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CITY OF PHOENIX
INFRASTRUCTURE FINANCING PLAN: 2020 UPDATE
IMPACT FEE STUDY, LAND USE ASSUMPTIONS, INFRASTRUCTURE IMPROVEMENTS PLANS

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INTRODUCTION

This document is the City of Phoenix Infrastructure Financing Plan: 2020 Update (IFP). The IFP consists of three core sections: 1) Impact Fee Study, 2) Land Use Assumptions, and 3) Infrastructure Improvements Plans; that contain the assumptions, values and methodologies used to update the City's development impact fees.

Arizona cities are authorized to collect development impact fees in accordance with A.R.S. 9-463.05 for the purpose of providing certain 'public services' or facilities, as defined by the Statute, that are 'necessary' to meet the demands created by new development. The process through which the development impact fees must be adopted is prescribed in the Statute. A series of reports, public input and Council actions is required; each of which must be conducted in a defined sequence and timeline. The required adoption process can be summarized as follows:

Step 1: Propose Land Use Assumptions (LUA).

Step 2: Propose an Infrastructure Improvements Plan (IIP) for each impact fee category.

Step 3: Post LUA's and IIP's online, no less than 60 days prior to a scheduled public hearing.

Step 4: Conduct a public hearing for LUA's and IIP's (City Council).

Step 5: Finalize LUA's and IIP's for Council consideration.

Step 6: Council approves the LUA's and IIP's. Council adoption of the LUA's and IIP's must take place between 30 (min) and 60 days (max) after the public hearing (Step 4).

Step 7: Provide public Notice of Intent and post recommended Impact Fee Report 30 days (min) prior to second public hearing.

Step 8: Conduct a public hearing for recommended Impact Fee Report (City Council).

Step 9: Prepare the Final Impact Fee Report for Council consideration.

Step 10: Council approves the Final Impact Fee Report, together with an Ordinance authorizing fee collection. Adoption of the impact fees must take place between 30 (min) and 60 days (max) after the public hearing.

Step 11: Impact fees take effect no less than 75 days after Council adoption.

This plan has been prepared and made available to the public to fulfill Step 7 above. Questions about the process can be directed to the Phoenix Planning and Development Department, Growth and Infrastructure Section at impactfees@phoenix.gov.

What's Inside

The IFP is the single document in which the City of Phoenix consolidates the Impact Fee Report, Land Use Assumptions and the Infrastructure Improvements Plans (one for each impact fee category).

This IFP is comprised of the Impact Fee Report and eleven chapters. The Impact Fee Report serves as an "executive" summary and provides a comparison of the existing and recommended net impact fees for each fee category and area. Chapter 1 provides the Land Use Assumptions (LUAs) for all impact fee areas that have been applied throughout the IFP. Chapter 2 presents updated Equivalent Demand Unit Factors for each impact fee program that are used to convert the projected *development units* described in Chapter 1 into *equivalent demand units*, EDUs for all land use categories. Chapters 3 – 11 contain the Infrastructure Improvements Plans (IIP's) for each of the City's nine impact fee programs, including the values, formulas and assumptions used to calculate potential impact fees. The following impact fee categories are described in this IFP.

- Fire Protection
- Police
- Parks
- Libraries
- Major Arterials
- Storm Drainage
- Water
- Wastewater
- Water Resources Acquisition

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IMPACT FEE REPORT

The following Impact Fee Report is divided into three sections: Northern Impact Fee Areas, Southern Impact Fee Areas, and Water Resources Acquisition Fee Areas. Each section includes a description of the fee area boundaries (including any recommended boundary changes), a summary of growth projections for each area, and the recommended changes to the net impact fees.

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NORTHERN IMPACT FEE AREAS (IFA)

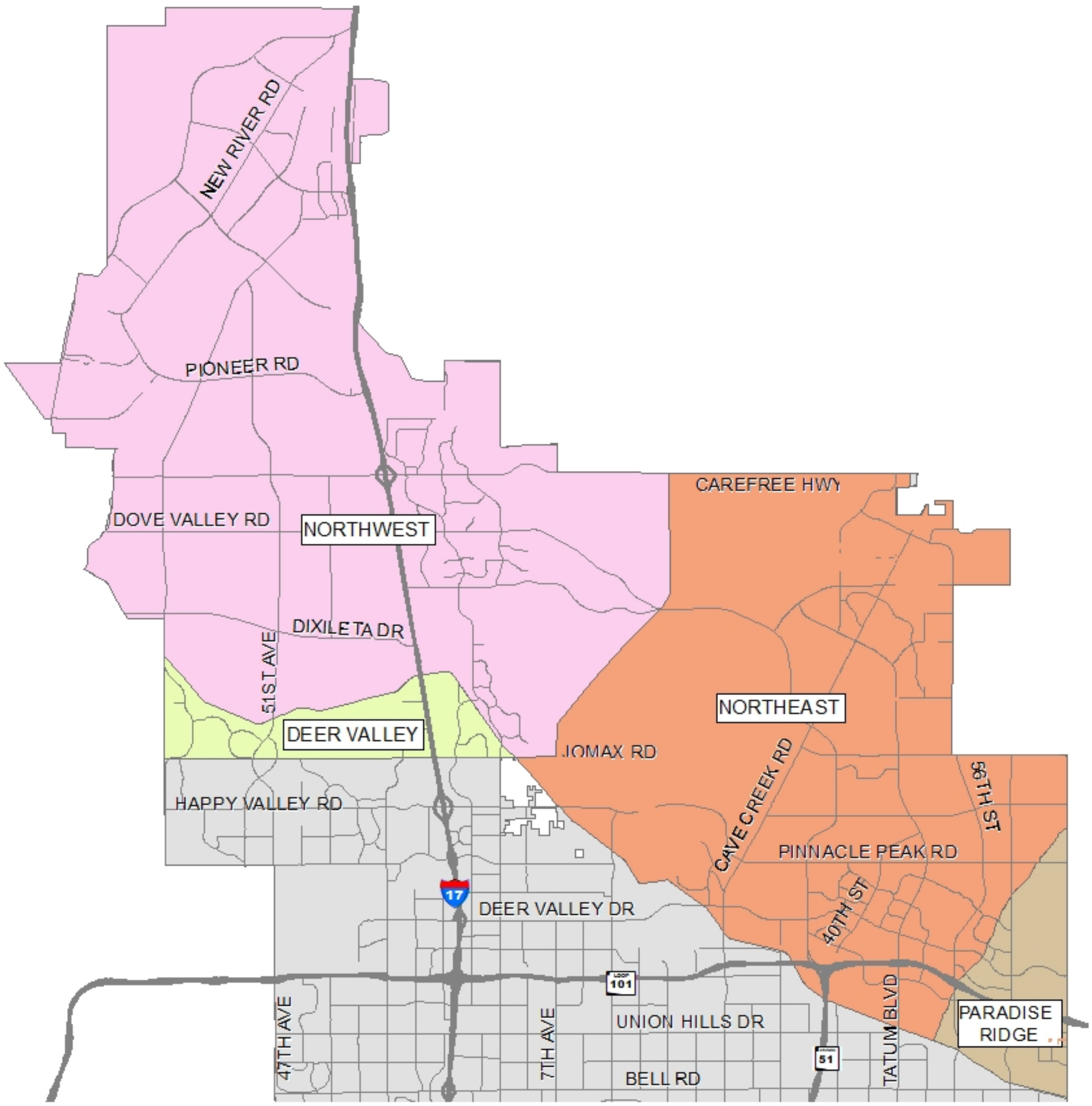

Figure A: Northern Impact Fee Areas

There are four geographic areas or building blocks that individually, or through various combinations, make up the Impact Fee Areas (IFAs) recommended for north Phoenix. As displayed in the map above, the building blocks are named Northwest, Deer Valley, Northeast, and Paradise Ridge. Prior to the 2015 Impact Fee Update, the northern area consisted of eight building blocks that included four small areas within the current Deer Valley IFA (Deer Valley I – IV), two areas within the current Northwest IFA (North Black Canyon and North Gateway), and two areas within the current Northeast IFA (Deer Valley V and Desert View). The 2015 Update established three building blocks in the northern part of the City by combining several smaller areas. In addition to reducing the number of areas from eight to three, the newly created Northwest IFA was also expanded to the north to include the Rio Vista Village (generally north of Pioneer Road), as well as to the east to include a small portion of the former Desert View IFA (generally east of the 7th Avenue alignment).

NORTHERN AREA FEE CATEGORIES: Different combinations of the northern building blocks are used depending on the impact fee category. Figure B below provides a graphical representation of the different building block combinations that determine the fee area(s) for each category of necessary public service.

Figure B: Relationship of Impact Fee Categories to Northern Impact Fee Area Building Blocks

Impact Fee Category	Impact Fee Area (IFA)	Building Block
Fire Protection, Police, Parks, Library	Northwest	Northwest & Deer Valley
	Northeast	Northeast & Paradise Ridge
Major Arterials	Northern	Northwest, Deer Valley, Northeast & Paradise Ridge
Storm Drainage	Paradise Ridge	Paradise Ridge
Water	Northern	Northwest, Deer Valley, Northeast & Paradise Ridge
Wastewater	Northern (Wastewater)	Northwest, Northeast & Paradise Ridge
	Deer Valley	Deer Valley

NORTHERN AREA RECOMMENDATIONS: Among the significant changes for the 2020 Update is a recommendation to establish the Paradise Ridge IFA within the eastern portion of the Northeast IFA. The Paradise Ridge IFA is necessary for the City to collect storm drainage fees to help fund planned drainage facilities that will only benefit land within the Paradise Ridge IFA boundaries. Since the benefits from the drainage facilities will not be realized until after the facilities are constructed and the flood plain has been eliminated; assessment of the recommended storm drainage impact fee would be deferred until such time that new development within the IFA will realize the full benefit of these facilities. The terms of this deferral would be defined in changes to Chapter 29 of the City Code that will be recommended for adoption at the same time as this report. As of the writing of this plan, the improvements are expected to be completed in the 2023 – 2025 timeframe; well within the 10-year planning horizon covered by this Infrastructure Financing Plan.

Another change for the 2020 Update that is related to the northern impact fee areas is a recommendation to create a single 'Northern' IFA for the Major Arterials Impact Fee (see Chapter 7). There are currently two (2) Major Arterial IFAs in the northern part of the City; Northwest and Northeast. The recommendation to establish a single Major Arterial IFA provides several benefits related to calculating street impact fees, providing greater flexibility for the City to participate in future capital projects, and combines two areas that will become increasingly inter-dependent. This change is also consistent with the methods used for Water and Wastewater impact fees for many years.

NORTHERN AREA GROWTH PROJECTIONS: It is anticipated that significant growth will occur in the area between 2020 and 2029, as shown in the following table:

Table A: Projected Development Units, Northern Impact Fee Areas, 2020-2029

	Dwellings		000's Sq Ft			
Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other
Northwest	6,833	1,930	2,030	1,054	794	1,444
Deer Valley	50	0	0	0	0	75
Northeast[1]	11,339	6,291	1,205	859	0	2,644
Northern Total	18,222	8,221	3,235	1,913	794	4,163

1) Projected development units for the Paradise Ridge IFA are included in the Northeast numbers. The LUAs prepared for this update did not consider the Paradise Ridge IFA separate from the Northeast IFA, since the Paradise Ridge IFA is only needed to collect storm drainage fees and the EDUs for storm drainage are derived from acreage rather than development units.

NORTHERN AREA RECOMMENDED NET IMPACT FEES PER EDU: The tables below compare the existing net fees per EDU for each IFA (including the proposed Paradise Ridge IFA) and impact fee category, with the net fees per EDU that are a result of the updated LUAs and IIPs, and will be recommended for approval by City Council. The net fees provided below have been adjusted to account for any required offsets in accordance with Arizona impact fee statutes.

Table B: Recommended Net Impact Fees per EDU, Northwest Impact Fee Area

	Northwest (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$444	**$516**
Police	$500	**$293**
Parks	$1,120	**$1,368**
Library	$0	**$105**
Major Arterial	$2,208	**$3,080**
Storm Drainage	$0	**$0**
Water	$5,935	**$6,330**
Wastewater	$3,130	**$3,303**
Total	$13,337	**$14,995**

Table C: Recommended Net Impact Fees per EDU, Deer Valley Impact Fee Area

	Deer Valley (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$444	**$516**
Police	$500	**$293**
Parks	$1,120	**$1,368**
Library	$0	**$105**
Major Arterial	$2,208	**$3,080**
Storm Drainage	$0	**$0**
Water	$5,935	**$6,330**
Wastewater	$1,221	**$1,380**
Total	$11,428	**$13,072**

Table D: Recommended Net Impact Fees per EDU, Northeast Impact Fee Area

	Northeast (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$519	**$551**
Police	$506	**$314**
Parks	$1,953	**$1,236**
Library	$232	**$105**
Major Arterial	$2,392	**$3,080**
Storm Drainage	$0	**$0**
Water	$5,935	**$6,330**
Wastewater	$3,130	**$3,303**
Total	$14,667	**$14,919**

Table E: Recommended Net Impact Fees per EDU, Paradise Ridge Impact Fee Area

	Paradise Ridge (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$519	**$551**
Police	$506	**$314**
Parks	$1,953	**$1,236**
Library	$232	**$105**
Major Arterial	$2,392	**$3,080**
Storm Drainage	$0	**$1,715**
Water	$5,935	**$6,330**
Wastewater	$3,130	**$3,303**
Total	$14,667	**$16,634**

SOUTHERN IMPACT FEE AREAS (IFA)

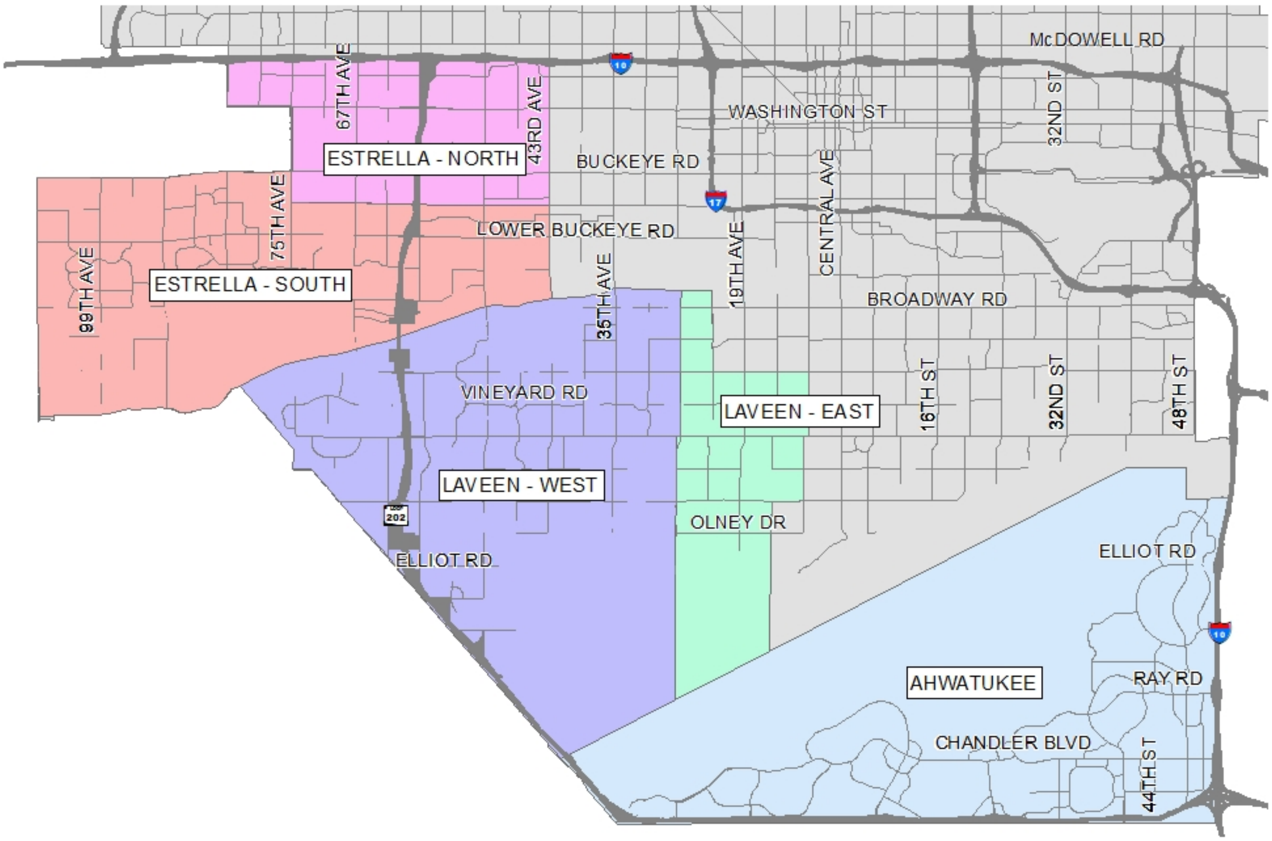

Figure C: Southern Impact Fee Areas

There are five geographic areas or building blocks that individually, or through various combinations, make up the Impact Fee Areas (IFAs) recommended for south Phoenix. As displayed in the map above, the southern area building blocks are named Estrella North, Estrella South, Laveen West, Laveen East and Ahwatukee. No changes have been made to the southern area boundaries for the past several impact fee updates including the 2015 Impact Fee Update.

SOUTHERN AREA RECOMMENDATIONS: There are no recommended changes to the southern area boundaries that are necessary for this update.

SOUTHERN AREA FEE CATEGORIES: Different combinations of the southern building blocks are used depending on the impact fee category. Figure D below provides a graphical representation of the different building block combinations that determine the fee area(s) for each category of necessary public service.

Figure D: Relationship of Impact Fee Categories to Southern Impact Fee Area Building Blocks

Impact Fee Category	Impact Fee Area (IFA)	Building Block
Fire Protection, Police, Parks, Library	Southwest	Estrella North, Estrella South, Laveen West & Laveen East
	Ahwatukee	Ahwatukee
Major Arterials	Southwest	Estrella North, Estrella South, Laveen West & Laveen East
Storm Drainage	Estrella	Estrella North & Estrella South
	Laveen	Laveen West & Laveen East
Water	Southern - Water	Estrella North, Estrella South, Laveen West, Laveen East & Ahwatukee
Wastewater	Estrella North	Estrella North
	Estrella South	Estrella South
	Laveen West	Laveen West
	Laveen East	Laveen East
	Ahwatukee	Ahwatukee

SOUTHERN AREA GROWTH PROJECTIONS: It is anticipated that significant growth will occur in the area between 2020 and 2029, as shown in the following table:

Table F: Projected Development Units, Southern Impact Fee Areas, 2020-2029

	Dwellings		000's Sq Ft			
Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other
Estrella North	10	470	249	326	5,250	773
Estrella South	5,545	2,295	1,271	1,154	7,679	2,760
Laveen West	8,301	3,398	1,543	1,140	189	2,295
Laveen East	1,949	0	527	0	0	540
Ahwatukee	1,414	516	141	285	0	0
Southern Total	17,219	6,679	3,731	2,905	13,118	6,368

SOUTHERN AREA RECOMMENDED NET IMPACT FEES PER EDU: The tables below compare the existing net fees per EDU for each IFA and impact fee category with the net fees per EDU that are a result of the updated LUAs and IIPs and will be recommended for approval by City Council. The net fees provided below have been adjusted to account for any required offsets in accordance with Arizona impact fee statutes.

Table G: Recommended Net Impact Fees per EDU, Estrella North Impact Fee Area

	Estrella North (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$616	**$487**
Police	$489	**$285**
Parks	$2,291	**$1,241**
Library	$112	**$105**
Major Arterial	$573	**$1,928**
Storm Drainage	$1,278	**$770**
Water	$3,499	**$4,016**
Wastewater	$1,221	**$1,380**
Total	$10,079	**$10,212**

Table H: Recommended Net Impact Fees per EDU, Estrella South Impact Fee Area

	Estrella South (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$616	**$487**
Police	$489	**$285**
Parks	$2,291	**$1,241**
Library	$112	**$105**
Major Arterial	$573	**$1,928**
Storm Drainage	$1,278	**$770**
Water	$3,499	**$4,016**
Wastewater	$3,102	**$3,787**
Total	$11,960	**$12,619**

Table I: Recommended Net Impact Fees per EDU, Laveen West Impact Fee Area

	Laveen West (per EDU)	
Fee Category	Existing	Adopted
Fire Protection	$616	**$487**
Police	$489	**$285**
Parks	$2,291	**$1,241**
Library	$112	**$105**
Major Arterial	$573	**$1,928**
Storm Drainage	$1,277	**$1,037**
Water	$3,499	**$4,016**
Wastewater	$2,947	**$3,630**
Total	$11,804	**$12,729**

Table J: Recommended Net Impact Fees per EDU, Laveen East Impact Fee Area

	Laveen East (per EDU)	
Fee Category	**Existing**	**Adopted**
Fire Protection	$616	**$487**
Police	$489	**$285**
Parks	$2,291	**$1,241**
Library	$112	**$105**
Major Arterial	$573	**$1,928**
Storm Drainage	$1,277	**$1,037**
Water	$3,499	**$4,016**
Wastewater	$1,221	**$1,380**
Total	$10,078	**$10,479**

Table K: Recommended Net Impact Fees per EDU, Ahwatukee Impact Fee Area

	Ahwatukee (per EDU)	
Fee Category	**Existing**	**Adopted**
Fire Protection	$513	**$470**
Police	$459	**$342**
Parks	$703	**$1,225**
Library	$0	**$105**
Major Arterial	$0	**$0**
Storm Drainage	$0	**$0**
Water	$3,499	**$4,016**
Wastewater	$1,221	**$1,380**
Total	$6,395	**$7,538**

WATER RESOURCE ACQUISITION FEE AREAS (IFA)

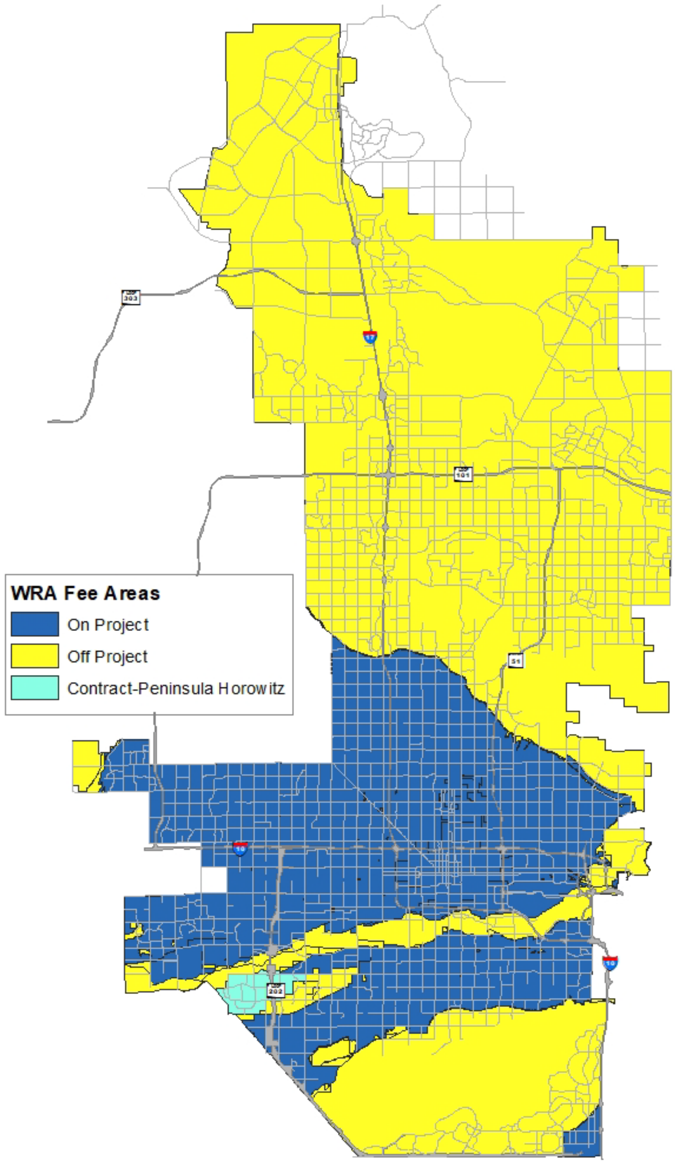

Figure E: Water Resources Acquisition Fee Areas

The Water Resources Acquisition Fee (WRAF) is collected citywide from two unique impact fee areas named Off-Project and On-Project. The boundaries for the WRAF are determined based on the delineation of Salt River Project (SRP) Member Lands. Lands that hold rights to SRP water are considered On-Project and are shown in blue on the map above. Since the SRP boundaries do not necessarily follow established political boundaries or assessor's parcel boundaries, some properties fall within both impact fee areas. In these cases, the assessment is pro-rated based on acreage. In addition, there is an area adjacent to the Salt River, known as Peninsula Horowitz, where development is assessed an adjusted WRAF based on a reduced allocation of SRP water. However, it should be noted that since the 2015 impact fee update the WRAF assessment for the On-Project area has been $0 per EDU. It is recommended to keep the On-Project assessment at $0 per EDU with this update (see Chapter 11). For this reason, the following sections are limited to the Off-Project area.

WATER RESOURCES ACQUISITION FEE AREA GROWTH PROJECTIONS: The WRAF is collected citywide including the entirety of the northern impact fee areas and portions of the southern impact fee areas. Most new development projected for the Off-Project WRAF area is expected to occur north of the Central Arizona Project (CAP) canal (i.e. within the Northern Impact Fee Areas) since the majority of land south of the CAP canal is developed. Anticipated growth for the period 2020 thru 2029 is shown in the following table:

Table L: Projected Development Units, Water Resources Acquisition Fee Areas, 2020-2029

	Dwellings		'000s Sq Ft				
	SF	MF	Com/Retail	Office	Industrial	Other	Public
Off-Project DU (dwellings or *000's sq ft*)	22,041	11,818	*5,873*	*3,999*	*2,016*	*4,071*	*4,128*

WATER RESOURCES ACQUISITION, RECOMMENDED NET IMPACT FEES PER EDU: The table below compares the existing net fees per EDU for each WRAF area with the net fees per EDU that are a result of the updated LUAs and IIPs and will be recommended for approval by City Council. There is no offset attributed to the WRAF, because the WRAF revenue is the only funding source used to acquire water resources needed to meet the demands of new development.

Table M: Recommended Net Impact Fees per EDU, Water Resources Acquisition Fee Areas

WRAF Areas	Existing	Adopted
Off-Project	$778	$583
On-Project	$0	$0

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CHAPTER 1: LAND USE ASSUMPTIONS

The land use assumptions detailed in this chapter provide the foundation for evaluating the future demand for public services for which the City collects Development Impact Fees (DIF) and Water Resources Acquisition Fees (WRAF).

Land use assumptions describe future development in terms of type, size, location and timing. For this Infrastructure Financing Plan Update residential development has been divided into single-family and multifamily categories and measured in terms of dwelling units. For non-residential development land use assumptions have been divided into four categories (retail, office, industrial and other) and are measured by structure size or building area where *1,000 square feet of building area is equal to one non-residential development unit.* Future development unit values for the City of Phoenix have been derived from county-wide population forecasts prepared by the Arizona State Demographer's Office and metro-area employment forecasts prepared by the University of Arizona. Dwelling units and non-residential building area have been allocated geographically throughout the City to project future development within impact fee areas. The land use assumptions detailed in this chapter were prepared by Applied Economics, LLC, a local economic research firm.

IMPACT FEE AREAS

For this Infrastructure Financing Plan, land use assumptions have been summarized in geographic *building blocks* that can be aggregated to the impact fee areas applicable to each impact fee program.

The impact fee areas used in this Infrastructure Financing Plan Update are based upon the areas established in previous plans. Some notable changes include:

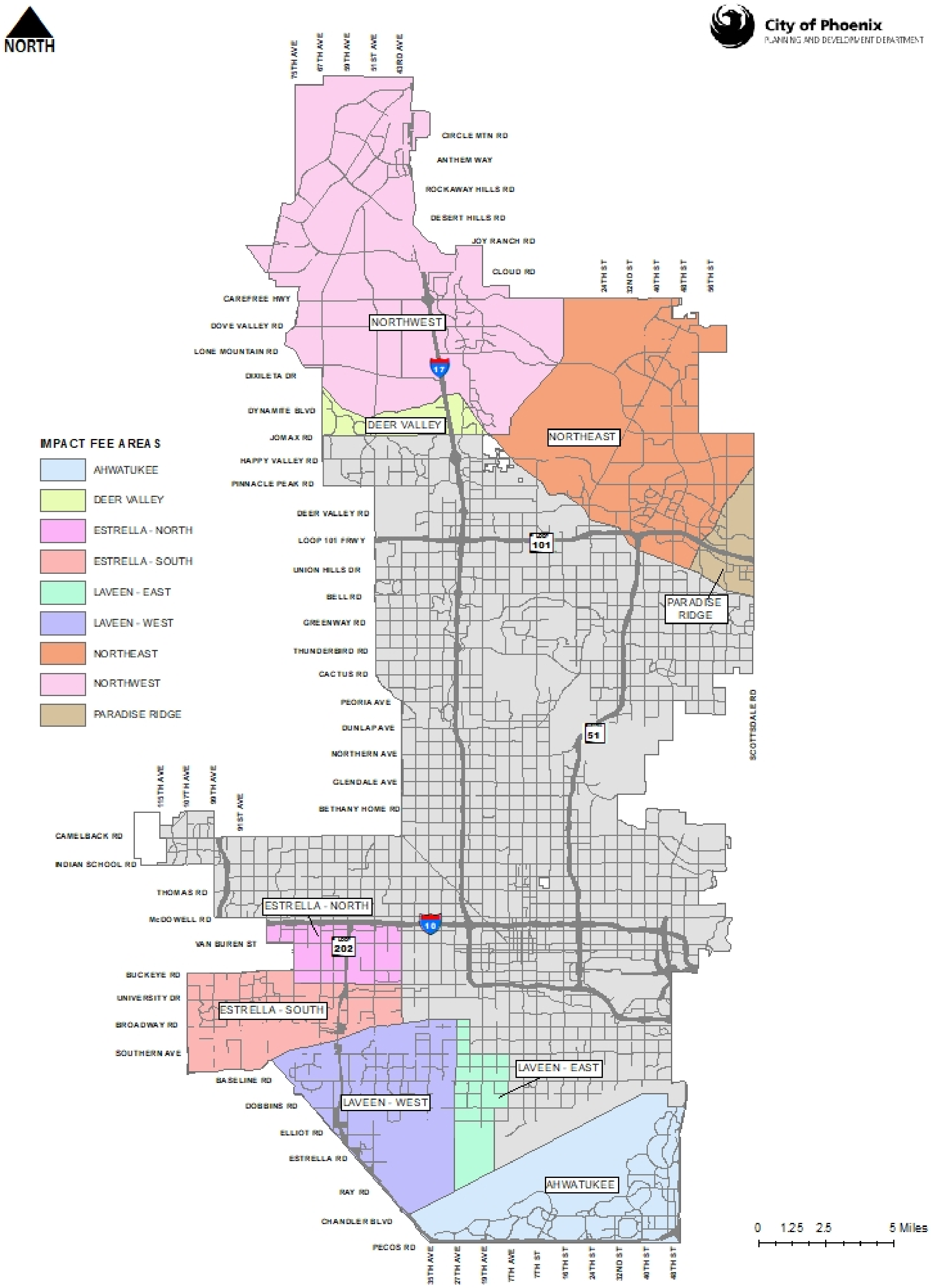
- Combining the Northwest/Deer Valley and Northeast Areas to create the Northern - Major Arterial area.

- Proposing a Storm Drainage impact fee sub-area within the Northeast building block area (see Chapter 8(A)).

- Including the Water Resources Acquisition Fee (WRAF) Update with this Infrastructure Financing Plan. Prior updates to the WRAF have been supported with separate impact fee studies, most recently the *2014 Water Resources Acquisition Fee Update Report and Infrastructure Improvements Plan*. Details for the WRAF can be found in Chapter 11.

The boundaries of the impact fee "building block" areas are provided in Figure 1.1 on the following page. The boundaries of the Water Resources Acquisition impact fee area are provided in Figure 1.2.

Figure 1.1: Map of Development Impact Fee "Building Block" Areas



COMBINATION OF IMPACT FEE AREA "BUILDING BLOCKS" BY FEE CATEGORY

The following specifies how the impact fee "building block" areas are combined to make designated impact fee areas for fee category:

Figure 1.2: Combinations of Impact Fee "Building Block" Areas by Fee Category

Impact Fee Category	Impact Fee Area	Building Block
Fire Protection, Police, Parks, Library	Northwest	Northwest, Deer Valley
	Northeast	Northeast
	Southwest	Estrella N., Estrella S., Laveen W. & Laveen E.
	Ahwatukee	Ahwatukee
Major Arterials	Northern	Northwest, Deer Valley & Northeast
	Southwest	Estrella N., Estrella S., Laveen W. & Laveen E.
Storm Drainage	Paradise Ridge	Paradise Ridge
	Estrella	Estrella N. & Estrella S.
	Laveen	Laveen W. & Laveen E.
Water	Northern	Northwest, Deer Valley & Northeast
	Southern	Estrella N., Estrella S., Laveen W., Laveen E., & Ahwatukee
Wastewater	Northern - WW	Northwest & Northeast
	Estrella South	Estrella South
	Laveen West	Laveen West
	Treatment Only (see Ch. 10)	Deer Valley, Estrella N., Laveen E. & Ahwatukee
Water Resources Acquisition See Figure 1.2	*Off-Project*	Off-Project
	On-Project	On-Project

EXISTING AND PROJECTED DEVELOPMENT

State impact fee rules require an estimation of forecasted development over a ten-year planning horizon. For this update, growth projections have been prepared for the period from 2020 to 2029. The Infrastructure Improvement Plans detailed in the following chapters are based on this ten-year period.

- Residential development has been estimated using the 2016 Maricopa County medium-series population projections prepared by the State Demographer's Office within the Arizona Office of Economic Opportunity. Down-scaling to Phoenix impact fee service areas and converting population to single family and multifamily units was performed by Applied Economics, LLC.

- Non-residential development has been estimated based on 2018 metro-area employment by industry data provided by the University of Arizona. Down scaling to Phoenix impact fee service areas and converting employment to non-residential development units was performed by Applied Economics, LLC.

For all estimations, the data is provided for the development impact fee area "building blocks".

ESTIMATED "BASE YEAR" DEVELOPMENT, 2019: It is necessary to estimate development units at the beginning of the planning horizon. For this update the starting point or "base year" is assumed to be 2019. At the time Applied Economics, LLC, initiated their study the best available data for actual existing development units was for 2017. These numbers were adjusted to provide the 2019 base year estimates using information about developments that were actively building and developments that were under review or already approved by the City. The 2019 estimated development units are used to calculate current Levels Of Service (LOS) for certain impact fee categories. A detailed explanation of current LOS is provided for each service category in the following chapters for this Infrastructure Financing Plan

Table 1.1: Estimated "Base Year" Development Units, 2019
Development Impact Fee "Building Block" Areas by Land Use

Impact Fee Area	Dwellings		000's Sq Ft			
	SF Units	MF Units	Retail	Office	Industrial	Other
Northwest	9,419	2,723	1,861	257	868	1,138
Deer Valley	5,026	304	5	0	0	120
Northeast	19,645	5,955	2,515	799	390	5,366
Estrella North	2,709	729	1,335	1,515	41,533	2,236
Estrella South	14,705	5	1,563	1,322	9,606	2,443
Laveen West	18,861	2	1,890	77	769	3,036
Laveen East	6,124	344	610	0	74	1,051
Ahwatukee	26,999	8,081	3,616	2,069	1,101	3,056
IFA Total	103,488	18,143	13,395	6,040	54,341	18,446
Balance of City	346,231	164,472	96,018	90,793	106,776	129,586
Citywide	449,719	182,615	109,413	96,833	161,117	148,032

PROJECTED DEVELOPMENT, 2020-2029: Disaggregating future development by land use allows for allocating demands, or the need for additional infrastructure capacity across different types of development (e.g., single-family homes, offices, retail centers) that are projected within the planning horizon. Different types of development place different levels of demand on infrastructure networks and public services. A detailed explanation of “demand units” or the relative impact of different types of development is provided for each category of service in the following chapters.

Table 1.2: Projected Development Units, 2020-2029
Development Impact Fee “Building Block” Areas by Land Use

	Dwellings		000's Sq Ft			
Impact Fee Area	**SF Units**	**MF Units**	**Retail**	**Office**	**Industrial**	**Other**
Northwest	6,833	1,930	2,030	1,054	794	1,444
Deer Valley	50	0	0	0	0	75
Northeast	11,339	6,291	1,205	859	0	2,644
Estrella North	10	470	249	326	5,250	773
Estrella South	5,545	2,295	1,271	1,154	7,679	2,760
Laveen West	8,301	3,398	1,543	1,140	189	2,295
Laveen East	1,949	0	527	0	0	540
Ahwatukee	1,414	516	141	285	0	0
IFA Total	35,441	14,900	6,966	4,818	13,912	10,531
Balance of City	1,509	15,786	4,983	5,096	1,183	5,601
Citywide	36,950	30,686	11,949	9,914	15,095	16,132

TOTAL FUTURE DEVELOPMENT, 2029: Total future development is estimated to quantify the total demand on infrastructure and necessary public services in 2029 (i.e., at the end of the planning horizon). The capacity expanding infrastructure improvements and public services needed to meet demand in 2029 are determined by the existing improvements and any future improvements for necessary public services that are required to serve growth over the planning horizon. The DIF program is based on these future improvements (i.e., those required to meet demand in 2029). A detailed explanation of future improvements for each category of service is provided in the following chapters.

Table 1.3: Total Future Development Units, 2029
Development Impact Fee "Building Block" Areas by Land Use

Impact Fee Area	Dwellings		000's Sq Ft			
	SF Units	MF Units	Retail	Office	Industrial	Other
Northwest	16,252	4,653	3,891	1,311	1,662	2,582
Deer Valley	5,076	304	5	0	0	195
Northeast	30,984	12,246	3,720	1,658	390	8,010
Estrella North	2,719	1,199	1,584	1,841	46,783	3,009
Estrella South	20,250	2,300	2,834	2,476	17,285	5,203
Laveen West	27,162	3,400	3,433	1,217	958	5,331
Laveen East	8,073	344	1,137	0	74	1,591
Ahwatukee	28,413	8,597	3,757	2,354	1,101	3,056
IFA Total	138,929	33,043	20,361	10,858	68,253	28,977
Balance of City	347,740	180,258	101,001	95,889	107,959	135,187
Citywide	486,669	213,301	121,362	106,747	176,212	164,164

HYPOTHETICAL "BUILDOUT" DEVELOPMENT, 2049: It is necessary to estimate total development under a hypothetical "buildout" scenario to calculate DIF using the "buy-in" method.

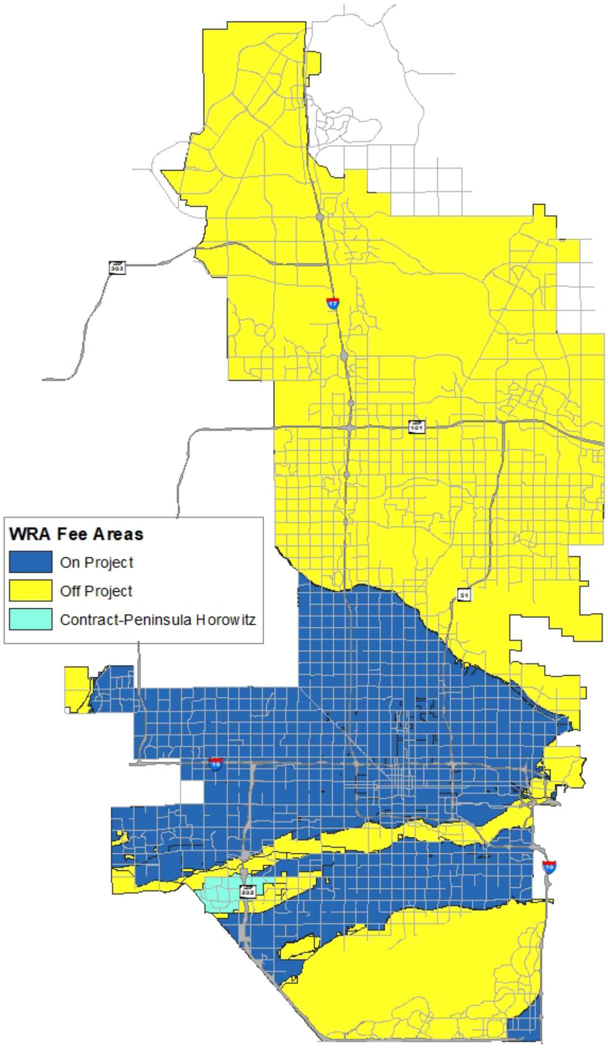
Table 1.4: Buildout Development Units
Development Impact Fee "Building Block" Areas by Land Use

Impact Fee Area	Dwellings		000's Sq Ft			
	SF Units	MF Units	Com/Retail	Office	Industrial	Pub/Other
Northwest	51,487	36,571	24,196	17,502	44,672	6,296
Deer Valley	5,275	304	5	0	0	195
Northeast	61,740	27,913	10,225	13,030	390	14,346
Estrella North	2,719	2,485	1,758	1,841	49,698	3,055
Estrella South	22,492	3,198	3,937	3,820	22,124	6,257
Laveen West	28,872	5,295	5,092	2,647	3,228	6,963
Laveen East	8,904	344	1,392	0	74	1,646
Ahwatukee	28,548	8,597	3,757	2,538	1,101	3,056
IFA Total	210,037	84,707	50,362	41,378	121,287	41,814

WATER RESOURCES ACQUISTION FEE AREAS

The Water Resources Acquisition Fee (WRAF) is collected citywide from two unique impact fee areas named Off-Project and On-Project. The boundaries for the WRAF are determined based on the delineation of Salt River Project (SRP) Member Lands. Lands that hold rights to SRP water are considered On-Project and are shown in blue on the map above. Since the SRP boundaries do not necessarily follow established political boundaries or assessor's parcel boundaries, some properties fall within both impact fee areas. In these cases, the assessment is pro-rated based on acreage. In addition, there is an area adjacent to the Salt River, known as Peninsula Horowitz, where development is assessed an adjusted WRAF based on a reduced allocation of SRP water. It should be noted that since the 2015 Impact Fee Update the WRAF assessment for the On-Project area has been $0 per EDU. For this reason, the following sections will focus on the Off-Project WRA area.

Figure 1.2: Map of Water Resources Acquisition Fee Areas



WATER RESOURCES ACQUISITION FEE AREA GROWTH PROJECTIONS: Most new development projected for the Off-Project WRAF area is expected to occur north of the Central Arizona Project (CAP) canal (i.e., within the northern impact fee areas) since the majority of land south of the CAP canal is developed. Anticipated growth for the period 2020 thru 2029 is shown in the following table:

Table 1.5: Projected Development Units, Water Resources Acquisition Fee Areas, 2020-2029

	Dwellings		000's Sq Ft				
Impact Fee Area	**SF Units**	**MF Units**	**Retail**	**Office**	**Industrial**	**Other**	**Public**
Off-Project	22,041	11,818	5,873	3,999	2,016	4,071	4,128

CHAPTER 2: EQUIVALENT DEMAND UNITS

The land use assumptions, provided in the previous chapter, provide the framework for determining the need for capacity-expanding infrastructure improvements in the impact fee service areas. However, different land uses place different demands on the necessary public services provided by the City. This chapter provides the values and formulas used to convert the development units presented in Chapter 1 to equivalent demand units for the different land use for each impact fee category.

EQUIVALENT DEMAND UNITS OVERVIEW

An Equivalent Demand Unit (EDU) is the measure used throughout this Infrastructure Financing Plan to compare the demand for a necessary public service by one land use to another. For all necessary public services one EDU is the typical demand placed on a system that would be expected from one single-family home. For example, the demand from one multifamily dwelling unit is compared to that of one single-family unit or one EDU. For non-residential uses the comparative demand from 1,000 square feet of gross area is used. The formulas get a bit complicated when determining the equivalent demand for Major Arterials (which uses trip generation data), Water (which are based upon water usage), Wastewater (also based upon water usage), and Storm Drainage (which is based upon land area). However, for Fire Protection, Police, Parks and Libraries the demand for the respective necessary public service is strongly related to the number of persons likely to be present at a site at any given time. To determine this the functional population method is used.

EDU FACTORS (FUNCTIONAL POPULATION): FIRE PROTECTION, POLICE, PARKS & LIBRARY

For Fire Protection, Police, Parks and Libraries the *functional population* method is used because it is a generally accepted methodology created in response to the observation that demand for certain facilities is generally proportional to the presence of people.

To a large extent the demand for public safety functions is proportional to the presence of people. The functional population concept is analogous to the concept of "full-time equivalent" employees. It represents the number of "full-time equivalent" people present at the site of a land use. Functional population is the equivalent number of people occupying a building or land use site on a 24-hour-per-day basis.

