text{ mgd} = 6.6 \text{ mgd} \end{aligned}$$

Table 1-1 summarizes the change in demand for water infrastructure during the study period.

Table 1-1 Water Infrastructure Capacity Criteria

Infrastructure Component	Capacity Required		
	2013	2023	Change
Water Resources (afy)	62,272	65,550	3,278
Water Production (mgd)	88.9	93.6	4.7
Water Pumping (mgd)	124.5	131.1	6.6

1.2.2 Wastewater Infrastructure Capacity Criteria

Reserved average daily wastewater flow projections are estimated based on reserved water demands. It is assumed that the ratio of actual average daily water demand to current reserved water demand is the same as the ratio of actual average daily wastewater flow to current reserved average daily wastewater flow. The ratio of actual average daily water demand to current reserved water demand is 1.24. Actual wastewater average daily flow (ADF) is assumed to be 18.5 mgd. Therefore, the current reserved ADF for wastewater is 22.9 mgd.

$$\begin{aligned} \text{Current reserved water ADD} / \text{Actual water ADD} &= \text{Reserved to actual demand} \\ &\text{ratio} \\ 55.6 \text{ mgd} / 45.0 \text{ mgd} &= 1.24 \end{aligned}$$

$$\begin{aligned} \text{Actual wastewater ADF} * \text{Reserved to actual demand ratio} &= \text{Current reserved} \\ &\text{wastewater ADF} \\ 18.5 \text{ mgd} * 1.24 &= 22.9 \text{ mgd} \end{aligned}$$

Using the current reserved ADF and the number of EDUs, we calculate that one wastewater EDU is equivalent to 254 gpd.

$$\begin{aligned} \text{Current reserved wastewater ADF} / \text{2013 EDUs} &= \text{Wastewater ADF per EDU} \\ 22.9 \text{ mgd} / 89,995 \text{ EDUs} &= 254 \text{ gpd per EDU} \end{aligned}$$

Assuming the ADF per EDU is constant throughout the study period, the projected average daily wastewater flow for 2023 is 24.1 mgd.

$$\begin{aligned} \text{2023 projected EDUs} * \text{Wastewater ADF per EDU} &= \text{2023 projected wastewater} \\ &\text{ADF} \\ 94,745 \text{ EDUs} * 254 \text{ gpd} &= 24.1 \text{ mgd} \end{aligned}$$

The wastewater treatment facilities are designed based on the maximum monthly flow (MMF), which is estimated using a maximum month peaking factor (MMPF) of 1.1. This capacity criterion is also applied to the SROG interceptors.

$$\begin{aligned} \text{MMF} &= \text{ADF} * \text{MMPF} * \text{No. of EDUs} \\ \text{2013 MMF} &= 254 \text{ gpd} * 1.1 * 89,995 \text{ EDUs} / 1,000,000 \\ \text{2013 MMF} &= 25.1 \text{ mgd} \end{aligned}$$

The estimated 2023 MMF for Tempe is 26.5 mgd:

$$\begin{aligned} \text{2023 MMF} &= 254 \text{ gpd} * 1.1 * 94,745 \text{ EDUs} / 1,000,000 \\ \text{2023 MMF} &= 26.5 \text{ mgd} \end{aligned}$$

The expected increase in MMF due to growth during the study period is 1.4 mgd:

$$\begin{aligned} \text{MMF increase} &= \text{2023 MMF} - \text{2013 MMF} \\ \text{MMF increase} &= 26.5 \text{ mgd} - 25.1 \text{ mgd} = 1.4 \text{ mgd} \end{aligned}$$

Table 1-2 summarizes the change in demand for wastewater infrastructure during the study period.

Table 1-2 Wastewater Infrastructure Capacity Criteria

Infrastructure Component	Capacity Required		
	2013	2023	Change
Wastewater Treatment (mgd)	25.1	26.5	1.4
SROG Interceptor (mgd)	25.1	26.5	1.4

1.3 Eligible Facilities

This section establishes the Tempe water and wastewater facilities that are eligible for inclusion in the calculation of the development fee. Projects and facilities included in the IIP can serve to rehabilitate and renew the system, enhance the system to improve efficiency and meet regulatory requirements, increase the system capacity, or achieve a combination of these objectives. Only those projects that provide or impact capacity available for growth projected to occur during the study period (2014 to 2023) can be included in the development fee calculation. Additionally, if the cost of a project cannot be sufficiently delineated or if alternate mechanisms for cost recovery are in place, the project is not included in the development fee calculation.

Although eligible for inclusion in the development fee calculation, financing costs associated with existing infrastructure with available capacity to serve new development are not included in Tempe’s IIP. Based on discussions with Tempe staff, Tempe prefers to use cash generated from development fee revenues to fund growth related IIP, to the extent that development fee collections provide that cash. Therefore, Tempe excluded financing costs from the development fee calculation.