Demand for Parks and Libraries facilities is also strongly correlated with the presence of people, but non-residential uses require a different demand calculation than that used for Fire Protection and Police, which will be explained later in this chapter.

RESIDENTIAL FUNCTIONAL POPULATION: Determining residential functional population multipliers is considerably simpler than the non-residential component. The demand for facilities is proportional to the number of people in a dwelling unit. Consequently, data on average household size for various types of units is a critical component of calculating the residential EDUs.

It is assumed that people spend 12 hours per day at home during week days and 20 hours per day during weekends. In total, people are assumed to spend 100 hours per week, or 60 percent of their time, at home. The other 40 percent of their time spent away from home accounts for working, shopping and other away-from-home activities. For residential uses Equivalent Demand Units are calculated by first multiplying average household size by 60 percent to determine functional population per unit then dividing by the functional population per single-family unit to determine equivalent demand units. The equivalent demand units for single-family and multifamily dwelling units are shown in the following table:

Table 2.1: Residential Functional Population and EDU Factors

Land Use	Unit	People per Unit	Occupancy Factor	Functional Population	EDU per Unit
Single-Family	Dwelling	2.80	0.6	1.68	1.00
Multifamily	Dwelling	2.10	0.6	1.26	0.75

NON-RESIDENTIAL FUNCTIONAL POPULATION (FIRE AND POLICE): For these necessary public services, the functional population methodology for non-residential uses is based on national trip generation data compiled by the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012. Functional population per 1,000 square feet is derived by dividing the total number of hours spent by employees and visitors during a day by 24 hours. Employees are assumed to spend eight hours per day at their place of employment and visitors are assumed to spend one hour per visit depending on land use. The formula used to derive the non-residential function population estimates is summarized as follows:

Figure 2.1: Non-Residential Functional Population Formula, Fire Protection and Police

<u>Functional population/1000 sf = (employee hours/1000 sf + visitor hours/1000 sf) ÷ 24 hours/day</u>

Where:

Employee hours/1000 sf = employees/1000 sf x 8 hours/day

Visitor hours/1000 sf (retail, office and public/institutional) = visitors/1000 sf x 1 hour/visit

Visitor hours/1000 sf (industrial/warehouse) = visitors/1000 sf x ½ hour/visit

Visitors/1000 sf = weekday ADT/1000 sf x avg. vehicle occupancy - employees/1000 sf

Weekday ADT/1000 sf = one way average daily trips (total trip ends ÷ 2)

Using this formula and information on trip generation rates from the ITE manual non-residential functional population estimates per 1,000 square feet of gross floor area were calculated. These functional population estimates were then converted into equivalent demand units by dividing them by the functional population per single-family unit calculated in the preceding table. The following tables present the results of these calculations for the four major non-residential land use categories used for calculating non-residential impact fees:

Table 2.2: Non-Residential Trip Rates, Fire Protection and Police

Land Use	Unit	Avg. Vehicle Trip Ends (weekday)	1/2 of AVT	Adjustment for Primary Trips	Equivalent Persons per Unit
Retail	1,000 ft^2	37.75	18.88	0.56	10.573
Office	1,000 ft^2	9.74	4.87	1.00	4.870
Industrial	1,000 ft^2	4.96	2.48	1.00	2.480
Other	1,000 ft^2	10.72	5.36	0.80	4.288

Table 2.3: Non-Residential Functional Population and EDU Factors, Fire Protection and Police

Land Use	Unit	Trip Rate	Persons per Trip	Emp / Unit	Visitors / Unit	Func. Pop. per Unit	EDU Factor
Retail	1,000 ft^2	10.57	1.75	2.00	16.50	1.354	0.81
Office	1,000 ft^2	4.87	1.15	2.86	2.74	1.068	0.64
Industrial	1,000 ft^2	2.48	1.67	1.00	3.14	0.464	0.28
Other	1,000 ft^2	4.29	1.83	2.22	5.63	0.975	0.58

NON-RESIDENTIAL FUNCTIONAL POPULATION (PARKS AND LIBRARIES): Demand from non-residential uses for Parks and Libraries is calculated differently from that for Fire Protection and Police. While the demand is still related to the presence of persons it is likely that demand for Parks and Libraries for persons who both live and work in the City of Phoenix is already sufficiently established with the residential demand calculations. However, there is additional demand, albeit small, from those who work but do not reside in the City of Phoenix. In the following table this additional non-residential demand is calculated by estimating the additional non-resident workers per unit (1,000 sf) of non-residential development and converting that to an EDU factor relative to the already-established residential EDU factors.

Table 2.4: Non-Residential Functional Population and EDU Factors, Parks and Libraries

Land Use	Unit	People per Unit	Occupancy Factor	Non-Resident Factor	Equivalent Persons per Unit	EDU Factor
Retail	1,000 ft^2	2.00	0.24	0.27	0.13	0.05
Office	1,000 ft^2	2.86	0.24	0.27	0.19	0.07
Industrial	1,000 ft^2	1.00	0.24	0.27	0.06	0.02
Other	1,000 ft^2	2.22	0.24	0.27	0.14	0.05

PROJECTED EQUIVALENT DEMAND UNITS: FIRE PROTECTION, POLICE, PARKS & LIBRARY

ESTIMATED "BASE-YEAR" EQUIVALENT DEMAND UNITS (EDU), 2019: To analyze the existing levels of service in each service area it is necessary to calculate "base-year" functional population based equivalent demand units for each impact fee area. The following tables provide the estimated "Base-Year" EDUs for the impact fee areas. The estimated development units from Table 1.1 are aggregated to the applicable impact fee areas then multiplied by the EDU factors calculated in Tables 2.1 (residentials land uses) and 2.3 or 2.4 (non-residential land uses) for the Fire Protection and Police fees or the Parks and Library fees respectively.

Table 2.5: Estimated "Base-Year" Equivalent Demand Units, 2019 (Fire Protection and Police)

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	0.81	0.64	0.28	0.58	
Northwest	14,445	2,270	1,512	165	243	730	19,365
Northeast	19,645	4,466	2,037	512	109	3,112	29,881
Southwest	42,399	810	4,372	1,865	14,555	5,084	69,085
Ahwatukee	26,999	6,061	2,929	1,324	308	1,772	39,393
IFA Total	103,488	13,607	10,850	3,866	15,215	10,698	157,724
Balance of City	346,231	123,354	77,775	58,108	29,897	75,160	710,525
Citywide	449,719	136,961	88,625	61,974	45,112	85,858	868,249

Table 2.6: Estimated "Base-Year" Equivalent Demand Units, 2019 (Parks and Libraries)

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	0.05	0.07	0.02	0.05	
Northwest	14,445	2,270	93	18	17	63	16,906
Northeast	19,645	4,466	126	56	8	268	24,569
Southwest	42,399	810	270	204	1,040	438	45,161
Ahwatukee	26,999	6,061	181	145	22	153	33,561
IFA Total	103,488	13,607	670	423	1,087	922	120,197
Balance of City	346,231	123,354	4,801	6,356	2,136	6,479	489,357
Citywide	449,719	136,961	5,471	6,779	3,223	7,401	609,554

PROJECTED EQUIVALENT DEMAND UNITS, 2020-2029: The basis for the methodology used to calculate impact fees lies primarily in the projected demand for the ten-year planning period of 2020 to 2029. Therefore, the projected development for 2020 to 2029 shown in the Land Use Assumptions is converted to EDUs by multiplying the development units from Table 1.2 by the Functional Population EDU factors presented earlier in this chapter. The ten-year projected demand units are provided in the following two tables; the first for Fire Protection and Police followed by Parks and Libraries.

Table 2.7: Projected Equivalent Demand Units, 2020-2029 (Fire Protection and Police)

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	0.81	0.64	0.28	0.58	
Northwest	6,883	1,448	1,644	675	222	881	11,753
Northeast	11,339	4,718	976	550	0	1,534	19,117
Southwest	15,805	4,622	2,908	1,677	3,673	3,693	32,378
Ahwatukee	1,414	387	114	182	0	0	2,097
IFA Total	35,441	11,175	5,642	3,084	3,895	6,108	65,345
Balance of City	1,509	11,840	4,036	3,261	331	3,249	24,226
Citywide	36,950	23,015	9,678	6,345	4,226	9,357	89,571

As with the existing service units, the 2020 to 2029 projected service units for Parks and Libraries are calculated using different non-residential EDU factors than for Fire Protection and Police, as shown in the following table:

Table 2.8: Projected Demand Units, 2020-2029 (Parks and Libraries)

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	0.05	0.07	0.02	0.05	
Northwest	6,883	1,448	102	74	16	76	8,599
Northeast	11,339	4,718	60	60	0	132	16,309
Southwest	15,805	4,622	180	183	262	318	21,370
Ahwatukee	1,414	387	7	20	0	0	1,828
IFA Total	35,441	11,175	349	337	278	526	48,106
Balance of City	1,509	11,840	249	357	24	280	14,259
Citywide	36,950	23,015	598	694	302	806	62,365

EDU FACTORS (TRIP GENERATION), MAJOR ARTERIALS

Major Arterial EDUs are calculated different from the functional population method. Demand for major arterials is directly related to anticipated growth in traffic generated by projected development. The objective for Major Arterials is to determine the number of vehicle trips (i.e. travel demand) generated by different land use categories relative to those generated by a single-family home.

EDU factors used in the Major Arterials IIP have been updated to reflect the latest trip generation data from the Institute of Transportation Engineers (ITE), *Trip Generation Manual, 10th Edition*. Additional detail on the proposed Major Arterials EDU factors is available in the *Infrastructure Financing Plan Update – Transportation Study*, April 19, 2019, prepared by Kimley-Horn and Associates for this update.

The following table shows the calculated Major Arterials EDU factors based upon the calculated Vehicle Miles Traveled (VMT) for each of major land use categories utilized in this IIP:

Table 2.9: EDU Factors, Major Arterials

Land Use	EDU Adjustment Factor Proposed (2020-2029)
Single-Family Residential	1.00
Multifamily Residential	0.75
Commercial/Retail	1.22
Office	0.55
Industrial	0.32
Public/Institutional	0.45
Mini Warehouse	0.09
Hotel	0.35

PROJECTED EQUIVALENT DEMAND UNITS, MAJOR ARTERIALS

EDUs USED IN MAJOR ARTERIAL FEE CALCULATION: The Major Arterials impact fee is calculated using a different methodology than the incremental cost approach used for Fire Protection, Police, Parks and Libraries requiring EDU estimates for different time periods. For Major Arterials, a hybrid 'buy-in 'plus ten-year plan' method is utilized. Details of the Major Arterials DIF methodology are provided in Chapter 7. The following EDU estimates are required for the Major Arterials DIF: Estimated "Base Year" EDU (2019), Projected Ten-Year EDU 2020-2029, Projected Total EDU 2029 and Projected Total EDU, Buildout.

For the Major Arterials DIF the impact fee area "building blocks" are aggregated as follows:

- **Northern Impact Fee Area includes** Northwest, Deer Valley and Northeast.
- **Southwest Impact Fee Area includes** Estrella N., Estrella S., Laveen W. and Laveen E.
  Note: The Major Arterial impact fee is not assessed in the Ahwatukee impact fee area

ESTIMATED "BASE YEAR" EDUs (2019): The following table provides the estimated EDUs for 2019, the last year prior to the start of the ten-year planning horizon, or "base year". These values are presented in the capacity analysis described in Chapter 7. The estimated development units from Table 1.1 are aggregated to the Major Arterial impact fee areas, then multiplied by the EDU factors listed in Table 2.9.

Table 2.10: Estimated "Base Year" EDU (2019) by Major Arterials Impact Fee Area

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	1.22	0.55	0.32	0.45	
Northern	34,090	6,737	5,345	581	403	2,981	50,137
Southwest	42,399	810	6,585	1,602	16,634	3,945	71,975
IFA Total	76,489	7,547	11,930	2,183	17,037	6,926	122,112
Balance of City	373,230	129,415	121,554	51,074	34,521	59,689	769,483
Citywide	449,719	136,962	133,484	53,257	51,558	66,615	891,595

PROJECTED TEN-YEAR EDUs, 2020-2029: The following table provides the projected EDUs for the ten-year planning period from 2020-2029. These values are presented in the capacity analysis described in Chapter 7. The ten-year projected development units from Table 1.2 are aggregated to the Major Arterial impact fee areas then multiplied by the EDU factors listed in Table 2.9.

Table 2.11: Projected Ten-Year EDU (2020-2029) by Major Arterials Impact Fee Area

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	1.22	0.55	0.32	0.45	
Northern	18,222	6,166	3,947	1,052	254	1,873	31,514
Southwest	15,805	4,622	4,380	1,441	4,198	2,866	33,312
IFA Total	34,027	10,788	8,327	2,493	4,452	4,739	64,826
Balance of City	2,923	12,227	6,251	2,960	379	2,520	27,260
Citywide	36,950	23,015	14,578	5,453	4,831	7,259	92,086

PROJECTED TOTAL EDUs, 2029: The following table provides the estimated total EDUs for 2029 the last year of the planning period. These values are used to calculate the gross and net fees for Major

Arterials. The estimated development units from Table 1.3: Total Future Development Units, 2029 are aggregated to the Major Arterial impact fee areas then multiplied by the EDU factors listed in Table 2.9 for the applicable land use category.

Table 2.12: Projected total EDU in 2029 by Major Arterial Impact Fee Area

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	1.22	0.55	0.32	0.45	
Northern	52,312	12,902	9,292	1,633	657	4,854	81,650
Southwest	58,204	5,432	10,965	3,043	20,832	6,810	105,286
IFA Total	110,516	18,334	20,257	4,676	21,489	11,664	186,936
Balance of City	376,153	141,641	127,805	54,034	34,899	62,209	796,741
Citywide	486,669	159,975	148,062	58,710	56,388	73,873	983,677

PROJECTED TOTAL EDUs, BUILDOUT: The following table provides the estimated total EDUs for 2029 the last year of the planning period. These values are used to calculate the gross and net fees for Major Arterials. The projected “buildout” development units from Table 1.4 are aggregated to the Major Arterial impact fee areas, then multiplied by the EDU factors listed in Table 2.9 for the applicable land use category.

Table 2.13: Projected total EDU at Buildout by Major Arterial Impact Fee Area

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.75	1.22	0.55	0.32	0.45	
Northern	118,502	48,591	42,000	16,792	14,420	9,377	249,682
Southwest	62,987	8,492	14,858	4,569	24,040	8,064	123,010
IFA Total	181,489	57,083	56,858	21,361	38,460	17,441	372,692

EDU FACTORS AND PROJECTED EQUIVALENT DEMAND UNITS, STORM DRAINAGE

Storm Drainage service units are calculated differently from the functional population method(s) used for Fire Protection and Police and Parks and Libraries. Flood control is necessitated more by terrain and gravity and is not influenced by the number of persons present on a site. It is therefore more appropriate to determine the proportionate share of storm drainage facilities on the basis of land area since it is assumed that all the land within the service areas benefit equally whether it be through protection of an actual site from flooding or from protection of access to a site during a flood event.

EDU Factors and Projected Equivalent Dwelling Units are discussed in detail in Chapter 8.

EDU FACTORS (PLANNING), WATER

While the number of people at a site can influence the demand for water the functional population method would not be able to take into account commercial and industrial uses of water or landscape uses which can have quite heavy water demands as compared to a single-family home. Therefore, actual water usage is compared to determine the existing and projected EDUs for the Water impact fee.

The number of projected EDUs for the ten-year planning period 2025-2029 is calculated by multiplying the projected number of single-family units, multifamily units, and thousands of square feet of office, retail, industrial and institutional space for the 2025-2029 period by estimated EDU per unit or '000 square feet of space ratios. Chapter 1, Land Use Assumptions, provided the basic methodology behind the projection of residential units and commercial space development at both the City-wide and service area level. EDU ratios were estimated using the following methods:

- Each future single-family dwelling unit is assumed to be one EDU since the EDU volume per day number is taken from the average water use of 301 Gallons Per Day (GPD) in FY 12/13 by newly constructed single-family homes with 5/8", ¾" and 1" meters built between 2001 and 2008.

- Each multifamily dwelling unit is assumed to be 0.52 EDU factor based on estimates of multifamily water use of 154 GPD in FY 2012/13 that includes both domestic and landscape meters taken from a sample of 6,742 units built in the City between 2002 and 2008.

Table 2.14: Residential EDU Factors for Planning, Water

Land Use	# of Developments	# of Living Units	Avg Annual Day Gal/Unit/Day	EDU Factor
Single-Family	N/A	60,323	299	**1.00**
Multifamily w/ Landscape	36	6,742	154	**0.52**
Multifamily w/o Landscape	36	6,742	114	**0.38**

The assumed ratios of EDUs per thousand square feet are based on reviews of assessment and meter data for several million square feet of retail, office and industrial space, undertaken by BBC Consulting, which was used to produce estimates of the total number and types of meters for the space identified in the three categories. These meter counts were then converted into EDUs by using the American Water Works Association (AWWA) maximum flow tables as a scale assuming that the ¾" meter times the residential/non-residential-landscape gross-up factor equaled one EDU, with an additional adjustment for known higher use for non-residential meters.

Table 2.15: Non-Residential EDU Factors for Planning, Water

Meter Size	# Meters	EDU Factor	EDUs	Area (SF)	EDU/SF	EDU/'000 SF	Com/Res Adj Factor	EDU/'000 Sq.Ft. (After Adjustment)
5/8"	1,839	0.67	1,232					
3/4"	39	1.00	39					
1"	1,041	1.67	1,738					
1 1/2"	804	3.33	2,677					
2"	875	5.33	4,664					
4"	1	20.00	20					
6"	3	45.00	135					
Comm / Ret	**4,602**		**10,506**	**51,215,228**	**0.0002**	**0.21**	**2.12**	**0.43**
5/8"	439	0.67	294					
3/4"	8	1.00	8					
1"	297	1.67	496					
1.5"	413	3.33	1,375					
2"	530	5.33	2,825					
6"	10	45.00	450					
Office	**1,697**		**5,448**	**41,480,142**	**0.0001**	**0.13**	**2.12**	**0.28**
5/8"	209	0.67	140					
3/4"	1	1.00	1					
1"	165	1.67	276					
1.5"	128	3.33	426					
2"	151	5.33	805					
3"	1	11.67	12					
6"	4	45.00	180					
Industrial	**659**		**1,839**	**17,527,387**	**0.0001**	**0.10**	**2.12**	**0.22**

PROJECTED EQUIVALENT DEMAND UNITS (PLANNING), WATER

The following tables are calculated by multiplying the development units from Chapter 1 for the corresponding timeframe and water impact fee area by the EDU factors for the corresponding land use.

Table 2.16: Estimated "Base Year" EDU for Water, 2019

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Northern	34,090	4,671	1,884	296	277	1,457	42,675
Southern	69,398	4,764	3,876	1,395	11,678	2,601	93,712
IFA Total	103,488	9,435	5,760	1,691	11,955	4,058	136,387
Balance of City	346,231	85,525	41,288	25,422	23,491	28,509	550,466
Citywide	449,719	94,960	47,048	27,113	35,446	32,567	686,853

Table 2.17: Projected Ten-Year EDU for Water, 2020-2029

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Northern	18,222	4,275	1,391	536	175	916	25,515
Southern	17,219	3,473	1,604	813	2,886	1,401	27,396
IFA Total	35,441	7,748	2,995	1,349	3,061	2,317	52,911
Balance of City	1,509	8,209	2,143	1,427	260	1,232	14,780
Citywide	36,950	15,957	5,138	2,776	3,321	3,549	67,691

Table 2.18: Projected Total EDU for Water, 2029

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Northern	52,312	8,946	3,275	831	451	2,373	68,188
Southern	86,617	8,237	5,480	2,209	14,564	4,002	121,109
IFA Total	138,929	17,183	8,755	3,040	15,015	6,375	189,297
Balance of City	347,740	93,734	43,431	26,849	23,751	29,741	565,246
Citywide	486,669	110,917	52,186	29,889	38,766	36,116	754,543

Table 2.19: Projected Buildout EDU for Water

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Northern	118,502	33,690	14,803	8,549	9,914	4,584	190,042
Southern	91,535	10,358	6,852	3,037	16,770	4,615	133,167
IFA Total	210,037	44,048	21,655	11,586	26,684	9,199	323,209

EDU FACTORS (PLANNING), WASTEWATER

Similar and related to water usage, wastewater production of different uses is compared to determine the existing and projected EDUs for the Wastewater impact fee.

The number of future Equivalent Demand Units (EDUs) is calculated by multiplying the projected number of single-family units, multifamily units and thousands of square feet of office, retail, industrial and institutional space for the 2025-2029 period by estimated EDU per unit or '000 square feet of space ratios. The basic methodology behind the projection of residential units and commercial space development at both the City-wide and service area level is provided in Chapter 1, Land Use Assumptions, of this report. EDU ratios were estimated using the following methods:

- Each future single-family dwelling unit is assumed to be one EDU since the EDU volume per day number is taken from the average low month water use of 218 GPD in FY 12/13 by newly constructed single-family homes with 5/8", 3/4" and 1" meters built between 2001 and 2008.

- Each multifamily dwelling unit is assumed to be 0.49 EDU factor based on estimates of multifamily water use of 107 GPD for the low month in FY 2012/13 that includes only domestic (no landscape) meters taken from a sample of 6,742 units built in the City between 2002 and 2008.

Table 2.20: Residential EDU Factors for Planning, Wastewater

Land Use	# of Developments	# of Living Units	Average Low Month Gal/Unit/Day	EDU Factor
Single Family	N/A	60,323	218	**1.00**
Multifamily w/o Landscape	36	6,742	107	**0.49**

The assumed ratios of EDUs per thousand square feet are based on reviews of assessment and meter data for several million square feet of retail, office and industrial space undertaken by BBC Consulting, which was used to produce estimates of the total number and types of meters for the space identified in the three categories. These meter counts were then converted into EDUs by using the AWWA maximum flow tables as a scale assuming that the 3/4" meter times the residential/non-residential-landscape gross-up factor equaled one EDU, with an additional adjustment for known higher use for non-residential meters. **Landscape meters have been removed from the calculations**.

PROJECTED EQUIVALENT DEMAND UNITS (PLANNING), WASTEWATER

The following tables are calculated by multiplying the development units from Chapter 1 for the corresponding timeframe and wastewater impact fee area by the EDU factors for the corresponding land use.

Table 2.21: Estimate "Base Year" EDU for Wastewater, 2019

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	29,064	4,259	1,870	285	286	1,481	37,245
Deer Valley	5,026	149	2	0	0	27	5,205
Estrella North	2,709	358	571	408	9,455	509	14,010
Estrella South	14,705	2	668	356	2,187	556	18,474
Laveen West	18,861	1	807	21	175	691	20,556
Laveen East	6,124	169	261	0	17	239	6,810
Ahwatukee	26,999	3,966	1,545	557	251	696	34,014
IFA Total	103,488	8,905	5,724	1,627	12,371	4,199	136,314
Balance of City	346,231	80,727	41,031	24,454	24,309	29,502	546,254
Citywide	449,719	89,632	46,755	26,081	36,680	33,701	682,568

Table 2.22: Projected Ten-Year EDU for Wastewater, 2020-2029

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	18,172	4,035	1,382	515	181	931	25,216
Deer Valley	50	0	0	0	0	17	67
Estrella North	10	231	106	88	1,195	176	1,806
Estrella South	5,545	1,126	543	311	1,748	628	9,902
Laveen West	8,301	1,668	659	307	43	522	11,501
Laveen East	1,949	0	225	0	0	123	2,297
Ahwatukee	1,414	253	60	77	0	0	1,804
IFA Total	35,441	7,313	2,977	1,298	3,167	2,397	52,593
Balance of City	1,509	7,748	2,129	1,373	269	1,275	14,303
Citywide	36,950	15,061	5,106	2,671	3,436	3,672	66,896

Table 2.23: Projected Total EDU for Wastewater, 2029

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	47,236	8,294	3,253	800	467	2,411	62,461
Deer Valley	5,076	149	2	0	0	44	5,272
Estrella North	2,719	588	677	496	10,651	685	15,816
Estrella South	20,250	1,129	1,211	667	3,935	1,184	28,376
Laveen West	27,162	1,669	1,467	328	218	1,214	32,057
Laveen East	8,073	169	486	0	17	362	9,107
Ahwatukee	28,413	4,220	1,605	634	251	696	35,818
IFA Total	138,929	16,218	8,701	2,924	15,538	6,597	188,908
Balance of City	347,740	88,475	43,160	25,827	24,578	30,777	560,557
Citywide	486,669	104,693	51,861	28,751	40,116	37,374	749,465

Table 2.24: Projected Buildout EDU for Wastewater

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	113,227	31,650	14,709	8,223	10,259	4,699	182,768
Deer Valley	5,275	149	2	0	0	44	5,471
Estrella North	2,719	1,220	751	496	11,314	695	17,196
Estrella South	22,492	1,570	1,682	1,029	5,037	1,424	33,234
Laveen West	28,872	2,599	2,176	713	735	1,585	36,680
Laveen East	8,904	169	595	0	17	375	10,059
Ahwatukee	28,548	4,220	1,605	684	251	696	36,003
IFA Total	210,037	41,576	21,521	11,145	27,612	9,519	321,411

EDU FACTORS & EQUIVALENT DEMAND UNITS, WATER RESOURCES ACQUISITION

The same EDU factors used for planning purposes for the Water DIF are also used for the Water Resources Acquisition DIF (WRAF) however, the impact fee areas are different for the WRAF (see Chapter 1 and 11). The Water Services Department made projections of the number of new Off-Project EDUs that will be added to the City's water system over the ten-year period from 2020-2029. These EDU projections are provided in the following table.

Table 2.25: Projected Ten-Year EDU for Water Resource Acquisition, 2020-2029

Impact Fee Area	SF	MF	Retail	Office	Industrial	Other	Total
Off-Project DU (dwellings or *000's sq ft*)	22,041	11,818	*5,873*	*3,999*	*2,016*	*8,200*	
EDU Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Off-Project EDU	22,041	6,145	2,525	1,120	444	1,804	34,079

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CHAPTER 3: FIRE PROTECTION INFRASTRUCTURE IMPROVEMENTS PLAN

Arizona statutes allow cities to charge development impact fees for “fire facilities, including all appurtenances, equipment and vehicles.” The City of Phoenix charges the Fire Protection impact fee to help provide new fire stations, vehicles and equipment needed to serve the City's growth areas. Chapter 3 contains the assumptions, values and formulas used to calculate the draft Fire Protection fee.

FIRE PROTECTION IMPACT FEE METHODOLOGY: The Fire Protection DIF is calculated using the i*ncremental cost method*, which is a forward-looking approach that assumes fire facilities will be expanded to achieve a specific Level of Service (LOS). This update recommends a LOS calculated from the current fire services provided citywide. A consistent citywide LOS for all impact fee areas reduces the potential for long-term resource inequities across the impact fee areas.

The Fire DIF is calculated using the i*ncremental cost method*, which is a forward-looking approach that assumes fire facilities will be expanded to achieve a specific Level of Service (LOS). In the absence of a highly detailed facilities plan using criteria like distances to residents and businesses or response times to various types of structures and that would provide specific future facility locations, attributes and costs the incremental cost method is the best available. It is anticipated that in the future a detailed facilities fire facilities master plan will be generated for the City’s growth areas, and that eventually a hybrid ‘buy-in’ plus ‘ten-year plan’ approach will likely be used. However, for this update the incremental cost method was deemed to be adequate because demand for fire facilities is highly correlated with functional population and fire facilities are relatively standardized over wide areas. This update proposes a LOS calculated from the current fire services provided citywide. A consistent citywide LOS for all impact fee areas reduces the potential for long-term resource inequities across the impact fee areas. The steps to calculate the Fire Impact Fee can be summarized as follows:

- **Project expected new development** in each impact fee area (see Chapter 1: Land Use Assumptions).
- **Analyze the current level of service** being provided for qualifying capital facilities.
- **Determine the ten-year demand** for additional fire services for each impact fee area (see Chapter 2: Equivalent Demand Units) based on the current level of service.
- **Estimate the cost** of new fire stations, vehicles and equipment needed to meet the ten-year demand.
- **Calculate the gross Fire Impact Fee per EDU** by dividing the estimated “plan” cost by the equivalent demand units projected over the ten-year period for each impact fee area.

- **Investigate alternative revenue funding for the types of facilities included in the IIP and if identified quantify the alternative revenue offsets** to ensure new development is not charged twice for the same improvements.

- **Calculate the net Fire Impact Fee per EDU** by subtracting any offset amounts from the gross impact fee per EDU for each impact fee area.

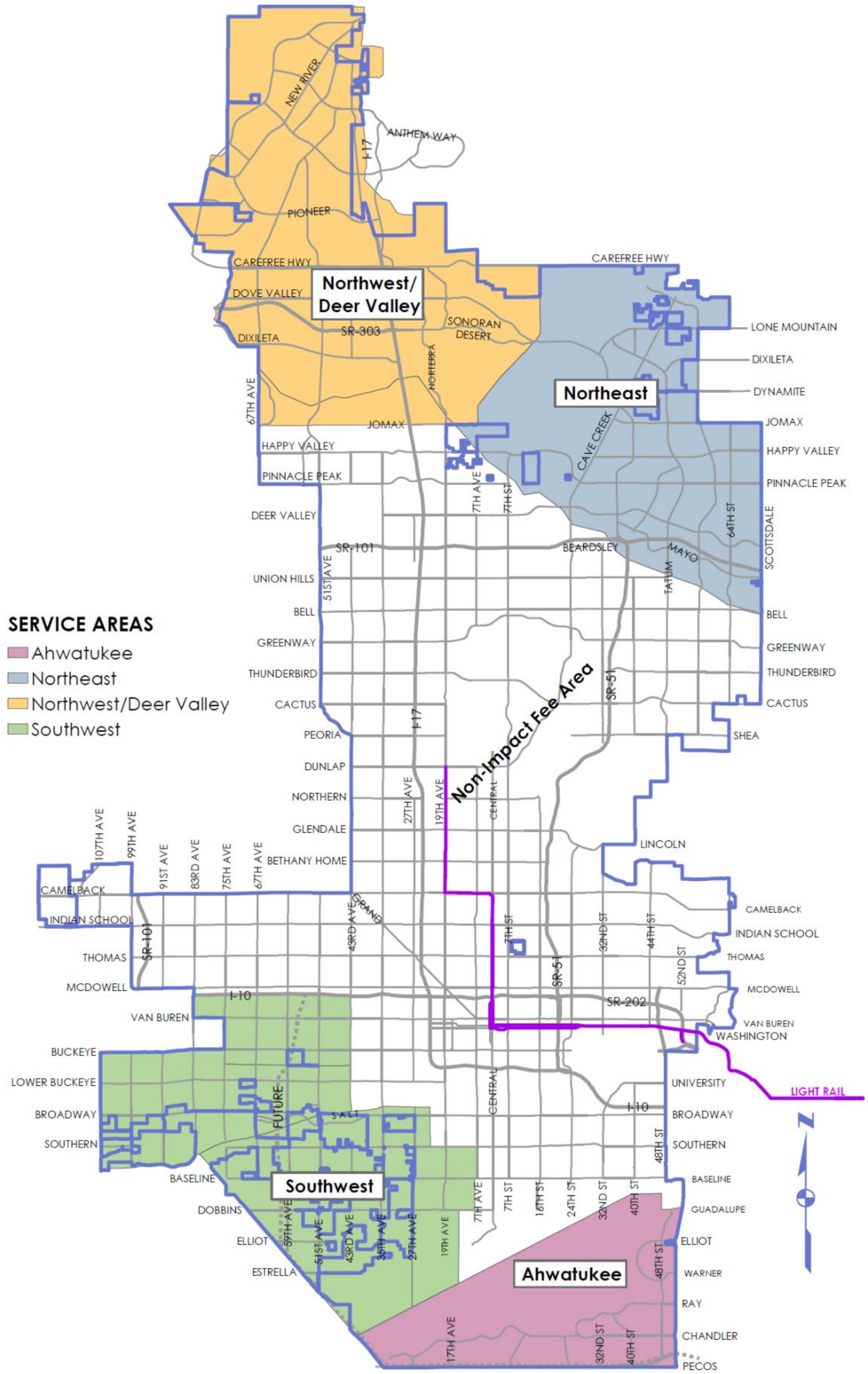
- **Calculate the Fire impact fee schedule for each type of land use** by multiplying the net Fire Impact Fee per EDU for each impact fee area by the EDU factor from Chapter 2: Equivalent Demand Units.

FIRE PROTECTION IMPACT FEE AREAS

The cost to provide new fire protection service capacity varies geographically for two major reasons. First, the demand for new fire protection services depends on the amount of planned development. Second, the cost of land varies significantly in different parts of the City. The Fire Protection Impact Fee is charged in four distinct areas: two in the City's northern growth area and two in the southern growth area. The Fire Protection Impact Fee Areas are named in the following manner:

- Northwest
- Northeast
- Southwest
- Ahwatukee

The boundaries of the Fire Protection Impact Fee Areas are provided in Figure 3.1 on the next page.


SERVICE AREAS
Ahwatukee
Northeast
Northwest/Deer Valley
Southwest
Northwest/ Deer Valley
Northeast
Non-Impact Fee Area
Southwest
Ahwatukee
LIGHT RAIL

LEVEL OF SERVICE (LOS) – FIRE STATIONS AND FIRE PROTECTION VEHICLES

The City's existing fire protection capacity and demand was reviewed for this update. The values used to quantify LOS for this IIP are provided in the following table. Note the LOS for fire protection resources is measured in EDU per unit, so a higher numeric value represents a lower service capacity.

Table 3.1 – Fire Protection: Level of Service

Description	2019 Fire EDU	Stations or Vehicles	Actual LOS (EDU / Unit)	Planning LOS EDU / Unit)	Impact Fee LOS (EDU / Unit)
Fire Station	868,249	57	15,232	10,000	15,232
Engine (quantity)	868,249	64	13,566	10,000	13,566
ALS Rescue	868,249	37	23,466	25,000	25,000
Brush Truck	868,249	13	66,788	75,000	75,000
Battalion Vehicle	868,249	8	108,531	50,000	108,531
Ladder	868,249	14	62,018	50,000	62,018
Ladder Tender	868,249	14	62,018	50,000	62,018
Utility/ Specialized	868,249	27	32,157	125,000	125,000
Tanker	868,249	6	144,708	250,000	250,000

2019 Fire EDU is from Table 2.5. Fire stations, vehicles and equipment values from Phoenix Fire Department. Planning LOS from the Phoenix Fire Department.

ANALYSIS OF DEMAND AND COST - FIRE STATIONS

The tables in the following section provide the values and formulas used to estimate the demand and cost of future fire stations for each impact fee area over the ten-year period from 2020 – 2029. The demand for fire stations is based on the projected demand units from Table 2.7 and the existing citywide level of service for fire stations identified in Table 3.1. Estimated construction costs have been updated based on the actual costs for a recent fire station in north Phoenix. The following table provides the values used to calculate fire station demand.

Table 3.2: Fire Station Demand (2020-29) by Impact Fee Area

Impact Fee Area	2020-29 EDU	Fire Station Level of Service (EDU / station)	2020-29 Fire Station Demand (#)
Northwest	11,753	15,232	0.77
Northeast	19,117	15,232	1.26
Southwest	32,378	15,232	2.13
Ahwatukee	2,097	15,232	0.14

2020-29 EDU is from Table 2.7. Fire Station Level of Service is from Table 3.1. 2020-29 Fire Station Demand is calculated by dividing 2020-29 EDU by Fire Station Level of Service for each impact fee area.

Fire station construction costs have been updated based on a 2018 contract for the construction of Fire Station #55, located at the northeast corner of I-17 and Jomax Road. The following table provides the updated cost estimates for constructing future fire stations.

Table 3.3: Estimated Construction Cost for Future Fire Stations

Cost Component	Fire Station Unit Cost (per facility)
Assembly Cost	$4,495,000
Design (15%)	$674,250
Administrative Costs (22%)	$988,900
Total Cost	$6,158,150

Assembly Cost from Fire Station #55, Notice to Proceed dated 9/26/18.

The following table provides the fire station demand, estimated construction cost per station and the total ten-year fire station “plan” cost for each impact fee area. The fire station “plan” cost is calculated by multiplying the ten-year demand for fire stations by the estimated construction cost per station.

Table 3.4: Plan Cost for Future Fire Stations by Impact Fee Area

Impact Fee Area	2020-29 Fire Station Demand (#)	Fire Station Unit Cost ($/station)[2]	Total Fire Improvement Cost[3]
Northwest	0.77	$6,158,150	$4,751,624
Northeast	1.26	$6,158,150	$7,728,818
Southwest	2.13	$6,158,150	$13,090,112
Ahwatukee	0.14	$6,158,150	$847,797

2020-29 Fire Station Demand is from Table 3.2. Fire Station Unit Cost is from Table 3.3.

ANALYSIS OF DEMAND AND COST - LAND

The City needs to acquire additional land for future fire stations that will serve new development. The tables in the following section provide the values and formulas used to estimate the demand and cost of land for each impact fee area over the ten-year period from 2020 – 2029. The amount of land provided through the impact fee program is calculated by subtracting any existing available fire station sites from the future fire station demand calculated in Table 3.2 then multiplying the remaining number of required fire station sites by the average acreage for a new fire station within the impact fee areas. Tables 3.5 and 3.6 provide the values used to calculate the land acquisition acres required to meet the ten-year demand for fire stations.

Table 3.5: Fire Station Site Demand (2020-29)

Impact Fee Area	2020-29 Fire Station Demand (#)	Available F.S. Sites (#)	2020-29 Fire Station Sites (#)
Northwest	0.77	0.00	0.77
Northeast	1.26	0.00	1.26
Southwest	2.13	1.00	1.13
Ahwatukee	0.14	1.00	0.00

2020-29 Fire Station Demand is from Table 3.2. Available F.S. Sites from Phoenix Fire Department. 2020-29 Fire Station Sites is calculated by subtracting Available F.S. Sites from 2020-29 Fire Station Demand for each impact fee area.

Table 3.6: Fire Station Land Acquisition (2020-29)

Impact Fee Area	2020-29 Fire Station Sites (#)	Acres per Fire Station Site (acres)	2020-29 Fire Station Land (acres)
Northwest	0.77	1.90	1.47
Northeast	1.26	1.90	2.38
Southwest	1.13	1.90	2.14
Ahwatukee	0.00	1.90	0.00

2020-29 Fire Station Site demand is from Table 3.5. Acres per Fire Station Site from Phoenix Fire Department. 2020-29 Fire Station Land demand is calculated by multiplying 2020-29 Fire Station Sites by Acres per Fire Station Site.

The cost of land will vary significantly across impact fee areas. The City retained Brekan-Nava Group, a local real estate appraisal firm, to update land cost estimates for different types of public uses for each impact fee area. The estimated land cost for fire stations from the Brekan-Nava studies are summarized in the following table.

Table 3.7: Land Acquisition Cost for Fire Stations

Impact Fee Area	Land Unit Cost Estimate (per acre)	Cost (acre)
Northwest	$260,000 - $480,000	$370,000
Northeast	$650,000	$650,000
Southwest	$260,000	$260,000
Ahwatukee	$650,000	$650,000

Land acquisition costs for Fire are from Brekan-Nava Group, *Land Cost Analysis for the Northern Development Impact Fee Areas* (October 23, 2018) and *Land Cost Analysis for the Southern Development Impact Fee Areas* (October 26, 2018).

The following table provides the land demand, estimated land acquisition costs per acre and the total ten-year land acquisition "plan" cost for each impact fee area.

Table 3.8: Plan Cost for Future Fire Protection Land Acquisition by Impact Fee Area

Impact Fee Area	2020-29 Fire Station Land (acres)	Land Acquisition Cost ($/acre)[5]	Total Land Acquisition Cost[6]
Northwest	1.47	$370,000	$542,434
Northeast	2.38	$650,000	$1,549,993
Southwest	2.14	$260,000	$556,074
Ahwatukee	0.00	$650,000	$0

2020-29 Fire Station Land is from Table 3.6. Land Acquisition Cost is from Table 3.7. Total Land Acquisition Cost is calculated by multiplying the 2020-29 Fire Station Land demand by the Land Acquisition Cost per acre.

ANALYSIS OF DEMAND AND COST – FIRE PROTECTION VEHICLES

The tables in the following section provide the values and formulas used to estimate the demand and cost of fire protection vehicles for each impact fee area over the ten-year period from 2020 – 2029. The ten-year demand for fire protection vehicles needed to serve new development is calculated by dividing the projected demand units for each impact fee area by the level of service identified in Table 3.1 for each type of vehicle. The following table lists the 2020-2029 demand for each type of fire protection vehicle by impact fee area.

Table 3.9: Fire Protection Vehicle Demand (2020-29)

Impact Fee Area	Fire Engine	ALS Rescue	Brush Truck	Battalion Vehicle	Ladder	Ladder Tender	Utility/ Specialized	Tanker
Northwest	0.87	0.47	0.16	0.11	0.19	0.19	0.09	0.05
Northeast	1.41	0.76	0.25	0.18	0.31	0.31	0.15	0.08
Southwest	2.39	1.30	0.43	0.30	0.52	0.52	0.26	0.13
Ahwatukee	0.15	0.08	0.03	0.02	0.03	0.03	0.02	0.01

Values are calculated by dividing the 2020-29 EDU from Table 2.7 with the level of service for each vehicle type from Table 3.1.

The Phoenix Fire Department provided updated unit costs for each type of fire protection vehicle based on recent purchases. The following table summarizes the updated unit cost.

Table 3.10: Unit Cost for Fire Protection Vehicles

Type of Vehicle	ALS Engine	ALS Rescue	Brush Truck	Battalion Truck	Ladder	Ladder Tender	Utility	Tanker
Vehicle Cost	$620,000	$260,000	$150,000	$65,000	$1,250,000	$300,000	$620,000	$280,000
Apparatus Shop Cost	$15,000	$15,000	$5,000	$10,000	$15,000	$10,000	$10,000	$10,000
MCT & Radios cost	$59,125	$35,650	$20,325	$35,650	$59,125	$59,125	$20,325	$20,325
Inventory of Equip Cost	$120,000	$110,000	$20,000	$25,000	$100,015	$100,015	$35,000	$20,000
Equipment Subtotal	*$194,125*	*$160,650*	*$45,325*	*$70,650*	*$174,140*	*$169,140*	*$65,325*	*$50,325*
Total Cost	$814,125	$420,650	$195,325	$135,650	$1,424,140	$469,140	$685,325	$330,325

From Fire Department: Engine/Pumper cost was based on the 17/18 purchase of a Velocity Pierce unit which can be found in SAP. Rescue cost was based on the 17/18 purchase of a Demers Type 1 unit which can be found in SAP. Battalion cost was based on the 17/18 purchase of a 2500 Chevy Pickup Truck which can be found in SAP. Ladder cost was based on the 16/17 purchase of Pierce mid mount unit which can be found in SAP. Utility cost was based on the 16/17 purchase of a Pierce utility unit which can be found in SAP. Brush truck cost was based on submitting a crew cab chassis purchase through a dealership in cooperation of City Fleet Control. Tanker cost was based on submitting a two-door tanker through a dealership in cooperation with City Fleet Control.

The following table provides the ten-year "plan" cost for each type of fire protection vehicle by impact fee area. The "plan" cost is calculated by multiplying the ten-year demand for each type of vehicle from Table 3.9 by the unit cost from Table 3.10.

Table 3.11: Plan Cost for Future Fire Protection Vehicles by Impact Fee Area

Impact Fee Area	ALS Engine	ALS Rescue	Brush Truck	Battalion Truck	Ladder	Ladder Tender	Utility	Tanker	Total
Northwest	$705,303	$382,736	$127,579	$88,163	$154,285	$154,285	$76,547	$38,274	$1,727,172
Northeast	$1,147,219	$622,545	$207,515	$143,402	$250,954	$250,954	$124,509	$62,255	$2,809,353
Southwest	$1,943,018	$1,054,390	$351,463	$242,877	$425,035	$425,035	$210,878	$105,439	$4,758,135
Ahwatukee	$125,842	$68,289	$22,763	$15,730	$27,528	$27,528	$13,658	$6,829	$308,167

ANALYSIS OF COST PER EDU – RMS / CAD PROJECT

The following tables provides the values used to calculate the cost per EDU for the Record Management System RMS/CAD System. RMS/CAD costs are charged at the proportionate share of total citywide costs that can be attributed to future development within the impact fee areas.

Table 3.12: Cost per EDU for RMS/CAD System

Description	Amount
Total Cost of RMS	$19,088,556
Citywide Total EDU	868,249
RMS Cost per EDU	**$22**

Ten-year plan costs are calculated by multiplying the 10-year demand units for each impact fee area by the cost per EDU from Table 3.12.

Table 3.13: Plan Cost for RMS / CAD by Impact Fee Area

Impact Fee Area	10-Year EDUs (2020-29)	RMS/CAD Unit Cost ($ per EDU)	2020-29 RMS/CAD "Plan" Cost
Northwest	11,753	$22	$258,566
Northeast	19,117	$22	$420,574
Southwest	32,378	$22	$712,316
Ahwatukee	2,097	$22	$46,134

10-Year EDUs are from Table 2.7. RMS/CAD Unit Cost is from Table 3.12. 2020-29 RMS/CAD “Plan” Cost is calculated by multiplying 10-Year EDUs by RMS/CAD Unit Cost per EDU.

POTENTIAL GROSS MPACT FEES PER EDU, FIRE PROTECTION

SUMMARY OF TEN-YEAR (2020-2029) "PLAN" COST – FIRE PROTECTION: The following table provides a summary of the ten-year "plan" cost for all fire protection facilities, vehicles and equipment for each impact fee area.

Table 3.14: Plan Cost Summary for Fire Protection by Impact Fee Area

Impact Fee Areas	Fire Station & Land "Plan" Cost	Fire Protection Vehicles "Plan" Cost	RMS / CAD "Plan" Cost	Total Fire Protection "Plan" Cost
Northwest	$5,294,058	$1,727,172	$258,566	$7,279,796
Northeast	$9,278,811	$2,809,353	$420,574	$12,508,738
Southwest	$13,646,186	$4,758,135	$712,316	$19,116,637
Ahwatukee	$847,797	$308,167	$46,134	$1,202,098

Fire Station & Land "Plan" Cost from Tables 3.4 & 3.8. Fire Protection Vehicles "Plan" Cost from Table 3.11. RMS/CAD "Plan" Cost from Table 3.13.

Table 3.15: Potential Gross Fire Protection Impact Fee by Impact Fee Area

Impact Fee Areas	Total Fire Protection "Plan" Cost	2020-29 EDU[2]	Proposed Gross Fire Impact Fee[3]
Northwest	$7,279,796	11,753	$619
Northeast	$12,508,738	19,117	$654
Southwest	$19,116,637	32,378	$590
Ahwatukee	$1,202,098	2,097	$573

Total Fire Protection "Plan" Cost from Table 3.14. 2020-29 EDU from Table 2.7.

ALTERNATIVE REVENUE OFFSETS, FIRE PROTECTION

Before determining an actual impact fee schedule, *offsets* must be taken into consideration in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same types of improvements funded by impact fees. For example, the City also funds Fire Protection facilities through bonds, sales tax collections and other restricted funds.

In order to avoid requiring new development to pay more than its proportionate share of facility costs impact fee calculations should account for future tax payments that will retire outstanding debt used to develop the types of fire facilities included in the impact fee program as well as any other taxes that will be used for the types of fire facilities or related capital improvements (e.g., RMS) included in the impact fee program. Offsets are not provided for grants since grant funds are limited to available Federal or State funding and the grant funding is not dedicated for growth related improvements. This section calculates the offsets associated with outstanding debt for relevant fire facilities paid through the secondary property tax and with funding for the Records Management System (RMS).

SECONDARY PROPERTY TAX (DEBT) OFFSET: The Fire Protection impact fees calculations include an offset to reflect the share of growth-related fire facilities and equipment that have been funded through bonds that will be repaid through the secondary property tax. In this update, the secondary property tax offset is based on the projected debt service for eligible fire improvements and the existing city-wide Fire Protection equivalent demand units. This approach avoids double payment issues and creates a uniform offset per EDU for all land uses. The following table shows the calculation of the Fire Protection debt offset per EDU.

Table 3.16: Debt Offset Calculation

Total Eligible Fire Protection Facility Costs	$88,050,158
Total Eligible Fire Protection Facility Projected Debt Service	$71,911,492
Total Citywide Fire Protection EDU, 2019	868,249
Debt Offset per EDU	**$83**

OFFSET CALCULATION FOR RMS: The RMS system provides benefits citywide, and a proportionate share of the cost can be included in the impact fee program. Since the remaining cost of RMS will be covered using alternative revenues, and since some of those revenues will come from new development within the impact fee area, it is necessary to calculate an offset for the non-impact fee cost of the RMS system. The following table provides the values used to calculate the RMS offset per EDU.

Table 3.17: Offset Calculation for RMS/CAD System

Description	Amount
Total Cost of RMS	**$19,088,556**
IFA 2020-29 EDU	*65,345*
RMS Cost per EDU	*$22*
Impact Fee Cost of RMS	$1,437,590
Non-Impact Fee RMS Cost	$17,650,966
Citywide EDU	868,249
RMS Offset per EDU	**$20**

POTENTIAL NET IMPACT FEES, FIRE PROTECTION

Table 3.18: Potential Fire Protection Net Impact Fee per EDU by Impact Fee Area

Impact Fee Areas	Proposed Gross Fire Impact Fee	Debt Offset	RMS Offset	Potential Net Fire Impact Fee
Northwest	$619	$83	$20	$516
Northeast	$654	$83	$20	$551
Southwest	$590	$83	$20	$487
Ahwatukee	$573	$83	$20	$470

Table 3.19: Potential Fire Protection Net Impact Fee per Development Unit

Impact Fee Area	Single Family (per unit)	Multifamily (per Unit)	Com / Ret (per 1000 sf)	Office (per 1000 sf)	Ind / WH (per 1000 sf)	Pub / Inst (per 1000 sf)
EDU Factor	*1.00*	*0.75*	*0.81*	*0.64*	*0.28*	*0.58*
Northwest	$516	$387	$418	$330	$144	$299
Northeast	$551	$413	$446	$353	$154	$320
Southwest	$487	$365	$394	$312	$136	$282
Ahwatukee	$470	$353	$381	$301	$132	$273

SUMMARY OF PLANNED IMPROVEMENTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that 100% of impact fee revenue will be used toward new projects that serve new development and no funding will be used to repay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single-family dwellings.

- That all of the future fire facilities and equipment identified in this IIP will be built or otherwise acquired within the ten-year planning period 2020-2029.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities that are eligible to be funded by the Fire Protection impact fee collections, as calculated within this Chapter.

Table 3.20: Northwest Impact Fee Area (Fire Protection), Planned Improvements and Costs, 2020-29

Planned Improvement	Quantity	IFP Cost
Fire Stations (#)	0.77	$4,751,624
Location to be determined		
Fire Station Land (acres)	1.47	$542,434
Location to be determined		
Fire Vehicles & Equipment (see Table X)	Various	$1,727,172
Record Management System (EDU)	11,753	$258,566
Total New Facilities 2020-2029		**$7,279,796**
Projected Impact Fee Revenue		$6,064,548
Anticipated Need for Alternative Funding		**$1,215,248**

Table 3.21: Northeast Impact Fee Area (Fire Protection), Planned Improvements and Costs, 2020-29

Planned Improvement	Quantity	Total Cost
Fire Stations (#)	1.26	$7,728,818
Location(s) to be determined		
Fire Station Land (acres)	2.38	$1,549,993
Location(s) to be determined		
Fire Vehicles & Equipment (see Table X)	Various	$2,809,353
Record Management System (EDU)	19,117	$420,574
Total New Facilities 2020-2029		**$12,508,738**
Projected Impact Fee Revenue		$10,533,467
Anticipated Need for Alternative Funding		**$1,975,271**

Table 3.22: Southwest Impact Fee Area (Fire Protection), Planned Improvements and Costs, 2020-29

Planned Improvement	Quantity	Total Cost
Fire Stations (#)	2.13	$13,090,112
99th Ave and Lower Buckeye		
Location(s) to be determined		
Fire Station Land (acres)	2.14	$556,074
Location(s) to be determined		
Fire Vehicles & Equipment (see Table X)	Various	$4,758,135
Record Management System (EDU)	32,378	$712,316
Total New Facilities 2020-2029		**$19,116,637**
Projected Impact Fee Revenue		$15,768,086
Anticipated Need for Alternative Funding		**$3,348,551**

Table 3.23: Ahwatukee Impact Fee Area (Fire Protection), Planned Improvements and Costs, 2020-29

Planned Improvement	Quantity	Total Cost
Fire Stations (#)	0.14	$847,797
19th Ave and Chandler Blvd		
Fire Vehicles & Equipment (see Table X)	Various	$308,167
Record Management System (EDU)	2,097	$46,134
Total New Facilities 2020-2029		**$1,202,098**
Projected Impact Fee Revenue		$985,590
Anticipated Need for Alternative Funding		**$216,508**

CHAPTER 4: POLICE INFRASTRUCTURE IMPROVEMENTS PLAN

Arizona statutes allow cities to charge development impact fees for "police facilities, including all appurtenances, equipment and vehicles". The City of Phoenix charges the Police impact fee to help provide new precincts, vehicles and equipment needed to serve the City's growth areas. Chapter 4 contains the assumptions, values and formulas used to calculate the draft Police impact fee.

POLICE DEVELOPMENT IMPACT FEE METHODOLOGY: The Police DIF is calculated using the *incremental cost method*, which is a forward-looking approach that assumes police facilities will be expanded to achieve a specific Level of Service (LOS). In the absence of a highly detailed facilities plan using criteria like distances to residents and businesses or response times to customers and that would provide specific future facility locations, attributes and costs, the incremental cost method is the best available. It is anticipated that in the future a detailed police facilities master plan will be generated for the City's growth areas and that eventually a hybrid 'buy-in' plus 'ten-year plan' approach will likely be used. However, for this update the incremental cost method was deemed to be adequate because demand for police facilities is highly correlated with functional population and police facilities are relatively standardized over wide areas. This update proposes a LOS calculated from the current police services provided citywide. A consistent citywide LOS for all impact fee areas reduces the potential for long-term resource inequities across the impact fee areas. The steps to calculate the Police impact fee can be summarized as follows:

- **Project expected new development** in each impact fee area (see Chapter 1: Land Use Assumptions).
- **Analyze the current level of service** being provided for qualifying capital facilities.
- **Determine the ten-year demand** for additional police services for each impact fee area (see Chapter 2: Equivalent Demand Units) based on the current level of service.
- **Estimate the cost** of new police precincts, vehicles and equipment needed to meet the ten-year demand.
- **Calculate the gross Police impact fee per EDU** by dividing the estimated "plan" cost by the equivalent demand units projected over the ten-year period for each impact fee area.
- **Investigate alternative revenue funding** for the types of facilities included in the IIP, and if identified, quantify the alternative revenue offsets to ensure new development is not charged twice for the same improvements.

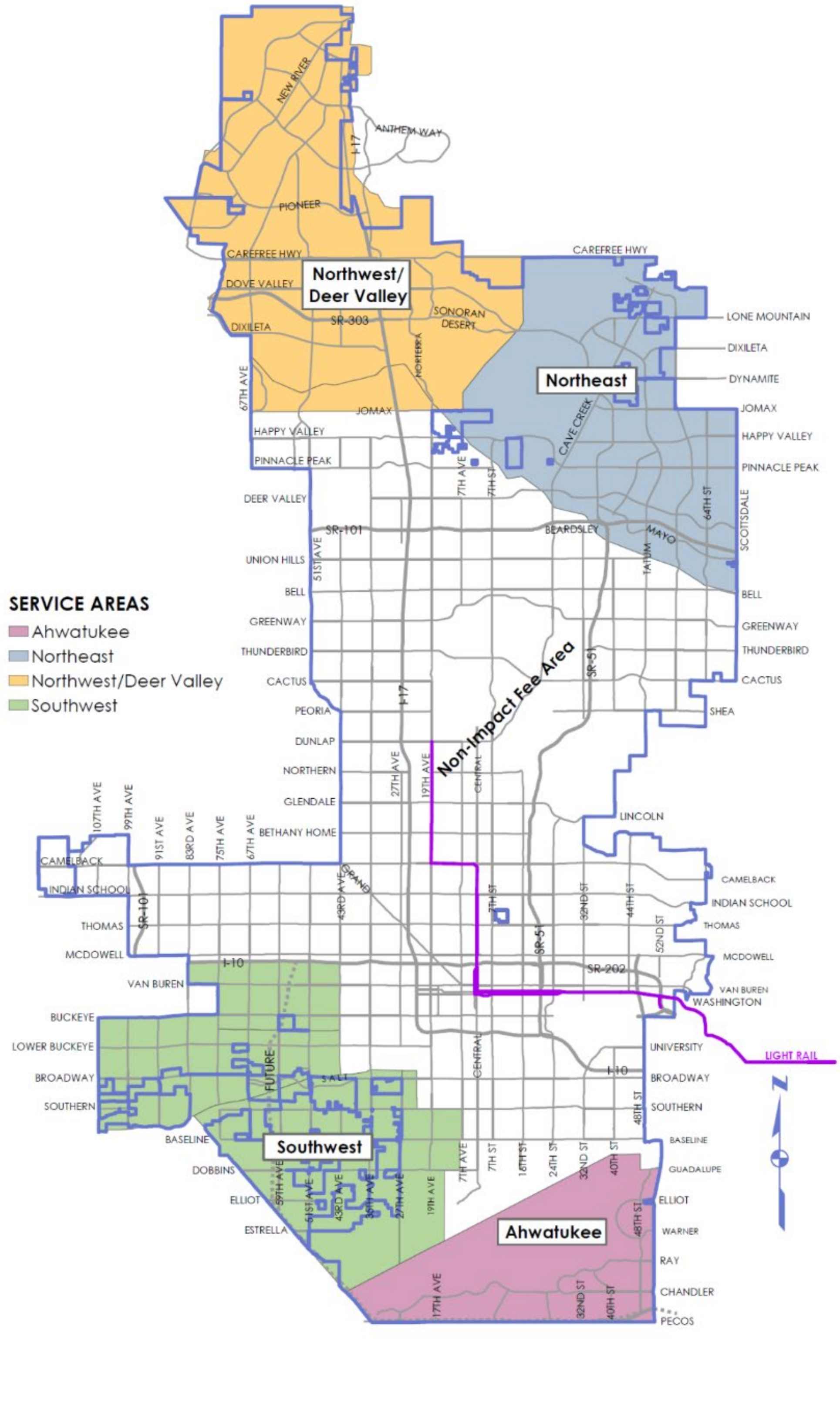
- **Calculate the net Police impact fee per EDU** by subtracting any offset amounts from the gross impact fee per EDU for each impact fee area.

- **Calculate the Police impact fee schedule** for each type of land use by multiplying the Net Police impact fee per EDU for each impact fee area by the EDU factor from Chapter 2: Equivalent Demand Units.

POLICE IMPACT FEE AREAS

The cost to provide new police service capacity varies geographically for two major reasons. First, the demand for new police services depends on the amount of planned development in each geographic location. Second, the cost of land varies significantly in different parts of the City. The Police impact fee is charged in four distinct areas: two in the City's northern growth area and two in the southern growth area. The Police Impact Fee Areas are named in the following manner:

- Northwest (Northwest and Deer Valley)
- Northeast
- Southwest (Estrella N., Estrella S., Laveen W., Laveen E.)
- Ahwatukee


SERVICE AREAS
Ahwatukee
Northeast
Northwest/Deer Valley
Southwest
Northwest/ Deer Valley
Northeast
Non-Impact Fee Area
Southwest
Ahwatukee
LIGHT RAIL
CAREFREE HWY
LONE MOUNTAIN
DIXILETA
DYNAMITE
JOMAX
HAPPY VALLEY
PINNACLE PEAK
DEER VALLEY
UNION HILLS
BELL
GREENWAY
THUNDERBIRD
CACTUS
PEORIA
SHEA
DUNLAP
NORTHERN
GLENDALE
BETHANY HOME
LINCOLN
CAMELBACK
INDIAN SCHOOL
THOMAS
MCDOWELL
VAN BUREN
WASHINGTON
BUCKEYE
LOWER BUCKEYE
UNIVERSITY
BROADWAY
SOUTHERN
BASELINE
GUADALUPE
DOBBINS
ELLIOT
ESTRELLA
WARNER
RAY
CHANDLER
PECOS
I-17
I-10
SR-101
SR-303
SR-51
SR-202
ANTHEM WAY
PIONEER
NEW RIVER
SONORAN DESERT
CAVE CREEK
BEARDSLEY
MAYO
SCOTTSDALE
TATUM
64TH ST
67TH AVE
51ST AVE
27TH AVE
19TH AVE
7TH AVE
7TH ST
CENTRAL
32ND ST
44TH ST
52ND ST
48TH ST
40TH ST
24TH ST
16TH ST
17TH AVE
107TH AVE
99TH AVE
91ST AVE
83RD AVE
75TH AVE
43RD AVE
35TH AVE
59TH AVE
GRAND
SALT
FUTURE

POLICE LEVEL OF SERVICE

The inventory of existing police precincts is needed to calculate existing level of service for precincts and land. In addition, the cost for new precincts is calculated by multiplying the estimated unit cost per square foot by the average square footage of existing precincts. These values are provided in the Police Unit Cost section below.

Table 4.1 lists the existing police precincts including average precinct size and land area.

Table 4.1: Inventory of Police Precincts and Substations

Nbr	Facility Name	Address	Precinct	Impact Fee Area	Facility (sf)	Land (acres)
1	Black Mountain Precinct	33355 N Cave Creek Rd	Black Mountain	Northwest & Northeast	30,524	14.13
2	Goelet A.C. Beuf Satellite	3435 W Pinnacle Peak Rd	Black Mountain		5,000	0.11
3	Cactus Park Precinct	12220 N 39th Ave	Cactus Park	Northwest	12,375	4.40
4	Central City Precinct	1902 S 16th St	Central City		13,200	5.09
5	Desert Horizon Precinct	16030 N 56th St	Desert Horizon	Northeast	14,866	5.00
6	Sunnyslope Police Substation	750 W Peoria Ave	Desert Horizon		7,862	3.18
7	Estrella Mountain Precinct	2111 S 99th Ave	Maryvale - Estrella Mtn		30,524	12.00
8	Maryvale Precinct	6180 W Encanto Blvd	Maryvale - Estrella Mtn	Southwest	14,866	5.44
9	Mountain View Precinct	2075 E Maryland Rd	Mountain View		29,949	12.00
10	South Mountain Precinct	400 W Southern Ave	South Mountain	Southwest & Ahwatukee	9,477	5.96
11	Ahwatukee Foothills Station	17010 S 48th St	South Mountain	Ahwatukee	8,000	0.18
12	24th St & Broadway NRC	2405 E Broadway Rd	South Mountain		13,284	4.60
Totals, Precinct Facilities					**189,927**	**72.1**
Averages, Precinct Facilities					**15,827**	**6.0**

From Phoenix Police Department

It is necessary to calculate the existing LOS for each component of the Police DIF program to determine the ten-year demand for each component. Tables in this section provide the values used to calculate existing LOS for precincts, land, officers and vehicles. The officer LOS is used to determine demand for vehicles and radios, but no direct cost for officers are included in the Police DIF program. The standard LOS for radios is one radio per police officer, so there is not a table included for radios.

The existing LOS for precincts of 72,354 EDU per precinct is calculated by dividing existing police EDU from Table 2.5 by existing police precincts from Table 4.1. The following table provides the values used to calculate the existing LOS for precincts.

Table 4.2: Level of Service, Police Precincts

Police EDU	Police Precinct (#)	Precinct LOS (EDU / precinct)
868,249	12	72,354

Police EDU from Table 2.5. Police Precinct number from Table 4.1.

The existing LOS for land of 6.0 acres per precinct is calculated by dividing total existing precinct land by the existing number of precinct facilities, both values are from Table 4.1. The following table provides the values used to calculate the existing LOS for land.

Table 4.3: Level of Service, Land Acquisition

Precinct Land (acres)	Police Precinct (#)	Land LOS (acre / precinct)
72	12	6.0

Precinct numbers are from Table 4.1.

The existing LOS for officers is derived from authorized officers provided by the Phoenix Police Department and existing police EDU from Table 2.5. The following table provides the values used to calculate the existing LOS for officers

Table 4.4: Level of Service, Officers

Authorized Officers	Police EDU	Officer LOS (per 1K EDU)
3,274	868,249	3.77

Authorized officers from Phoenix Police Department. Police EDU is from Table 2.5.

The existing LOS for vehicles of 2.24 officers per vehicle was calculated using filled officer positions and existing vehicle values from the Phoenix Police Department. The following table provides the values used to calculate the existing LOS for police vehicles.

Table 4.5: Level of Service, Vehicles

Filled Officers	Police Vehicles (#)	Vehicle LOS (officer/veh.)
2,906	1,295	2.24

Filled officers and police vehicles from Phoenix Police Department.

POLICE TEN-YEAR DEMAND, 2020-2029

The demand for precincts is calculated by dividing the projected 2020-29 EDU for each impact fee area from Table 2.7 by the existing precinct LOS from Table 4.2. The following table provides the values used to calculate the ten-year demand for precincts in each impact fee area.

Table 4.6: Ten-Year (2020-29) Demand, Precincts

Impact Fee Area	2020-29 EDU	Precint LOS (EDU / Precinct)	Precinct Demand (#)
Northwest	11,753	72,354	0.16
Northeast	19,117	72,354	0.26
Southwest	32,378	72,354	0.45
Ahwatukee	2,097	72,354	0.03

The demand for land is calculated by multiplying precinct demand from Table 4.6 by the existing land LOS from Table 4.3. The following table provides the values used to calculate the ten-year demand for land in each impact fee area.

Table 4.7: Ten-Year (2020-29) Demand, Land

Impact Fee Area	Precinct Demand (#)	Land LOS (acre / precinct)	Land Demand (acres)
Northwest	0.16	6.00	0.96
Northeast	0.26	6.00	1.56
Southwest	0.45	6.00	2.70
Ahwatukee	0.03	6.00	0.18

The demand for officers is derived from the projected 2020-29 EDU for each impact fee area from Table 2.7 and the existing officer LOS from Table 4.4. The following table provides the values used to calculate the ten-year demand for officers in each impact fee area.

Table 4.8: Ten-Year (2020-29) Demand, Officers

Impact Fee Area	2020-29 EDU	Officer LOS (per 1K EDU)	Officer Demand (#)
Northwest	11,753	3.77	44
Northeast	19,117	3.77	72
Southwest	32,378	3.77	122
Ahwatukee	2,097	3.77	8

The demand for vehicles is calculated by multiplying the officer demand from Table 4.8 by the existing vehicle LOS from Table 4.5. The following table provides the values used to calculate the ten-year demand for vehicles in each impact fee area.

Table 4.9: Ten-Year (2020-29) Demand, Vehicles

Impact Fee Area	Officer Demand (#)	Vehicle LOS (Officer / Vehicle)	Vehicle Demand
Northwest	44	2.24	20
Northeast	72	2.24	32
Southwest	122	2.24	54
Ahwatukee	8	2.24	4

The demand for radios is calculated by multiplying the officer demand from Table 4.8 by the standard radio LOS of one radio per officer. The following table provides the values used to calculate the ten-year demand for radios in each impact fee area.

Table 4.10: Ten-Year (2020-29) Demand, Radios

Impact Fee Area	Officer Demand (#)	Radio LOS (per Officer)	Radio Demand
Northwest	44	1.00	44
Northeast	72	1.00	72
Southwest	122	1.00	122
Ahwatukee	8	1.00	8

UNIT COST ANALYSIS, POLICE

Unit cost have been estimated for each component of the Police DIF program. Unit cost estimates are multiplied by projected demand to determine the “plan” cost for each component within each impact fee area. This section provides the source information and unit cost values for precincts, land, vehicles, radios and the Record Management System (RMS).

Table 4.11 provides the values used to calculate the estimated unit cost for precincts. Costs for precincts have been derived from historic actual cost data, and adjusted for inflation using the Engineering News Record, Building Cost Index. The estimated unit cost per square foot is multiplied by the average square footage of existing precincts from Table 4.1.

Table 4.11: Estimated Cost for Police Precincts

Cost Element	2007 Precinct (20,000 sq ft)	2011 Precinct (35,524 sq ft)	2007 - Adj. (per ft)	2011 - Adj. (per ft)	Avg. Unit Cost ($ / sq ft)
Assembly Cost	$5,463,970	$11,549,253	$366.39	$388.35	$377.37
Construction Fee (6.30%)	$344,230	$727,603	$23.00	$24.00	$24.00
Tax (5.27%)	$287,951	$608,646	$19.00	$20.00	$20.00
Bond/Insurance (3.00%)	$163,919	$346,478	$11.00	$12.00	$12.00
General Conditions (8.75%)	$478,097	$1,010,560	$32.00	$34.00	$33.00
Design (8.00%)	$437,118	$923,940	$29.00	$31.00	$30.00
Engineering (14.00%)	$764,956	$1,616,895	$51.00	$54.00	$53.00
Construction Management (8.00%)	$437,118	$923,940	$29.00	$31.00	$30.00
Total Cost	$8,377,359	$17,707,315	$560	$594	$579
Average Precinct (sq ft)					*15,800*
Estimated Cost per Precinct					$9,148,200

Table 4.12 lists the estimated land acquisition costs for Police from Brekan-Nava Group, *Land Cost Analysis for the Northern Development Impact Fee Areas* (October 23, 2018) and *Land Cost Analysis for the Southern Development Impact Fee Areas* (October 26, 2018).

Table 4.12: Land Acquisition Cost by Police Impact Fee Area

Impact Fee Area	Land Unit Cost Estimate (per acre)[1]	Cost (acre)
Northwest	$260,000 - $480,000	$370,000
Northeast	$650,000	$650,000
Southwest	$260,000	$260,000
Ahwatukee	$650,000	$650,000

Table 4.13 lists the estimated unit costs for vehicles and radios.

Table 4.13: Estimated Unit Cost for Police Vehicles and Radios

Vehicle Unit Cost	Radio Unit Cost
$77,629	$5,229

Table 4.14 provides the values used to calculate the estimated cost per EDU for the Record Management System (RMS). RMS costs are charged at the proportionate share of total citywide costs that can be attributed to new development within the impact fee areas. An offset is provided for RMS costs that significantly reduces the RMS component of the net impact fee. This is described in more detail under the police offset section and reflected in the net impact fee tables.

Table 4.14: Estimated Cost per EDU for RMS

Total Cost of RMS	$28,102,002
Citywide Total EDU	868,249
RMS Cost per EDU	**$32.00**

TEN-YEAR (2020-2029) PLAN COST, POLICE

Tables 4.15 – 4.19 provide the values used to calculate the ten-year "plan" cost for each component of the Police DIF program.

The ten-year plan cost for precincts is calculated by multiplying the ten-year demand for precincts from Table 4.6 by the estimated cost for precincts from Table 4.11. The following table provides the values used to calculate the "plan" cost for precincts for each impact fee area.

Table 4.15: Ten-Year (2020-29) Plan Cost, Precincts

Impact Fee Area	10-Year Precinct Demand (#)	Estimated Cost ($ per Precinct)	10-Year Precinct Plan Cost
Northwest	0.16	$9,148,200	$1,463,712
Northeast	0.26	$9,148,200	$2,378,532
Southwest	0.45	$9,148,200	$4,116,690
Ahwatukee	0.03	$9,148,200	$274,446

The ten-year plan cost for land is calculated by multiplying the ten-year demand for land from Table 4.7 by the estimated cost for land from Table 4.12. The following table provides the values used to calculate the "plan" cost for land for each impact fee area.

Table 4.16: Ten-Year (2020-29) Plan Cost, Land

Impact Fee Area	10-Year Land Demand (acres)	Estimated Cost ($ per Acre)	10-Year Precinct Plan Cost
Northwest	0.96	$370,000	$355,200
Northeast	1.56	$650,000	$1,014,000
Southwest	2.70	$260,000	$702,000
Ahwatukee	0.18	$650,000	$117,000

The ten-year plan cost for vehicles is calculated by multiplying the ten-year demand for vehicles from Table 4.9 by the estimated cost for vehicles from Table 4.13. The following table provides the values used to calculate the "plan" cost for vehicles for each impact fee area.

Table 4.17: Ten-Year (2020-29) Plan Cost, Vehicles

Impact Fee Area	2020-29 Vehicle Demand	Vehicle Unit Cost	2020-29 Vehicle Cost[3]
Northwest	20	$77,629	$1,552,580
Northeast	32	$77,629	$2,484,128
Southwest	54	$77,629	$4,191,966
Ahwatukee	4	$77,629	$310,516

The ten-year plan cost for radios is calculated by multiplying the ten-year demand for vehicles from Table 4.10 by the estimated cost for radios from Table 4.13. The following table provides the values used to calculate the "plan" cost for radios for each impact fee area.

Table 4.18: Ten-Year (2020-29) Plan Cost, Radios

Impact Fee Area	2020-29 Radio Demand	Radio Unit Cost	2020-29 Radio Cost
Northwest	44	$5,229	$230,076
Northeast	72	$5,229	$376,488
Southwest	122	$5,229	$637,938
Ahwatukee	8	$5,229	$41,832

The ten-year plan cost for RMS is calculated by multiplying the projected ten-year EDU from Table 2.7 by the estimated RMS cost per EDU from Table 4.14.

Table 4.19: Estimated Cost per EDU for RMS

Impact Fee Area	Projected EDU (2020-29)	RMS Unit Cost ($ per EDU)	2020-29 RMS Cost
Northwest	11,753	$32	$376,096
Northeast	19,117	$32	$611,744
Southwest	32,378	$32	$1,036,096
Ahwatukee	2,097	$32	$67,104

The ten-year total plan cost for each impact fee area is the sum of ten-year cost for each component of the Police DIF program provided in Tables 4.15 – 4.19. The following table summarizes the "plan" cost of each component and provides the total cost for each impact fee area.

Table 4.20: Total Cost for Police Facilities and Equipment, 2020-2029

Impact Fee Area	2020-29 Precinct Cost[3]	2020-29 Land Cost[6]	2020-29 Vehicle Cost[3]	2020-29 Radio Cost	2020-29 RMS Cost	2020-29 Plan Cost
Northwest	$1,463,712	$355,200	$1,552,580	$230,076	$376,096	$3,977,664
Northeast	$2,378,532	$1,014,000	$2,484,128	$376,488	$611,744	$6,864,892
Southwest	$4,116,690	$702,000	$4,191,966	$637,938	$1,036,096	$10,684,690
Ahwatukee	$274,446	$117,000	$310,516	$41,832	$67,104	$810,898

POTENTIAL GROSS AND NET IMPACT FEES, POLICE

Potential gross impact fees per EDU are calculated for each area by dividing the total cost provided in Table 4.20 by the 10-year EDU for each impact fee area.

Table 4.23: Potential Gross Impact Fee per EDU, Police

Impact Fee Area	2020-29 Total Plan Cost	2020-29 Projected EDU	Potential Gross Fee ($ per EDU)
Northwest	$3,977,664	11,753	$338
Northeast	$6,864,892	19,117	$359
Southwest	$10,684,690	32,378	$330
Ahwatukee	$810,898	2,097	$387

ALTERNATIVE REVENUE OFFSET, POLICE

Before determining an actual impact fee schedule, *offsets* must be taken into consideration in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same types of improvements funded by impact fees. For example, the City also funds Police facilities through bonds, sales tax collections and other restricted funds.

In order to avoid requiring new development to pay more than its proportionate share of facility costs, impact fee calculations should account for future tax payments that will retire outstanding debt used to develop the types of police facilities included in the impact fee program as well as other taxes that will be used for the types of facilities or other capital improvements (e.g., RMS) included in the impact fee program. Additional offsets are not necessary for grants since grant funds are limited to available Federal or State funding and the grant funding is not dedicated for growth related improvements. This section calculates the offsets associated with outstanding debt for relevant police facilities paid through the secondary property tax and with funding for the Records Management System (RMS).

SECONDARY PROPERTY TAX (DEBT) OFFSET: The Police impact fees calculations include an offset to reflect the share of growth-related police facilities and equipment that have been funded through bonds that will be repaid through the secondary property tax. In this update, the secondary property tax offset is based on the projected debt service for relevant police improvements and the existing city-wide Police equivalent demand units. This approach avoids double payment issues and creates a uniform offset per EDU for all land uses. The following table shows the calculation of the Police debt offset per EDU.

Table 4.21: Debt Offset Calculation

Total Eligible Police Facility Costs	$12,909,605
Total Eligible Police Facility Projected Debt Service	$12,594,171
Total Citywide Police EDU, 2019	868,249
Debt Offset per EDU	**$15**

OFFSET CALCULATION FOR RMS: The RMS system provides benefits citywide, and a proportionate share of the cost can be included in the impact fee program. Since the remaining cost of RMS will be covered using alternative revenues, and since some of those revenues will come from new development within the impact fee area, it is necessary to calculate an offset for the non-impact fee cost of the RMS system. The following table provides the values used to calculate the RMS offset per EDU.

Table 4.22: Alternative Revenue Offset for RMS

Total Cost of RMS	**$28,102,002**
IFA 2020-29 EDU	*65,345*
RMS Cost per EDU	*$32*
Impact Fee Cost of RMS	$2,091,040
Non-Impact Fee RMS Cost	$26,010,962
Citywide EDU	868,249
RMS Offset per EDU	**$30**

POTENTIAL NET IMPACT FEES, POLICE

Potential net impact fees per EDU are calculated for each area by subtracting the offset amounts provided in Tables 4.21 and 4.22 from the gross fees listed in Table 4.23.

Table 4.24: Potential Net Impact Fee per EDU, Police

Impact Fee Area	Proposed Gross Fee (per EDU)	Debt Offset (per EDU)	RMS Offset (per EDU)	Potential Net Impact Fee (per EDU)
Northwest	$338	$15	$30	$293
Northeast	$359	$15	$30	$314
Southwest	$330	$15	$30	$285
Ahwatukee	$387	$15	$30	$342

Table 4.25: Potential Net Impact Fee per Development Unit, Police

Impact Fee Area	Single Family (per unit)	Multifamily (per Unit)	Com / Ret (per 1000 sf)	Office (per 1000 sf)	Ind / WH (per 1000 sf)	Pub / Inst (per 1000 sf)
EDU Factor	*1.00*	*0.75*	*0.81*	*0.64*	*0.28*	*0.58*
Northwest	*$308*	*$231*	*$249*	*$197*	*$86*	*$179*
Northeast	*$329*	*$247*	*$266*	*$211*	*$92*	*$191*
Southwest	*$300*	*$225*	*$243*	*$192*	*$84*	*$174*
Ahwatukee	*$357*	*$268*	*$289*	*$228*	*$100*	*$207*

SUMMARY OF PLANNED IMPROVEMENTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that 100% of impact fee revenue will be used toward new projects that serve new development and no funding will be used to repay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single-family dwellings.

- That all of the future police facilities will be built within the ten-year planning period 2020-2029.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities that are eligible to be funded by the Police impact fee collections, as calculated within this Chapter.

Table 4.26: Northwest Impact Fee Area (Police), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity	Total Cost
Police Precincts (#)	0.16	$1,463,712
Police Station Land (acres)	0.96	$355,200
Police Vehicles	20	$1,552,580
Police Radios	44	$230,076
Record Management System (pro-rata per EDU)	11,753	$376,096
Subtotal		**$3,977,664**
Planned Net Impact Fee Revenue		$3,443,629
Anticipated Need for Alternative Funding		**$534,035**

Table 4.27: Northeast Impact Fee Area (Police), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity	Total Cost
Police Precincts (#)	0.26	$2,378,532
Police Station Land (acres)	1.56	$1,014,000
Police Vehicles (#)	32	$2,484,128
Police Radios (#)	72	$376,488
Record Management System (pro-rata per EDU)	19,117	$611,744
Subtotal		**$6,864,892**
Planned Net Impact Fee Revenue		$6,002,738
Anticipated Need for Alternative Funding		**$862,154**

Table 4.28: Southwest Impact Fee Area (Police), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity	Total Cost
Police Precincts (#)	0.45	$4,116,690
Police Station Land (acres)	2.70	$702,000
Police Vehicles (#)	54	$4,191,966
Police Radios (#)	122	$637,938
Record Management System (pro-rata per EDU)	32,378	$1,036,096
Subtotal		**$10,684,690**
Planned Net Impact Fee Revenue		$9,227,730
Anticipated Need for Alternative Funding		**$1,456,960**

Table 4.29: Ahwatukee Impact Fee Area (Police), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity	Total Cost
Police Precincts (#)	0.03	$274,446
Police Station Land (acres)	0.18	$117,000
Police Vehicles (#)	4	$310,516
Police Radios (#)	8	$41,832
Record Management System (pro-rata per EDU)	2,097	$67,104
Subtotal		**$810,898**
Planned Net Impact Fee Revenue		$717,174
Anticipated Need for Alternative Funding		**$93,724**

CHAPTER 5: PARKS INFRASTRUCTURE IMPROVEMENTS PLAN

The City of Phoenix charges a Parks Development Impact Fee (DIF) to help provide new recreational facilities commonly associated with neighborhood and community parks. The Park Impact Fee is based on the estimated cost of providing recreational land and amenities within the designated Park Impact Fee Areas.

PARKS IMPACT FEE BACKGROUND: In 2012, the Arizona legislature adopted new rules on the types of park improvements that are eligible to be funded with impact fees. Under Arizona law, Parks DIF are limited to improvements that can be demonstrated to "provide a direct benefit to the development". This rule has been interpreted as allowing new recreational facilities commonly associated with neighborhood and community parks but excluding amenities that can reasonably be expected to attract users from outside the local area (e.g., soccer and softball complexes designed for tournaments). Park and recreation facilities that are explicitly ineligible per State law include, but are not limited to: vehicles, equipment, aquatic centers, cultural facilities, environmental education centers, golf course facilities and theme parks. Community centers up to 3,000 square feet and swimming pools may be included by law but are not currently provided in the City's Parks DIF program nor are they included as part of the 2020 Update.

PARKS DEVELOPMENT IMPACT FEE METHODOLOGY: The proposed Parks DIF is calculated using an incremental cost method which is a forward-looking approach that assumes the park system will be expanded to achieve a specific Level of Service (LOS). This update recommends a LOS based on the citywide park service area rather than calculating a unique LOS for each impact fee area. Using a consistent citywide LOS for all impact fee areas reduces the potential for long-term inequities in park services across the impact fee areas. The incremental cost method is suitable for the Parks category because the provision of facilities depends largely on the functional population being served in any given area and location-specific factors like topography, man-made networks (roads, canals, barriers, etc.) and property ownership (especially preserves) which have less of an effect on park facilities than on other categories like arterial streets, water and wastewater infrastructure. Neighborhood and community park facilities tend to be relatively standardized with similar amenities like playing fields, parking lots, playground equipment for young children, washrooms and basketball courts being installed in most locations.

This update recommends two new approaches to maximize existing resources while minimizing impacts to the Parks and Recreation Department operating budget. Specifically, this update recommends including an adjustment to the calculated demand for park land by carrying forward available "undeveloped" park land. In addition, this update anticipates the possibility of installing eligible capacity-expanding amenities at existing park locations which may include "locally-serving" amenities located within regional park boundaries.

The steps to calculate the Parks impact fee can be summarized as follows:

- **Project expected new development** in each impact fee area (see Chapter 1: Land Use Assumptions).

- **Analyze the current level of service** being provided for qualifying capital facilities.

- **Determine the ten-year demand** for additional park facilities for each impact fee area (see Chapter 2: Equivalent Demand Units) based on the current level of service.

- **Estimate the cost** to acquire land and construct new parks needed to meet the ten-year demand.

- **Calculate the gross Parks impact fee per EDU** by dividing the estimated "plan" cost by the equivalent demand units projected over the ten-year period for each impact fee area.

- **Investigate possible alternative revenue offsets,** and if alternative funding sources are identified, offsets must be quantified to ensure new development is not charged twice for the same improvements.

- **Calculate the net Parks impact fee per EDU** in impact fee areas by subtracting any offset amounts from the gross impact fee per EDU.

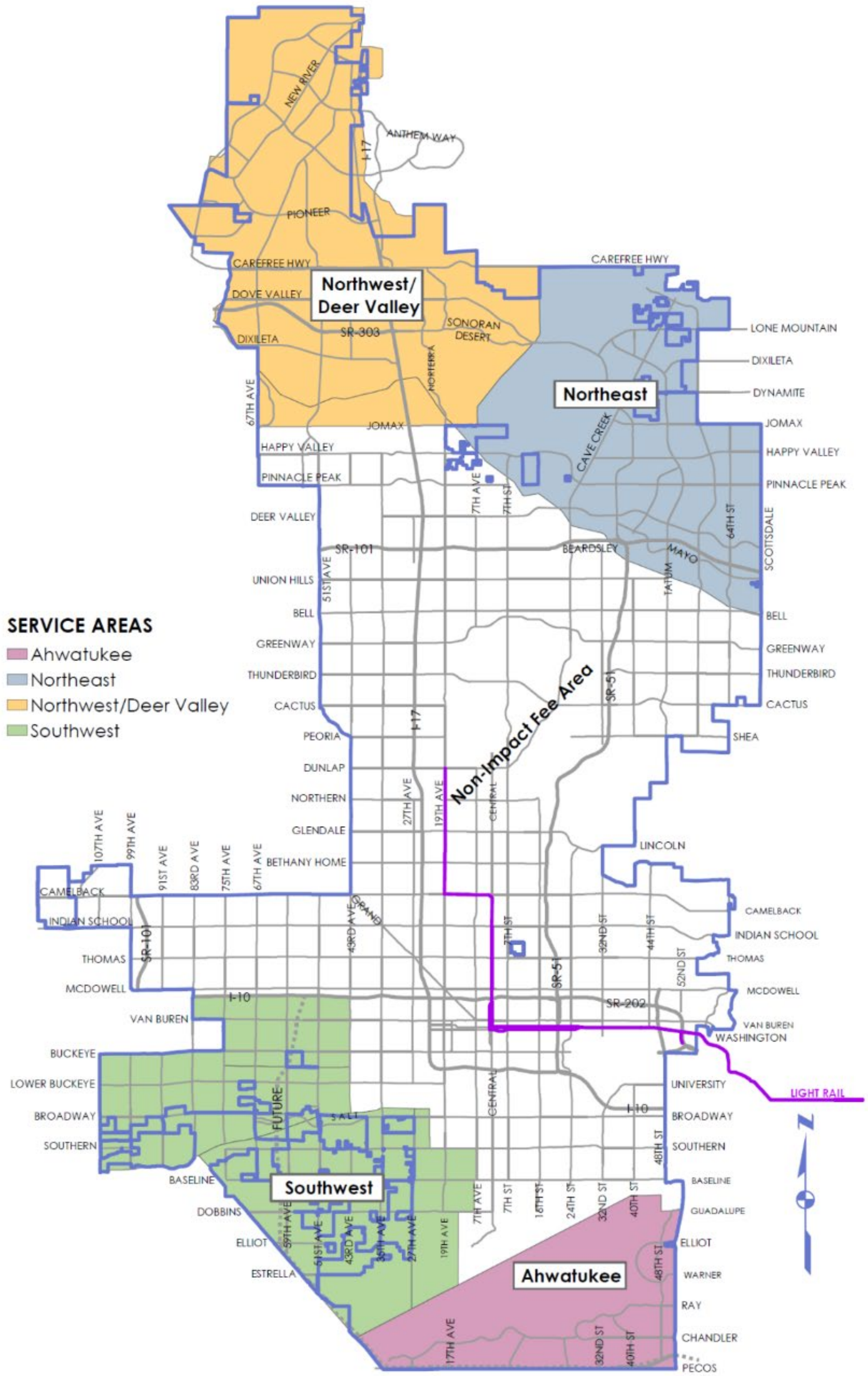
- **Calculate the Parks impact fee schedule for each type of land use** by multiplying the net Parks impact fee per EDU in each impact fee area by the EDU factor from Chapter 2: Equivalent Demand Units.

PARKS IMPACT FEE AREAS

The cost to provide new park service capacity varies geographically for two major reasons. First, the demand for new park services depends the amount of planned development in each geographic location. Second, the cost of land varies significantly in different parts of the City. The Parks impact fee is charged in four distinct areas, two in the City's northern growth area and two in the southern growth area. The Parks impact fee areas are named in the following manner:

- Northwest (Northwest and Deer Valley)
- Northeast
- Southwest (Estrella N., Estrella S., Laveen W., Laveen E.)
- Ahwatukee

Please see the map on the following page to see the boundaries of each of the Parks impact fee areas.


SERVICE AREAS
Ahwatukee
Northeast
Northwest/Deer Valley
Southwest
Northwest/ Deer Valley
Northeast
Non-Impact Fee Area
Southwest
Ahwatukee
LIGHT RAIL

PARKS LEVEL OF SERVICE

The inventory of existing neighborhood and community parks is needed to calculate existing level of service for parks.

INVENTORY OF EXISTING NEIGHBORHOOD AND COMMUNITY PARKS: The following table lists City's existing parks that are used to calculate the existing Park level of service. The inventory of "undeveloped" park land is incorporated in the fee calculation methodology as an adjustment as explained in the section describing ten-year park demand.