1.3.1 Water Facilities

The water development fee includes growth-related costs for existing water infrastructure and for new projects to be constructed. As with the capacity criteria, the allocation of existing facilities and future IIP is determined for each type of infrastructure in the water development fee calculation. For each of these infrastructure types, there are multiple facilities and each facility is likely to have some available capacity for future growth, which is the capacity in excess of the capacity reserved for existing customers. Planned expansion projects in the IIP may include construction of a new facility within the service area even though other facilities within that service area may have available capacity. Because new water facilities are constructed and put into service even when available capacity exists at older facilities, the assumption that growth will utilize all existing available capacity before utilizing future IIP capacity is not realistic. Existing available and future CIP capacity are considered together as total available capacity during the study period, and the amount of that available capacity that would be utilized by study period growth is determined using the capacity criteria from Section 1.2. This approach results in a lower eligible percentage than if only future capacity was considered, which, when applied to the total value of existing and future infrastructure, generates a comparable eligible IIP value.

1.3.1.1 Water Resources

The water development fee includes growth-related costs for existing water supplies and for new water resources projects to be completed. Tempe staff provided the available water supply information, as well as the amount of water supply to be added during the study period through IIP projects.

Tempe currently has 88,518 afy of water supply available for its customers. Of the 88,518 afy of existing capacity in 2013, 62,272 afy is needed to meet the ADD of existing customers. Therefore, 26,246 afy is available to serve new development. The IIP includes 4,181 afy of water resources projects so the total available water resources during the study period is 30,427 afy:

$$\begin{aligned} \text{Total Available Water Resources} &= \text{Existing Available Water Resources} + \text{Future} \\ &\quad \text{IIP Water Resources} \\ \text{Total Available Water Resources} &= 26,246 \text{ afy} + 4,181 \text{ afy} = 30,427 \text{ afy} \end{aligned}$$

From Section 1.2.1.1, approximately 3,278 afy is required to serve growth during the study period. This represents 10.8% of the total available water resources:

$$\text{Study period growth allocation} = \frac{\text{Study period water resources demand}}{\text{Total available water resources}}$$
$$\text{Study period growth allocation} = 3,278 \text{ afy} / 30,427 \text{ afy} = 10.8\%$$

1.3.1.2 Water Production

Tempe staff provided the capacities of the existing water production facilities and the future IIP projects. The 2013 and 2023 water production capacities for the Tempe water system are 116.7 mgd and 123.4 mgd, respectively.

Of the 116.7 mgd of existing capacity in 2013, 88.9 mgd is needed to meet the MDD of existing customers. Therefore, 27.8 mgd is available to serve new development. The IIP includes 6.8 mgd of well capacity so the total available capacity during the study period is 34.6 mgd:

$$\text{Total available capacity} = \text{Existing available capacity} + \text{Future IIP capacity}$$
$$\text{Total available capacity} = 27.8 \text{ mgd} + 6.8 \text{ mgd} = 34.6 \text{ mgd}$$

From Section 1.2.1.2, approximately 4.7 mgd is required to serve growth during the study period. This represents 13.6% of the total available capacity:

$$\text{Study period growth allocation} = \frac{\text{Study period demand}}{\text{Total available capacity}}$$
$$\text{Study period growth allocation} = 4.7 \text{ mgd} / 34.6 \text{ mgd} = 13.6\%$$

1.3.1.3 Water Pumping

Tempe staff provided the capacities of the existing high service and booster pump stations. The 2013 pump station capacity for the Tempe water system is 110.0 mgd. No pump station expansions are planned during the study period.

Of the 110.0 mgd of existing capacity in 2013, 124.5 mgd is needed to meet the MDD of existing customers, which indicates that there is not currently sufficient capacity to serve the existing demand. However, Tempe's well pumps also provide pumping capacity for the system. If the existing pumping capacity is applied to the current pumping demand, the remaining demand requirement is 107.8 mgd:

$$\text{Pump station capacity requirement} = \text{Water pumping demand} - \text{Well pumping capacity}$$

Pump station capacity requirement = 124.5 mgd – 16.7 mgd = 107.8 mgd

As a result, 2.2 mgd is available to serve new development. The IIP includes 6.8 mgd of well capacity so the total available capacity during the study period is 9.0 mgd:

Total available capacity = Existing available capacity + Future IIP capacity
Total available capacity = 2.2 mgd + 6.8 mgd = 9.0 mgd

From Section 1.2.1.3, approximately 6.6 mgd is required to serve growth during the study period. This represents 73.9% of the total available capacity:

Study period growth allocation = Study period demand / Total available capacity
Study period growth allocation = 6.6 mgd / 9.0 mgd = 73.9%

Table 1-3 below summarizes the values of the eligible water facilities included in the development fee calculation.