Table 5.1: Summary of Existing Neighborhood and Community Parks by Impact Fee Area

Impact Fee Area	Total Park Land (acres)	Neighborhood & Community Park Land	Neighborhood & Community Park Capacity
Northwest	177	76	28
Northeast	568	247	63
Southwest	819	306	152
Ahwatukee	284	147	113
All IFAs	1,847	775	356
Non-IFA	1,863	1,863	1,640
Citywide	3,710	2,639	1,997

From Phoenix Parks Department

PARK LEVEL OF SERVICE (LOS) CALCULATION: It is necessary to calculate the Park LOS to determine the ten-year demand. A LOS of 3.3 acres per 1,000 EDU is calculated using 2019 citywide neighborhood and community park acreage from Table 5.1 and citywide park equivalent demand units from Table 2.6.

Table 5.2: Park Level of Service

Neighborhood & Community Park Capacity (acres)	Existing (2019) Citywide EDU	Level of Service (acres per 1,000 EDU)
1,997	609,554	3.3

PARKS TEN-YEAR DEMAND, 2020-2029

DEMAND FOR NEW DEVELOPED PARK ACREAGE: The 2020-2029 demand for "developed" park acreage is calculated by multiplying the 2020-2029 projected EDU from Table 2.8 with Park LOS from Table 5.2. The following table provides the values used to calculate the ten-year demand for new "developed" park acreage for each Park impact fee area.

Table 5.3: Ten-Year Park Demand "Developed", 2020-2029

Impact Fee Area	2020-29 Park EDU	LOS (acres per 1,000 EDU)	2020-29 Park Demand (acres)[1]
Northwest	8,599	3.3	28
Northeast	16,309	3.3	54
Southwest	21,370	3.3	71
Ahwatukee	1,828	3.3	6

ADJUSTMENT FOR AVAILABLE PARK LAND: Available park land is calculated by multiplying 2019 EDU from Table 2.6 by Park LOS from Table 5.2 to determine 2019 Park Demand which is then subtracted from the existing park acres from Table 5.1 to derive "available" park land that can be "carried-forward" as part of this update. The following table provides the values used to calculate "available" park land incorporated as an adjustment to the ten-year demand for park land acquisition. The ten-year demand for land acquisition is adjusted when "undeveloped" park land is estimated to be available to accommodate the ten-year demand for "developed" park space.

Table 5.4: Available Park Land by Impact Fee Area, 2019

Impact Fee Area	2019 Park EDU	LOS (acres per 1,000 EDU)	2019 Park Demand (acres)	Existing Park Land (acres)	2019 Available Park Land (acres)
Northwest	16,906	3.3	56	76	20
Northeast	24,569	3.3	81	247	166
Southwest	45,161	3.3	149	306	157
Ahwatukee	33,561	3.3	111	147	36

DEMAND FOR PARK LAND: The 2020-29 demand for land is calculated by subtracting available park land from Table 5.4 from 2020-29 Park Demand from Table 5.3. The following table provides the values used to calculate the ten-year demand for park land acquisition acreage for each Park IFA.

Table 5.5: Ten-Year Park Land Acquisition Requirements, 2020-2029

Impact Fee Area	2020-29 Park Demand (acres)	2019 Available Park Land (acres)	2020-29 Land Acquisition (acres)
Northwest	28	20	**8**
Northeast	54	166	**0**
Southwest	71	157	**0**
Ahwatukee	6	36	**0**

UNIT COST ANALYSIS, PARKS

PARK DEVELOPMENT COST ESTIMATE: The following table provides the cost elements and estimated cost per acre to complete park improvements. A fully-developed park is one that has all necessary amenities to fulfill its ultimate service objectives. For example, completed neighborhood parks generally include a lighted basketball court, a lighted volleyball court, a playground with shade canopy, a restroom, two picnic ramadas, irrigation and parking improvements. Completed community parks have more of the same facilities plus a multi-use athletic field, tennis courts and a paved skate plaza. These costs are carried forward from the City of Phoenix, *Infrastructure Financing Plan; Table 111, Pg. 96* (April 6, 2015); adjusted for inflation using the Engineering News Record, Building Cost Index for April 2019.

Table 5.6: Park Development Cost per Acre

Cost Component	Park Development Cost per Acre
Assembly Cost	$291,942
Design (15%)	$43,791
Administrative Costs (22%)	$64,227
Total Cost, per acre	**$399,960**

PARK LAND ACQUISITION COST ESTIMATE: The following table lists the estimated land acquisition costs for Parks from Brekan-Nava Group, *Land Cost Analysis for the Northern Development Impact Fee Areas* (October 23, 2018) and *Land Cost Analysis for the Southern Development Impact Fee Areas* (October 26, 2018).

Table 5.7: Land Acquisition Cost by Parks Impact Fee Area

Impact Fee Area	Cost Range Estimate (acre)[1]	Cost (acre)
Northwest	$110,000 - $200,000	$165,000
Northeast	$200,000	$200,000
Southwest	$140,000	$140,000
Ahwatukee	$260,000	$260,000

TEN-YEAR (2020-2029) PLAN COST, PARKS

TOTAL TEN-YEAR PARK COST: The park plan cost is calculated by multiplying the 2020-2029 requirements for developed parks from Table 5.3 by the estimated park development unit cost from Table 5.6 and the 2020-2029 land demand from Table 5.5 by the estimated land acquisition cost from Table 5.7. The following table provides the values used to calculate the total ten-year "plan" cost for each Park IFA.

Table 5.8: Parks Ten-Year "Plan" Cost, 2020-2029

Impact Fee Area	2020-29 Park Expansion (acres)	Park Unit Cost (per acre)[1]	2020-29 Park Expansion Total Cost	2020-29 Land Acquisition (acres)	Land Unit Cost (per acre)[2]	2020-29 Land Acquisition Total Cost
Northwest	28	$399,960	**$11,198,880**	8	$165,000	**$1,320,000**
Northeast	54	$399,960	**$21,597,840**	0	$200,000	**$0**
Southwest	71	$399,960	**$28,397,160**	0	$140,000	**$0**
Ahwatukee	6	$399,960	**$2,399,760**	0	$260,000	**$0**

POTENTIAL GROSS IMPACT FEE PER EDU, PARKS

POTENTIAL GROSS IMPACT FEE: The potential gross Park DIF per EDU for each fee area is calculated by dividing the sum of ten-year plan costs from Table 5.8 with the ten-year projected park EDU from Table 2.8. The following table provides the values used to calculate gross Park DIF per EDU for each fee area.

Table 5.9: Potential Gross Park Impact Fee per EDU

Impact Fee Area	2020-29 Park Plan Cost[1]	2020-29 Park EDU	Gross Park Impact Fee (per EDU)
Northwest	$12,518,880	8,599	**$1,456**
Northeast	$21,597,840	16,309	**$1,324**
Southwest	$28,397,160	21,370	**$1,329**
Ahwatukee	$2,399,760	1,828	**$1,313**

ALTERNATIVE REVENUE OFFSET, PARKS

Before determining an actual impact fee schedule, *offsets* must be taken into consideration in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. For example, the City also funds parks facilities through bonds, sales tax collections and other restricted funds.

In order to avoid requiring new development to pay more than its proportionate share of facility costs impact fee calculations should account for future tax payments that will retire outstanding debt associated with the types of parks included in the impact fee program as well as any future taxes that will be used for the construction of the types of parks included in the impact fee program. Existing debt or future expenditures on the types of facilities not in the plans, such as those associated with preserves, district parks, golf courses or stadiums, are not included in the calculations; only relevant or eligible facilities such as neighborhood and community parks (land and improvements) are included in the analysis. Additional offsets are also not necessary for grants since grant funds are limited to available Federal or State funding, such as Community Development Block Grants, and the grant funding is not dedicated for growth-related improvements so those have not been included in the analysis either.

PPPI SALES TAX OFFSET. In 2008, City voters approved the Phoenix Parks and Preserve Initiative (PPPI), which continued a previous Parks 0.10 percent sales tax through 2039 for specific types of parks facilities. Revenues from the PPPI sales tax are allocated for park improvements, the acquisition of desert preserves and related purposes. Sixty percent of the revenues are to be used for traditional "flat land" parks and forty percent is to be used for desert and mountain preserves. Of those percentages, the City has committed up to ten percent of PPPI revenues to be used for operations and maintenance. As shown in the following table, the PPPI offset calculation is based on the total anticipated city-wide tax revenues for the period 2020 through the last authorized year 2039. The percentage of revenue that will go toward relevant park expenditures of 4.1% is assumed to remain constant at that rate and was calculated by dividing FY 2018/19 actual PPPI revenue by an estimate of average annual expenditures. The average annual expenditures estimate was estimated by combining actual expenditures for 2014 – 2018 and anticipated expenditures from the approved CIP for the period 2019 through 2023.

Table 5.10: PPPI Sales Tax Offset Calculation

City-Wide PPPI Sales Tax Revenue, 2018/19*	$32,517,000
Eligible Park Facility PPPI Sales Tax Expenditures, 2014-2023**	$1,338,604
Eligible Park Facility Percent of PPPI Sales Tax	4.1%
Projected PPPI Sales Tax Revenue, 2020-2039*	**$911,428,000**
Eligible Park Facility Share of PPPI Sales Tax (4.1%)	$37,520,102
Total Existing Citywide Park EDU, 2019	609,554
PPPI Sales Tax Offset per EDU	**$62**

* Actual and Projected Sales Tax Revenues, City of Phoenix, Budget and Research Department (Nov. 2018)
** Eligible Park Facility Expenditures, City of Phoenix, Parks and Recreation Department

SECONDARY PROPERTY TAX (DEBT) OFFSET. The Parks impact fees calculations also include an offset to reflect the share of growth-related parks that have been funded through bonds that will be repaid through the secondary property tax. In this update, the secondary property tax offset is based on the projected debt service for relevant park facilities and the existing city-wide Parks equivalent demand units. This approach avoids double payment issues and creates a uniform offset per EDU for all land uses. The following table shows the calculation of the Parks debt offset per EDU.

Table 5.11: Park Facility Debt Offset Calculation

Total Eligible Park Facility Costs*	$32,396,079
Total Eligible Park Facility Projected Debt Service*	$15,881,532
Total Citywide Park EDU, 2019	609,554
Debt Offset per EDU	**$26**

*Eligible Park Facility Costs and Projected Debt Service; City of Phoenix, Finance Department (Nov. 2019)

POTENTIAL NET IMPACT FEES, PARKS

POTENTIAL NET IMPACT FEE: The potential net fee per EDU is calculated by subtracting any offset amounts from the potential gross fee from Table 5.9. The parks offset amounts are under review however, it is anticipated that park offsets will decline sharply from the current sum amount of $1,055.

Table 5.12: Potential Net Park Impact Fee per EDU by Impact Fee Area

Impact Fee Area	Gross Park Impact Fee (per EDU)	PPPI Offset (per EDU)	Debt Offset (per EDU)	Potential Net Fee (per EDU)
Northwest	$1,456	$62	$26	**$1,368**
Northeast	$1,324	$62	$26	**$1,236**
Southwest	$1,329	$62	$26	**$1,241**
Ahwatukee	$1,313	$62	$26	**$1,225**

The potential net Park impact fee per development unit is calculated by multiplying the net fee per EDU from Table 5.10 by the EDU factor from Tables 2.1 and 2.3 for each land use category.

Table 5.13: Potential Net Park Impact Fee per Development Unit by Impact Fee Area

Impact Fee Area	Single Family (per unit)	Multifamily (per Unit)	Com / Ret (per 1k sf)	Office (per 1k sf)	Ind / WH (per 1K sf)	Pub / Inst (per 1K sf)
EDU Factor	*1.00*	*0.75*	*0.05*	*0.07*	*0.02*	*0.05*
Northwest	$1,368	$1,026	$68	$96	$27	$68
Northeast	$1,236	$927	$62	$87	$25	$62
Southwest	$1,241	$931	$62	$87	$25	$62
Ahwatukee	$1,225	$919	$61	$86	$25	$61

SUMMARY OF PLANNED IMPROVEMENTS AND COSTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that 100% of impact fee revenue will be used toward new projects that serve new development, and no funding will be used to repay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single family dwellings.
- That all of the future park facilities will be built within the ten-year planning period 2020-2029.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities that are eligible to be funded by the Parks impact fee collections, as calculated within this Chapter.

Table 5.14: Northwest Planned Improvements and Costs (Parks), 2020-2029

Planned Improvement	Quantity (acres)	Total Cost
Park Development*	28	$11,198,880
Deem Hills		
Insp Mnt Pkw & Molly Ln		
Stetson Hills		
*Undetermined Site***		
Land Acquisition (acres)**	8	$1,320,000
Subtotal		**$12,518,880**
Planned Net Impact Fee Revenue		$12,141,788
Anticipated Need for Alternative Funding		**$377,092**

*Impact fee funded park development will take place at one or more of the listed park sites. Funding for these sites has not been prioritized by the Parks Department.
**Impact fee funded land acquisition will take place within the impact fee area. A specific future park site has not been identified by the Parks Department.

Table 5.15: Northeast Planned Improvements and Costs (Parks), 2020-2029

Planned Improvement	Quantity (acres)	Total Cost
Park Development*	54	$21,597,840
24th St & Cave Creek Dam Rd		
Deer Valley Rd & Tatum Blvd		
Desert Broom		
Lone Mountain		
Black Mountain		
John W. Teets		
Desert Ridge SB-1 (west)		
Subtotal		**$21,597,840**
Planned Net Impact Fee Revenue		$20,157,924
Anticipated Need for Alternative Funding		**$1,439,916**

*Impact fee funded park development will take place at one or more of the listed park sites. Funding for these sites has not been prioritized by the Parks Department.
** Impact fee funded "locally benefitting recreational facilities" may be constructed within Regional Parks. Funding for these facilities has not been determined by the Parks Department.

Table 5.16: Southwest Planned Improvements and Costs (Parks), 2020-2029

Planned Improvement	Quantity (acres)	Total Cost
Park Development*	71	$28,397,160
59th Ave & Olney Ave		
100th Ave & Jones Ave		
103rd Ave Country Place		
47th Ave & Alta Vista Rd		
55th Ave & Dobbins Rd		
71st Av and Meadows Lp		
83rd Ave & Elwood St		
87th Av & Lwr Buckeye Rd		
89th Drive & Illini St		
Gary Road East of 27th Ave		
Subtotal		**$28,397,160**
Planned Net Impact Fee Revenue		$26,520,170
Anticipated Need for Alternative Funding		**$1,876,990**

*Impact fee funded park development will take place at one or more of the listed park sites. Funding for these sites has not been prioritized by the Parks Department.
** Impact fee funded "locally benefitting recreational facilities" may be constructed within Regional Parks. Funding for these facilities has not been determined by the Parks Department.

Table 5.17: Ahwatukee Planned Improvements and Costs (Parks), 2020-2029

Planned Improvement	Quantity	Total Cost
Park Development*	6	$2,399,760
Desert Foothills		
17th Ave and Liberty Lane		
Subtotal		**$2,399,760**
Planned Net Impact Fee Revenue		$2,239,300
Anticipated Need for Alternative Funding		**$160,460**

*Impact fee funded park development will take place at one or more of the listed park sites. Funding for these sites has not been prioritized by the Parks Department.
** Impact fee funded "locally benefitting recreational facilities" may be constructed within Regional Parks. Funding for these facilities has not been determined by the Parks Department.

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CHAPTER 6: LIBRARIES INFRASTRUCTURE IMPROVEMENTS PLAN

The City of Phoenix charges a Libraries Development Impact Fee (DIF) to help provide new branch libraries. The Libraries DIF is based on the estimated cost of providing library services that are eligible under Arizona impact fee rules within the designated impact fee areas.

LIBRARIES IMPACT FEE BACKGROUND: In 2012, the Arizona legislature adopted new limits on the types of library improvements that are eligible to be funded with impact fees. Under Arizona law, Library DIF are limited to "library facilities of up to ten thousand square feet that provide a direct benefit to development". Since branch libraries are the smallest category in Phoenix's library system, and since the current standard for branch libraries exceeds 10,000 square feet in size, the rule has been interpreted to allow inclusion of a cost equivalent to a 10,000 square foot branch library facility. The values used to calculate the "eligible" share of library costs are presented later in this IIP. Library facilities that are explicitly ineligible per Arizona law include: equipment, vehicles or appurtenances.

The 2015 Library IIP does not provide for a fee in the Northwest and Ahwatukee impact fee areas. This IIP proposes reestablishing the Libraries impact fee for those two areas, in addition to the Northeast and Southwest areas where Libraries impact fees are currently assessed.

LIBRARIES DEVELOPMENT IMPACT FEE METHODOLOGY: The proposed Libraries DIF is calculated using an Incremental-Cost Method; which is a forward-looking approach that assumes the branch library system will be expanded to achieve a specific Level of Service (LOS). This update recommends a LOS based on the citywide park service area, rather than calculating a unique LOS for each impact fee area. Using a consistent citywide LOS for all impact fee areas reduces the potential for long-term inequities in park services across the impact fee areas. The incremental-cost method is suitable for the libraries category because the provision of facilities depends largely on the functional population being served in any given area. Location-specific factors like topography, man-made networks (roads, canals, barriers, etc.) and property ownership (especially preserves) have less of an effect on libraries than some other infrastructure categories like arterial streets, water and wastewater networks.

This update recommends a slight variation to the typical *incremental-cost* approach to help maximize existing resources. Specifically, this update recommends including an adjustment to the calculated demand for library land by carrying-forward land previously acquired for future libraries.

The steps to calculate the Libraries impact fee can be summarized as follows:

- **Project expected new development** in each impact fee area (see Chapter 1: Land Use Assumptions).

- **Analyze the current level of service** being provided for qualifying capital facilities.

- **Determine the ten-year demand** for additional branch libraries for each impact fee area (see Chapter 2: Equivalent Demand Units) based on the current level of service.

- **Estimate the cost** to acquire land and construct new branch libraries needed to meet the ten-year demand.

- **Calculate the gross Parks impact fee per EDU** by dividing the estimated "plan" cost by the equivalent demand units projected over the ten-year period for each impact fee area.

- **Investigate possible Alternative Revenue Offsets**, and if alternative funding sources are identified, offsets must be quantified to ensure new development is not charged twice for the same improvements. However, Arizona impact fee rules that limit development impact fee contributions toward library facilities dictate that significant funding from alternative revenue sources will be needed to construct future libraries. As such, an alternative revenue offset is not provided for the Libraries impact fee because the funding deficiency is so great that any alternative funding available will be used to address that deficiency.

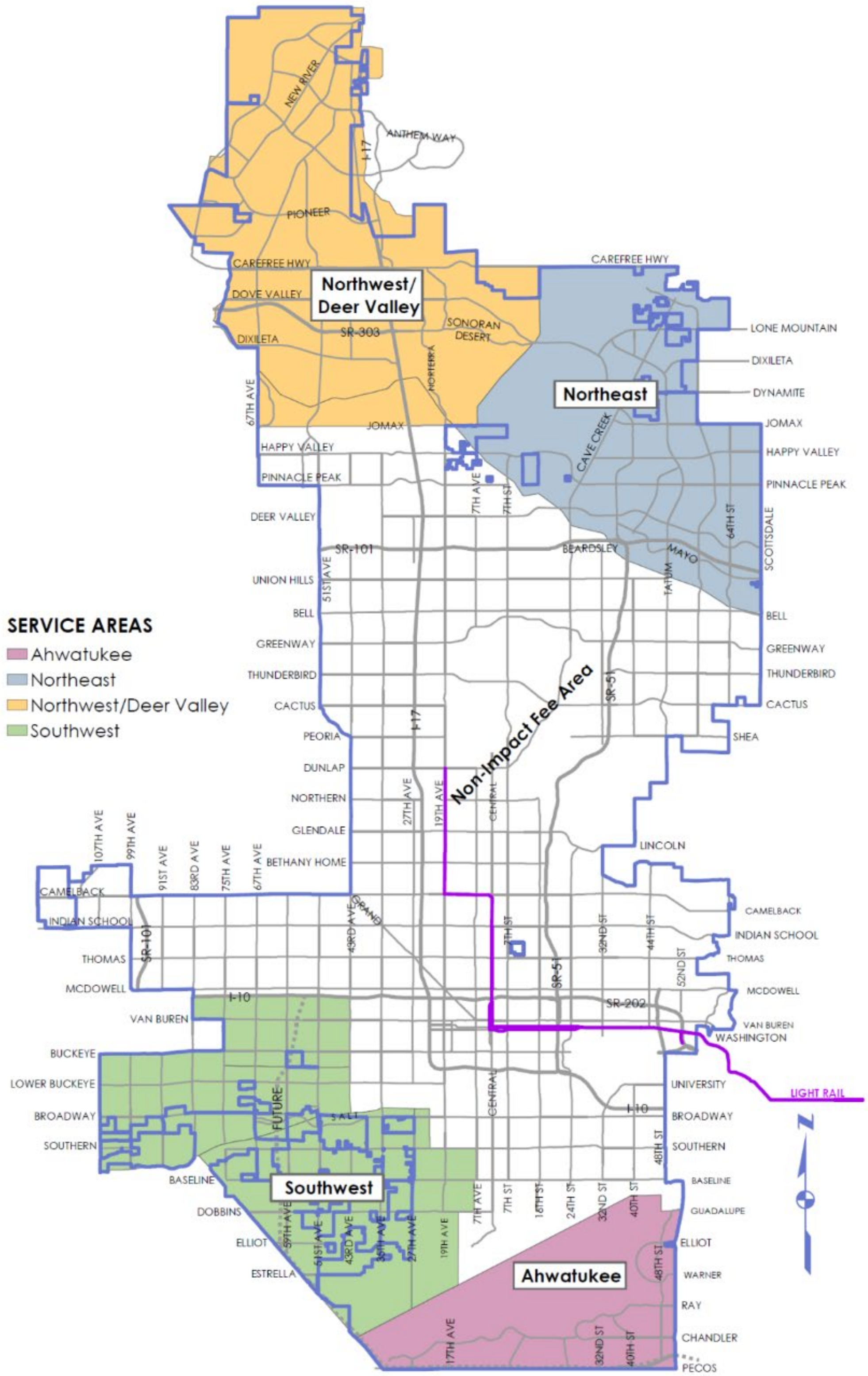
- **Calculate the Libraries Net Impact Fee per EDU** in impact fee areas by subtracting any offset amounts from the gross impact fee per EDU.

- **Calculate the Libraries Net Impact Fee schedule for each type of land use** by multiplying the Net Libraries impact fee per EDU in each impact fee area by the EDU factor from Chapter 2: Equivalent Demand Units.

LIBRARIES IMPACT FEE AREAS

Construction costs for new branch library facilities are generally consistent irrespective of where the library is located within the City. However, since the cost to acquire land for future libraries can vary significantly across the City, it is necessary to have multiple Libraries impact fees areas to help account for this potential variability in cost. The Libraries impact fee is charged in four distinct areas: two in the City's northern growth area and two in the southern growth area. The Libraries Impact Fee Areas are named in the following manner:

- Northwest (Northwest and Deer Valley)
- Northeast
- Southwest (Estrella N., Estrella S., Laveen W., Laveen E.)
- Ahwatukee


SERVICE AREAS
Ahwatukee
Northeast
Northwest/Deer Valley
Southwest
Northwest/
Deer Valley
Northeast
Non-Impact Fee Area
Southwest
Ahwatukee
LIGHT RAIL

LEVEL OF SERVICE, LIBRARIES

INVENTORY OF EXISTING LIBRARIES: The following table lists City's existing libraries that are used to calculate the existing Library Level of Service. The inventory of land for future libraries is incorporated in the fee calculation methodology as an adjustment as explained in the section describing ten-year library demand.

Table 6.1: Inventory of Existing Libraries

Library	Address	Service Area	Facility (sq ft)	Land (acres)
Ironwood Library	4333 E Chandler Blvd	Ahwatukee	16,300	2.10
West Ahwatukee Branch Library	19th Ave & Chandler Blvd	Ahwatukee		3.00
Desert Broom Library	29710 N Cave Creek Rd	Northeast	15,000	3.00
Future Branch Library	56th St & Deer Valley Dr	Northeast		3.00
Agave Library*	23550 N 36th Ave	Northwest	25,000	3.84
Future Branch Library	Sonoran Blvd. west of Paloma Prkwy	Northwest		3.00
Cesar Chavez Library	3635 W Baseline Rd	Southwest	25,000	3.63
Estrella Branch Library	NEC of 67th Ave & Lower Buckeye Rd	Southwest		3.00
Future Branch Library	NEC of 99th Ave & Lower Buckeye	Southwest		3.00
Acacia Library	750 E Townley Ave		6,600	1.42
Century Library	1750 E Highland Ave		6,500	1.52
Cholla Library	10050 N Metro Parkway		30,000	0.69
Desert Sage Library	7602 W Encanto Blvd		13,400	2.30
Harmon Library	411 W Yavapai St		12,400	1.40
Juniper Library	1825 W Union Hills Drive		14,435	1.43
Mesquite Library	4525 E Paradise Village Parkway		19,875	1.90
Ocotillo Library	102 W Southern Ave		6,600	1.35
Palo Verde Library	4402 N 51st Ave		16,000	1.40
Saguaro Library	2808 N 46th St		10,500	2.00
South Mountain Community Library**	7050 S 24th St		51,600	3.00
Yucca Library	5648 N 15th Ave		10,000	1.00
Totals			**279,210**	**47.0**
Average			**17,451**	**2.0**

LIBRARY LEVEL OF SERVICE (LOS) CALCULATION: It is necessary to calculate the Library LOS to determine the ten-year demand. A LOS of 458 square feet per 1,000 EDU is calculated using 2019 citywide total library square footage from Table 6.1 and citywide library equivalent demand units from Table 2.6.

Table 6.2: Library Level of Service

Branch Library Capacity (Sq Ft)	2019 EDU	Existing LOS (Sq Ft per 1,000 EDU)
279,210	609,554	458

LIBRARY TEN-YEAR DEMAND, 2020-2029

DEMAND FOR NEW BRANCH LIBRARIES: The 2020-2029 demand for branch libraries is calculated by multiplying the 2020-2029 projected EDU from Table 2.8 with the Libraries LOS from Table 6.2. The following table provides the values used to calculate the ten-year demand for new branch libraries for each Libraries impact fee area.

Table 6.3: Ten-Year Libraries Demand, 2020-2029

Impact Fee Area	2020-29 EDU	LOS (Sq Ft per 1,000 EDU)	2020-29 Demand (Sq Ft)
Northwest	8,599	458	3,938
Northeast	16,309	458	7,470
Southwest	21,370	458	9,787
Ahwatukee	1,828	458	837

UNIT COST ANALYSIS, LIBRARIES

The Libraries DIF is comprised of two cost components: 1) the cost to construct new branch libraries, and 2) the cost to acquire land for future libraries. The Libraries DIF does not include costs for library equipment, vehicles, or appurtenances, since these items are specifically prohibited by A.R.S. 9-463.05, Section T. 7(d).

LIBRARY CONSTRUCTION COSTS: For this analysis, cost estimates for development of a branch library were developed from the actual construction costs for the Agave Branch Library, completed in October, 2008. To adjust for cost inflation, construction costs were updated with the Engineering News Record 20-City Building Cost Indices (ENR BCI), for the period October 2008 to April 2019. The following table provides the cost elements and estimated cost per square foot for new libraries.

Table 6.4: Library Construction Cost per Square Foot

Cost Element	Unit Cost
Design/Engineering/Permits	$758,854
Construction	$7,243,044
Total Construction Cost	**$8,001,898**
x ENR BCI (Apr 2019/Oct 2008)	1.26
Adjusted Cost per Facility	**$10,082,391**
÷ Square Feet	25,000
Cost per Square foot	**$403**

Note: Design and construction costs for Agave Library completed in 2008.

LIBRARY LAND COSTS: The following table lists the estimated land acquisition costs for Libraries from Brekan-Nava Group, *Land Cost Analysis for the Northern Development Impact Fee Areas* (October 23, 2018) and *Land Cost Analysis for the Southern Development Impact Fee Areas* (October 26, 2018). The Library Department has land available to meet the ten-year demand for new library facilities. There are no land costs recommended with this impact.

Table 6.5: Land Acquisition Cost by Libraries Impact Fee Area

Impact Fee Area	Land Unit Cost Estimate (per acre)[1]	Cost (acre)
Northwest	$260,000 - $480,000	$370,000
Northeast	$650,000	$650,000
Southwest	$260,000	$260,000
Ahwatukee	$650,000	$650,000

TEN-YEAR (2020-2029) PLAN COST, LIBRARIES

The Libraries DIF ten-year "plan" cost for the period from 2020 – 2029 is calculated by multiplying the additional library square footage needed to meet projected demands in each impact fee area (see Table 6.3), by the estimated construction cost per square foot provided in Table 6.4. The Library Department has adequate land available to meet new demand over the ten-year period in the four Libraries impact fee areas. As such, **there is no land cost for libraries included in this IIP for any impact fee area**. The land sites previously obtained by the City for future libraries are included in the library inventory provided in Table 6.1.

The following table provides the values used to calculate the total ten-year "plan" cost for each Libraries impact fee area.

Table 6.6: Total Library Plan Cost by Impact Fee Area

Impact Fee Area	Planned Expansion (Sq Ft)	Unit Cost ($/sq ft)	Library Expansion Cost
Northwest	3,938	$403	$1,587,014
Northeast	7,470	$403	$3,010,410
Southwest	9,787	$403	$3,944,161
Ahwatukee	837	$403	$337,311

ADJUSTMENT FOR 10,000 SQUARE FOOT RULE: A.R.S. 9-643.05 limits library impact fees to "facilities up to ten thousand square feet that provided a direct benefit to development". Since the average Phoenix branch library is 17,451 sq ft (see Table 6.1), an adjustment factor is incorporated in the fee calculation to make sure new development's contribution toward future branch library facilities does not exceed this requirement. This rule and the associated adjustment means that significant City funding from non-impact fee sources will be needed to construct future libraries that serve new development. As such, an alternative revenue offset likely is not required for the Libraries DIF, though a review of outstanding library debt is underway to confirm this assumption. The following table provides the values used to calculate and adjustment factor that pro-rates the Libraries DIF plan cost to the equivalent of 10,000 sq ft library facilities.

Table 6.7: Library Adjustment Factor for 10,000 Sq Ft Rule

Avg. Branch Library (Sq Ft)	Impact Fee Eligible (Sq Ft)	Impact Fee Eligible Adj. Factor
17,451	10,000	0.57

ELIGIBLE LIBRARY PLAN COST, 2020-2029: The total library plan cost is reduced to obtain the eligible library plan cost by multiplying the Library Expansion Cost for each impact fee area from Table 6.6 by the adjustment factor from Table 6.7.

Table 6.8: Eligible Library Plan Cost, 2020-2029 by Impact Fee Area

Impact Fee Areas	Library Plan Cost	Impact Fee Eligible Adj. Factor	Eligible Library Plan Cost
Northwest	$1,587,014	0.57	$904,598
Northeast	$3,010,410	0.57	$1,715,934
Southwest	$3,944,161	0.57	$2,248,172
Ahwatukee	$337,311	0.57	$192,267

POTENTIAL GROSS IMPACT FEE PER EDU, LIBRARIES

POTENTIAL GROSS IMPACT FEE: The potential Gross Libraries DIF per EDU for each fee area is calculated by dividing eligible ten-year plan costs from Table 6.8 by the ten-year projected Library EDU from Table 2.8. The following table provides the values used to calculate Gross Library DIF per EDU for each fee area.

Table 6.9: Potential Gross Library Impact Fee per EDU

Impact Fee Areas	Eligible Library Plan Cost	2020-29 EDU	Proposed Gross Library Fee (per EDU)
Northwest	$904,598	8,599	$105
Northeast	$1,715,934	16,309	$105
Southwest	$2,248,172	21,370	$105
Ahwatukee	$192,267	1,828	$105

ALTERNATIVE REVENUE OFFSET, LIBRARIES

Alternative revenue offsets are not provided for the library fee because State Law limits the proportion of library facilities that can be funded with impact fees, leaving a large funding deficiency that must be made up by other sources; as a result, there is no 'offset' because all funding from sources like bonds paid by secondary property tax will already be allocated. The total cost of providing library facilities to new development was estimated to be $185 an EDU, while restrictions imposed by State Law limit the impact fee to $105 per EDU, effectively creating a deficiency of $80 per EDU (43%). A potential secondary property tax offset of $53 per EDU was calculated, indicating that alternative City funding is significantly less than the funding deficiency. There is therefore no 'double payment' occurring, because the total amounts collected from new development from all sources do not meet the needs calculated through the incremental method, and no offset is provided.

POTENTIAL NET IMPACT FEES, LIBRARIES

POTENTIAL NET IMPACT FEE: The potential net fee per EDU is calculated by subtracting any offset amounts from the potential gross fee from Table 6.9. The offset amounts are tentatively shown as $0 per EDU, pending the results of on-going evaluation of possible offset amounts. If it is determined that an offset is required, the net fee per EDU would be reduced in an amount equal to the offset.

Table 6.10: Potential Net Libraries DIF per EDU by Impact Fee Area

Impact Fee Areas	Proposed Gross Library Fee (per EDU)	Offset[1] (per EDU)	Potential Net Library Fee (per EDU)
Northwest	$105	$0	*$105*
Northeast	$105	$0	*$105*
Southwest	$105	$0	*$105*
Ahwatukee	$105	$0	*$105*

The potential net Libraries DIF per development unit is calculated by multiplying the net fee per EDU from Table 6.10 by the EDU factor from Tables 2.1 and 2.3 for each land use category.

Table 6.11: Potential Net Libraries DIF per Development Unit by Impact Fee Area

Impact Fee Area	Single Family (per unit)	Multifamily (per Unit)	Com / Ret (per 1000 sf)	Office (per 1000 sf)	Ind / WH (per 1000 sf)	Pub / Inst (per 1000 sf)
EDU Factor	*1.00*	*0.75*	*0.05*	*0.07*	*0.02*	*0.05*
Northwest	$105	$79	$5	$7	$2	$5
Northeast	$105	$79	$5	$7	$2	$5
Southwest	$105	$79	$5	$7	$2	$5
Ahwatukee	$105	$79	$5	$7	$2	$5

SUMMARY OF PLANNED IMPROVEMENTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that 100% of impact fee revenue will be used toward new projects that serve new development, and no funding will be used to repay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single family dwellings.
- That all of the future library facilities will be built within the ten-year planning period 2020-2029.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities that are eligible to be funded by the Library impact fee collections, as calculated within this Chapter.

Table 6.12: Northwest Impact Fee Area (Libraries), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity (Sq Ft)	Total Cost
Share of Future Branch Library	3,938	$1,587,014
Sonoran Blvd. west of Paloma Pkwy		
Subtotal		**$1,587,014**
Planned Net Impact Fee Revenue		$902,895
Anticipated Need for Alternative Funding		**$684,119**

Table 6.13: Northeast Impact Fee Area (Libraries), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity (Sq Ft)	Total Cost
Share of Future Branch Library	7,470	$3,010,410
56th St & Deer Valley Dr		
Subtotal		**$3,010,410**
Planned Net Impact Fee Revenue		$1,712,445
Anticipated Need for Alternative Funding		**$1,297,965**

Table 6.14: Southwest Impact Fee Area (Libraries), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity (Sq Ft)	Total Cost
Share of Future Branch Library	9,787	$3,944,161
NEC of 67th Ave & Lower Buckeye Rd		
NEC of 99th Ave & Lower Buckeye Rd		
Subtotal		**$3,944,161**
Planned Net Impact Fee Revenue		$2,243,850
Anticipated Need for Alternative Funding		**$1,700,311**

Table 6.15: Ahwatukee Impact Fee Area (Libraries), Planned Improvements and Costs, 2020-2029

Planned Improvement	Quantity (Sq Ft)	Total Cost
Share of Future Branch Library	837	$337,311
19th Ave & Chandler Blvd		
Subtotal		**$337,311**
Planned Net Impact Fee Revenue		$191,940
Anticipated Need for Alternative Funding		**$145,371**

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CHAPTER 7: MAJOR ARTERIALS INFRASTRUCTURE IMPROVEMENTS PLAN

The City of Phoenix charges a Major Arterials impact fee in to cover the cost of capacity-expanding major arterial roadways and associated bridges, culverts and storm drains in the growth areas of the City.

GENERAL MAJOR ARTERIALS IMPACT FEE METHODOLOGY

The Major Arterials impact fee was first adopted with the 2015 Infrastructure Financing Plan. The City's impact fee for street facilities has evolved from Major Streets and Bridges impact fees that initially included construction and right-of-way acquisition for all arterial streets in the City's growth areas but was later revised extensively. In 2009, the Major Streets and Bridges impact fee was replaced with the Roadway Facilities impact fees that provided for construction of arterial-street drainage facilities (storm drains, culverts and bridges), but did not provide for roadway expansions or right-of-way acquisition for arterial streets needed to accommodate new demands.

The most recent 2015 revision added a limited number of major arterial roadways, as identified on the City-Council adopted Street Classification Map, into the Major Arterial impact fee. These are the largest and most important of the arterial streets in the City's growth areas. This concept is based on the Water and Wastewater impact fee models where only the largest types of backbone infrastructure that expands capacity for the entire impact fee area are included in the program. Other improvements that may be required of a developer by ordinance (minor arterials, major and minor collectors) are excluded. Because of the nature of the impact fee program, as specified by the state statute, a future time horizon of ten years is used for future construction so only a limited number of major arterials are included in the inventory of future facilities.

Major arterial street construction included in this IIP is limited to certain types of improvements that increase the capacity, safety, and efficiency of the major arterial street network. Grading, paving, and median construction (where designated) are included, plus bridges, culverts and drainage facilities that are required to evacuate storm water from the street itself. Right-of-way acquisition is not included under the assumption that most right-of-way will be dedicated directly by adjacent private development or in conjunction with an Arizona State Land Department property disposition. Any remaining right-of-way not obtained through these means will need to be purchased with other funds. Required improvements along a development's frontage such as: perimeter curb and gutter, perimeter landscaping, sidewalks, street lights, and traffic signals are also not included in the Major Arterial impact fee.

The general methodology and process can be summarized as follows:

- **Determine the value of the existing major arterial network**; including culverts and bridges for each impact fee area.

- **Estimate the cost of new major arterial roadways, culverts and bridges** needed to service land that is projected to develop during the ten-year planning horizon (2020-29) for each impact fee area.

- **Estimate pass-through traffic demand for each impact fee area**. Pass-through traffic is measured as the percentage of vehicle trips on the major arterial network inside an impact fee area that do not begin (origin) or end (destination) inside the same impact fee area. Roadway capacity needed to serve pass-through traffic is not the responsibility of new development, and an adjustment is provided in the cost calculation to deduct for pass-through traffic.

- **Adjust for any "excess" capacity included in the IIP.** To make sure new development over the next ten-year period is not contributing a disproportionate share of the major arterial road network cost, a capacity adjustment may be necessary in the cost calculation. Excess capacity is determined from the ratio of the ten-year projected growth (EDUs) relative to buildout, and the major arterial capacity included in this IIP relative to ultimate major arterial capacity at buildout. If the ratio is less than one (1), the additional capacity included in the IIP exceeds the proportionate growth in EDUs.

- **Utilize a hybrid "Buy-in" plus "10-Year Plan" gross fee calculation.** A two-component fee calculation methodology is employed to fulfill the requirements of Arizona impact fee rules. It is a combination of the "buy-in" method to account for the existing roadway network and a "plan" -based approach to provide new facilities needed over a ten-year planning horizon. The estimated value of the existing network and the estimated cost of new facilities are adjusted for pass-through traffic and service level equity for each impact fee area. The resulting combination "buy-in" and "plan" costs are then divided by the total number of existing and future EDUs projected within each impact fee area as of 2029 (i.e. at the end of the planning period) to obtain the gross fee per EDU.

- **Determine any Alternative Revenue Offsets (ARO).** The City must ensure that new development (new residents and businesses) are not charged twice for the same obligation to construct new infrastructure. There are two sources of potential offsets for the Major Arterial impact fee. First, funding sources used to repay debt incurred for growth-related street projects, and second, non-impact fee funding sources that are expected to help pay for future growth-related street projects. Since the "plan" cost is already being reduced for pass-through traffic, and the "pass-through" share of the cost will need to be made up with City funds, any offsets would only be for the portion of alternative revenue used for growth-related projects that exceeds the City's contribution to cover the pass-through percentage.

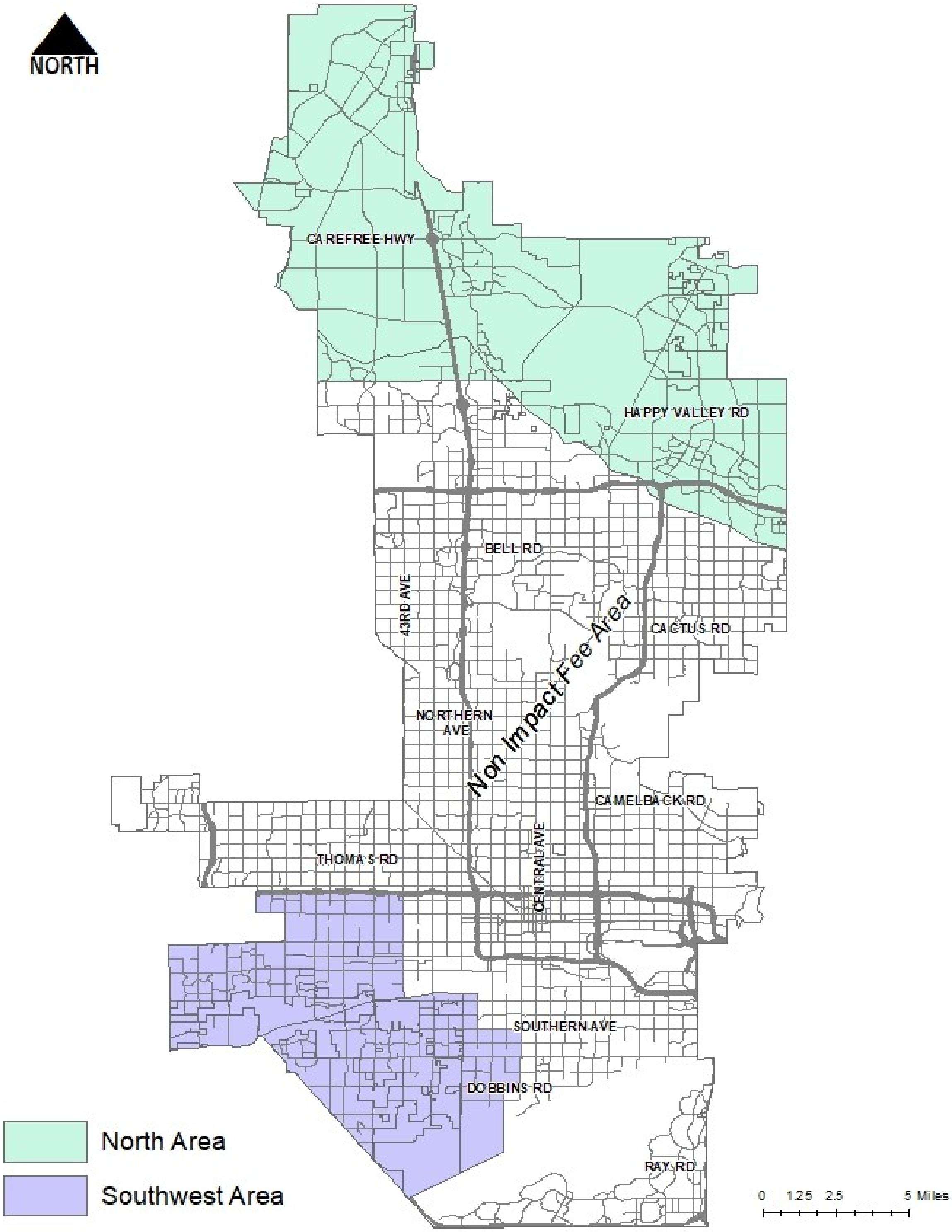
- **Calculate a net fee.** A net fee should be calculated by subtracting the offset amount from the gross fee.

MAJOR ARTERIALS IMPACT FEE AREAS

The 2015 Infrastructure Financing Plan included three Major Arterial impact fee areas: two in the north part of the City and one in the southwest. With this update, it is proposed to combine the two fee areas in the north part of the City to make one 'Northern' fee area. Combining the two fee areas is consistent with the previously adopted policy to only include facilities that provide a regional benefit. There is also precedent for a large northern area that was established through the water and wastewater impact fees. Combining the north areas also makes it easier to allocate costs for the east/west major arterials that cross the City. The recommended Major Arterial impact fee areas are as follows:

- Northern (Northwest, Deer Valley, and Northeast)
- Southwest (Estrella N., Estrella S., Laveen W., Laveen E.)

Figure 7.1: Major Arterial Impact Fee Areas



LEVEL OF SERVICE AND TEN-YEAR DEMAND FOR CAPACITY

For the Major Arterials impact fee, there is potential confusion between the level of service as discussed in terms of A.R.S. 9-463.05, which requires a level of service analysis for each necessary public service for which an impact fee is charged, and the transportation level of service term that is typically used as a measure of traffic flow on a scale of A through F. In this chapter, unless otherwise specified, references to service levels are associated with the former.

The primary intent of the Major Arterials impact fee methodology is to ensure new development contributes a proportionate share of the cost for the ultimate major arterial network. One way to test the recommended IIP against this objective is by comparing the ten-year projected new development (EDUs) with the ten-year planned new capacity (vehicles-miles), included in the IIP. This is done by determining projected EDUs and vehicle-miles as a percent of buildout EDUs and ultimate vehicle miles. If the ratio of these percentages equals one, then the ten-year development cycle would contribute its proportionate share of the ultimate major arterial network under the recommended IIP. If the ratio is less than one, meaning the percent of vehicles-miles included in the IIP exceeds the percent of EDUs, then a downward adjustment to the "plan" cost is warranted. Alternatively, improvements could be removed from the IIP to lower the amount of new capacity planned for the ten-year period. There is no adjustment provided, if the ratio is greater than one, because Arizona impact fee rules only allow a ten-year IIP for street-related impact fees. However, it may be justifiable to include additional improvements in the IIP that would add capacity.

The following tables provide the values used to calculate "excess capacity" and determine whether an adjustment is necessary. In the Northern Area the ten-year projected EDU as a percent of buildout EDU is 12.6%, and the ten-year planned capacity as a percent of ultimate capacity is 12.8%, indicating the proportion of ultimate facilities that will be built from 2020-29 is fractionally greater than the proportion of ultimate EDUs that will be developed. The **ratio of these two values of 0.99 is less than one**, so an adjustment is provided in the Northern Area fee calculation.

Table 7.2: Northern Area Capacity Adjustment Calculation

Northern Area	Capacity (veh-miles)	Capacity (% of Ult.)	EDU	EDU (% of BldOut)	Excess Capacity
Existing (2019) Major Arterial Roadways	1,657,815	23.9%	50,137	20.1%	0.84
10-Year IIP (2020-2029) Major Arterial Roadways	887,933	12.8%	31,514	12.6%	0.99
Ultimate Major Arterial Roadways	6,933,386	100.0%	249,682	100.0%	1.00

Capacity (veh-miles) is from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study*, May 16, 2019. EDU is from Tables 2.10, 2.11 and 2.13.

In the Southwest Area the ten-year projected EDU as a percent of buildout EDU is 27.1%. The ten-year planned capacity as a percent of ultimate capacity is 25.9%. The **ratio of these two values of 1.04 exceeds one (1)**, so no adjustment is provided in the Southwest Area fee calculation.

Table 7.3: Southwest Area Capacity Adjustment Calculation

Southwest Area	Capacity (veh-miles)	Capacity (% of Ult.)	EDU	EDU (% of BldOut)	Excess Capacity
Existing (2019) Major Arterial Roadways	1,121,959	70.9%	71,975	58.5%	0.83
10-Year IIP (2020-2029) Major Arterial Roadways	410,439	25.9%	33,312	27.1%	1.04
Ultimate Major Arterial Roadways	1,582,228	100.0%	123,010	100.0%	1.00

Capacity (veh-miles) is from Kimley-Horn and Associates, Memorandum: I*nfrastructure Financing Plan Update – Transportation Study*, May 16, 2019. EDU is from Tables 2.10, 2.11 and 2.13.

ESTIMATED MAJOR ARTERIAL UNIT COSTS - ROADWAYS AND DRAINAGE FACILITIES

ESTIMATED UNIT COSTS FOR MAJOR ARTERIAL ROADWAYS: The road construction component of the Major Arterial impact fee is limited to costs that provide additional vehicle capacity to the major arterial network. Common costs associated with roadway projects that are not included in the major arterial impact fee include, but are not limited to: **street lighting, signals, sidewalks, outside curb and gutter, frontage landscaping, right-of-way acquisition**. A detailed breakdown of road construction costs is available in the Kimley-Horn Memorandum, *2019 Impact Fee Update Approach*, dated April 19, 2019.

Table 7.4: Major Arterial Road Construction Unit Costs

Cross Section (XSEC) Type			
Lane Configuration	Standard City Cross Section	Capacity (veh/day)	Roadway Construction Cost (per mile)
6LD	A	55,000	$3,947,094
6LD	B	55,000	$3,667,281
4LU+	C	34,833	$3,076,813
4LD	CM	34,833	$3,004,840
4LU+	D	34,833	$2,745,591

Kimley-Horn and Associates Memorandum, *2019 Impact Fee Update Approach*, April 19, 2019.

ESTIMATED UNIT COSTS FOR MAJOR ARTERIAL DRAINAGE FACILITIES: The drainage facilities cost component of the Major Arterial impact fee is limited to bridges, culverts and storm drains associated with the major arterial road network. Costs shown below include soft costs such as design, construction management, mobilization, City administration, and permits. A detailed breakdown of road construction costs is available in the Kimley-Horn Memorandum, *Cost Estimation of I-Girder Bridges, Deck Slab Bridges, and Single Barrel Reinforced Concrete Box Culverts*, dated June 27, 2018.

Table 7.5: Drainage Facility Unit Cost Estimates

• BRIDGES	$151 PER SQUARE FOOT
• BOX CULVERTS	$25 PER CUBIC FOOT
• PIPE CULVERTS	VARIABLE BY SIZE
• STORM DRAINS	VARIABLE BY SIZE

MAJOR ARTERIAL NETWORK - EXISTING VALUE & 10-YEAR PLANNED COST

The Major Arterial Impact Fee is calculated using a hybrid: 'buy-in' plus ten-year plan' method. This section describes how the value of the existing major arterials network was calculated, how planned improvements were selected for the ten-year period from 2020-2029, and how the estimated cost of those improvements has been determined.

EVALUATION OF THE MAJOR ARTERIAL NETWORK: Kimley-Horn developed an inventory and analyzed existing and planned major arterial streets from the City's adopted Street Classification Map within each impact fee area (Kimley-Horn and Associates, *Infrastructure Financing Plan Update – Transportation Study*, May 16, 2019). The following information was collected and analyzed for each subdivided segment of each major arterial street:

- Existing and ultimate roadway cross-section and segment length.
- Roadway capacity (vehicle-miles) for existing, planned (2020-2029), and ultimate.
- Percent 'physically' and 'functionally' complete.
- Estimated existing roadway value (based on unit costs presented later in this chapter)
- Estimated future roadway cost (based on unit costs presented later in this chapter)

PLEASE NOTE: MINOR DISCREPANCIES EXISTS BETWEEN THE NUMBERS CONTAINED IN THIS IIP AND THE NUMBERS IN THE KIMLEY-HORN STUDY FOR THE NORTHERN AREA. THE MINOR DISCREPENCIES ARE DUE TO A SEGMENT OF SONORAN DESERT DRIVE THAT WAS ADDED TO THE IIP AFTER COMPLETION OF THE KIMLEY-HORN REPORT. THE NET RESULT IS AN INCREASE OF $26 PER EDU TO $3,080 PER EDU.

ESTIMATED VALUE OF EXISTING MAJOR ARTERIAL IMPROVEMENTS, 'BUY-IN': The following tables provide the total estimated value of existing major arterial roadways and associated drainage facilities within the impact fee areas. The amounts displayed below are derived from the Major Arterial unit costs presented earlier in this chapter and the inventory of existing major arterial roadways and associated drainage facilities for each impact fee area prepared by Kimley-Horn. Detailed descriptions and estimated values for each individual improvement are available in the Kimley-Horn Study: *Infrastructure Financing Plan Update – Transportation Study*.

Table 7.6: Northern Impact Fee Area, Estimated Value of Existing Facilities

NORTHERN SERVICE AREA EXISTING	AMOUNT
Existing Major Arterial Roadway Value	$86,293,937
Existing Major Arterial Culvert Value	$15,162,407
Existing Major Arterial Bridge Value	$55,554,939
Total Value - Existing Major Arterial Network	$157,011,282

Estimated value of existing improvements is from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study,* May 16, 2019. Note: the discrepancy with the Kimley-Horn study is for a segment of Sonoran Desert Drive that was added to the plan after the study was completed.

Table 7.7: Southwest Impact Fee Area, Estimated Value of Existing Facilities

SOUTHWEST SERVICE AREA EXISTING	AMOUNT
Existing Major Arterial Roadway Value	$82,175,550
Existing Major Arterial Storm Drain Value	$73,458,664
Existing Major Arterial Bridge Value	$27,735,061
Total Value - Existing Major Arterial Network	$183,369,275

Estimated value of existing improvements is from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study*, May 16, 2019.

SELECTION OF MAJOR ARTERIAL ROADWAYS: The maps on the following pages provide a visual representation of the geographic distribution of development projections detailed in Chapter 1. These 'parcel sequencing' maps were used to help select the major arterial street segments in each impact fee area for inclusion in this IIP.

Orange shaded areas on the maps represent areas with 'active' development, or development that is expected to start developing prior to 2020. While these areas may have been building-out over several years, they have been determined to have some remaining capacity to absorb additional development units during the next ten-year planning period from 2020 to 2029, and these areas will contribute additional demand to the major arterial network. In general, the orange shaded parcels have access to the existing major arterial network, however the existing segments may not be constructed to ultimate capacity, in which case certain costs for major arterial improvements adjacent to orange shaded parcels may be included in this IIP.

Red shaded areas are expected to start developing during the ten-year period from 2020 to 2029. In many cases, the red parcels will require extensions to the major arterial network. In general, if it necessary to extend the major arterial network to provide access to a parcel that is anticipated to develop during the ten-year planning period, then these improvements have been included in this IIP.

The planned major arterial improvements included in this IIP are shown in blue. Any drainage facilities (bridges, culverts and storm drains) associated with these segments are also provided through the Major Arterial impact fee and included in this IIP. In some cases, the ultimate facility will be completed while in others only partial expansions of capacity may be identified by the blue lines. A detailed description of major arterial road segments and drainage facilities recommended for this IIP can be found in the Kimley-Horn report titled: *Infrastructure Financing Plan Update – Transportation Study*.

Figure 7.8: Northern Area Parcel Sequencing and Planned Roadway Improvements, 2020-2029

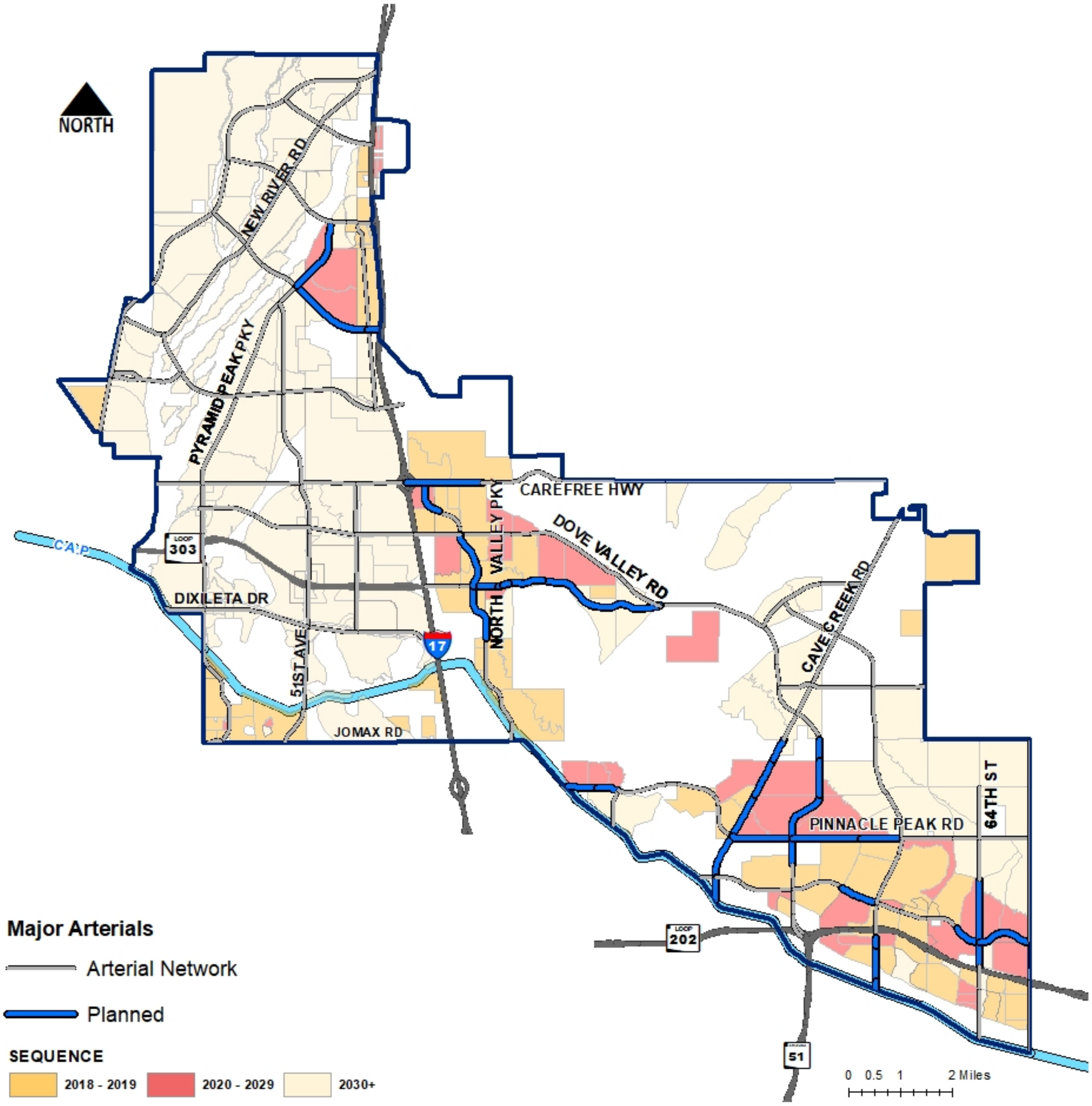
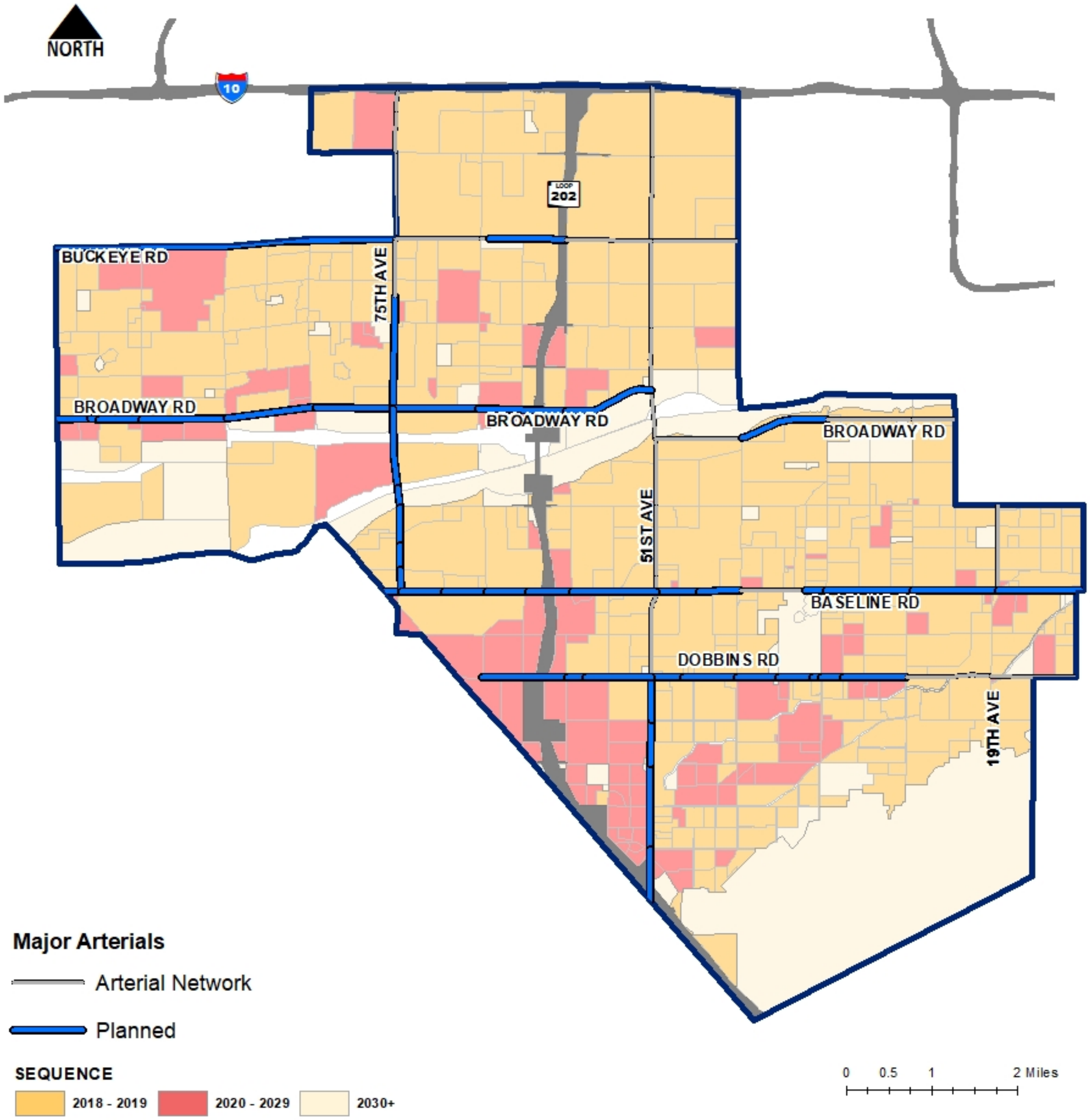


Figure 7.9: Southern Area Parcel Sequencing and Planned Roadway Improvements, 2020-2029



ESTIMATED COST OF PLANNED MAJOR ARTERIAL IMPROVEMENTS, 'TEN-YEAR PLAN': The following tables provide the total estimated cost of planned roadways, culverts, bridges and storm drains recommended for this ten-year IIP. The amounts displayed below are derived from the Major Arterial unit costs presented earlier in this chapter and the selected major arterial roadways and associated drainage facilities for each impact fee area. Detailed descriptions and cost estimates for each individual improvement are available in the Kimley-Horn Study: *Infrastructure Financing Plan Update – Transportation Study*.

Table 7.10: Northern Impact Fee Area, Estimated Cost of Planned Facilities, 2020-2029

NORTHERN SERVICE AREA 2020-2029 PLANNED	AMOUNT
2020-2029 Planned Major Arterial Roadway Cost	$70,208,888
2020-2029 Planned Major Arterial Culvert Cost	$33,141,739
2020-2029 Planned Major Arterial Bridge Cost	$94,021,182
Total Cost - 2020-2029 Planned Major Arterial Network	$197,371,808

Estimated cost of 10-year planned improvements is from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study,* May 16, 2019. Note: the discrepancy with the Kimley-Horn study is for a segment of Sonoran Desert Drive that was added to the plan after the study was completed.

Table 7.11: Southwest Impact Fee Area, Estimated Cost of Planned Facilities, 2020-2029

SOUTHWEST SERVICE AREA 2020-29 PLANNED	AMOUNT
2020-29 Planned Major Arterial Roadway Cost	$28,868,214
2020-29 Planned Major Arterial Storm Drain Cost	$19,903,834
2020-29 Planned Major Arterial Bridge Cost	$28,159,144
Total Cost - 2020-29 Planned Major Arterial Network	$76,931,193

Estimated cost of 10-year planned improvements is from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study*, May 16, 2019.

POTENTIAL GROSS IMPACT FEES PER EDU, MAJOR ARTERIALS

As described in the methodology section of this Chapter, the Major Arterial impact fee is based on a combined 'buy-in' plus 'ten-year plan' method. The 'buy-in' component is for the existing major arterial network, and the ten-year plan is for the improvements that are needed to meet the projected demand of new development over the ten-year period from 2020-2029. The methodology also involves two adjustment factors: one for pass-through traffic, and another for excess capacity. These elements of the fee calculation are described below.

PASS-THROUGH TRAFFIC ADJUSTMENT: New development is only responsible for the share of the costs attributable to traffic with an origin or destination inside the impact fee area. An adjustment is included in the fee calculation to account for "pass-through" traffic that puts a demand on the major arterial network, but the demand is not associated with development within the impact fee area. The pass-through traffic adjustment is calculated as 100% minus the pass-through percentage (i.e., the percentage of traffic in the service area with neither an origin or destination in the service area). Pass-through traffic percentages of 28% and 22% for the Northern and Southwest impact fee areas, respectively, were prepared by Kimley-Horn. A detailed description of how the pass-through percentages were determined is available in the Kimley-Horn and Associates, *StreetLight Origin-Destination Study*, April 26, 2019.

CAPACITY ADJUSTMENT: As described under the methodology and level of service sections, it may necessary to adjust the IIP for excess capacity. The Capacity Adjustment for the 2020-2029 period was calculated to be 0.99 and 1.04 for the Northern and Southwest impact fee areas, respectively. As a result, a 1% reduction is applied to total plan cost for the Northern Impact Fee Area. There is no adjustment applied to the plan cost for the Southwest Impact Fee Area.

Table 7.12: Potential Northern Area Gross Impact Fee Calculation

NORTHERN SERVICE AREA EXISTING	AMOUNT
Existing Major Arterial Roadway Value	$86,293,937
Existing Major Arterial Culvert Value	$15,162,407
Existing Major Arterial Bridge Value	$55,554,939
Total Value - Existing Major Arterial Network	$157,011,282
NORTHERN SERVICE AREA 2020-2029 PLANNED	**AMOUNT**
2020-2029 Planned Major Arterial Roadway Cost	$70,208,888
2020-2029 Planned Major Arterial Culvert Cost	$33,141,739
2020-2029 Planned Major Arterial Bridge Cost	$94,021,182
Total Cost - 2020-2029 Planned Major Arterial Network	$197,371,808
NORTHERN SERVICE AREA GROSS FEE CALCULATION	**AMOUNT**
Existing & 2020-2029 Planned Major Arterial Network Value	$354,383,090
Adjustment for Pass-Through Traffic	0.72
Major Arterial Network Value, Adjusted for Pass-Through Traffic	$255,155,825
Adjustment for 2029 Capacity	0.99
Major Arterial Network Value, Adjusted for Excess Capacity	$251,470,590
2029 Northern Area EDU	81,650
Northern Service Area Gross Fee per EDU	**$3,080**

Adjustment for Pass-Through Traffic is from Kimley-Horn and Associates, *StreetLight Origin-Destination Study*, April 26, 2019. Adjustment for 2029 Capacity is from Table 7.2. All cost estimates are from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study,* May 16, 2019. Note: the discrepancy with the Kimley-Horn study is for a segment of Sonoran Desert Drive that was added to the plan after the study was completed. 2029 Northern Area EDU from Table 2.12.

Table 7.13: Potential Southwest Area Gross Impact Fee Calculation

SOUTHWEST SERVICE AREA EXISTING	AMOUNT
Existing Major Arterial Roadway Value	$82,175,550
Existing Major Arterial Storm Drain Value	$73,458,664
Existing Major Arterial Bridge Value	$27,735,061
Total Value - Existing Major Arterial Network	$183,369,275
SOUTHWEST SERVICE AREA 2020-29 PLANNED	**AMOUNT**
2020-29 Planned Major Arterial Roadway Cost	$28,868,214
2020-29 Planned Major Arterial Storm Drain Cost	$19,903,834
2020-29 Planned Major Arterial Bridge Cost	$28,159,144
Total Cost - 2020-29 Planned Major Arterial Network	$76,931,193
SOUTHWEST SERVICE AREA GROSS FEE CALCULATION	**AMOUNT**
Existing & 2020-29 Planned Major Arterial Network Value	$260,300,467
Adjustment for Pass-Through Traffic	0.78
Major Arterial Network Value, Adjusted for Pass-Through Traffic	$203,034,365
Adjustment for 2029 Capacity	1.00
Major Arterial Network Value, Adjusted for Excess Capacity	$203,034,365
2029 Southwest Area EDU	105,287
Southwest Area Gross Fee per EDU	**$1,928**

Adjustment for Pass-Through Traffic is from Kimley-Horn and Associates, *StreetLight Origin-Destination Study*, April 26, 2019. Adjustment for 2029 Capacity is from Table 7.3 All cost estimates are from Kimley-Horn and Associates, Memorandum: *Infrastructure Financing Plan Update – Transportation Study,* May 16, 2019. 2029 Southwest Area EDU from Table 2.12.

ALTERNATIVE REVENUE OFFSETS, MAJOR ARTERIALS

Before determining an actual impact fee schedule, offsets must be taken into consideration, in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. There are two sources of potential offsets for the Major Arterial impact fee. First, funding sources used to repay debt incurred for growth-related street projects. Second, funding sources that are expected to help pay for future growth-related street projects. For example, the City also funds major arterial street improvement projects facilities through municipal bonds and AHUR (Arizona Highway User Revenue) tax revenue.

OFFSETS FOR DEBT REPAYMENT: To account for future revenue streams that will be used to pay principal and interest on outstanding debt associated with previous major arterial capacity expansions of the type included in the IIP (anywhere in the City), records of past projects and associated outstanding bonds were scrutinized to identify any ongoing debt service. Only a limited amount of relevant outstanding debt was found, and the per EDU amount was very small in comparison to the large obligations associated with the City's 'pass-through traffic' portion of costs that are removed from the gross impact fee calculation.

OFFSETS FOR FUTURE EXPENDITURES ON GROWTH-RELATED MAJOR ARTERIALS: To account for future revenue streams like Arizona Highway Users Revenue (AHUR) that will fund potentially fund future facilities, the Capital Improvement Plan was examined to identify future major-arterial expansions of the type included in the IFP (anywhere in the City) that would be funded through a means other than impact fees. Staff could find no capacity-adding, growth-related projects in the City's five-year CIP, and AHUR-funding is now devoted entirely to street rehabilitation and repair (particularly repaving), improvements related to pedestrian access, bike lanes and ADA requirements, and signage and signals. While some capacity-adding, growth-related projects over the next twenty years are likely, the per EDU amount would be dwarfed by the large future obligations associated with the City's 'pass-through traffic' portion of costs that are removed from the gross impact fee calculation.

POTENTIAL NET IMPACT FEES, MAJOR ARTERIALS

Table 7.14: Potential Major Arterial Net Impact Fee per Equivalent Demand Unit (EDU)

Impact Fee Areas	Gross Fee per EDU	Offset	Net Fee per EDU
Northern	$3,080	N/A	$3,080
Southwest	$1,928	N/A	$1,928

Table 7.15: Potential Major Arterial Net Impact Fee per Development Unit by Land Use Category

Land Use Category	Unit	EDU Factor	Northern	Southwest
Single Family	Dwelling	1.00	*$3,080*	*$1,928*
Multifamily	Dwelling	0.75	*$2,310*	*$1,446*
Com. / Retail	1,000 Sq Ft	1.22	*$3,758*	*$2,352*
Office	1,000 Sq Ft	0.55	*$1,694*	*$1,060*
Industrial	1,000 Sq Ft	0.32	*$986*	*$617*
Public / Institutional	1,000 Sq Ft	0.45	*$1,386*	*$868*
Mini-Warehouse	1,000 Sq Ft	0.09	*$277*	*$174*
Hotel (Lodging)	Room	0.35	*$1,078*	*$675*

EDU Factors are from Table 2.9.

SUMMARY OF PLANNED IMPROVEMENTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that 100% of impact fee revenue will be used toward new projects that serve new development, and no funding will be used to repay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single family dwellings.

- That all of the future improvements identified in this IIP will be built within the ten-year planning period 2020-2029.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities that are eligible to be funded by the Major Arterials impact fee collections, as calculated within this Chapter.

Table 7.16: Northern Impact Fee Area (Major Arterials), Planned Improvements and Costs, 2020-2029

Planned Improvement	Total Cost
Major Arterial Roadways	$70,208,888
Culverts	$33,141,739
Bridges	$94,021,182
Subtotal	**$197,371,809**
Planned Net Impact Fee Revenue	$97,063,120
Anticipated Need for Alternative Funding	**$100,308,689**

Table 7.17: Southwest Impact Fee Area (Major Arterials), Planned Improvements and Costs, 2020-2029

Planned Improvement	Total Cost
Major Arterial Roads	$28,868,214
Storm Drains	$19,903,834
Bridges	$28,159,144
Subtotal	**$76,931,193**
Planned Net Impact Fee Revenue	$64,225,536
Anticipated Need for Alternative Funding	**$12,705,657**

CHAPTER 8(A): NORTHEAST STORM DRAINAGE INFRASTRUCTURE IMPROVEMENTS PLAN

The City is proposing charging a Storm Drainage Impact Fee to cover the City's share of the cost of construction of regional flood control improvements in Northeast Phoenix in areas currently located in floodplains associated with Rawhide Wash.

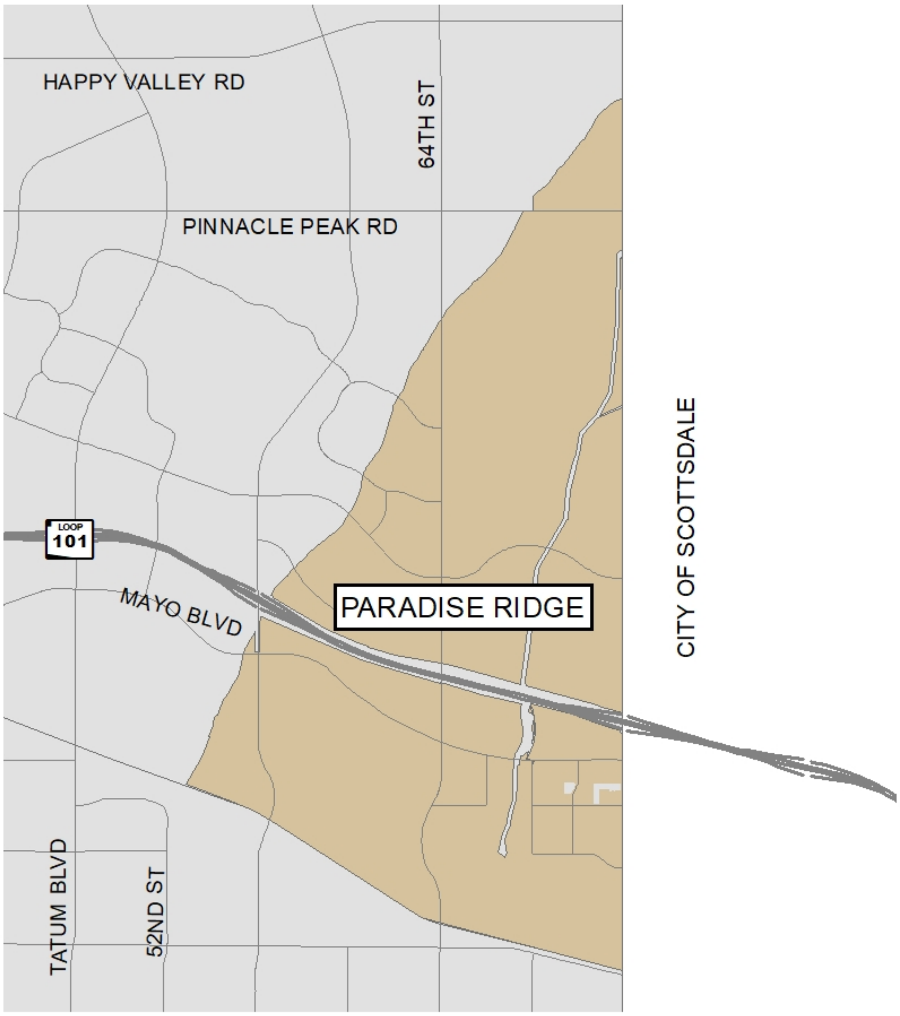
NORTHEAST DRAINAGE IMPACT FEE AREA

The proposed Storm Drainage impact fee would be charged in one area in the easternmost portion of the Northern growth area, with boundaries largely corresponding with: north of the Central Arizona Project canal, south of Pinnacle Peak, west of Scottsdale Road, and mostly east of 56th Street. Since the boundaries of this area were largely developed based on natural topographical conditions, and not man-made structures, the map on the following page should be consulted to identify the affected areas.

Storm Drainage impact fees are used to fund the City's portion of a network of channels, basins and large storm drains designed to address 100-year flood events. The regional facilities needed to serve new development are based on Flood Control District of Maricopa County (FCDMC) Area Drainage Master Plans (ADMPs), and/or similar master plans developed by the City, which are developed through topographical analysis and hydrological modeling. Localized protection from other, limited duration storm events for all service areas is generally provided by street drainage facilities and onsite retention requirements. The Storm Drainage Impact Fee is currently charged only in the Estrella and Laveen service areas because only these areas had regional-level, large-scale drainage facility plans prepared prior to significant amounts of development that could be reasonably apportioned over large areas.

New planning and design work completed by the FCDMC, City of Phoenix and City of Scottsdale has now established that through the construction of channels in Scottsdale and Phoenix very large areas of developed and undeveloped land can be removed from the AO floodplain associated with Rawhide Wash. Through a cost-sharing arrangement between the FCDMC, City of Phoenix and City of Scottsdale, the design and right-of-way phase for the first phase of the project is underway, and construction is likely to begin in 2020 or 2021. The FCDMC is currently managing a consultant project to develop a Design Concept Report (DCR) which will provide preliminary alignment, engineering requirements and construction cost estimate for the second phase of the project, and it is anticipated that when that report is complete that the FCDMC and the City of Phoenix will begin negotiating the design and construction of the second part of the flood control project. Initial estimates of phase II project costs have been provided by AECOM, the consultant currently preparing the DCR for the MCFCD; this phase of the project will involve the construction of a channel to convey flood water from the Scottsdale/Phoenix boundary south of Pinnacle Peak across the 101 Freeway and down to the area adjacent to the CAP.

Figure 8(A).1: Paradise Ridge Impact Fee Area



LEVEL OF SERVICE AND FEE CALCULATION METHODOLOGY

The City of Phoenix has an adopted level of service (LOS) for Storm Drainage, as follows:

- Protect development, including roadway access, from flooding in a 100-year, 24-hour flood event through the provision of regional drainage facilities.

PROPORTIONALITY AND LEVEL OF SERVICE ISSUES: There currently is no level of service in the relevant area – it is currently included in a FEMA AO floodplain and is prone to flooding during major storm events and as a result new development generally requires expensive mitigation factors like additional fill, retaining walls, higher structure and road elevations, and ongoing federal and/or private flood insurance. Once implemented, the planned drainage facilities would provide protection against 100-year, 24-hour storm events and would remove the area from the FEMA regulatory floodplain.

Removal of the AO floodplain designation would result in new developments not being subject to City building and site plan requirements associated with flood plains and not being subject to flood insurance requirements to obtain financing.

Because impact fee case law and the State Statute requires that developers pay only their proportionate share of new capacity, a method of equitably allocating drainage facility costs is required. The method used in this study is to allocate costs equally on a per acre basis across all areas that would be removed from the FEMA AO floodplain as a result of the construction of the Rawhide Wash project. Only developable or developed land was included in the calculations. The method used is a plan-based one, with the assumption being that all necessary facilities would be constructed in the next ten years using a combination of debt financing (City portion) and funding from the Flood Control District of Maricopa County.

EQUIVALENT DEMAND UNITS: Methods of translating measures of new development into demand for service are required to establish impact fees that can be calculated and assessed in a standardized and understandable fashion. At the City of Phoenix this means of translation is referred to as the calculation of equivalent demand units, or EDUs. For example, in the case of water treatment and transmission, average daily demand of a single-family home for potable water is a way of establishing one EDU. In the case of arterial street transportation, the amount of trip generation on arterial streets by one single-family home is used as an EDU. In the case of storm drainage infrastructure, it is somewhat more difficult to establish a translation function, because the benefits of flood control are numerous and difficult to quantify, especially if development patterns and densities vary a great deal and transportation networks are complex. The calculations in this section utilize acreage of the development as the means of assessing fees. For planning and assessment purposes it has been assumed that four single family units per acre will be developed, so one EDU is a quarter acre of land. For all non-residential and multifamily development, fees are assessed on a per acre basis and an EDU factor of 4 is applied.

SELECTION OF METHODOLOGY: Numerous methods are available for impact fee calculation, including the incremental, plan-based, buy-in, and hybrid methods. The plan-based approach was chosen for a number of reasons. The ‘buy-in- approach is not applicable because no facilities have yet been completed in this area, and the ‘incremental’ approach is not advisable because the flood control challenges are location-specific and are relevant only to a particular area that has been designated as a AO floodplain by FEMA and that will require particular drainage solutions. A plan-based approach is required because there are specific facilities and associated costs that must be allocated to one area that will benefit from those improvements, and those improvements will be constructed over the next three to six years. The fee will be initially assessed at approximately the same time as the design and construction of the two phases is started, and the project will be completed within the ten-year time frame required in the State Statute (fees cannot be collected for infrastructure projects that take place more than ten years in the future). Because funds will be borrowed from a third party – in this case the Arizona State Land Department – interest charges will also be included in the total costs attributable to the project that must be assessed to new development. In future updates, once construction of the project is complete, development occurs and drainage impact fees are collected and used to pay for principal and interest, a transition to a ‘buy-in’ methodology will likely be warranted.

EQUIVALENT DEMAND UNITS: PROJECTIONS

For purposes of this analysis, it is was determined that the most appropriate method of allocating the proportionate share of storm drainage facilities would be on the basis of land area, since it is assumed that all the land within the service areas benefit equally, whether it be through protection of an actual site from flooding, or from protection of street access to a site during a flood event. Estimates of existing and future single-family unit development, and non-residential and multifamily development by acreage, were prepared by Applied Economics, and then City of Phoenix staff used geographic information systems to calculate the portion of parcels that were in the relevant floodplain and then estimate total affected acres. The estimated total area of land that would be removed from the FEMA designated AO floodplain is 3,127 acres.

TEN-YEAR PLAN COSTS

To calculate a ten-year plan cost, estimates were obtained from a variety of sources. Phase I costs were based on FCDMC design, land acquisition and construction costs, anticipated cost sharing arrangements regarding construction, and known cost-sharing arrangements for design and land acquisition associated with an executed Intergovernmental Agreement (IGA) between the FCDMC, City of Phoenix, and City of Scottsdale. Phase II costs were estimated by AECOM, the firm currently working on the design construction report for phase II, and City of Phoenix staff – these costs include assumed interest costs with a 3 percent rate and a 20-year amortization period.

Table 8(A).1: NE Phoenix/Rawhide Wash Phase I 10 Year Plan Costs

Item	Quantity	Unit	Unit Cost	Total
Existing Floodwall Removal and Replacement	966	LF	$420	$405,720
Existing Floodwall Footing Widening	2,197	LF	$30	$65,910
Existing Floodwall Stem Strength Augmentation	932	CY	$700	$652,400
Existing Floodwall Raises to Meet FEMA Requirements	1	LS	$507,815	$507,815
New Floodwalls	13,466	LF	$340	$4,578,440
Existing Floodwall Scour Protection Augmentation	3,677	CY	$160	$588,320
New Floodwall Scour Protection	8,977	CY	$160	$1,436,320
Los Portones Drive Containment	1	LS	$848,440	$848,440
Happy Valley Road Interim Containment	1	LS	$1,223,725	$1,223,725
Utilities Relocation/Protection Allowance	1	LS	$50,000	$50,000
Vegetation Salvage and Landscaping	22	AC	$10,000	$220,000
Total Constructions Cost				$10,577,090
Design, Construction Management, City Administration, Etc.*				$3,173,127
Sub-Total Project Cost				$13,750,217
Contingency**				$3,437,554
Total Project Cost				**$17,187,771**

Source: JE Fuller
*Assumes 30%
**Assumes 20%

Table 8(A).2: NE Phoenix/Rawhide Wash Phase II 10 Year Plan Costs

Item	Quantity	Unit	Unit Cost	Total
Clearing and Grubbing	125	AC	$1,300	$162,500
Earthwork (Primary)	1,070,000	CY	$6	$6,420,000
Earthwork (Secondary West)	90,000	CY	$6	$540,000
Earthwork (Secondary East)	69,000	CY	$6	$414,000
Earthwork (Deer Valley Channel)	36,000	CY	$6	$216,000
Drop Structures	23	EA	$70,000	$1,610,000
Overbank Landscape Grading (Primary Corridor)	232,000	SY	$3	$696,000
Overbank Landscape Hydroseed (Primary Corridor)	48	AC	$2,857	$137,136
Overbank Landscape Hydromulch (Primary Corridor)	48	AC	$2,285	$109,680
Landscape Grading (Secondary and Deer Valley Ch Corridor)	131,000	SY	$3	$393,000
Landscape Hydroseed (Secondary and Deer Valley Ch Corridor)	27	AC	$2,857	$77,139
Landscape Hydromulch (Secondary and Deer Valley Ch Corridor)	27	AC	$2,285	$61,695
Dumped Riprap	15,000	CY	$100	$1,500,000
Concrete Cutoff Wall	35,000	LF	$150	$5,250,000
Total Construction Cost				$17,587,150
Design, Construction Management, City Administration, Etc.*				$5,276,145
Sub-Total Project Cost				$22,863,295
Contingency**				$9,145,318
Total Project Cost				**$32,008,613**

Source: AECOM Preliminary Estimates – Rawhide Wash Phase II
*Assumes 30%
**Assumes 20%

CALCULATION OF GROSS IMPACT FEES

CALCULATION OF GROSS IMPACT FEES PER EDU: A gross impact fee is the calculated fee per EDU using only the 10-year plan cost per EDU. A gross impact fee does not include any credit for alternative revenues, or offsets, which are discussed in the next section of this Chapter.

Table 8(A).3: NE Phoenix/Rawhide Wash Gross Drainage Fee Calculation

Description	Amount
Phase I Facility Costs	$17,187,771
Participation By Other Entities	$10,312,663
Phase I Phoenix Share of Costs	$6,875,109
Phase I Interest Costs	$0
Total Phase I Costs	$6,875,109
Phase II Facility Costs	$32,008,613
Phase II Participation By Other Entities*	$16,004,307
Phase II Phoenix Share of Costs	$16,004,307
Phase II Interest Costs**	$5,715,341
Total Phase II Costs	$21,719,647
Total Phase I and II Costs	$28,594,756
Phoenix - Other Funding Sources***	$7,148,689
Phoenix - Drainage Impact Fee Costs	$21,446,067
Total Acres (AO Floodplain/Associated With Rawhide)	3,127
Cost Per Acre	$6,859
Cost Per EDU****	**$1,715**

*Assumes 50/50 cost share with MCFCD
**Assumes amortization of loan over 20 year period with approximately 3% interest rate
***Assumes other funds used to cover 25% (current estimate is 20%) developed/developing acreage
****Assumes 1 EDU = 1 SF unit and 4 SF units per acre

GROSS IMPACT FEES PER EDU (ASSESSMENT)

The gross impact fees calculated above, if adopted, will be charged on the basis of per unit for new single-family home developments, and will be charged on the basis of acreage for all other types of development.

Table 8(A).4: Gross Impact Fee per EDU by Impact Fee Area

Impact Fee Area	Unit Type	Service Unit	EDU Factor	Gross Fee/ Unit
Paradise Ridge	Single-Family	Dwelling	1.00	$1,715
	All other uses	1 acre	4.00	$6,860

OFFSETS

Before determining an actual impact fee schedule, offsets must be taken into consideration, in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. In the case of storm drainage fees, the only alternative revenue sources used to pay for relevant projects are funds collected by the Flood Control District of Maricopa County, and these funds are taken into account in the project-by-project calculations. Since the Flood Control District matches are already assumed, and the impact fee-funding portion is only the City contribution, no separate calculation is made for offsets.

POTENTIAL NET IMPACT FEE SCHEDULE

The proposed net storm drainage impact fees, which will depend on offsets that have yet to be finalized, have yet to be determined, but will be equal to or less than the gross fees:

Table 8(A).5: Potential Net Impact Fee Schedule

Impact Fee Area	Unit Type	Service Unit	EDU Factor	Gross Fee per Unit	Offset per Unit	Net Fee per Unit
Paradise Ridge	Single-Family	Dwelling	1.00	$1,715	N/A	**$1,715**
	All other uses	1 acre	4.00	$6,859	N/A	**$6,860**

SUMMARY OF PLANNED IMPROVEMENTS AND DEBT PAYMENT, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that the majority of funds collected in the Paradise Ridge Drainage Impact Fee area will be used to pay down debt (interest & principal) associated with the construction of facilities that will likely be in place by 2025. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- Development of residential units and non-residential space will take place at the pace assumed by Applied Economics projections;

- Land development on an acreage basis will occur at density levels of four single-family residences per acre, eight multifamily residences per acre, and with a floor-to-area ratio of .35 for non-residential space.

A summary of the planned improvements and expenditures is shown below. Please note that since all facilities must be built in approximately the next five years, this IIP is unusual in that all facilities will be 'front-loaded' and most impact fee revenues will be used for debt principal and interest payments.