Table 1-3 Summary of Eligible Water Costs

	Existing Capacity			New IIP Capacity			Total Capacity		
	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs
	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)
Water Resources	3.4	0.1	0.0	4.8	0.5	0.0	8.2	0.6	0.0
Water Production	178.3	5.8	0.0	14.2	1.9	0.0	192.5	7.7	0.0
Water Pumping	22.8	0.3	0.0	0.0	0.0	0.0	22.8	0.3	0.0
Total	204.5	6.2	0.0	19.0	2.4	0.0	223.5	8.6	0.0

1.3.2 Wastewater Facilities

The wastewater development fee includes growth-related costs associated with the SROG 91st Avenue Wastewater Treatment Plan (WWTP), the Kyrene Water Reclamation Facility (WRF) and the SROG Interceptor which delivers flow to the plant. The 91st Avenue WWTP has a rated capacity of 230 mgd, 32.5 mgd of which is

allocated to the City of Tempe. Because Tempe's projected maximum monthly flow in 2023 is 26.5 mgd, no additional capacity will be required for the 91st Ave WWTP during the study period. However, improvements to the plant with respect to odor control, solids handling, and side stream management will improve the value of the existing plant capacity available for future customers, and have thus been included. In addition to the 32.5 mgd of capacity at the 91st Avenue WWTP, Tempe has 4.0 mgd capacity at Kyrene WRF.

1.3.2.1 Wastewater Treatment

Of the 36.5 mgd of existing capacity in 2013, 25.1 mgd is needed to meet the MMF of existing customers. As a result, 11.4 mgd is available to serve new development. From Section 3.2.1.3, approximately 1.4 mgd is required to serve growth during the study period. This represents 11.7% of the total available capacity:

$$\text{Study period growth allocation} = \frac{\text{Study period demand}}{\text{Total available capacity}}$$
$$\text{Study period growth allocation} = 1.4 \text{ mgd} / 11.4 \text{ mgd} = 11.7\%$$

1.3.2.2 SROG Interceptors

The SROG interceptors are capacity-limited, and Tempe has already exceeded its 15 mgd allocation for conveying wastewater into the 91st Avenue WWTP. As such, the SROG Interceptor Capacity Improvements Project has been included in this analysis as it will increase the conveyance capacity available to Tempe by 12 mgd to 27 mgd. However, because 10.1 mgd of added capacity is required to serve existing customers, only 1.9 mgd is available. This represents 71.6% of the total available capacity or 11.1% of the added capacity.

$$\text{Study period growth allocation} = \frac{\text{Study period demand}}{\text{Total available capacity}}$$
$$\text{Study period growth allocation} = 1.4 \text{ mgd} / 1.9 \text{ mgd} = 71.6\%$$

$$\text{Study period growth allocation} = \frac{\text{Study period demand}}{\text{Total added capacity}}$$
$$\text{Study period growth allocation} = 1.4 \text{ mgd} / 12.0 \text{ mgd} = 11.1\%$$

Table 1-4 summarizes the values of the eligible wastewater facilities included in the development fee calculation.

Table 1-4 Summary of Eligible Wastewater Costs

	Existing Capacity			New IIP Capacity			Total Capacity		
	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs	Value of Capacity	Value of Eligible Capacity	Eligible Financing Costs
	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)	(\$ mil)
Wastewater Treatment	152.0	5.5	0.0	2.5	0.3	0.0	154.5	5.8	0.0
SROG Interceptor	67.1	0.0	0.0	4.5	0.5	0.0	71.7	0.5	0.0
Total	219.1	5.5	0.0	7.0	0.8	0.0	226.2	6.3	0.0



Appendix A

Infrastructure Improvements Plan
Eligible Assets and CIP Projects

City of Tempe, AZ
Water and Wastewater Development Fee Study
Asset Summary - Replacement Cost New Less Depreciation

Line No.	Description	Alloc. Code	RCNLD as of 6/30/13					
			Water	Wastewater	W / S	Reclaimed	Irrigation	Total
1	Treatment Plant	TP	\$ 164,636,492	\$ 37,136,019	\$ -	\$ -	\$ -	\$ 201,772,510
2	Distribution Line (1)	DL	297,405,104	0	6,413,200	0	0	303,818,304
3	Distribution Line - Contributed (1)	DLX	34,055,629	0	0	0	0	34,055,629
4	Transmission Line (1)	TL	2,796,388	0	380,900	0	0	3,177,287
5	Transmission Line - Contributed (1)	TLX	0	0	0	0	0	-
6	Wells	W	13,643,355	0	0	0	0	13,643,355
7	Source of Supply	S	2,859,740	0	573,613	0	0	3,433,353
8	Storage Tanks	ST	12,048,849	0	0	0	0	12,048,849
9	Pump and Booster Stations - Water	P	22,808,630	0	18,514	0	0	22,827,144
10	General Plant, Buildings, Improvements	G	68,746,684	21,998	33,111,145	0	0	101,879,827
11	Equipment, Vehicles, etc	E	15,391,697	5,713,072	10,881,266	584,874	52,378	32,623,287
12	Meters	M	5,837,739	103,194	22,724	0	0	5,963,657
13	Administrative	A	0	0	9,130,273	0	0	9,130,273
14	Water Reclamation Facilities	RP	0	0	29,918,335	54,971,335	0	84,889,670
15	Water Reclamation Facilities - Land	RL	0	0	3,191,924	0	0	3,191,924
16	Water Reclamation Effluent Lines	RE	1,200,689	0	0	0	0	1,200,689
17	Water Reclamation Infrastructure	RI	0	2,433,411	0	16,858,293	0	19,291,705
18	Land (3)	L	1,616,852	13,061	1,871,540	0	0	3,501,453
19	Pump, Booster and Lift Stations - WW	PS	0	2,167,594	0	0	0	2,167,594
20	Collection System	CS	0	203,729,188	5,031,518	0	0	208,760,707
21	Collection System - Contributed	CSX	0	6,615,944	0	0	0	6,615,944
22								
23	Total		643,047,847	257,933,480	100,544,952	72,414,502	52,378	1,073,993,160
24			71%	29%				
25								
26	Direct Allocation		643,047,847	257,933,480				900,981,328
27	Indirect Allocation (5)		97,155,717	75,856,115				173,011,832
28	Total Water / Wastewater		740,203,565	333,789,596				1,073,993,160
29			-	-				-
30	Developer Contributions (6)		\$ 34,055,629	\$ 6,615,944				40,671,573
31			\$ -	\$ -				-
32	Assets Less Developer Contributions		\$ 706,147,935	\$ 327,173,652				\$ 1,033,321,587

- (1) Per City staff, water lines less than or equal to 12" in diameter are distribution and greater than 12" are transmission.
(2) Per City staff, Water Reclamation Facilities are 100% Wastewater, Effluent Lines are 100% Water and Water Reclamation Infrastructure is 50% Water, 50% Wastewater.
(3) Land assets are not indexed to the Engineering News Record Construction Cost Index for purposes of the replacement cost new calculation.
(4) Remaining Water / Wastewater assets allocated to water and Wastewater based on pro-rated percent of directly allocated water and Wastewater assets.

City of Tempe, AZ
Water and Wastewater Development Fee Study
IIP-eligible CIP Projects

Project Number	Facility Type	Project Name	Cost	Additional Capacity	Units	Completed Within Study Period?
1	Water Production	Chlorine Generation Cells Replacement at Water Treatment Plants	\$ 2,760,000	Enhancement		Yes
2	Water Production	Filter Rehabilitation at Water Treatment Plants	\$ 950,000	Enhancement		Yes
3	Water Production	JGMWTP Water Aqueduct Repair and Security	\$ 1,100,000	Enhancement		Yes
4	Water Production	JGMWTP Water Quality Upgrades	\$ 2,071,440	Enhancement		Yes
5	Water Resource	Ken McDonald Golf Course Recharge Project (1700 Acre-Ft Addition)	\$ 2,600,000		1700 acre-ft	Yes
6	Water Production	New Production Wells (9 MGD Addition)	\$ 6,076,763		9 MGD	Yes
7	Water Production	South Tempe Water Treatment Plant Improvements	\$ 331,232	Enhancement		Yes
8	Water Production	STWTP Main Power Building	\$ 938,000	Enhancement		Yes
9	Water Resources	WMAT Quantification Settlement Agreement CAP Water Lease (2481 Acre-Ft Addition)	\$ 4,770,168		2481 acre-ft	Yes
10	SROG Interceptor	SROG Interceptor Capacity Improvements	\$ 3,393,212		9 MGD	Yes
11	SROG Interceptor	Metering Station Improvements	\$ 1,154,499	Enhancement		Yes
12	Wastewater Treatment	SRO Biofilter at Airport	\$ 14,766	Enhancement		Yes
13	Wastewater Treatment	SRO/SAI Interceptor Odor Control	\$ 35,326	Enhancement		Yes
14	Wastewater Treatment	SRO/SAI Interceptor Odor Control Implement	\$ 683,913	Enhancement		Yes
15	Wastewater Treatment	Resolution of Digestion System Engineering Issues	\$ 353,261	Enhancement		Yes
16	Wastewater Treatment	Outfitting of Additional Solar Sludge Drying Beds	\$ 706,522	Enhancement		Yes
17	Wastewater Treatment	Improvements to Centrate Treatment Facility	\$ 706,522	Enhancement		Yes