Table 8(A).6: Paradise Ridge Drainage Projected Revenues, 2020-2029

Land Use	2020-29 Development (Dwellings or 000's SqFt)	Acres Per Unit or 1,000 Sq.Ft.	2020-29 Acres Developed	Cost Per Acre	Fee Revenue
Single-Family	2,760	0.250	690	$6,859	$4,732,402
Multifamily	761	0.125	95	$6,859	$652,420
Retail	2,000	0.066	131	$6,859	$899,718
Office	0	0.066	0	$6,859	$0
Industrial	0	0.066	0	$6,859	$0
Other	812	0.066	53	$6,859	$365,286
Total Revenues					$6,649,826

Table 8(A).7: Paradise Ridge Drainage Projected Expenditures, 2020-2029

Rawhide I - City Impact Fee Portion Only	$0
Rawhide II - City Impact Fee Portion Only	$16,004,307
Total New Facilities 2020-29	**$16,004,307**
Projected Revenues 2020-29	**$6,649,826**
Borrowing Requirement (To Be Paid By 2030+ Development)	**$9,354,481**

CHAPTER 8(B): ESTRELLA & LAVEEN STORM DRAINAGE INFRASTRUCTURE IMPROVEMENTS PLAN

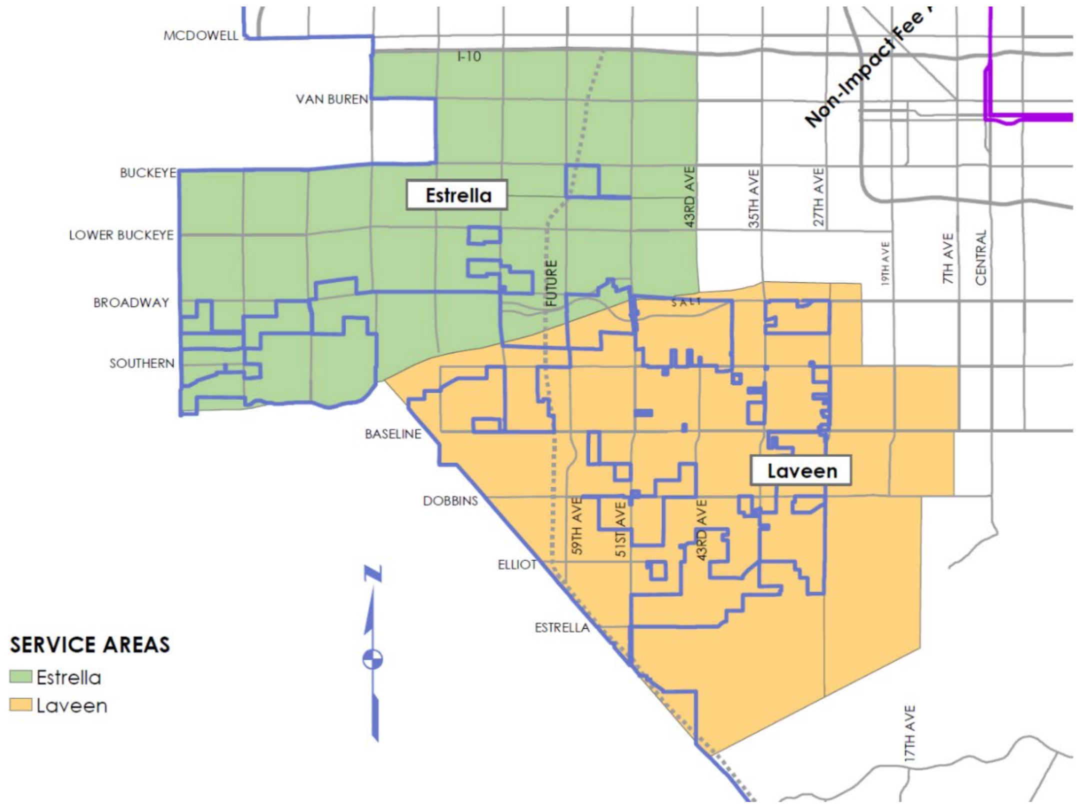
The City charges a Storm Drainage Impact Fee to cover the City's share of the cost of construction of regional flood control improvements in the Estrella and Laveen growth areas.

ESTRELLA AND LAVEEN STORM DRAINAGE IMPACT FEE AREAS

The Storm Drainage Impact Fee is charged in two distinct service areas:

- Estrella (North and South)
- Laveen (West and East)

Figure 8(B).1: Estrella and Laveen Storm Drainage Impact Fee Areas



Storm Drainage impact fees are used to fund the City's portion of a network of channels, basins and large storm drains designed to address 100-year flood events. The regional facilities needed to serve new development are based on Flood Control District of Maricopa County (FCDMC) Area Drainage Master Plans (ADMPs), and/or similar master plans developed by the City, which are developed through topographical analysis and hydrological modeling. Localized protection from other, limited duration storm events for all service areas is generally provided by street drainage facilities and onsite retention requirements.

The Storm Drainage Impact Fee is currently charged only in the Estrella and Laveen service areas because only these areas had regional-level, large-scale drainage facility plans prepared prior to significant amounts of development that could be reasonably apportioned over large areas. These areas have exceptionally flat terrain in part due to grading to facilitate agriculture and historically were prone to severe flood events. The Estrella and Laveen service areas were not combined because they are located on opposite sides of the Salt River and have distinct, separate drainage systems. A new Storm Drainage Fee is proposed in a separate section for the Paradise Ridge area that is affected by the Rawhide Wash floodplain; that area is largely undeveloped, and plans are being prepared in conjunction with the Flood Control District to provide large-scale, 100-year protection from storm events.

LEVEL OF SERVICE AND FEE CALCULATION METHODOLOGY

The City of Phoenix has an adopted level of service (LOS) for Storm Drainage, as follows:

- Protect development, including roadway access, from flooding in a 100-year, 24-hour flood event through the provision of regional drainage facilities.

PROPORTIONALITY AND LEVEL OF SERVICE ISSUES: Prior to the preparation of Area Drainage Master Plans (ADMPs) for the Laveen and Estrella areas, and the construction of large drainage facilities through cooperative efforts of the City of Phoenix and the Maricopa County Flood Control District, there was no level of service in these areas for severe floods associated with 100-year storms. Most land was agricultural or large-lot County-island residential lots, and flood water simply pooled up and collected on farms, and County roads were often blocked. When urban development began to occur approximately two decades ago, impact fees were established to pay for the facilities identified in the ADMPs. It should be noted that all the major facilities shown in the plan have been built, or will be built, through a cooperative venture between the City of Phoenix and the Maricopa County Flood Control District, with funding for the City portion coming exclusively from drainage impact fees.

Because impact fee case law and the State Statute requires that developers pay only their proportionate share of new capacity, a two-part series of calculations was prepared to establish the proposed fees in this section. First, impact fees were calculated using the "buy-in plus ten-year plan" method. This is the total value of existing facilities, plus the estimated cost of planned facilities that will be built over the next ten years (2020-29), divided by the projected total demand units in 2029. The buy-in plus ten-year IIP methodology was chosen as the basic impact fee methodology because the State Statute does not permit the use of a plan-based approach that stretches out beyond a decade. Second, fees based on build-out infrastructure costs and build-out EDUs were calculated to provide a cost basis that could be used as a proxy for determining the proportionate amount of new capacity that any given development cohort could be expected to pay. If the build-out cost per EDU is less than the buy-in plus ten-year cost per unit, then it can be discerned that a disproportionate share of the facilities had been built, or would be built in the next decade (2020-29), and the lower “build-out cost per EDU” would be applicable.

EQUIVALENT DEMAND UNITS: Methods of translating measures of new development into demand for service are required to establish impact fees that can be calculated and assessed in a standardized and understandable fashion. At the City of Phoenix this means of translation is referred to as the calculation of equivalent demand units, or EDUs. For example, in the case of water treatment and transmission, average daily demand of a single-family home for potable water is a way of establishing one EDU. In the case of arterial street transportation, the amount of trip generation on arterial streets by one single-family home is used as an EDU. In the case of storm drainage infrastructure, it is somewhat more difficult to establish a translation function, because the benefits of flood control are numerous and difficult to quantify, especially if development patterns and densities vary a great deal and transportation networks are complex. Luckily in the case of Estrella and Laveen the land is flat, densities are relatively uniform with an emphasis on standard-density single family homes and industrial parcels, and the street network largely conforms to a big grid. That makes simple acreage a good proxy for the calculation and assessment of drainage fees in Estrella and Laveen.

For planning and assessment purposes it has been assumed that four single family units per acre will be developed, so one EDU is a quarter acre of land. For all non-residential and multifamily development, fees are assessed on a per acre basis and an EDU factor of 4 is applied. The underlying presumption is that a new industrial development on one acre of land will benefit as much from an avoidance of flooding as a new commercial development on an equivalent amount of land or as much as four single family homes. While other methods of calculating fees might be possible, such as total square footage of new buildings, total square footage of first story structures, or assessed value, these methods are far more complicated to use and likely would produce no improvements in the equity of calculation and fee collection in Estrella and Laveen.

SELECTION OF METHODOLOGY: Numerous methods are available for impact fee calculation, including the incremental, plan-based, buy-in, and hybrid methods. For this update we are recommending the “buy-in plus 10-year plan” approach. This approach is a hybrid that combines elements of the traditional ‘buy-in’ method, which looks backward at what has already been built, and the traditional ‘plan’ method, which looks forward to what will be built. The ‘buy-in’ method is used to develop an impact fee that relies on what the share of existing development (and of development that takes place in the immediate future) is of the costs of facilities that have already been put in place. The buy-in method is commonly used by water, wastewater and other utilities that frequently need to install excess capacity in advance of new development – utilities cannot wait until after development has taken place, for example, to install water treatment plants and transmission mains. This approach is relevant in the Estrella and Laveen drainage impact fee areas because a significant amount of drainage facilities are already in place to accommodate new development. The plan-based method is applicable because extensive additional facilities are still required and are planned to be constructed over the 2020-29 period. These channels and basins will supplement the protection provided by the existing network of facilities – as a result, a combined ‘buy-in’ and ‘plan’ based approach is recommended.

EQUIVALENT DEMAND UNITS: EXISTING (2019), PROJECTED (2020-29), BUILDOUT

In areas like Estrella and Laveen where development is relatively low density, it is most appropriate to determine the proportionate share of storm drainage facilities on the basis of land area, since it is assumed that all the land within the service areas benefit equally, whether it be through protection of an actual site from flooding, or from protection of street access to a site during a flood event.

Estimates of existing and future single-family unit development, and non-residential and multifamily development by acreage, were prepared by Applied Economics. Only developable parcel acreage or unit counts in the case of single family homes were used in the calculation of the equivalent demand units (EDU). Open space, utility corridor and street-related acreage was not included; excluded land included the Salt River, South Mountain Park, neighborhood and community parks, and existing and future storm drainage basins.

Table 8(B).1: Estrella Storm Drainage Equivalent Demand Units

	2019	2029	Buildout
Single-Family Units	16,719	22,274	24,750
Non-Residential and Multifamily Acres	6,756	8,387	10,214
SF EDU Conversion Factor	1	1	1
Non-Residential and MF EDU Conversion Factor	4	4	4
SF EDU Total	16,719	22,274	24,750
Non-Residential and MF EDU Total	27,022	33,546	40,856
Total EDU	**43,741**	**55,820**	**65,606**

Table 8(B).2: Laveen Storm Drainage Equivalent Demand Units

	2019	2029	Buildout
Single-Family Units	24,363	34,613	37,154
Non-Residential and Multifamily Acres	1,474	3,339	3,339
SF EDU Conversion Factor	1	1	1
Non-Residential and MF EDU Conversion Factor	4	4	4
SF EDU Total	24,363	34,613	37,154
Non-Residential and MF EDU Total	5,895	9,016	13,354
Total EDU	**30,258**	**43,629**	**50,508**

'BUY-IN" PLUS 'TEN-YEAR PLAN' CALCULATIONS

To calculate a hybrid 'buy-in' plus ten-year plan cost inventories of existing drainage projects must be compiled and the costs of those projects adjusted to 2019 dollars, and then added to the estimated 2019-dollar costs of projects that will be undertaken over the 2020 to 2029 period. These inventories and associated costs were documented by JE Fuller and Associates in a study that was completed in 2018 using data from the City of Phoenix, the Maricopa County Flood Control District, and other sources. Past and future costs were segregated into City of Phoenix costs and costs that were incurred, or will be incurred by other entities like the MCFCD, the Maricopa County Department of Transportation, federal agencies or other municipalities or utilities.

Table 8(B).3: Estrella Buy-In + Ten Year Plan Costs

Existing Estrella Drainage Facility Name	Original Total Project Cost	Year Built/Acquired	FCDMC, MCDOT, Other Cost Share	Phoenix Cost Share	Inflation Adjusted Phoenix Cost
75th Ave Storm Drain and Durango Conveyance Channel (DRCC)	$32,000,000	2006-2009	$20,650,000	$11,350,000	$15,322,500
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Land Acquisition	$4,250,000	2017	$2,125,000	$2,125,000	$2,146,250
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Design	$1,100,000	2016	$550,000	$550,000	$561,000
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Construction	$14,200,000	2018-2019	$8,700,000	$5,500,000	$5,500,000
Existing Estrella Drainage Facility Costs	**$51,550,000**			**$19,525,000**	**$23,529,750**
Future Estrella Drainage Facility Name	**Original Total Project Cost**	**Year Cost Estimated**	**FCDMC, MCDOT, Other Cost Share**	**Phoenix Cost Share**	**Inflation Adjusted Phoenix Cost**
47th Ave Channel	$10,864,447	2001	$5,432,224	$5,432,224	$9,234,780
47th Ave Basin and Inlet	$11,994,019	2001	$5,997,010	$5,997,010	$10,194,916
Future Estrella Drainage Facility Costs	**$22,858,466**			**$11,429,233**	**$19,429,696**
Total Buy-In Facility Costs = Existing + Planned (2020-2029)					**$42,959,446**

Table 8(B).4: Laveen Buy-In + Ten Year Plan Costs

Existing Laveen Drainage Facility Name	Original Total Project Cost	Year Built/Acquired	FCDMC, MCDOT, Other Cost Share	Phoenix Cost Share	Inflation Adjusted Phoenix Cost
23rd Ave and Roeser Basin and Storm Drain	$9,000,000	2010	$4,500,000	$4,500,000	$5,220,000
35th Ave and Dobbins Basin and Storm Drain	$8,263,750	1998	$1,763,750	$6,500,000	$11,830,000
43rd Ave Storm Drain - Baseline Road to Salt River	$11,266,000	2000	$11,266,000	$0	$0
43rd Ave and Baseline & 27th and South Mtn Basins ("Two Basins")	$7,000,000	2014-2015	$4,900,000	$2,100,000	$2,163,000
Laveen Area Conveyance Channel & 43rd Ave & Southern Ave Basin	$21,000,000	2005	$8,000,000	$13,000,000	$18,850,000
Baseline Storm Drain	$7,215,000	2000	$7,215,000	$0	$0
Existing Laveen Drainage Facility Costs	**$63,744,750**			**$26,100,000**	**$38,063,000**
Future Laveen Drainage Facility Name	**Planned Total Project Cost**	**Year Cost Estimated**	**FCDMC, MCDOT, Other Cost Share**	**Phoenix Cost Share**	**Inflation Adjusted Phoenix Cost**
AoMI No. 1/Hidden Valley	$8,252,000	2017	$4,126,000	$4,126,000	$4,167,260
AoMI No. 2/51st & Sunrise	$5,568,000	2017	$2,784,000	$2,784,000	$2,811,840
AoMI No. 3/35th Ave & Dobbins	$1,013,000	2017	$506,500	$506,500	$511,565
AoMI No. 4/27th Ave & Olney	$6,267,000	2017	$3,133,500	$3,133,500	$3,164,835
AoMI No. 5/19th Ave & Dobbins	$7,242,000	2017	$3,621,000	$3,621,000	$3,657,210
Future Laveen Drainage Facility Costs	**$28,342,000**			**$14,171,000**	**$14,312,710**
Total Buy-In Facility Costs = Existing + Planned (2020-2029)					**$52,375,710**

BUILDOUT COSTS PER EDU

CALCULATION OF BUILDOUT FACILITY COSTS AND BUILDOUT COST PER EDU: A proxy is needed to ensure that development taking place between 2020 and 2029 does not pay for an excessive amount of flood control capacity. The most practical approach is to estimate buildout costs per EDU, which is to say the cost of providing all existing and future facilities divided by the number of all existing and future EDUs, and to require that the gross fee charged does not exceed that amount. It should be noted that the closer an area is to total buildout, the more similar the 'buy-in plus 10-year plan' cost per EDU will be to the buildout cost per EDU. By definition, if all facilities are constructed, and all development completed, within the 10-year plan horizon, the numbers will be identical. Shown below are the calculations for buildout costs per EDU:

Table 8(B).9: Estrella Buildout Cost Per EDU

Existing Estrella Drainage Facility Name	Original Total Project Cost	Year Built/Acquired	FCDMC, MCDOT, Other Cost Share	Phoenix Cost Share	Inflation Adjusted Phoenix Cost
75th Ave Storm Drain and Durango Conveyance Channel (DRCC)	$32,000,000	2006-2009	$20,650,000	$11,350,000	$15,322,500
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Land Acquisition	$4,250,000	2017	$2,125,000	$2,125,000	$2,146,250
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Design	$1,100,000	2016	$550,000	$550,000	$561,000
DRCC 75th Ave to 107th Ave - Phases 1 and 2 Construction	$14,200,000	2018-2019	$8,700,000	$5,500,000	$5,500,000
Existing Estrella Drainage Facility Costs	**$51,550,000**			**$19,525,000**	**$23,529,750**
Future Estrella Drainage Facility Name	**Planned Total Project Cost**	**Year Cost Estimated**	**FCDMC, MCDOT, Other Cost Share**	**Phoenix Cost Share**	**Inflation Adjusted Phoenix Cost**
Sunland Channel	$10,007,906	2001	$5,003,953	$5,003,953	$9,862,559
47th Ave Channel	$10,864,447	2001	$5,432,224	$5,432,224	$9,234,780
47th Ave Basin and Inlet	$11,994,019	2001	$5,997,010	$5,997,010	$10,194,916
Future Estrella Drainage Facility Costs	**$32,866,372**			**$16,433,186**	**$29,292,255**
Total Estrella Buildout Facility Costs					**$52,822,005**
Total Estrella Buildout EDU					**65,606**
Total Estrella Buildout Cost Per EDU					**$805**

Table 8(B).10: Laveen Buildout Cost Per EDU

Existing Laveen Drainage Facility Name	Original Total Project Cost	Year Built/Acquired	FCDMC, MCDOT, Other Cost Share	Phoenix Cost Share	Inflation Adjusted Phoenix Cost
23rd Ave and Roeser Basin and Storm Drain	$9,000,000	2010	$4,500,000	$4,500,000	$5,220,000
35th Ave and Dobbins Basin and Storm Drain	$8,263,750	1998	$1,763,750	$6,500,000	$11,830,000
43rd Ave Storm Drain - Baseline Road to Salt River	$11,266,000	2000	$11,266,000	$0	$0
43rd Ave and Baseline & 27th and South Mtn Basins ("Two Basins")	$7,000,000	2014-2015	$4,900,000	$2,100,000	$2,163,000
Laveen Area Conveyance Channel and 43rd Ave & Southern Ave Basin	$21,000,000	2005	$8,000,000	$13,000,000	$18,850,000
Baseline Storm Drain	$7,215,000	2000	$7,215,000	$0	$0
Existing Laveen Drainage Facility Costs	**$63,744,750**			**$26,100,000**	**$38,063,000**
Planned Laveen Drainage Facility Name	**Planned Total Project Cost**	**Year Cost Estimated**	**FCDMC, MCDOT, Other Cost Share**	**Phoenix Cost Share**	**Inflation Adjusted Phoenix Cost**
AoMI No. 1/Hidden Valley	$8,252,000	2017	$4,126,000	$4,126,000	$4,167,260
AoMI No. 2/51st & Sunrise	$5,568,000	2017	$2,784,000	$2,784,000	$2,811,840
AoMI No. 3/35th Ave & Dobbins	$1,013,000	2017	$506,500	$506,500	$511,565
AoMI No. 4/27th Ave & Olney	$6,267,000	2017	$3,133,500	$3,133,500	$3,164,835
AoMI No. 5/19th Ave & Dobbins	$7,242,000	2017	$3,621,000	$3,621,000	$3,657,210
Planned Laveen Drainage Facility Costs	**$28,342,000**			**$14,171,000**	**$14,312,710**
Total Laveen Buildout Costs					**$52,375,710**
Total Laveen Buildout EDU					**50,508**
Total Laveen Buildout Costs Per EDU					**$1,037**

CALCULATION OF GROSS IMPACT FEES

CALCULATION OF GROSS IMPACT FEES PER EDU: A gross impact fee is the calculated fee per EDU using only the buy-in plus 10-year plan cost per EDU, with adjustments for proportionality. A gross impact fee does not include any credit for alternative revenues, or offsets, which are discussed in the next section of this Chapter. As explained previously, due to proportionality/capacity issues, development that occurs in the 2020-29 timeframe should not have to pay more than the share associated with the buildout cost per EDU. As a result, the buy-in plus 10-year plan is calculated, and then compared with the buildout cost per EDU, and the lower of the two cost-per-EDU values is used for the gross fee in the following table:

Table 8(B).19: Estrella Gross Drainage Fee Calculation

Total Existing and Projected (2020-2029) Facility Costs	$42,959,446
Total Existing and Projected (2020-29) EDUs	55,820
Existing + 2020-29 Cost Per EDU	$770
Buildout Cost Per EDU	$805
Lower of Existing/10 Year and Buildout Cost Per EDU	**$770**

Table 8(B).20: Laveen Gross Drainage Fee Calculation

Total Existing and Projected (2020-2029) Facility Costs	$52,375,710
Total Existing and Projected (2020-29) EDUs	43,629
Existing + 2020-29 Cost Per EDU	$1,200
Buildout Cost Per EDU	$1,037
Lower of Existing/10 Year and Buildout Cost Per EDU	**$1,037**

GROSS IMPACT FEES PER EDU (ASSESSMENT)

The gross impact fees calculated above, if adopted, will be charged on the basis of per unit for new single-family home developments, and will be charged on the basis of acreage for all other types of development.

Table 8(B).21: Gross Impact Fee per EDU by Impact Fee Area

Impact Fee Area	Unit Type	Service Unit	EDU Factor	Gross Fee/ Unit
Estrella (North and South)	Single-Family	Dwelling	1.00	**$770**
	All other uses	1 acre	4.00	**$3,080**
Laveen (West and East)	Single-Family	Dwelling	1.00	**$1,037**
	All other uses	1 acre	4.00	**$4,148**

OFFSETS

Before determining an actual impact fee schedule, offsets must be taken into consideration, in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. In the case of storm drainage fees, the only alternative revenue sources used to pay for relevant projects are County funds collected by the Maricopa County Flood Control District, and these funds are taken into account in the project-by-project calculations. Since the Flood Control District matches are already assumed, and the impact fee-funding portion is only the City contribution, no separate calculation is made for offsets.

POTENTIAL NET IMPACT FEE SCHEDULE

The proposed net storm drainage impact fees, which will depend on offsets that have yet to be finalized, have yet to be determined, but will be equal to or less than the gross fees:

Table 8(B).22: Potential Net Impact Fee Schedule

Impact Fee Area	Unit Type	Service Unit	EDU Factor	Gross Fee/ Unit	Offset/ Unit	Net Fee/ Unit
Estrella (North and South)	Single-Family	Dwelling	1.00	$770	n/a	**$770**
	All other uses	1 acre	4.00	$3,078	n/a	**$3,080**
Laveen (West and East)	Single-Family	Dwelling	1.00	$1,037	n/a	**$1,037**
	All other uses	1 acre	4.00	$4,148	n/a	**$4,148**

SUMMARY OF PLANNED IMPROVEMENT AND COSTS, 2020-2029

Funds collected through the assessment of the Estrella and Laveen Storm Drainage Impact Fees will be spent on new projects specified in prior sections and listed below. In both the cases of Estrella and Laveen, the anticipated collection of funds will be less than that required to design and construct the facilities listed, probably requiring the borrowing of funds from other sources to initiate some of the projects that would take place later in the planning period (2020-29). In the case of Laveen, anticipated fee revenue collection is almost enough to cover facility costs, while in the case of Estrella, some sort of borrowing would almost be certain to cover the cost of one of the two large projects planned. However, faster rates of development could result in more revenue being collected, with no borrowing being required, and slower rates of development could result in either more borrowing or delays in the construction of necessary projects.

Table 8(B).23: Estrella Drainage Projected Revenues, 2020-2029

Number of 2020-29 EDUs	12,079
Net Fee per EDU	$770
Anticipated Revenues, 2020-29	**$9,295,898**

Table 8(B).24: Laveen Drainage Projected Revenues, 2020-2029

Number of 2020-29 EDUs	13,371
Net Fee per EDU	$1,037
Anticipated Revenues, 2020-29	**$13,865,350**

Table 8(B).25: Estrella Drainage Projected Expenditures, 2020-2029

Type of Facility	Cost/EDUs
47th Ave Channel	$9,234,780
47th Ave Basin and Inlet	$10,194,916
Total New Facilities 2020-29	**$19,429,696**
Projected Revenues 2020-29	**$9,295,898**
Borrowing Requirement (To Be Paid By 2030+ Development)	**$10,133,798**

Table 8(B).26: Laveen Drainage Projected Expenditures, 2020-2029

Type of Facility	Cost/EDUs
AoMI No. 1/Hidden Valley	$4,167,260
AoMI No. 2/51st & Sunrise	$2,811,840
AoMI No. 3/35th Ave & Dobbins	$511,565
AoMI No. 4/27th Ave & Olney	$3,164,835
AoMI No. 5/19th Ave & Dobbins	$3,657,210
Total New Facilities 2020-29	**$14,312,710**
Projected Revenues 2020-29	**$13,865,350**
Borrowing Requirement (To Be Paid By 2030+ Development)	**$447,360**

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CHAPTER 9: WATER INFRASTRUCTURE IMPROVEMENTS PLAN

The City of Phoenix charges a Water Impact Fee to cover the costs of water treatment and water transmission infrastructure in the growth areas of the City.

IMPACT FEE AREAS

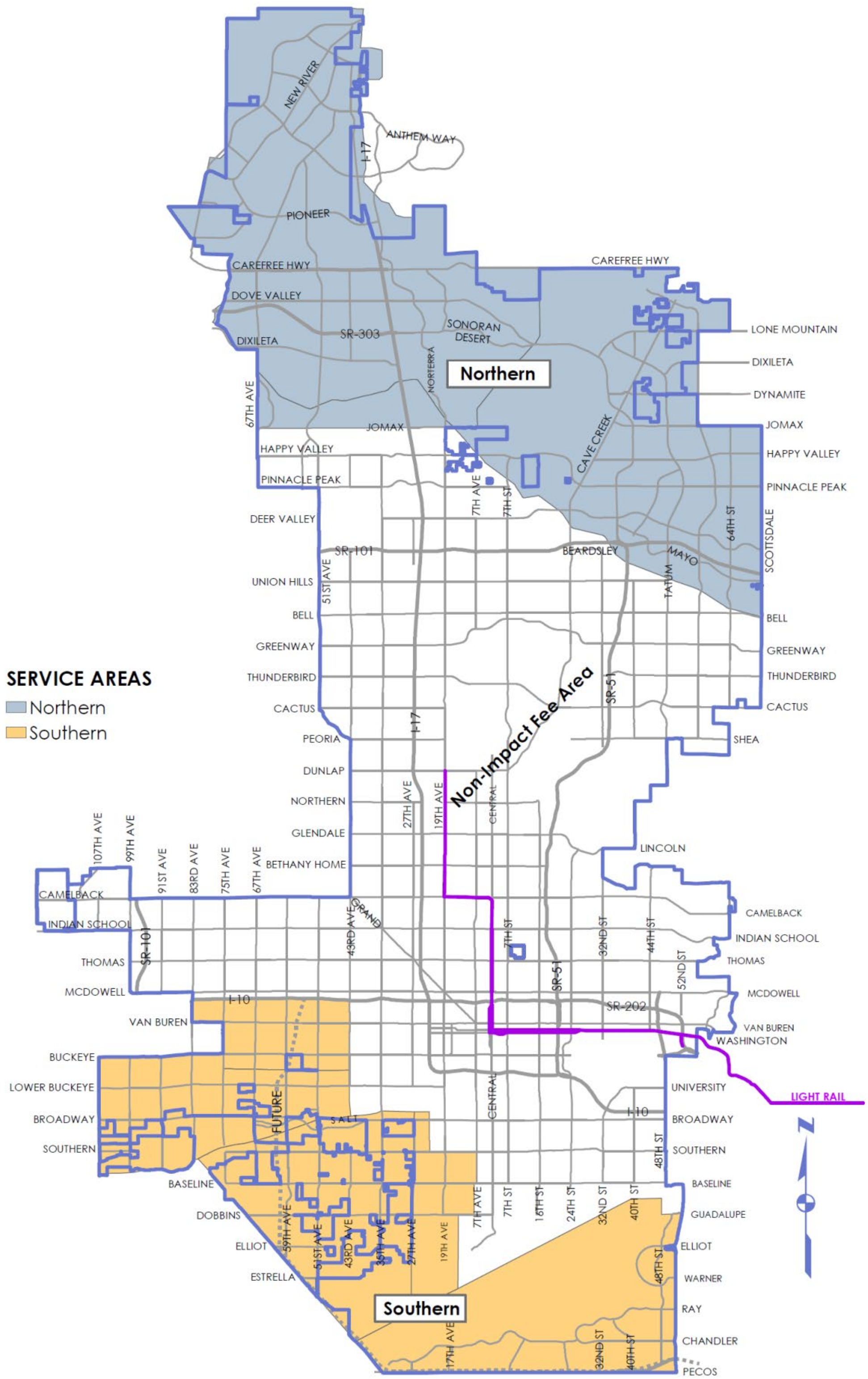
The Water Impact Fee is charged in two distinct impact fee areas:

- Northern (Northeast, Northwest, Deer Valley)
- Southern (Estrella North, Estrella South, Laveen West, Laveen East, and Ahwatukee)

Please see the map on the following page to see the boundaries of each of the service areas.

WATER TREATMENT VS. WATER TRANSMISSION INFRASTRUCTURE: The City's water treatment and transmission infrastructure is one large integrated pressurized system that encompasses over 26 water pressure zones, thousands of miles of water mains, and five water treatment plants. Because water treated at the City's various plants will serve different parts of the City at different times (depending on the aggregate level of demand, peaking factors, plant and SRP/CAP canal down times, reservoir turnover requirements, and changing network characteristics), the water treatment portion of the fees is considered City-wide in nature, and costs are based on the most recent expansion of the City's treatment capacity (Lake Pleasant Water Treatment Plant). Water transmission infrastructure characteristics, however, are more distinct, and separate transmission network fees are calculated for the Northern and Southern Areas. The topography and development pattern in the Northern service area is more complex and requires more infrastructure than in the Southern service area, necessitating different calculations for the transmission infrastructure component of the impact fee for each of the two service areas, even though exactly the same facility types (large mains, reservoirs, boosters and PRVs) are included in the inventories of facilities required to serve those areas.

Figure 9.1: Water Impact Fee Areas



LEVEL OF SERVICE

Definitions of level of service associated with water services are difficult to summarize because of the numerous metrics used to evaluate potable water treatment and transmission. However, as a general rule, once the City legally accepts the transfer of water facilities from a developer, the City is obligated to meet all state and federal regulatory requirements, and it attempts to provide reliable and high quality water services to all customers at all times. The City also endeavors to meet a wide range of standards that are not legally required, but which it seeks to attain. For example, the City's Water Services Department has the following types of objectives that must be considered as being part of the level of service for water transmission:

- **Water pressure (normal demand).** The City maintains water pressures needed for typical uses and standard plumbing fixtures, which can routinely vary between 40 and 100 pounds per square inch (PSI), depending on the location within any of the City's 26 different water pressure zones.
- **Water pressure (emergency demand) and associated water volumes.** The City maintains adequate emergency water pressures and volumes during fire events, which can go as high as 3,000 gallons per minute (GPM) at fire-fighting incidents involving commercial or industrial structures.
- **Uninterrupted water services.** The City maintains system-wide water pressures and volumes at adequate levels during inevitable transmission and distribution line breaks and equipment failures or replacement.
- **Water quality standards: water chemistry.** The City achieves or exceeds minimum federal and state water quality standards in terms of water chemistry (usually measured in the form of dissolved salts, metals or organic material at the point of discharge from a treatment plant, of which the City has five).
- **Water quality standards: diseases and pathogens**. The City also achieves or exceeds minimum water quality standards in terms of the presence of disease and pathogens that are a threat to customers, measured both at the treatment plants and throughout the transmission and distribution network.
- **Water quality standards: treatment residuals.** The City also achieves or exceeds minimum water quality standards in terms of chlorine residuals and other potentially dangerous compounds that are formed in the transmission and distribution network after water has left treatment plants.

While there are many different parameters that dictate the specific sizes, quantities and locations of various types of facilities needed in the City's two water impact fee service areas, the following assumptions were used to establish the proportionate amount of infrastructure required to serve an equivalent demand unit (EDU):

- **An EDU's average annual daily volume requirement is the same as the average annual daily requirement in fiscal year 2013 calculated for all single family residential 5/8", ¾", and 1" meters installed from 2001 to 2008.** This average annual GPD factor indicates the amount of water volume that will be required by a relatively new single family dwelling unit constructed in Phoenix and serves as a proxy for infrastructure needs associated with a given amount of demand.
- **This average of 299 gallons per day per EDU is assumed to be consistent with the level of service associated with a 5/8", ¾", or 1" single family meter**, and larger single family meters are calculated using a scale indicating recommended maximum rates for continuous operations cited

in American Water Works Association (AWWA) reference tables. For example, a 1.5" single family displacement meter is assumed to use 3.33 EDU, or 1,001 gallons a day.

- **For purposes of treatment capacity requirement calculation, a peaking factor of 1.41** based on maximum month daily averages versus annual average daily averages has been used. Similarly, **a gross-up factor of 1.09** to take into account system losses between the treatment plant and customer meters is also utilized. These factors reflect the fact that a treatment plant must be sized to accommodate both peak seasonal demands and water losses that occur in the transmission and distribution networks.
- **The EDU factor for planning purposes for multifamily units is .52 per unit** and is calculated based on estimates of average multifamily water use of 154 GPD in FY 2012/13 that includes both domestic and landscape meters taken from a sample of 6,742 units built in the City between 2002 and 2008.
- **EDU factors for industrial, commercial and institutional meters** were calculated from an analysis of millions of square feet of space and associated meters.
- **EDU factors for industrial, commercial and institutional meters are also calculated by using an additional adjustment factor that reflects the fact that these types of meters on average use far more water than a comparably sized single-family water meter.** This adjustment factor, based on FY 12/13 water use data, is 2.12, indicating that any given meter size/type supplying industrial and commercial customers will use 2.12 times as much water as a similar single family residential meter, as shown in the following table:

Table 9.1: Water Use Ratio for Non-Single Family EDU Adjustment Factor

Meter Type	Meter-Based EDU	CCF (FY13)	CCF/EDU/DAY
Single-Family Standard	365,706	59,404,322	0.4450
Non-Single-Family	121,701	41,903,665	0.9433
Non-SF EDU Adjustment Factor			**2.12**

Source: COP Water Services Department.

GENERAL WATER IMPACT FEE CALCULATION METHODOLOGY

The Water Impact Fee is calculated by using a mix of incremental and buy-in system development fee methodologies, with all costs estimated in terms of December 2018 dollars. Treatment plant costs are calculated by estimating the amount of incremental treatment plant capacity that will be required for an EDU, and then estimating the cost of constructing that amount of plant capacity based on actual design and construction costs with an adjustment to reflect inflation to October 2018. The Lake Pleasant Treatment Plant was used as the source of construction cost per gallon of capacity because it was the most recent of the new treatment plants.

Transmission network costs are calculated by estimating the current cost of constructing existing facilities as well as facilities that will need to be constructed over the 2020-29 period, estimating the proportionate amount of those facilities that can be attributed to EDUs already built or that will be built in the 2020-29 period, and then dividing the cost of the existing and new (2020-29) facilities by the number of existing and new EDUs, taking into account any excess levels of capacity. Existing and future infrastructure costs are all based on the current cost of construction, estimated in October 2018 costs, using generic infrastructure types and quantities projected by Jacobs/CH2MHILL in 2019.

Once treatment plant costs and network costs have been calculated on a per-EDU basis and combined to create the gross impact fee, offsets for alternative revenue sources that are used to pay for new growth-related infrastructure are then calculated and subtracted, resulting in the potential net impact fee. In the case of the Water impact fee, offsets are provided for water rate revenue that will be used to pay down outstanding debt and for the Development Occupational Fee (DOF) which is used to fund new water infrastructure. The resulting net impact fee is then assessed to all customers obtaining new (or larger) water meters that will add to demands on the City's water treatment and transmission systems.

ANALYSIS OF EXISTING SERVICE AND CAPACITY IN THE SERVICE AREAS

TREATMENT PLANTS: While a significant amount of additional capacity exists in the City's five water treatment plants, an extensive analysis of existing services and capacity is not included because the treatment fee is based on incremental cost. By definition, new development being assessed this type of fee is only paying for that increment of capacity needed to serve that development, and not for capacity used to serve existing customers or for unused capacity. However, as indicated in the following table, the City has more than enough capacity to serve existing and future customers over the 2020-29 period using existing plants:

Table 9.2: Available Capacity, Water Treatment Plants

Water Treatment Plant	Capacity Available to the System	Maximum Daily Production, CY 2018	Immedately Available Capacity
Val Vista*	117	123** (August, 2018)	
Deer Valley	100	83 (October, 2018)	
24th Street	126	120 (July, 2018)	
Union Hills	160	125 (June, 2018)	
Lake Pleasant**	52	41 (June, 2018)	
Total* **	**555**	**408**	**147**

*Val Vista max day production in 2018 was 170 MGD including Mesa delivery of 47 MGD.
**Lake Pleasant has a capacity of 80 MGD but is currently limited by the transmission network to 52 MGD.
*** Max day Phoenix-only production in calendar year 2018 was 408 MGD and took place in July 2018.
Source: Water Services Department, May 2019

Additional capacity will eventually be required in the period after 2029, and new facilities will likely be constructed at the Lake Pleasant Water Treatment Plant (current location in northwest Phoenix) and at the future Western Canal WTP site (future location in Laveen in southwest Phoenix).

The calculation of incremental costs associated with the utilization of treatment plant capacity was undertaken using costs from the most recently-constructed facility, Lake Pleasant WTP, and escalated to adjust for inflation, and is described in the section on water treatment costs.

TRANSMISSION NETWORK: In the previous update produced in 2015, estimates of used transmission network facility capacity were produced by calculating the ratio of the amount of capacity used in 2013 to the amount of capacity projected to be used in 2050 in a large sample of major transmission mains and trunk sewers, weighted to reflect the size, type and cost of those facilities. These numbers were developed as part of the prior City-Wide Water Master Plan development that had recently occurred. Because the City-Wide Water Master Plan is currently underway and those numbers are not yet available, an alternative approach to estimating capacity utilizations and proportionate share of costs was used. Calculating maximum capacities or the amount of capacity currently being used in a large network is difficult because of complexities associated with the type and number of facilities and the need to retain redundancy for emergency situations, facility maintenance, and daily/seasonal peaking. For example, reservoirs must be used so as to "turn over" the water in the tanks to preserve water quality, regardless of the amount of demand for water in areas backed up by the reservoirs, while straight calculations of total volume used vs. total volume capacity in specific mains are irrelevant if the total capacity will never be used except in emergencies. Similarly, it is difficult to compare the use of booster stations or pressure-reducing valve stations over a multi-decade period when usage varies on a daily, monthly or even yearly basis depending on operational needs and the extent and layout of a growing and changing network.

To replace the estimates of capacity utilization at the end of the IIP period (previously 2025 and now 2029), a proxy was needed to indicate the total share of the facilities constructed by 2029 that would be required to serve only those EDUs built by 2029. The proxy chosen was the calculation of the cost per EDU of building out all facilities to meet demands placed on the system by all future (or build-out) EDUs, which provides a cost per capacity per EDU number that can compared with the buy-in plus 10-year IIP calculation. If the build-out cost per EDU is lower than the buy-in plus 10-year IIP cost per EDU, this indicates that the past and current (2020-29) development cohorts have built some extra capacity that can be utilized by future development (2030+) cohorts. If the build-out cost per EDU is higher than the buy-in plus 10-year IIP cost per EDU, this indicates that past and current (2020-29) cohorts are not constructing their proportionate share of ultimate facilities. The build-out cost per EDU was estimated by using the existing facility inventories, inventories of facilities in the 2020-29 IIP, and inventories of future (2030+) facilities identified in the last City-Wide Master Plan, divided by the sum of existing EDUs and estimated amount of total remaining EDUs (development capacity) provided by Applied Economics and City staff.

The total buildout cost per EDU yielded a cost per EDU that was lower than that generated by the buy-in plus 10 year IIP cost per EDU, revealing that some additional capacity will be available in 2029, and that the gross fee should be set at the lower value of the build-out cost. This is shown in the final calculations table where the lower of the total buildout cost per EDU and the buy-in plus ten-year IIP cost per EDU is utilized for the final gross fee.

WATER EQUIVALENT DEMAND UNITS (EDUS)

EXISTING EQUIVALENT DEMAND UNITS (2019): The number of existing equivalent demand units (EDUs) are provided below:

Table 9.3: Estimated "Base Year" Equivalent Demand Units, 2019

Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other	Total
Northern	34,090	4,671	1,884	296	277	1,457	42,675
Southern	69,398	4,764	3,876	1,395	11,678	2,601	93,712
IFA Total	103,488	9,435	5,760	1,691	11,955	4,058	136,387

Source: Chapter 2, Table 2.16

PROJECTED EQUIVALENT DEMAND UNITS, 2020-29: The number of projected equivalent demand units (EDUs) for the ten-year planning period 2020-29 is provided below:

Table 9.4: Projected Service Units, 2020-29

Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other	Total
Northern	18,222	4,275	1,391	536	175	916	25,515
Southern	17,219	3,473	1,604	813	2,886	1,401	27,396
IFA Total	35,441	7,748	2,995	1,349	3,061	2,317	52,911

Source: Chapter 2, Table 2.17

DIFFERENCES BETWEEN EQUIVALENT DEMAND UNITS FOR PURPOSES OF PROJECTION AND ASSESSMENT: The estimation of service units for purposes of projection can be somewhat different from the estimation of service units for purposes of assessment, which is the amount charged to a customer for new or larger water meters. The EDU projections for multifamily, industrial, office, retail and institutional developments are only estimates of how many and what type of meters would be associated on average with a multifamily unit or a thousand square feet of different kinds of commercial space. For purposes of assessment, new meters for single family dwellings will be charged at the rate of one EDU per ¾" or 1" meter, while other types of uses will pay fees based on the following ratios:

- **Multifamily developments will pay .38 EDU per multifamily unit** for domestic meters and pay the non-residential charge associated with any landscape meters. This will ensure that new multifamily developments that have no outdoor irrigation or only limited outdoor irrigation will not pay the same as new multifamily developments that have significant amounts of irrigated landscape. No wastewater impact fees will be assessed for landscape meters. This rate differs from the .52 factors used for projections, which is based on both domestic and landscape meters.

- **Non-residential developments** will pay the non-residential charge associated with the size and type of meters acquired, reflecting the amount of demand that will be placed on the water treatment and transmission system. Fees for different sizes and types of water meters will be assessed according to the following table:

Table 9.5: Equivalent Demand Unit (EDU) Factors for Assessment Purposes, Water

Unit or Meter Type*	Max Rate Meter Scale**	Non-Residential Use Adjustment Factor***	Assessment EDU
Multifamily Unit	0.38	1.00	0.38
Single Family Unit - 3/4" or 1" Meters	1.00	1.00	1.00
Single Family Unit - 1.5" Meters	3.33	1.00	3.33
Single Family Unit - 2" Meters	5.33	1.00	5.33
3/4" Displacement (Non-Residential)	1.00	2.12	2.12
1.0" Displacement (Non-Residential)	1.67	2.12	3.54
1.5" Displacement (Non-Residential)	3.33	2.12	7.06
2.0" Displacement (Non-Residential)	5.33	2.12	11.30
2.0" Turbine Class II	6.33	2.12	13.42
3.0" Compound Class II	11.67	2.12	24.74
3.0" Turbine Class II	14.50	2.12	30.74
4.0" Compound Class II	20.00	2.12	42.40
4.0" Turbine Class II	25.00	2.12	53.00
6.0" Compound Class II	45.00	2.12	95.40
6.0" Turbine Class II	53.33	2.12	113.06
8.0" Compound Class II	53.33	2.12	113.06
8.0" Turbine Class II	93.33	2.12	197.86

*Landscape meters for multifamily projects are assessed separately at the standard non-residential level.
** Recommended maximum rate for continuous operations cited in AWWA reference tables.
***Water use for any given meter size/type is 2.12 times as much for any non-res/landscape meter on average

CALCULATION OF INCREMENTAL WATER TREATMENT PLANT COSTS

Water treatment costs are calculated using the incremental method, which focuses on estimating the cost of providing enough treatment plant capacity for one equivalent demand unit, which is the amount of water needed to serve an average new single-family dwelling. Because newer residential units use less water on average than older units (because the newer water-using fixtures, appliances and irrigation devices are more efficient), average annual water demand in 2013 for homes built between 2001 to 2008 was used as a proxy for one EDU worth of water demand for future development. This number was then adjusted upwards to take into account the realities that water treatment plants must be sized to accommodate peak demands in the summer and that some water is lost in the transmission and distribution mains between the plant and customers' meters. A **peaking factor of 1.41** was calculated from calendar year 2012 data and then used to reflect the much higher maximum month needs of the City's plants. A **gross-up factor of 1.09** was calculated using production and consumption data for the 2010 through 2012 period and then used to adjust upwards the annual average day use to main leaks and other unaccounted losses.

The costs used to estimate the construction cost per gallon of new treatment capacity were obtained from the Lake Pleasant Water Treatment Plant, which was the most recently constructed new facility, completed in 2007. The City has five treatment plants – Val Vista, 24th Street, Deer Valley, Union Hills and Lake Pleasant – and the areas served by these plants changes routinely because of factors related to plant and canal closings for rehabilitation and repair work, seasonal changes in demand, operational requirements, and extensions of the network. For example, new residential developments in the North Black Canyon area north of the Central Arizona Project were served for many years with water from the

Union Hills plant, while now the area is usually served from the Lake Pleasant plant; similarly most of Desert View in the far northeast of the City is currently served with Union Hills WTP water but will likely be served by the Lake Pleasant WTP sometime in the next twenty years. Given that it is impossible to designate specific treatment plants service boundaries, it is assumed that additional treatment facilities are interchangeable and that existing and future treatment costs are best calculated using data from the most recent new construction project. All costs for the first phase of Lake Pleasant were included – design, land, and construction – and then divided by the 80 million gallon per day capacity of the first phase to arrive at a treatment cost per gallon. This figure was then adjusted using the Engineering News Record 20-city Construction Cost Index (ENR CCI) to take into account the inflation that occurred since the time of bidding and construction; costs were escalated from January 2007 to October 2018.

Table 9.6: Water Treatment Plan Costs (2019)

	MGD	Construction Cost	Land Cost	Total Cost
Lake Pleasant WTP - 80 MGD initial	80	$250,015,918	$3,320,215	$253,336,133
Inflation escalation**				$116,514,778
Cost in 2019 dollars				$369,850,911
Cost per gallon per day				$4.62
SF Average GPD Demand (Avg Annual)*				299
System Loss Gross Up				1.09
Peaking Factor				1.41
Capacity Required per EDU				460
Treatment cost per EDU				**$2,124**

*FY 2013 average GPD for all single family residential 5/8", 3/4" and 1" meters installed from 2001 to 2008
**Lake Pleasant was constructed between August 2004 and January 2007; for purposes of inflation adjustment the ENR index from January 2006 to October 2018 (7660 to 11183) was used.

CALCULATION OF WATER TRANSMISSION NETWORK FACILITIES COSTS

EXISTING TRANSMISSION NETWORK COSTS: Impact fee theory and practice allows a variety of methods to be used to value existing facilities, and these include actual historical costs, actual historical costs plus all debt service costs, actual historical costs plus only interest costs, historical costs plus all debt service costs less depreciation, and replacement costs (current design and construction costs). Current construction cost, or replacement value, was used because it was deemed to be the most fair and accurate representation of the accumulated costs of the existing system. Including only historical accounting costs would significantly underestimate the value of infrastructure because of the impact of inflation, while including both original costs and all financing costs would exaggerate the value of facilities. Using any sort of adjusted historical costs would be difficult and potentially inaccurate given that a very large portion of the network facilities currently in existence was constructed by developers and in many cases the value of credit against fees provided for those facilities was determined by plan costs from the infrastructure financing plans, and not the actual cost to the developer.

EXISTING UNIT COSTS: As discussed earlier, current design and construction unit costs as estimated by Jacobs/CH2MHILL for October 2018 were deemed to be the best proxy for the value of existing network facilities. The results are shown in the table on the following page:

Table 9.7: Unit Costs Used to Value Existing and Future Network Facilities

Facility Type	Method of Calculation	Diameter or MGD	2018 Construction Costs	Soft Cost % Assumption	2018 Total Costs
DIP Water Main*	Linear Foot	12	$182	25%	$228
DIP Water Main*	Linear Foot	16	$195	25%	$244
DIP Water Main*	Linear Foot	18	$212	25%	$265
DIP Water Main*	Linear Foot	20	$221	25%	$276
DIP Water Main*	Linear Foot	24	$267	25%	$334
DIP Water Main*	Linear Foot	30	$356	25%	$445
DIP Water Main*	Linear Foot	36	$404	25%	$505
DIP Water Main*	Linear Foot	42	$481	25%	$601
Welded Steel Water Main	Linear Foot	48	$519	25%	$649
Welded Steel Water Main	Linear Foot	54	$584	25%	$730
Welded Steel Water Main	Linear Foot	60	$651	25%	$814
Welded Steel Water Main	Linear Foot	66	$745	25%	$931
Welded Steel Water Main	Linear Foot	72	$814	25%	$1,018
Welded Steel Water Main	Linear Foot	78	$888	25%	$1,110
Welded Steel Water Main	Linear Foot	84	$963	25%	$1,204
Welded Steel Water Main	Linear Foot	90	$1,036	25%	$1,295
Booster Station**	Max Capacity	5	$4,976,200	25%	$6,220,250
Booster Station**	Max Capacity	10	$6,678,900	25%	$8,348,625
Booster Station**	Max Capacity	13.5	$7,785,838	25%	$9,732,297
Booster Station**	Max Capacity	15	$8,069,500	25%	$10,086,875
Booster Station**	Max Capacity	20	$9,480,700	25%	$11,850,875
Booster Station**	Max Capacity	30	$11,312,800	25%	$14,141,000
Booster Station**	Max Capacity	35	$12,304,009	25%	$15,380,011
Booster Station**	Max Capacity	40	$13,157,400	25%	$16,446,750
Booster Station**	Max Capacity	50	$14,627,288	25%	$18,284,109
Booster Station**	Max Capacity	60	$15,846,000	25%	$19,807,500
Pressure Reducing Station***		3	$685,900	25%	$857,375
Pressure Reducing Station***		5	$771,700	25%	$964,625
Pressure Reducing Station***		10	$977,100	25%	$1,221,375
Pressure Reducing Station***		20	$1,030,600	25%	$1,288,250
Pressure Reducing Station***		30	$1,082,400	25%	$1,353,000
Pressure Reducing Station***		40	$1,167,900	25%	$1,459,875
Pressure Reducing Station***		50	$1,217,000	25%	$1,521,250
Pressure Reducing Station***		60	$1,286,400	25%	$1,608,000
Pressure Reducing Station***		70	$1,335,500	25%	$1,669,375
Reservoir****		2	$5,869,100	25%	$7,336,375
Reservoir****		3	$6,314,700	25%	$7,893,375
Reservoir****		5	$6,536,600	25%	$8,170,750
Reservoir****		10	$14,906,400	25%	$18,633,000
Reservoir****		15	$17,705,200	25%	$22,131,500
Reservoir****		20	$22,355,700	25%	$27,944,625
Reservoir****		30	$30,651,800	25%	$38,314,750
Reservoir****		40	$38,939,000	25%	$48,673,750

Source: Jacobs/CH2MHill, October 2018

ESTIMATED TOTAL COSTS, EXISTING WATER FACILITIES: The total costs of existing water facilities were calculated by multiplying the amount and type of facility characteristics (e.g. 5,000 feet of 30" transmission main or a 10-million gallon reservoir) by the generic costs estimated $445 per foot of 30" transmission main) by the unit costs provided in the previous table. The inventory of existing facilities was provided by Water Services Department staff using GIS databases of as-built records provided by engineers and surveyors when facilities are completed and accepted by the City. As a general rule, additional 'adder costs' identified by B&V such as: phased construction, deep trenching, pavement removal and replacement, or rock excavation were not included for existing facilities, even when those costs were incurred, making the inventory extremely conservative (i.e. underestimating the current cost of replacing those projects). Jack and bore, sleeve and protective casing costs associated with highway or canal crossing costs also were not included for existing facilities.

Existing network infrastructure costs are comprised of the following categories:

- **Large transmission mains** (16" mains who sole or primary purpose is to move water from treatment plants to the distribution grid of 12" and smaller mains that directly serve customers; 16" mains that serve individual customers and provide little transmission role are not included in the inventory).

- **Reservoirs** of 1.5 million gallons (MG) or more that provide back-up storage for the transmission network for line breaks and fire events or maintain pressures during peak periods.

- **Booster stations** with capacities of 5 million gallons a day (MGD) or more that move water through the transmission network of mains and that maintain adequate levels of pressure throughout the transmission and distribution network.

- **Pressure reducing valve (PRV)** stations with capacities of 3 million gallons a day or more (3 MGD) that slow down water at specific points in the transmission networks and allow for the separation of the network into different water pressure zones.

- **Production wells** with a capacity of at least 1 million gallons a day (MGD) whose primary purpose is the production of water for transfer into the transmission and distribution networks.

Details on the assumed design specifications for these facilities are included in the Jacobs/CH2MHILL Unit Cost Study Update (2019). Actual facility characteristics will rarely match these design guidelines exactly because of site-specific requirements, but by and large the facilities will fit the standard model for that type and size, and total land, design and construction costs will on average approximate that assumed.

The estimated totals for all existing water transmission facility costs are shown by service area, in the following tables:

Table 9.8: Northern Area Water Impact Fees Summary of Existing Facility Costs

Type of Facility	Cost
Cost of Existing Transmission Mains	$254,474,521
Cost of Existing Reservoirs	$87,762,800
Cost of Existing Boosters	$158,051,392
Cost of Existing PRVs	$33,156,500
Cost of Existing Wells	$55,313,416
Total Existing Facilities	**$588,758,630**

Table 9.9: Southern Area Water Impact Fees Summary of Existing Facility Costs

Type of Facility	Cost
Cost of Existing Transmission Mains	$214,382,805
Cost of Existing Reservoirs	$97,541,874
Cost of Existing Boosters	$71,896,875
Cost of Existing PRVs	$14,394,125
Total Existing Facilities	**$398,215,679**

FUTURE WATER TRANSMISSION COSTS: Costs for future water network facilities are calculated in essentially the same way as for existing water facilities, using 2018 costs established by Jacobs/CH2MHILL. Future facility sizes, locations, lengths or capacities were determined by engineering and modeling staff in the Water Services Department. Only infrastructure needed to serve projected developments between 2020 and 2029 were included in the inventory of future facilities. 'Adder' costs such as pavement removal and replacement, when known, have been included in the cost of certain future water projects, in part to ensure that when and if developers that construct those facilities, realistic credit levels will be available to them. On the whole, however, the costs are generic in the sense that they are a best estimate of what a project of a specific type would cost if constructed anywhere in the growth areas of the City of Phoenix in December 2018 dollars. Actual project costs will inevitably be higher or lower depending on topography, the type of soils encountered, and future trends in labor, equipment, materials and contractor costs.

Future network infrastructure costs are comprised of the following categories:

- **Large transmission mains** (16" mains who sole or primary purpose is to move water from treatment plants to the distribution grid of 12" and smaller mains that directly serve customers; 16" mains that serve individual customers and provide little transmission role are not included in the inventory).

- **Reservoirs** of 1.5 million gallons (MG) or more that provide back-up storage for the transmission network for line breaks and fire events or maintain pressures during peak periods.

- **Booster stations** with capacities of 5 million gallons a day (MGD) or more that move water through the transmission network of mains and that maintain adequate levels of pressure throughout the transmission and distribution network.

- **Pressure reducing valve (PRV)** stations with capacities of 3 million gallons a day or more (3 MGD) that slow down water at specific points in the transmission networks and allow for the separation of the network into different water pressure zones.

- **Production wells** with a capacity of at least 1 million gallons a day (MGD) whose primary purpose is the production of water for transfer into the transmission and distribution networks.

Details on the assumed design specifications for these facilities are included in the Jacobs/CH2MHILL Unit Cost Study Update (2019). The estimated totals for the projected 2020-29 water transmission facility costs are shown by service area, in the following tables:

Table 9.10: Northern Area Water Impact Fees Summary of Future Facility Costs

Type of Facility	Cost
Cost of New Transmission Mains	$57,986,586
Cost of New Booster Stations	$11,086,875
Cost of New PRV Stations	$3,217,500
Cost of New Wells	$6,423,124
New Facilities 2020-29	**$78,714,085**

Table 9.11: Southern Area Water Impact Fees Summary of Future Facility Costs

Type of Facility	Cost
Cost of New Transmission Mains	$24,612,059
Cost of New Boosters	$0
Cost of New PRVs	$1,007,375
New Facilities 2015-24	**$25,619,434**

BUILDOUT COST PER EDU

Facilities that have already been constructed or that will be constructed between 2020 and 2029 may have additional capacity that can benefit future cohorts of development (i.e. post 2030 development). To acknowledge that the current cohort of development (2020-29) may be providing excess capacity that exceeds its proportionate share, a buildout cost per EDU was calculated and then used as an alternative gross impact fee if the buildout cost is less than the 'buy in plus 10-year plan'-based gross impact fee. The buildout cost per EDU was calculated using facility inventories that are a combination of the existing facilities identified for this plan and future facilities identified in the 2012 City Water Master Plan (the plan is currently being revised and should be complete in late 2019 or early 2020), and maximum development yields for all parcels provided by Applied Economics. Basically, this the cost of all existing and future water transmission infrastructure in 2019 dollars, divided by all existing and future EDUs.

Table 9.12: Northern Area Buildout Network Cost per EDU (Capacity Responsibility)

Northern Water	2019 Dollars
Existing Facilities	$588,758,630
Future to Buildout According to 2012 MP - Northeast	$257,176,875
Future to Buildout According to 2012 MP - Northwest	$198,612,625
Total Network Costs at Buildout	$1,044,548,130
Total EDU at Buildout	190,042
Total Network Cost Per EDU	$5,496

Table 9.13: Southern Area Buildout Network Cost per EDU (Capacity Responsibility)

Southern Water	2019 Dollars
Existing Facilities	$398,215,679
Future Facilities 2020-29	$25,619,434
Total Network Costs at Buildout	$423,835,113
Total EDU at Buildout	133,167
Total Network Cost Per EDU	$3,183

POTENTIAL GROSS IMPACT FEE PER EDU

For the Water category, a gross impact fee is the proportionate share of the costs of the existing and planned (from 2020-29) transmission facilities and treatment plants, per EDU, for each service area. The gross impact fee does not include any credit for alternative revenues, or offsets, which will be calculated in the next section of this Chapter. Please note that the gross fee for the network portion is the lower of the 2020-29 IIP cost per EDU and the buildout cost per EDU to ensure that capacity issues are taken into account (see previous discussion). The calculations for each service area are shown in the following tables:

Table 9.14: Northern Area Water Impact Fee – Gross Fee Calculations

Type of Facility	Cost
Cost of New Transmission Mains	$57,986,586
Cost of New Booster Stations	$11,086,875
Cost of New PRV Stations	$3,217,500
Cost of New Wells	$6,423,124
New Facilities 2020-29	**$78,714,085**
Cost of Existing Transmission Mains	$254,474,521
Cost of Existing Reservoirs	$87,762,800
Cost of Existing Boosters	$158,051,392
Cost of Existing PRVs	$33,156,500
Cost of Existing Wells	$55,313,416
Total Existing Facilities	**$588,758,630**
Total Network Facilities in 2029	**$667,472,714**
2020-29 EDUs	25,515
Existing EDUs	42,675
Total EDU in 2029	**68,190**
Cost per EDU - Network	$9,788
Network Capacity Responsibility (Based On Build-Out Share)	$5,496
Revised Cost per EDU (Lower of Previous Two Lines)	$5,496
Cost per EDU - Treatment Plant	$2,124
Total Cost per EDU	**$7,621**

**DOF offset shown is for one single family dwelling unit; DOF offsets for other unit/meter types might be slightly different on a per-EDU basis.

Table 9.15: Southern Area Water Impact Fee – Gross Fee Calculations

Type of Facility	Cost
Cost of New Transmission Mains	$24,612,059
Cost of New Boosters	$0
Cost of New PRVs	$1,007,375
New Facilities 2020-29	**$25,619,434**
Cost of Existing Transmission Mains	$214,382,805
Cost of Existing Reservoirs	$97,541,874
Cost of Existing Boosters	$71,896,875
Cost of Existing PRVs	$14,394,125
Total Existing Facilities	**$398,215,679**
Total Network Facilities in 2029	**$423,835,113**
2020-29 EDUs	27,396
Existing EDUs	93,712
Total EDU in 2029	**121,108**
Cost per EDU - Network	$3,500
Network Capacity Responsibility (Based On Build-Out Share)	$3,183
Revised Cost per EDU (Lower of Previous Two Lines)	$3,183
Cost per EDU - Treatment Plant	$2,124
Total Cost per EDU	**$5,307**

**DOF offset shown is for one single family dwelling unit; DOF offsets for other unit/meter types might be slightly different on a per-EDU basis.

OFFSETS

Before determining an actual impact fee schedule, offsets must be taken into consideration, in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. In the case of Water impact fees assessed by the City of Phoenix, two major sources of alternative revenue are relevant: Development Occupational Fees (DOF) and water rate revenue.

Development Occupational Fees (DOF) are charged in all parts of the City and are used to fund new infrastructure that serves new development and are assessed in a manner similar to that of the City's impact fees in growth areas. Since the DOF charges are offset at a one-to-one ratio, a $600 single-family water DOF reduces water impact fees by a single-family home by $600. These offsets are calculated at the time of building permit or water meter acquisition and are based either on number of units for residential developments or on number and type of water meters for commercial and industrial development.

Water rate revenue offsets are much more complicated to calculate, because only a fraction of those rates paid by a customer is used to pay for principal and interest on bonds issued to fund growth-related projects. The vast majority of rate revenue is used to pay for items like energy, chemicals, treatment plant operations, infrastructure repair and renovations, and administration. To estimate the amount of revenue that will be collected from homeowners and businesses in the future that can be used to offset water impact fees, several steps can be used.

The first step would be to estimate how much water rate revenue will be generated by an EDU. Since the majority of rate revenue is tied to volume-based rates, a consistent per-EDU estimate relying on the number and type of meters is possible by multiplying the volume consumed by the average single-family dwelling (annual average in gallons per day) by the average annual rate revenue per gallon of water sold to obtain an average annual rate revenue per EDU amount. The next step would be to calculate an estimate of the percentage of total rate revenue that goes towards paying debt service for capital improvements of the types included in the impact fee program. That percentage of total rate revenue can then be multiplied by the average annual rate revenue per EDU amount to obtain an estimate of how much rate revenue from any given EDU is used to fund capital improvements of the type included in the water impact fee plans, on an annual basis. The final step would be to take this estimate of annual rate revenue devoted to growth-related water and wastewater expenditures, and then multiply it by some number of future years and then discount it back to current values using a net present value calculation.

However, an even more simple and conservative approach is used in this plan. Total debt associated with growth-related water infrastructure projects is simply divided into the total number of existing EDUs. This calculation provides an offset per EDU that is slightly higher than the type of calculation cited above because the entire value of all debt-related facilities is essentially removed from the fee, at least on a City-wide, per EDU basis. In reality, the growth in the number of the EDUs as development takes place and the use of future impact fees to pay down the debt means that the actual amount of debt repaid through water rates will be less than that estimated. The type of calculation used in this plan is extremely conservative in that it does not assume that the rate base will be expanded or that the debt burden will be reduced by future impact fee-related debt repayment beyond funds currently held in impact fee accounts. This calculation is also consistent with the methodology used to calculate offsets for other impact fee categories in this Infrastructure Financing Plan.

Table 9.16: Growth-related Water Projects Funded by Bond Proceeds

Description	Total Project Cost	Spent from Operating Funds	Total Projected Debt Service after FY2018
5 MG Pinnacle Peak Reserv oir	$1,277,371	$0	$1,432,273
North Gateway Pump Station	$43,202,373	$14,328,383	$22,972,566
DV WTP - East Basins	$152,795,606	$6,755,421	$164,135,098
Union Hills WTP 160 expansion	$44,234,371	$7,656	$34,372,114
Lake Pleasant WTP - Land	$2,950,772	$2,860,901	$34,822
Lake Pleasant WTP	$4,573,696	$0	$1,734,184
Lake Pleasant WTP - A1	$745,442	$0	$64,371
Lake Pleasant WTP - DB	$7,227,660	$0	$3,819,249
Lake Pleasant WTP - De	$230,387,203	$215,611	$184,138,362
Cav e Creek Rd Happy Vlly-Jomax	$3,921,050	$0	$425,135
Cav e Creek Rd Jomax-Tatum	$6,899,052	$0	$802,183
Cav e Creek Rd Tatum-Dov e Vlly	$2,292,157	$0	$251,249
19th Av e & Chandler to 35th Av e & Pecos	$2,065,453	$0	$1,071,039
43rd Av e/ Chandler	$6,402,495	$0	$3,345,077
43rd Av e & Carv er to 27th Av e & Ceton	$4,029,538	$61,131	$2,180,099
51st Av e to 43 Av e/ Knox	$3,169,794	$17,717	$1,729,611
Foothills Res to 19th Av e & Chandler	$4,549,017	$4,286,344	$37,449
Foothills Res to 20th Str & Pecos	$6,802,160	$0	$4,066,423
20st Str/ Peco	$4,221,990	$0	$2,314,544
67th Av e/ Buckeye	$3,310,823	$0	$1,830,701
67th Av e/ Baseline	$3,300,366	$162,473	$1,739,280
67th Av e/ Buckeye	$5,291,908	$334,922	$2,738,517
67th Av e/ Broadway	$4,573,993	$57,894	$3,491,583
South Mountain Tunnel	$10,545,410	$0	$5,985,474
Peco / 27th Av e to 43rd Av e	$1,787,570	$0	$1,101,879
Lake Pleasant WTP to 27av e Main	$46,765,493	$3,871,927	$34,305,105
Lower Camelback East Residential Improv ement	$50,771,321	$17,983,178	$41,446,093
TOTAL	$658,094,083	$50,943,558	$521,564,481

The total outstanding debt for capacity-expanding projects is then divided by the number of City-wide EDUs to determine the debt offset per EDU, as shown in the following table:

Table 9.17: Water Debt Offset Calculation

Outstanding Debt, Capacity-Expanding Projects	$521,564,481
Less Existing Southern Impact Fee Fund Balance	$46,980,859
Net Growth-Related Outstanding Debt	$474,583,622
÷ Total Existing City-Wide EDUs	686,852
Growth-Related Debt Offset per EDU	**$691**

POTENTIAL NET IMPACT FEE SCHEDULES

The potential Water net impact fee schedule for each service area is calculated by subtracting the offset(s) per EDU from the gross impact fee per EDU. The following table shows the calculation of the net water impact fee on a per EDU basis for a new single-family dwelling:

Table 9.18: Single Family, Potential Water Net Impact Fees per EDU by Impact Fee Area

Impact fee Area	Gross Fee per EDU	DOF Offset per EDU	W Rate Offset per EDU	Net Fee per EDU
Northern	$7,621	$600	$691	**$6,330**
Southern	$5,307	$600	$691	**$4,016**

The potential Water net impact fees for larger single-family uses, multi-family uses, and for non-residential uses, are shown in the following tables:

Table 9.19: Non-Single Family, Potential Northern Water Net Impact Fee Schedule

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset*	Water Rate Offset	Net Fee
Multifamily Unit	0.38	$2,896	$360	$263	**$2,273**
Single Family Unit - 3/4" or 1" Meters	1.00	$7,621	$600	$691	**$6,330**
Single Family Unit - 1.5" Meters	3.33	$25,378	$600	$2,301	**$22,477**
Single Family Unit - 2" Meters	5.33	$40,620	$600	$3,683	**$36,337**
3/4" Displacement (Non-Residential)	2.12	$16,157	$600	$1,465	**$14,092**
1.0" Displacement (Non-Residential)	3.54	$26,978	$1,500	$2,446	**$23,032**
1.5" Displacement (Non-Residential)	7.06	$53,804	$2,760	$4,878	**$46,166**
2.0" Displacement (Non-Residential)	11.30	$86,117	$4,500	$7,808	**$73,809**
2.0" Turbine Class II	13.42	$102,274	$7,200	$9,273	**$85,801**
3.0" Compound Class II	24.74	$188,544	$9,240	$17,095	**$162,209**
3.0" Turbine Class II	30.74	$234,270	$16,200	$21,241	**$196,829**
4.0" Compound Class II	42.40	$323,130	$15,000	$29,298	**$278,832**
4.0" Turbine Class II	53.00	$403,913	$18,000	$36,623	**$349,290**
6.0" Compound Class II	95.40	$727,043	$27,600	$65,921	**$633,522**
6.0" Turbine Class II	113.06	$861,630	$37,500	$78,124	**$746,006**
8.0" Compound Class II	113.06	$861,630	$48,000	$78,124	**$735,506**
8.0" Turbine Class II	197.86	$1,507,891	$54,000	$136,721	**$1,317,170**

*As of January 2020. These will change if the DOF is revised by separate ordinance.

Table 9.20: Non-Single Family, Potential Southern Water Net Impact Fee Schedule

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset*	Water Rate Offset	Net Fee
Multifamily Unit	0.38	$2,017	$360	$263	**$1,394**
Single Family Unit - 3/4" or 1" Meters	1.00	$5,307	$600	$691	**$4,016**
Single Family Unit - 1.5" Meters	3.33	$17,672	$600	$2,301	**$14,771**
Single Family Unit - 2" Meters	5.33	$28,286	$600	$3,683	**$24,003**
3/4" Displacement (Non-Residential)	2.12	$11,251	$600	$1,465	**$9,186**
1.0" Displacement (Non-Residential)	3.54	$18,787	$1,500	$2,446	**$14,841**
1.5" Displacement (Non-Residential)	7.06	$37,467	$2,760	$4,878	**$29,829**
2.0" Displacement (Non-Residential)	11.30	$59,969	$4,500	$7,808	**$47,661**
2.0" Turbine Class II	13.42	$71,220	$7,200	$9,273	**$54,747**
3.0" Compound Class II	24.74	$131,295	$9,240	$17,095	**$104,960**
3.0" Turbine Class II	30.74	$163,137	$16,200	$21,241	**$125,696**
4.0" Compound Class II	42.40	$225,017	$15,000	$29,298	**$180,719**
4.0" Turbine Class II	53.00	$281,271	$18,000	$36,623	**$226,648**
6.0" Compound Class II	95.40	$506,288	$27,600	$65,921	**$412,767**
6.0" Turbine Class II	113.06	$600,009	$37,500	$78,124	**$484,385**
8.0" Compound Class II	113.06	$600,009	$48,000	$78,124	**$473,885**
8.0" Turbine Class II	197.86	$1,050,043	$54,000	$136,721	**$859,322**

*As of January 2020. These will change if the DOF is revised by separate ordinance.

SUMMARY OF PLANNED IMPROVEMENTS AND DEBT PAYMENT, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that the majority of funds collected from Water impact fees between 2020 and 2029 will be used to pay down debt associated with treatment plant and water transmission projects, but funding will also be used for future projects to serve new development. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That all of the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single family dwellings. Depending on the types of units and meters actually obtained, the net fees will not exactly match this number because the scale for charging DOF is slightly different than the scale used in assessing water impact fees; however the net impact fees collected should be very close to those shown.

- That all of the future water mains, booster station, pressure reducing valve station, and reservoir facilities listed in the plan are built in the ten-year planning period 2020-2029, with remaining funds going towards repayment of debt associated with the design and construction of existing growth water treatment and transmission facilities.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities and debt repayments that are eligible to be funded by the Water impact fee collections, as calculated within this Chapter. **Other planned facilities NOT funded by impact fees are not shown.**

Table 9.21: Planned Improvements and Costs, 2020-2029, Northern Impact Fee Area

Facility	Total Costs
Cost of New Transmission Mains	$57,986,586
Cost of New Booster Stations	$11,086,875
Cost of New PRV Stations	$3,217,500
Cost of New Wells	$6,423,124
Debt Repayment	$82,789,535
Subtotal	**$161,503,620**
- Anticipated Net Impact Fee Revenue, 2020-29	$161,503,620
Anticipated Need for Alternative Funding	**$0**

Source: Costs from Table 9.14; debt repayment assumed to be the difference between estimated costs and anticipated revenues.

Table 9.22: Planned Improvements and Costs, 2020-2029, Southern Impact Fee Area

Facility	Total Costs
Cost of New Transmission Mains	$24,612,059
Cost of New Boosters	$0
Cost of New PRVs	$1,007,375
Debt Repayment	$84,406,918
Subtotal	**$110,026,352**
- Anticipated Net Impact Fee Revenue, 2020-29	$110,026,352
Anticipated Need for Alternative Funding	**$0**

Source: Costs from Table 9.15; debt repayment assumed to be the difference between estimated costs and anticipated revenues.

CHAPTER 10: WASTEWATER INFRASTRUCTURE IMPROVEMENTS PLAN

The City charges a Wastewater Impact Fee to cover the cost of wastewater collection and wastewater treatment infrastructure in the City's growth areas.

WASTEWATER IMPACT FEE AREAS

The Wastewater Impact Fee is charged in seven distinct service areas:
- Northern (Northwest and Northeast)
- Deer Valley
- Estrella North
- Estrella South
- Laveen West
- Laveen East
- Ahwatukee

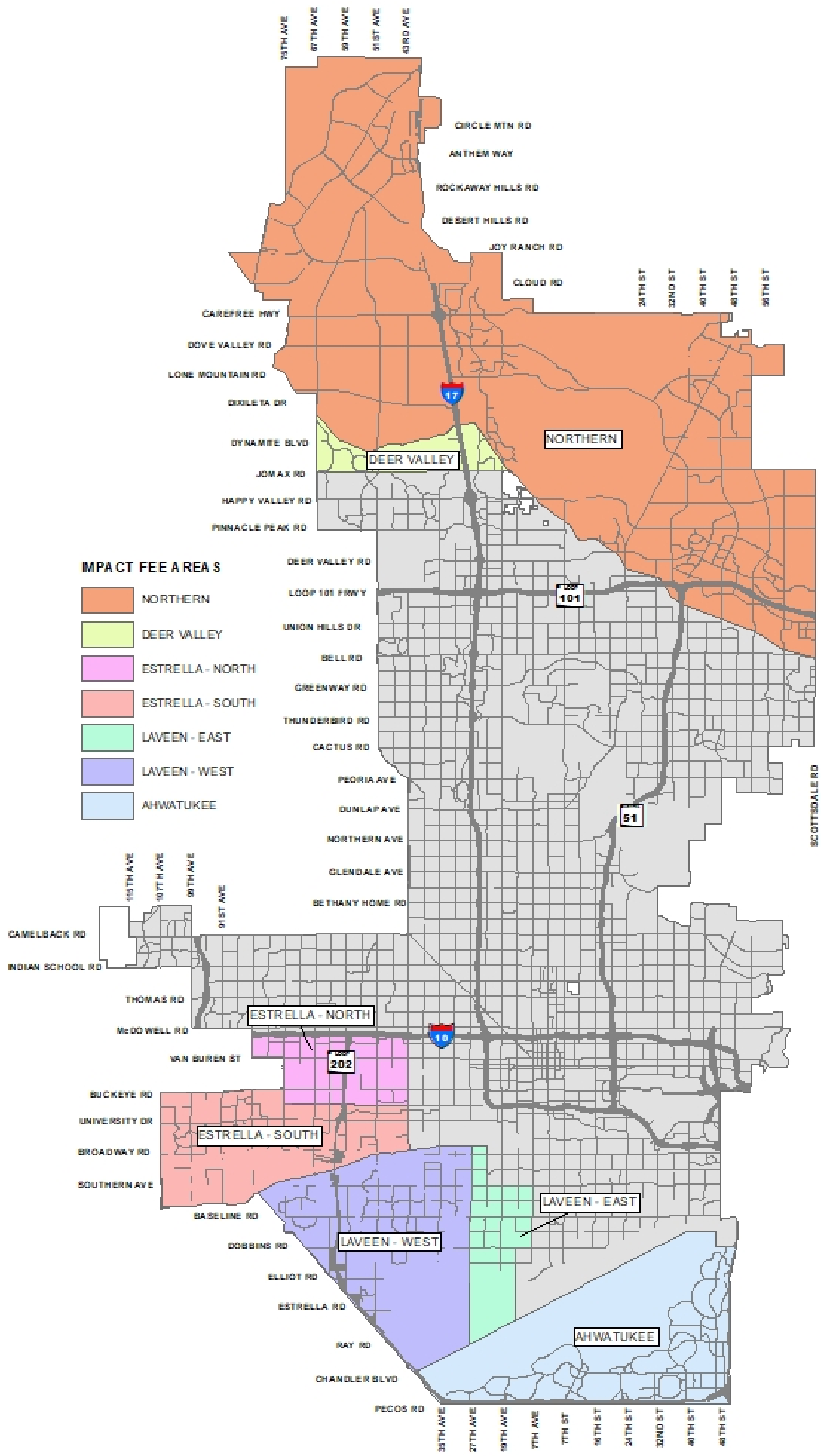
Please see the map on the following page to see the boundaries of each of the service areas.

The Wastewater Impact Fee is comprised of two components: a collection network component and a treatment plant component. In Deer Valley, Estrella North, Laveen East, and Ahwatukee, only the treatment plant component is calculated and assessed.

WASTEWATER COLLECTION VS. WASTEWATER TREATMENT: The City's wastewater collection and treatment infrastructure is a large integrated system that encompasses 191 drainage basins, thousands of miles of sewers, and two treatment plants. Because all of the wastewater produced by the City's growth areas is treated at the 91st Avenue Wastewater Treatment Plant (WWTP), and because the vast majority of future capacity expansions will take place at the 91st Avenue WWTP, costs are based on the most recent expansion of the City's treatment capacity at that plant. Wastewater collection facility characteristics, however, are more distinct, and separate network fees are calculated for the Northern, Estrella South, and Laveen West areas where major distinct networks have been and will continue to be constructed. In each of these areas a network of large gravity sewers, lift stations and pressurized force mains is being built to serve functionally separate areas so a unique fee can be calculated and assessed.

LEVEL OF SERVICE

Definitions of level of service associated with wastewater services are difficult to summarize because of the numerous metrics used to evaluate wastewater collection and treatment. However, as a general rule, once the City legally accepts the transfer of wastewater facilities from a developer, the City is obligated to meet all state and federal regulatory requirements, and it attempts to provide reliable and high quality


IMPACT FEE AREAS
NORTHERN
DEER VALLEY
ESTRELLA - NORTH
ESTRELLA - SOUTH
LAVEEN - EAST
LAVEEN - WEST
AHWATUKEE
NORTHERN
DEER VALLEY
ESTRELLA - NORTH
ESTRELLA - SOUTH
LAVEEN - EAST
LAVEEN - WEST
AHWATUKEE
CIRCLE MTN RD
ANTHEM WAY
ROCKAWAY HILLS RD
DESERT HILLS RD
JOY RANCH RD
CLOUD RD
CAREFREE HWY
DOVE VALLEY RD
LONE MOUNTAIN RD
DIXILETA DR
DYNAMITE BLVD
JOMAX RD
HAPPY VALLEY RD
PINNACLE PEAK RD
DEER VALLEY RD
LOOP 101 FRWY
UNION HILLS DR
BELL RD
GREENWAY RD
THUNDERBIRD RD
CACTUS RD
PEORIA AVE
DUNLAP AVE
NORTHERN AVE
GLENDALE AVE
BETHANY HOME RD
CAMELBACK RD
INDIAN SCHOOL RD
THOMAS RD
McDOWELL RD
VAN BUREN ST
BUCKEYE RD
UNIVERSITY DR
BROADWAY RD
SOUTHERN AVE
BASELINE RD
DOBBINS RD
ELLIOT RD
ESTRELLA RD
RAY RD
CHANDLER BLVD
PECOS RD
SCOTTSDALE RD
17
101
51
10
202

wastewater services to all customers at all times. The City also endeavors to meet a wide range of standards that it is not legally required to, but which it seeks to attain. For example, the City's Water Services Department has the following types of objectives that must be considered as being part of the level of service for wastewater:

- **Collection.** The City collects all wastewater produced by customers that are connected to the City's wastewater system and transports it to treatment facilities using a network of lift stations and interceptors.

- **Capacity management.** The City ensures that the wastewater system does not generate surplus situations where wastewater levels exceed capacities and sewage is discharged through manholes into streets or washes, even during extreme storm events that result in massive inflow and infiltration situations.

- **Capacity standards.** The City complies with U.S. Environmental Protection Agency and Arizona Department of Environmental Quality standards regarding maximum sewer capacity use and associated system sampling and modeling requirements.

- **Wastewater treatment: liquid discharges.** The City treats all wastewater collected in the network and converts that wastewater into treated water that can be used either for safe disposal in the Salt River or for reclaimed water uses such as agricultural irrigation, cooling water at the Palo Verde nuclear plant, groundwater recharge, or other beneficial uses.

- **Wastewater treatment: solid discharges.** The City processes, separates and then disposes of solids found in the wastewater on farms, in energy production units, in landfills or at other appropriate locations.

- **Wastewater treatment standards.** The City achieves or exceeds minimum treated water and solids standards established by the U.S. Environmental Protection Agency and Arizona Department of Environmental Quality.

While there are many different parameters that dictate the specific sizes, quantities and locations of various types of facilities needed in the City's wastewater service areas, the following assumptions were used to establish the proportionate amount of infrastructure required to serve an equivalent demand unit (EDU):

- An EDU's average daily wastewater generation is the same as the average monthly daily generation in the lowest-use month in fiscal year 2013 calculated for all single family residential 5/8", 3/4", and 1" meters installed from 2001 to 2008. This average gallon per day factor indicates the amount of wastewater capacity that will be required by a relatively new single-family dwelling unit constructed in Phoenix and serves as a proxy for infrastructure needs associated with a given amount of wastewater generation.

- The EDU factor for multifamily units is 0.49 per unit and is calculated based on estimates of multifamily water use of 107 GPD for the low month in FY 2012/13 that includes only domestic (no landscape) meters taken from a sample of 6,742 units built in the City between 2002 and 2008.

- EDU factors for industrial, commercial and institutional meters were calculated from an analysis of millions of square feet of space and associated meters.

- EDU factors for industrial, commercial and institutional meters are also calculated by using an additional adjustment factor that reflects the fact that these types of meters on average use far more water than a comparably sized single-family meter, and thus generate more wastewater. This adjustment factor, based on the low month use in FY 12/13 (wastewater flows are correlated with low month or winter use), is 2.25, indicating that any given meter size/type supplying industrial and commercial customers (not including landscape meters) will generate 2.25 times as much wastewater as a similar single-family residential meter.

- For purposes of treatment-capacity-requirement calculations, a peaking factor of 1.5 based on average daily flows has been used. This factor reflects the fact that a treatment plant must be sized to accommodate major fluctuations in flows that result from storm events and variable residential and industrial customer wastewater generation patterns.

Table 10.1: Wastewater Use Ratio for Non-Single-Family EDU Adjustment Factor

Meter Type	MER-Based EDU	CCF (FY13 Low Month)	CCF/EDU/DAY
SF Standard	365,706	3,310,427	0.2976
Non-SF	97,294	1,981,060	0.6694
		Non-Single-Family EDU Adjustment Factor	**2.25**

Source: COP Water Services Department.

WASTEWATER IMPACT FEE CALCULATION METHODOLOGY

The Wastewater Impact Fee is calculated by using a mix of incremental, buy-in and plan development fee methodologies, with all costs estimated in October 2018 dollar terms. **Treatment plant costs are calculated by estimating the amount of incremental treatment plant capacity** that will be required for an EDU, and then estimating the cost of constructing that amount of plant capacity based on actual design and construction costs with an adjustment to reflect inflation to December 2018. The 91st Avenue WWTP expansion was used as the source of construction cost per gallon of capacity because this plant treats the majority of the City's wastewater, almost all (or all) of the wastewater generated by the City's growth areas, and the majority of the future wastewater generated in the City's growth areas. In the future some of the wastewater generated in the Northern Impact Fee Area will be treated at the Cave Creek Water Reclamation Plant (CCWRP) but the capital cost of treating that wastewater will be greater than using conventional processes and the timing of improvements to the CCWR are uncertain so those higher costs have not been included in the Northern Wastewater Impact Fee.

Wastewater collection network costs are calculated by estimating the current cost of constructing existing facilities as well as facilities that will need to be constructed over the 2020-29 period, estimating the proportionate amount of those facilities that can be attributed to EDUs already built or that will be built in the 2020-29 period, and then dividing the cost of the existing and new (2020-29) facilities by the number of existing and new EDUs, taking into account any excess levels of capacity. Existing and future infrastructure costs are all based on the current cost of construction, estimated in October 2018 costs, using generic infrastructure types and quantities provided by Jacobs/CH2MHILL. Buildout costs per EDU are also calculated to ensure that the development cohort (2020-29) covered by this plan are not forced to pay for a disproportionate amount of infrastructure; where buildout cost per EDU are lower than the 'buy-in plus 10-year plan' cost per EDU, the buildout cost per EDU is used.

Once treatment plant costs and network costs have been calculated on a per EDU basis and combined to create the gross water impact fee, offsets for alternative revenue sources that are used to pay for new growth-related infrastructure are then calculated and subtracted, resulting in the potential net impact fee. In the case of the Wastewater Impact Fee, offsets are provided for wastewater rate revenue that will be used to pay down outstanding debt and for the Development Occupational Fee (DOF) which is used to fund new wastewater infrastructure. The resulting net fee is then assessed to all customers obtaining new (or larger) water meters that will add to demands on the City's wastewater collection and treatment systems. Customers acquiring water meters for purely landscape water use or other uses not connected to the City's wastewater network will not be assessed a Wastewater Impact Fee.

ANALYSIS OF EXISTING SERVICE AND CAPACITY IN THE IMPACT FEE AREAS

Treatment Plants. While a significant amount of additional capacity exists in the City's two wastewater treatment plants, an extensive analysis of existing services and capacity is not included because the treatment fee is based on incremental cost. By definition, new development being assessed this type of fee is only paying for that increment of capacity needed to serve that development, and not for capacity used to serve existing customers or for unused capacity. However, as indicated in the following table, the City has more than enough capacity to serve existing and future customers over the 2020-29 period using existing plants:

Additional capacity will eventually be required in the period beyond 2029, and new facilities will likely be constructed at the 91st Avenue WWTP. Calculation of incremental costs associated with the utilization of treatment plant capacity was undertaken using costs from the most recently constructed expansion (UP05) - escalated to adjust for inflation, and is described in the section on wastewater treatment costs.

WASTEWATER EQUIVALENT DEMAND UNITS

Existing Equivalent Demand Units. The detailed calculations for the number of existing equivalent demand units (EDUs) are provided below. It should be noted that existing EDUs are only calculated for the Northern, Estrella South, and Laveen West service areas, since only those areas have future 2020-29 wastewater collection network improvements (and thus need the table date for the methodology). As stated earlier, the Deer Valley, Estrella North, Laveen East, and Ahwatukee service areas include only treatment plant costs in the fee methodology, which uses a City-wide EDU count for calculations. The summary is provided in the following tables:

Table 10.2: Estimated "Base Year" Equivalent Demand Units (2019), Wastewater

Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	29,064	4,259	1,870	285	286	1,481	37,245
Deer Valley	5,026	149	2	0	0	27	5,205
Estrella North	2,709	358	571	408	9,455	509	14,010
Estrella South	14,705	2	668	356	2,187	556	18,474
Laveen West	18,861	1	807	21	175	691	20,556
Laveen East	6,124	169	261	0	17	239	6,810
Ahwatukee	26,999	3,966	1,545	557	251	696	34,014
IFA Total	103,488	8,905	5,724	1,627	12,371	4,199	136,314
Balance of City	346,231	80,727	41,031	24,454	24,309	29,502	546,254
Citywide	449,719	89,632	46,755	26,081	36,680	33,701	682,568

Projected Service Units, 2020-29. The detailed calculations for the number of projected equivalent demand units (EDUs) for the ten-year planning period 2020-29 are provided in the following table:

Table 10.3: Projected Equivalent Demand Units (2020-2029), Wastewater

Impact Fee Area	SF Units	MF Units	Retail	Office	Industrial	Other	Total
EDU Factor	1.00	0.49	0.43	0.27	0.23	0.23	
Northern - WW	18,172	4,035	1,382	515	181	931	25,216
Deer Valley	50	0	0	0	0	17	67
Estrella North	10	231	106	88	1,195	176	1,806
Estrella South	5,545	1,126	543	311	1,748	628	9,902
Laveen West	8,301	1,668	659	307	43	522	11,501
Laveen East	1,949	0	225	0	0	123	2,297
Ahwatukee	1,414	253	60	77	0	0	1,804
IFA Total	35,441	7,313	2,977	1,298	3,167	2,397	52,593
Balance of City	1,509	7,748	2,129	1,373	269	1,275	14,303
Citywide	36,950	15,061	5,106	2,671	3,436	3,672	66,896

DIFFERENCES BETWEEN EQUIVALENT DEMAND UNITS FOR PURPOSES OF PLANNING AND ASSESSMENT: The estimation of service units for purposes of projection can be somewhat different from the estimation of EDUs for purposes of assessment, which is the amount charged to a customer for new or larger water meters. The EDU projections for multifamily, industrial, office, retail and institutional developments are only estimates of how many and what type of meters would be associated on average with a multifamily unit or a thousand square feet of different kinds of commercial space. For purposes of assessment, while new meters for single family dwellings will be charged at the rate of one EDU per ¾" or 1" meter, other types of uses will pay fees based on the following formulas which are calculated specifically for each new development or additional meter acquired:

- Multifamily developments will pay 0.49 EDU per multifamily unit for domestic meters and not pay any wastewater fee for landscape meters.
- Non-residential developments will pay the non-residential charge associated with the size and type of meters acquired, reflecting the amount of demand that will be placed on the wastewater collection system and treatment plants. No wastewater impact fees will be assessed for landscape meters. Fees for different sizes and types of water meters will be assessed according to the following table:

Table 10.4: Equivalent Demand Unit (EDU) Factors for Assessment Purposes, Wastewater

Unit or Meter Type*	Max Rate Meter Scale**	ICI Use-Based Adj. Factor***	Assessment EDU
Multifamily (Per Unit)	0.49	1.00	**0.49**
Single Family Unit - 3/4" or 1" DISP Meters	1.00	1.00	**1.00**
Single Family Unit - 1.5" DISP Meters	3.33	1.00	**3.33**
Single Family Unit - 2" DISP Meters	5.33	1.00	**5.33**
3/4" DISP Industrial/Commercial/Landscape	1.00	2.25	**2.25**
1" DISP Industrial/Commercial/Landscape	1.67	2.25	**3.76**
1.5" DISP Industrial/Commercial/Landscape	3.33	2.25	**7.49**
2" DISP Industrial/Commercial/Landscape	5.33	2.25	**11.99**
2" TURBCL2 Industrial/Commercial/Landscape	6.33	2.25	**14.24**
3" COMPCL2 Industrial/Commercial/Landscape	11.67	2.25	**26.26**
3" TURBCL2 Industrial/Commercial/Landscape	14.50	2.25	**32.63**
4" COMPCL2 Industrial/Commercial/Landscape	20.00	2.25	**45.00**
4" TURBCL2 Industrial/Commercial/Landscape	25.00	2.25	**56.25**
6" COMPCL2 Industrial/Commercial/Landscape	45.00	2.25	**101.25**
6" TURBCL2 Industrial/Commercial/Landscape	53.33	2.25	**119.99**
8" COMPCL2 Industrial/Commercial/Landscape	53.33	2.25	**119.99**
8" TURBCL2 Industrial/Commercial/Landscape	93.33	2.25	**209.99**

*Wastewater impact fees are not assessed for landscape meters.
** Recommended maximum safe operating capacity cited in AWWA reference tables.
***Wastewater generation for any given meter size/type is 2.25 times as much for any non-residential meter on average.

CALCULATION OF INCREMENTAL WASTEWATER TREATMENT PLANT COSTS

Wastewater treatment costs are calculated using the incremental method, which focuses on estimating the cost of providing enough treatment plant capacity for an equivalent demand unit, which is the amount of water needed to serve an average new single-family dwelling. Because newer residential units use less water on average than older units because the water-using fixtures, appliances and irrigation devices are more efficient, average daily water demand in the low month of FY 2012/13 for homes built between 2001 to 2008 was used as a proxy for one EDU worth of wastewater generation for future development. This number was then adjusted upwards to take into account the reality that wastewater treatment plants must be sized to accommodate peak demands caused by storm events and customer cycles. A peaking factor of 1.5 was used based on current engineering practices.

The costs used to estimate the construction cost per gallon of new treatment capacity were obtained from the most recent expansion of the 91st Avenue Treatment Plant. The City has two treatment plants – 91st Avenue WWTP and 23rd Avenue WWTP – and the City's growth areas are served entirely or almost entirely by the 91st Avenue WWTP. Since the 23rd Avenue Treatment Plant serves central parts of the City and that plant is not well-suited to future expansions, it is anticipated that all future treatment expansions will take place at the 91st Avenue WWTP or at reclamation plants in the north. All costs for the UP05 expansion of the 91st Avenue Treatment Plant were included – design and construction – and then divided by the 22 million gallon per day capacity provided by the expansion project to arrive at a treatment cost per gallon. This figure was then adjusted using the Engineering News Record 20-city Construction Cost Index (ENR CCI) to take into account the inflation that occurred since the time of bidding and construction.

Table 10.5: Wastewater Treatment Plant Costs – 91st Ave (Most Recent New Construction):

	MGD	Construction Cost	Land Cost	Total Cost/Units
91st Ave UPO5 Expansion	22	$125,134,609	$0	$125,134,609
Inflation Escalation*				$27,410,698
Cost in 2019 Dollars				$152,545,307
Cost per gallon per day				7
GPD per EDU[2]				218
Peaking Factor				1.5
Wastewater Generation per EDU				327
Treatment cost per EDU				**$2,267**

*Design was started in 2005, construction started in 2008 and construction was completed in 2011. Escalation assumes Jan 2012 ENR of 9176 to Dec 2018 ENR of 11,186.

EXISTING WASTEWATER COLLECTION NETWORK COSTS

EXISTING COLLECTIONS COSTS: Impact fee theory and practice allows a variety of methods to be used to value existing facilities, and these include actual historical cost, actual historical cost plus all debt service costs, actual historical cost plus only interest costs, historical cost plus all debt service costs less depreciation, and replacement cost (current design and construction costs). Current construction cost, or replacement value, was used because it was deemed to be the most fair and accurate representation of the accumulated costs of the existing system. Including only historical accounting costs would significantly underestimate the value of infrastructure because of the impact of inflation, while including both original costs and all financing costs would exaggerate the value of facilities. Using any sort of adjusted historical costs would be difficult and potentially inaccurate given that a very large portion of the network facilities currently in existence were constructed by developers and in many cases the value of credit against fees provided for those facilities was determined by plan costs from the infrastructure financing plans, and not the actual cost to the developer.

EXISTING UNIT COSTS: As a result of the difficulties discussed in the previous paragraph, current design and construction cost as estimated by the Jacobs/CH2MHILL Unit Cost Report, adjusted to October 2018 dollars, were deemed to be the best proxy for the value of existing network facilities.

ESTIMATED TOTAL COSTS, EXISTING WASTEWATER COLLECTION FACILITIES: The cost of existing wastewater collection facilities was calculated by multiplying the amount and type of facility characteristics (e.g. 5,000 feet of 24” gravity sewer or a 5 MGD lift station) by the generic costs estimated ($429 per foot of 24” gravity sewer, regular depth) by the unit costs provided in the previous table. The inventory of existing facilities was provided by Water Services Department staff using GIS databases of as-built records provided by engineers and surveyors when facilities are completed and accepted by the City. As a general rule, additional ‘adder costs’ identified by B&V such as: phased construction, deep trenching, pavement removal and replacement, or rock excavation were not included for existing facilities, even when those costs were incurred, making the inventory extremely conservative (i.e. underestimating the current cost of replacing those projects). One exception was the very deep sewers constructed in Broadway in Estrella South; these costs were so high that the deep trenching ‘adder’ was used to partially reflect those costs. Jack and bore, sleeve and protective casing costs associated with highway or canal crossing costs were not included for existing facilities.

Existing network infrastructure costs are comprised of the following categories:

- Large sewers (15” and larger diameter sewers).
- Lift stations of 1 million gallons per day capacity or more.
- Pressurized force mains that serve lift stations of 1 MGD or more.

Details on the assumed design specifications for these facilities are included in the Jacobs Unit Cost Study Update (2019). Details on the facility locations and attributes are included in the appendices. Actual facility characteristics will rarely match these design guidelines exactly because of site-specific requirements, but by and large the facilities will fit the standard model for that type and size, and total land, design and construction costs will on average approximate that assumed.

The estimated totals for all existing wastewater facility costs are shown only for the service areas where additional collection network facilities are required, since the calculations are not necessary for the service areas where only treatment plant costs will contribute to the Wastewater impact fee:

Table 10.6: Northern Area Wastewater Existing Facility Costs

Type of Facility	Cost
Cost of Existing Sewers	$88,705,408
Cost of Existing Force Mains	$87,978,524
Cost of Existing Lift Stations	$25,732,375
Total Existing Facilities	**$202,416,306**

Table 10.7: Estrella South Area Wastewater Existing Facility Costs

Type of Facility	Cost
Cost of Existing Sewers	$31,012,213
Cost of Existing Force Mains	$10,046,724
Cost of Existing Lift Stations	$9,456,000
Total Existing Facilities	**$50,514,937**

Table 10.8: Laveen West Area Wastewater Existing Facility Costs

Type of Facility	Cost
Cost of Sewers	$54,516,762
Cost of Existing Force Mains	$10,881,982
Cost of Existing Lift Stations	$3,821,500
Total Existing Facilities	**$69,220,245**

FUTURE WASTEWATER NETWORK COLLECTION FACILITY COSTS: Costs for future wastewater network facilities were calculated in essentially the same way as for existing water facilities, using costs from the Jacobs/CH2MHILL report multiplied by the inventory of facilities that are anticipated to be built between 2020 and 2029. Future facility sizes, locations, lengths or capacities were determined by engineering and modeling staff in the Water Services Department. Only infrastructure needed to serve projected developments between 2020-29 were included in the inventory of future facilities. 'Adder' costs such as pavement removal and replacement, when known, have been included in the cost of certain future wastewater projects, in part to ensure that when and if developers that construct those facilities, realistic credit levels will be available to them. On the whole, however, the costs are generic in the sense that they are a best estimate of what a project of a specific type would cost if constructed anywhere in the growth areas of the City of Phoenix in October 2018 dollars. Actual project costs will inevitably be higher or lower depending on topography, the type of soils encountered, and future trends in labor, equipment, materials and contractor costs.

Future network infrastructure costs are comprised of the following categories:

- Large sewers (15” and larger diameter sewers).
- Lift stations of 1 million gallons per day capacity or more.
- Pressurized force mains that serve lift stations of 1 MGD or more.

Details on the assumed design specifications for these facilities are included in the Jacobs/CH2MHILL Unit Cost Study Update (October 2018 costs). Details on the facility locations and attributes are included in the appendices. As with the existing costs, the estimated totals for the projected 2020-29 wastewater facility costs are shown only for the service areas where additional collection network facilities are required, since the calculations are not necessary for the service areas where only treatment plant costs will contribute to the Wastewater impact fee:

Table 10.9: Northern Area Wastewater Future Facility Costs, 2020-29

Type of Facility	Cost
Cost of New Sewers	$36,839,148
Cost of New Force Mains	$2,898,500
Cost of New Lift Stations	$5,389,375
Total New Facilities 2020-29	**$45,127,023**

Table 10.10: Estrella South Area Wastewater Future Facility Costs, 2020-29

Type of Facility	Cost
Cost of New Sewers	$12,125,988
Cost of New Force Mains	$7,517,929
Cost of New Lift Stations	$9,837,500
New Facilities 2020-29	**$29,481,416**

Table 10.11: Laveen West Area Wastewater Future Facility Costs, 2020-29

Type of Facility	Cost
Cost of New Sewers	$11,531,545
Cost of New Lift Stations	$1,772,000
New Facilities 2020-29	**$13,303,545**

BUILDOUT IMPACT FEE PER EDU

Facilities that have already been constructed or that will be constructed between 2020 and 2029 may have additional capacity that can benefit future cohorts of development (i.e. post 2030 development). To acknowledge that the current cohort of development (2020-29) may be providing excess capacity that exceeds its proportionate share, a buildout cost per EDU was calculated and then used as an alternative gross impact IF the buildout cost is less than the 'buy in plus 10-year plan'-based gross impact fee. The buildout cost per EDU for the northern areas was calculated using facility inventories that are a combination of the existing facilities identified for this plan and future facilities identified in the 2012 City Wastewater Master Plan (the plan is currently being revised and should be complete in late 2019 or early 2020), and maximum development yields for all parcels provided by Applied Economics. Basically, this the cost of all existing and future water transmission infrastructure in 2019, divided by all existing and future EDUs.

Table 10.12: Northern Area Wastewater Buildout Network Cost per EDU (Capacity Responsibility)

Description	2019 Dollars
Existing	$202,416,306
Future Northwest Costs (MP with $2019)	$109,634,039
Future Northeast Costs (MP with $2019)	$39,491,008
Total Buildout North Wastewater	$351,541,353
Total EDU in North Buildout	182,768
Total Network Cost At Buildout, Per EDU	$1,923

Table 10.13: Estrella South Area Wastewater Buildout Network Cost per EDU (Capacity Responsibility)

Description	2019 Dollars
Existing Facility Costs	$50,514,937
Future Facility Costs	$29,481,416
Total Buildout Facility Costs (Assumes All Future Done By 2029)	$79,996,353
Total EDU in South Estrella Buildout	33,234
Cost Per EDU at Buildout	$2,407

Table 10.14: Laveen West Area Wastewater Buildout Network Cost per EDU (Capacity Responsibility)

Description	2019 Dollars
Existing Facility Costs	$69,220,245
Future Facility Costs	$13,303,545
Total Buildout Facility Costs (Assumes All Future Done By 2029)	$82,523,790
Total EDU in Laveen West Buildout	36,680
Cost Per EDU at Buildout	$2,250

POTENTIAL GROSS IMPACT FEE PER EDU

For the Wastewater category, a gross impact fee is the proportionate share of the costs of the existing and planned (from 2020-29) collection facilities and treatment plants, per EDU, for each service area. However, the Deer Valley, Estrella North, Laveen East, and Ahwatukee service areas have gross fees based only upon wastewater treatment costs, since additional collection facilities are not required in these areas, as discussed earlier in this Chapter. As discussed previously, if the buildout cost per EDU is less than the 'buy-in plus 10-year' cost per EDU, the buildout cost per EDU is used for the collection portion of the gross fee.

The gross impact fee does not include any credit for alternative revenues, or offsets, which will be calculated in the next section of this Chapter. The calculations for each service area are shown in the following tables:

Table 10.15: Northern Area Gross Wastewater Impact Fee

Type of Facility	Cost/EDUs
Cost of New Sewers	$36,839,148
Cost of New Force Mains	$2,898,500
Cost of New Lift Stations	$5,389,375
Total New Facilities 2020-29	**$45,127,023**
Cost of Existing Sewers	$88,705,408
Cost of Existing Force Mains	$87,978,524
Cost of Existing Lift Stations	$25,732,375
Total Existing Facilities	**$202,416,306**
Total Facilities in 2029	$247,543,329
Number of 2020-29 EDUs	25,216
Existing EDUs	37,245
Total EDU in 2029	**62,461**
Cost per EDU - Network	$3,963
Build Out Cost per EDU Network	$1,923
Lower of Build Out or 2029 Cost Per EDU	**$1,923**
Cost per EDU - Treatment Plant	**$2,267**
Total Cost per EDU	**$4,190**

Table 10.16: Deer Valley Area Gross Wastewater Impact Fee

Type of Facility	Cost/EDUs
Cost per EDU - Treatment Plant	**$2,267**
Total Cost per EDU	**$2,267**

Table 10.17: Estrella North, Laveen East and Ahwatukee Areas Gross Wastewater Impact Fee

Type of Facility	Cost
Cost per EDU - Treatment Plant	**$2,267**
Total Cost per EDU	**$2,267**

Table 10.18: Estrella South Area Gross Wastewater Impact Fee

Type of Facility	Cost
Cost of New Sewers	$12,125,988
Cost of New Force Mains	$7,517,929
Cost of New Lift Stations	$9,837,500
New Facilities 2020-29	**$29,481,416**
Cost of Existing Sewers	$31,012,213
Cost of Existing Force Mains	$10,046,724
Cost of Existing Lift Stations	$9,456,000
Total Existing Facilities	**$50,514,937**
Total Facilities in 2029	**$79,996,353**
Number of 2020-29 EDUs	9,902
Existing EDUs	18,474
Total EDU in 2029	**28,376**
Cost per EDU - Network	$2,819
Network Responsibility (Based On Build-Out Share)	$2,407
Revised Network Cost per EDU (Lower of Previous Two Lines)	**$2,407**
Cost per EDU - Treatment Plant	**$2,267**
Total Cost per EDU	**$4,674**

Table 10.19: Laveen West Area Gross Wastewater Impact Fee

Type of Facility	Cost
Cost of New Sewers	$11,531,545
Cost of New Lift Stations	$1,772,000
New Facilities 2020-29	**$13,303,545**
Cost of Sewers	$54,516,762
Cost of Existing Force Mains	$10,881,982
Cost of Existing Lift Stations	$3,821,500
Total Existing Facilities	**$69,220,245**
Total Facilities in 2029	**$82,523,790**
Number of 2020-29 EDUs	11,501
Existing EDUs	20,556
Total EDU in 2029	**32,057**
Cost per EDU - Network	$2,574
Network Responsibility (Based On Build-Out Share)	$2,250
Revised Network Cost per EDU (Lower of Previous Two Lines)	**$2,250**
Cost per EDU - Treatment Plant	**$2,267**
Total Cost per EDU	**$4,517**

OFFSETS

Before determining an actual impact fee schedule, offsets must be taken into consideration, in accordance with A.R.S 9-463.05, Section E.7. An offset is applied for any alternative revenue dedicated to paying for a portion of the same improvements funded by impact fees. In the case of Wastewater impact fees assessed by the City of Phoenix, two major sources of alternative revenue are relevant: Development Occupational Fees (DOF) and wastewater rate revenue.

Development Occupational Fees (DOF) are charged in all parts of the City and are used to fund new infrastructure that serves new development and are assessed in a manner similar to that of the City's impact fees in growth areas. Since the DOF charges are offset at a one-to-one ratio, a $600 single-family water DOF reduces wastewater impact fees by a single-family home by $600. These offsets are calculated at the time of building permit or water meter acquisition and are based either on number of units for residential developments or on number and type of water meters for commercial and industrial development.

Wastewater rate revenue offsets are calculated by estimating all outstanding -bond debt associated with City-wide growth-related wastewater infrastructure projects and then dividing that number into the total number of existing City-wide EDUs. It is assumed that current balances in the various wastewater impact fee accounts will be used to pay debt, so this amount has been subtracted from the estimate of growth-related outstanding bond debt. This type of calculation is extremely conservative in that it does not assume that the rate base will be expanded or that the debt burden will be reduced by future impact fee-related debt repayment.

Table 10.20: Growth-Related Wastewater Projects Funded with Bond Proceeds

Description	Total Project Cost	Spent from Operating Funds	Total Projected Debt Service after FY2018
Unified Plant 01 Design	$5,458,268	$0	$2,661,262
Unified Plant 01 Construction	$30,719,067	$3,163,513	$22,341,834
Unified Plant 05 Design	$8,884,308	$0	$9,252,018
Unified Plant 05 I & C Inspection	$1,273,918	$876,520	$318,074
Unified Plant 01 Construction Restart	$74,431,459	$63,616	$77,522,508
Unified Plant 05 Project A **	$32,607,973	$0	$35,373,146
Unified Plant 05 Project B **	$81,397,785	$1,538,856	$102,529,932
Broadway rd - 75th ave to	$2,780,367	$0	$2,225,384
Sumitomo Sewer	$1,703,426	$0	$277,856
Tatum Blvd/ north of CAP	$2,210,800	$0	$388,618
40th Street - Bell to	$1,203,992	$0	$201,615
Lift Station / Frc Main - 51	$1,058,918	$0	$443,114
LS / Frc Mn - Mayo / Sumitomo	$3,587,171	$0	$584,967
Lift Station - 64th St	$2,121,518	$0	$888,252
Laveen Lift Station	$5,706,569	$0	$2,330,043
Estrella Village Trunk	$2,318,367	$0	$1,855,603
TOTAL	$257,463,906	$5,642,505	$259,194,227

The total outstanding debt for capacity-expanding projects is then divided by the number of City-wide EDUs to determine the debt offset per EDU, as shown in the following table:

Table 10.21: Wastewater Debt Offset Calculation

Description	Amount
Outstanding Debt, Capacity-Expanding Projects	$259,194,227
Less Existing Impact Fee Fund Balance	$63,456,149
Net Growth-Related Outstanding Debt	$195,738,078
÷ Total Existing City-Wide EDUs	682,568
Growth-Related Debt Offset per EDU	**$287**

POTENTIAL NET IMPACT FEE SCHEDULES

The potential Wastewater net impact fee schedule for each service area is calculated by subtracting the offset(s) per EDU from the gross impact fee per EDU. The following table shows the calculation of the net Wastewater impact fee on a per-EDU-basis for a new single-family dwelling:

Table 10.22: Single Family, Potential Wastewater Net Impact Fees by Impact Fee Area

Impact Fee Area	Gross Fee per EDU	DOF Offset per EDU	WW Rate Offset per EDU	Net Fee per EDU
Northern	$4,190	$600	$287	**$3,303**
Deer Valley	$2,267	$600	$287	**$1,380**
Estrella North	$2,267	$600	$287	**$1,380**
Estrella South	$4,674	$600	$287	**$3,787**
Laveen West	$4,517	$600	$287	**$3,630**
Laveen East	$2,267	$600	$287	**$1,380**
Ahwatukee	$2,267	$600	$287	**$1,380**

The following tables show the calculation of the net wastewater impact fee for other types of uses/meters:

Table 10.23: Northern Non-Single-Family, Potential Wastewater Net Impact Fees

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset**	WW Rate Offset	Net Fee
Multifamily Unit	0.49	$2,053	$360	$141	**$1,552**
Single Family Unit - 3/4" or 1" Meters	1.00	$4,190	$600	$287	**$3,303**
Single Family Unit - 1.5" Meters	3.33	$13,953	$600	$956	**$12,397**
Single Family Unit - 2" Meters	5.33	$22,333	$600	$1,530	**$20,203**
3/4" Displacement (Non-Residential)	2.25	$9,428	$600	$646	**$8,182**
1.0" Displacement (Non-Residential)	3.76	$15,754	$1,500	$1,079	**$13,175**
1.5" Displacement (Non-Residential)	7.49	$31,383	$2,760	$2,150	**$26,473**
2.0" Displacement (Non-Residential)	11.99	$50,238	$4,500	$3,441	**$42,297**
2.0" Turbine Class II	14.24	$59,666	$7,200	$4,087	**$48,379**
3.0" Compound Class II	26.26	$110,029	$9,240	$7,537	**$93,252**
3.0" Turbine Class II	32.63	$136,720	$16,200	$9,365	**$111,155**
4.0" Compound Class II	45.00	$188,550	$15,000	$12,915	**$160,635**
4.0" Turbine Class II	56.25	$235,688	$18,000	$16,144	**$201,544**
6.0" Compound Class II	101.25	$424,238	$27,600	$29,059	**$367,579**
6.0" Turbine Class II	119.99	$502,758	$37,500	$34,437	**$430,821**
8.0" Compound Class II	119.99	$502,758	$48,000	$34,437	**$420,321**
8.0" Turbine Class II	209.99	$879,858	$54,000	$60,267	**$765,591**

**as of January 2020. These will change if the DOF is revised by separate ordinance.

Table 10.24: Deer Valley Non-Single-Family, Potential Wastewater Net Impact Fees

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset**	WW Rate Offset	Net Fee
Multifamily Unit	0.49	$1,111	$360	$141	**$610**
Single Family Unit - 3/4" or 1" Meters	1.00	$2,267	$600	$287	**$1,380**
Single Family Unit - 1.5" Meters	3.33	$7,549	$600	$956	**$5,993**
Single Family Unit - 2" Meters	5.33	$12,083	$600	$1,530	**$9,953**
3/4" Displacement (Non-Residential)	2.25	$5,101	$600	$646	**$3,855**
1.0" Displacement (Non-Residential)	3.76	$8,524	$1,500	$1,079	**$5,945**
1.5" Displacement (Non-Residential)	7.49	$16,980	$2,760	$2,150	**$12,070**
2.0" Displacement (Non-Residential)	11.99	$27,181	$4,500	$3,441	**$19,240**
2.0" Turbine Class II	14.24	$32,282	$7,200	$4,087	**$20,995**
3.0" Compound Class II	26.26	$59,531	$9,240	$7,537	**$42,754**
3.0" Turbine Class II	32.63	$73,972	$16,200	$9,365	**$48,407**
4.0" Compound Class II	45.00	$102,015	$15,000	$12,915	**$74,100**
4.0" Turbine Class II	56.25	$127,519	$18,000	$16,144	**$93,375**
6.0" Compound Class II	101.25	$229,534	$27,600	$29,059	**$172,875**
6.0" Turbine Class II	119.99	$272,017	$37,500	$34,437	**$200,080**
8.0" Compound Class II	119.99	$272,017	$48,000	$34,437	**$189,580**
8.0" Turbine Class II	209.99	$476,047	$54,000	$60,267	**$361,780**

**as of January 2020. These will change if the DOF is revised by separate ordinance.

Table 10.25: Estrella North, Laveen East & Ahwatukee Non-Single-Family, Potential Wastewater Net Impact Fees

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset**	WW Rate Offset	Net Fee
Multifamily Unit	0.49	$1,111	$360	$141	**$610**
Single Family Unit - 3/4" or 1" Meters	1.00	$2,267	$600	$287	**$1,380**
Single Family Unit - 1.5" Meters	3.33	$7,549	$600	$956	**$5,993**
Single Family Unit - 2" Meters	5.33	$12,083	$600	$1,530	**$9,953**
3/4" Displacement (Non-Residential)	2.25	$5,101	$600	$646	**$3,855**
1.0" Displacement (Non-Residential)	3.76	$8,524	$1,500	$1,079	**$5,945**
1.5" Displacement (Non-Residential)	7.49	$16,980	$2,760	$2,150	**$12,070**
2.0" Displacement (Non-Residential)	11.99	$27,181	$4,500	$3,441	**$19,240**
2.0" Turbine Class II	14.24	$32,282	$7,200	$4,087	**$20,995**
3.0" Compound Class II	26.26	$59,531	$9,240	$7,537	**$42,754**
3.0" Turbine Class II	32.63	$73,972	$16,200	$9,365	**$48,407**
4.0" Compound Class II	45.00	$102,015	$15,000	$12,915	**$74,100**
4.0" Turbine Class II	56.25	$127,519	$18,000	$16,144	**$93,375**
6.0" Compound Class II	101.25	$229,534	$27,600	$29,059	**$172,875**
6.0" Turbine Class II	119.99	$272,017	$37,500	$34,437	**$200,080**
8.0" Compound Class II	119.99	$272,017	$48,000	$34,437	**$189,580**
8.0" Turbine Class II	209.99	$476,047	$54,000	$60,267	**$361,780**

**as of January 2020. These will change if the DOF is revised by separate ordinance.

Table 10.26: Estrella South Non-Single-Family, Potential Wastewater Net Impact Fees

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset**	WW Rate Offset	Net Fee
Multifamily Unit	0.49	$2,290	$360	$141	**$1,789**
Single Family Unit - 3/4" or 1" Meters	1.00	$4,674	$600	$287	**$3,787**
Single Family Unit - 1.5" Meters	3.33	$15,564	$600	$956	**$14,008**
Single Family Unit - 2" Meters	5.33	$24,912	$600	$1,530	**$22,782**
3/4" Displacement (Non-Residential)	2.25	$10,517	$600	$646	**$9,271**
1.0" Displacement (Non-Residential)	3.76	$17,574	$1,500	$1,079	**$14,995**
1.5" Displacement (Non-Residential)	7.49	$35,008	$2,760	$2,150	**$30,098**
2.0" Displacement (Non-Residential)	11.99	$56,041	$4,500	$3,441	**$48,100**
2.0" Turbine Class II	14.24	$66,558	$7,200	$4,087	**$55,271**
3.0" Compound Class II	26.26	$122,739	$9,240	$7,537	**$105,962**
3.0" Turbine Class II	32.63	$152,513	$16,200	$9,365	**$126,948**
4.0" Compound Class II	45.00	$210,330	$15,000	$12,915	**$182,415**
4.0" Turbine Class II	56.25	$262,913	$18,000	$16,144	**$228,769**
6.0" Compound Class II	101.25	$473,243	$27,600	$29,059	**$416,584**
6.0" Turbine Class II	119.99	$560,833	$37,500	$34,437	**$488,896**
8.0" Compound Class II	119.99	$560,833	$48,000	$34,437	**$478,396**
8.0" Turbine Class II	209.99	$981,493	$54,000	$60,267	**$867,226**

**as of January 2020. These will change if the DOF is revised by separate ordinance.

Table 10.27: Laveen West Non-Single-Family, Potential Wastewater Net Impact Fees

Unit or Meter Type	Assessment EDU	Gross Fee	DOF Offset**	WW Rate Offset	Net Fee
Multifamily Unit	0.49	$2,213	$360	$141	**$1,712**
Single Family Unit - 3/4" or 1" Meters	1.00	$4,517	$600	$287	**$3,630**
Single Family Unit - 1.5" Meters	3.33	$15,042	$600	$956	**$13,486**
Single Family Unit - 2" Meters	5.33	$24,076	$600	$1,530	**$21,946**
3/4" Displacement (Non-Residential)	2.25	$10,163	$600	$646	**$8,917**
1.0" Displacement (Non-Residential)	3.76	$16,984	$1,500	$1,079	**$14,405**
1.5" Displacement (Non-Residential)	7.49	$33,832	$2,760	$2,150	**$28,922**
2.0" Displacement (Non-Residential)	11.99	$54,159	$4,500	$3,441	**$46,218**
2.0" Turbine Class II	14.24	$64,322	$7,200	$4,087	**$53,035**
3.0" Compound Class II	26.26	$118,616	$9,240	$7,537	**$101,839**
3.0" Turbine Class II	32.63	$147,390	$16,200	$9,365	**$121,825**
4.0" Compound Class II	45.00	$203,265	$15,000	$12,915	**$175,350**
4.0" Turbine Class II	56.25	$254,081	$18,000	$16,144	**$219,937**
6.0" Compound Class II	101.25	$457,346	$27,600	$29,059	**$400,687**
6.0" Turbine Class II	119.99	$541,995	$37,500	$34,437	**$470,058**
8.0" Compound Class II	119.99	$541,995	$48,000	$34,437	**$459,558**
8.0" Turbine Class II	209.99	$948,525	$54,000	$60,267	**$834,258**

**as of January 2020. These will change if the DOF is revised by separate ordinance.

SUMMARY OF PLANNED IMPROVEMENTS AND DEBT PAYMENT, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that the majority of funds collected from Wastewater impact fees between 2020 and 2029 will be used to pay down debt associated with treatment plant and wastewater collection projects, but funding will also be used for future projects to serve new development. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- That the projected number of projected EDUs will be developed in the ten-year planning period 2020-2029, and that all EDUs will pay net fees that are consistent with single family dwellings. Depending on the types of units and meters actually obtained, the net fees will not exactly match this number because the scale for charging DOF is slightly different than the scale used in assessing water impact fees; however, the net impact fees collected should be very close those shown.

- That all of the future sewers, force mains, lift stations, and other facilities listed in this plan are built in the ten-year planning period 2020-2029, with remaining funds going towards repayment of debt associated with the design and construction of existing growth wastewater treatment and collection facilities.

A summary of the planned improvements and costs for the ten-year planning period 2020-2029 for the impact fee service areas are shown in the following tables. The tables provide a summary of planned facilities and debt repayments that are eligible to be funded by the Wastewater impact fee collections, as calculated within this Chapter. **Other planned facilities NOT funded by impact fees are not shown.**

Table 10.28: Planned Improvements and Costs, 2020-2029, Northern Impact Fee Area

Facility	Total Costs
Cost of New Sewers	$36,839,148
Cost of New Force Mains	$2,898,500
Cost of New Lift Stations	$5,389,375
Debt Repayment	$38,161,425
Subtotal	**$83,288,448**
- Anticipated Net Impact Fee Revenue, 2020-29	$83,288,448
Anticipated Need for Alternative Funding	**$0**

Source: Costs from Table 10.15; debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.29: Planned Improvements and Costs, 2020-2029, Deer Valley Impact Fee Area

Facility	Total Costs
Debt Repayment	$92,460
Subtotal	**$92,460**
- Anticipated Net Impact Fee Revenue, 2020-29	$92,460
Anticipated Need for Alternative Funding	**$0**

Source: Debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.30: Planned Improvements and Costs, 2020-2029, Estrella North Impact Fee Area

Facility	Total Costs
Debt Repayment	$2,492,280
Subtotal	**$2,492,280**
- Anticipated Net Impact Fee Revenue, 2020-29	$2,492,280
Anticipated Need for Alternative Funding	**$0**

Source: Debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.31: Planned Improvements and Costs, 2020-2029, Estrella South Impact Fee Area

Facility	Total Costs
Cost of New Sewers	$12,125,988
Cost of New Force Mains	$7,517,929
Cost of New Lift Stations	$9,837,500
Debt Repayment	$8,017,458
Subtotal	**$37,498,874**
- Anticipated Net Impact Fee Revenue, 2020-29	$37,498,874
Anticipated Need for Alternative Funding	**$0**

Source: Costs from 10.18; debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.32: Planned Improvements and Costs, 2020-2029, Laveen West Impact Fee Area

Facility	Total Costs
Cost of New Sewers	$11,531,545
Cost of New Lift Stations	$1,772,000
Debt Repayment	$28,445,085
Subtotal	**$41,748,630**
- Anticipated Net Impact Fee Revenue, 2020-29	$41,748,630
Anticipated Need for Alternative Funding	**$0**

Source: Costs from 10.19; debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.33: Planned Improvements and Costs, 2020-2029, Laveen East Impact Fee Area

Facility	Total Costs
Debt Repayment	$3,169,860
Subtotal	**$3,169,860**
- Anticipated Net Impact Fee Revenue, 2020-29	$3,169,860
Anticipated Need for Alternative Funding	**$0**

Source: Debt repayment assumed to be difference between actual costs and actual revenues.

Table 10.34: Planned Improvements and Costs, 2020-2029, Ahwatukee Impact Fee Area

Facility	Total Costs
Debt Repayment	$2,489,520
Subtotal	**$2,489,520**
- Anticipated Net Impact Fee Revenue, 2020-29	$2,489,520
Anticipated Need for Alternative Funding	**$0**

Source: Debt repayment assumed to be difference between actual costs and actual revenues.

CHAPTER 11: WATER RESOURCES ACQUISITION INFRASTRUCTURE IMPROVEMENTS PLAN

The City of Phoenix (City) charges a Water Resources Acquisition Fee (WRAF) to new customers to fund the acquisition of incremental water resources and related infrastructure needed to serve those customers. The funds collected by the fee are not used for operations, maintenance or rehabilitation purposes; and are not used to meet environmental or other regulations for existing customers.

SERVICE AREAS

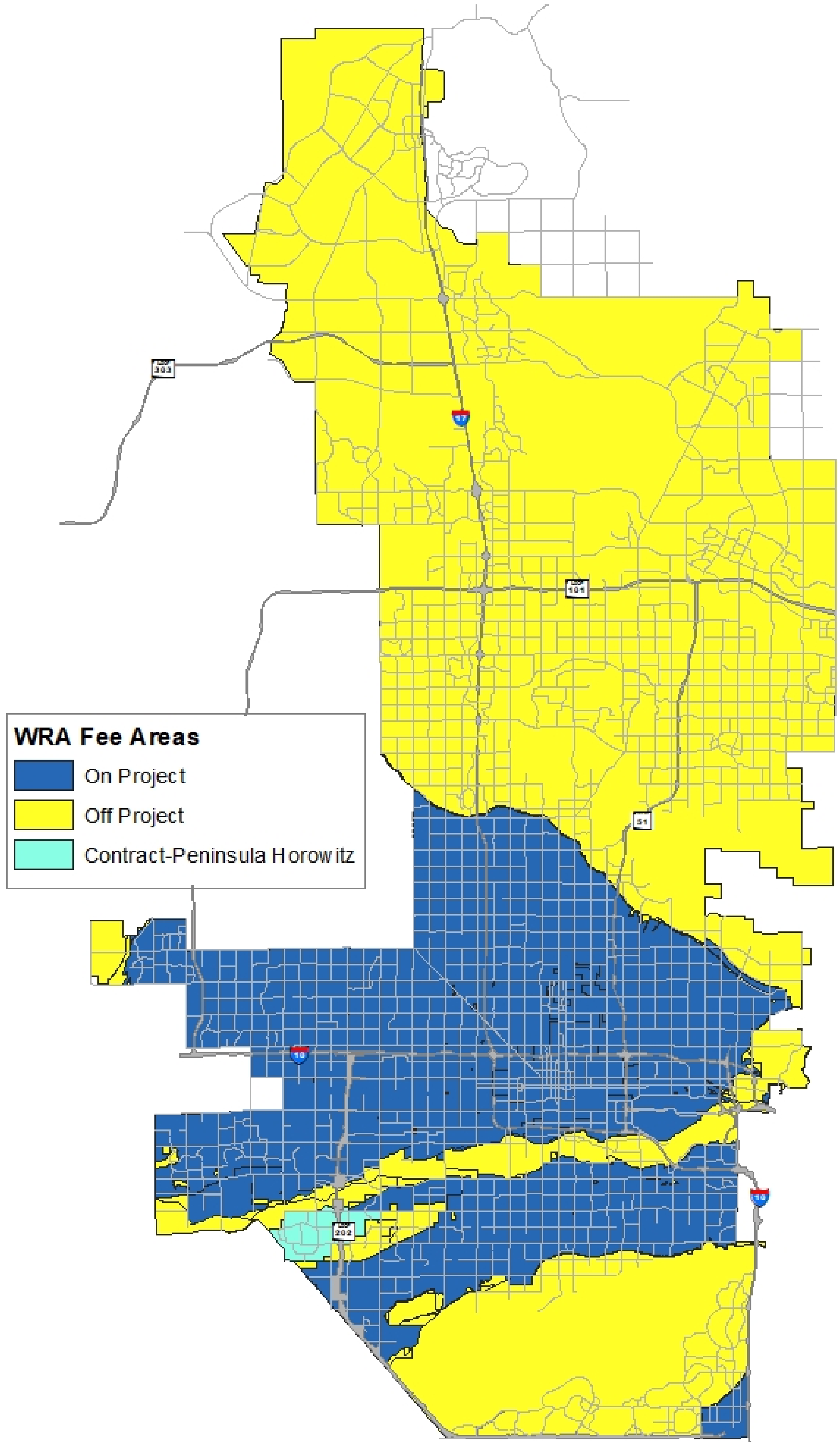
The WRAF is calculated for two distinct areas of the City – the area provided water by the Salt River Project (SRP), called 'On-Project', and the area provided water by sources other than SRP, called 'Off-Project'. Based on legal and institutional precedents going back over a century, On-Project areas are primarily supplied by water from the Salt and Verde River systems through a series of reservoirs and canals managed by SRP. Off-Project areas rely upon other sources such as Colorado River water, delivered via the Central Arizona Project (CAP), and service area groundwater.

Please refer to **Figure 11.1** on the following page for the boundaries of the On- and Off-Project WRAF areas.

Initial calculations indicate that water supplies for On-Project areas served by the SRP system are adequate to meet future development projected to occur over the current WRAF period, and that no additional water resources or associated infrastructure are needed for those areas over the next 10 years. **As a result, the WRAF is proposed to remain at $0 per connection for On-Project areas.**

Off-Project areas of the City are currently served predominantly by Municipal and Industrial (M&I) and other Colorado River water supplies that are subject to severe reductions when shortage conditions are declared on the Colorado River. All CAP deliveries to the City are now being used for direct deliveries or for water banking purposes that will protect existing customers during anticipated shortages. Under existing legal and institutional arrangements, cuts to Arizona's allocation of Colorado River water will be disproportionately high, with reductions in the CAP transfers being greatly reduced.

Figure 11.1: Water Resource Acquisition Fee Area Map



It is widely accepted that the Colorado River is over-subscribed, with theoretical allocations greatly exceeding actual flows even under normal conditions, and the river is experiencing ongoing and worsening drought conditions that are reducing flows to Lake Powell, Lake Mead and downstream recipients like the CAP. Several states, including Arizona, have responded with a plan to slow down the decline in Lake Mead and Lake Powell storage levels, or the 'Lower Basin Drought Contingency Plan'. The plan seeks to use voluntary reductions in the near term to avoid lake levels reaching the point where the Secretary of the Interior will have to impose significant and unknown mandatory restrictions on future usage. Even if the plan is implemented, it is possible that if conditions worsen over time that new institutional and legal arrangements will add to the severity of cuts to Arizona and the CAP system and impose major restrictions on the ability of Phoenix to obtain CAP supplies.

While the City's priority rights are good within current CAP allocation arrangements, a major reduction in overall CAP deliveries could significantly impact the ability of the City to maintain full service to existing customers, and efforts are being made to provide additional back-up supplies during short and intermediate-time frame restrictions. These efforts have included:

- Establishing an exchange arrangement with the City of Tucson that allows Phoenix to effectively store water in Tucson. During years when allocations are being met completely, Phoenix sends water via the CAP to Tucson, which uses storage and recovery wells to supplement its storage. During years when allocations of Colorado River are reduced due to shortages, Tucson will pump more groundwater and allow Phoenix to take a portion of Tucson's CAP deliveries. The cost of this exchange program has been more than $30 million.
- Establishing a well lease capacity arrangement with the Salt River Project that will allow the City to pump additional groundwater during periods of shortage on the Colorado River. This arrangement has cost Phoenix in excess of $12 million.
- Storing over 160,000 acre-feet of water to build groundwater reserves that can be recovered during periods of shortage on the Colorado River. With the cost of purchasing raw water at approximately $200 an acre-foot, total expenditures on raw water alone exceed $40 million.

Given the City's need to spend significant and increasing amounts of rate revenue to provide supply security to existing customers, calculations in this plan assume that no surplus water is available to serve new development and that acquisition of additional resources for use both during normal and shortage situations is required. Additional resource needs and associated costs in this plan are calculated assuming incremental need during normal conditions. In the future, however, worsening shortages on the Colorado River system may force the City to charge impact fees to new development to meet both needs under normal conditions and additional needs triggered by reduced deliveries of CAP water.

LEVEL OF SERVICE

The level of service selected by the City for this WRAF update requires that the City have water resources sufficient to provide a continuous supply of treatable water over a 100-year period to existing and new customers under typical hydrologic conditions. As such, there could be circumstances for which existing and newly-acquired water resources would not be sufficient to meet all demands in all circumstances, such as a persistent, severe shortage or higher than anticipated demand.

This update to the City's WRAF incorporates two overlapping time frames, as follows:

- **Water Resources Infrastructure Improvements Plan (IIP) Period:** ten-year period beginning with fiscal year (FY) 2019/2020 (July 1, 2019) and ending with FY 2028/2029 (June 30, 2029). This is the period of time for which the City will collect and spend WRAF funds to acquire and develop water resources adequate to meet the demands associated with new service connections that occur during this time frame. This time frame is limited to 10 years in accordance with revisions to ARS §9-463.05.

- **Water Resources Planning Period:** 110-year period beginning with FY 2019/2020 and ending with FY 2128/2129. This period encompasses the ten-year IIP period followed by the City's requirement under the Arizona Department of Water Resources (ADWR) Assured Water Supply (AWS) program to demonstrate an assured water supply that will be physically, legally, and continuously available for the next 100 years.

While there are many factors that affect the amount of water resources required to serve the City's On- and Off-Project areas, the following assumptions were used to establish the proportionate amount of water resources required to serve an equivalent demand unit (EDU):

- **An EDU's average annual daily volume requirement is the same as the average annual daily requirement in fiscal year 2013 calculated for all single family residential 5/8", ¾", and 1" meters installed from 2001 to 2008.** This average annual GPD factor indicates the amount of water volume that will be required by a relatively new single family dwelling unit constructed in Phoenix and serves as a proxy for water resource needs associated with a given amount of demand.
- **This average of 299 gallons per day, or 0.33 acre-feet/year (299 gpd x 0.00112), per EDU is assumed to be consistent with the level of service associated with a 5/8", ¾", or 1" single-family meter**, and larger single family meters are calculated using a scale indicating recommended maximum rates for continuous operations cited in *American Water Works Association (AWWA)* reference tables. For example, a 1.5" single family displacement meter is assumed to use 3.33 EDU, or 1,001 gallons a day.
- **A gross-up factor of 1.10 (or 10%)** is applied to the EDU demand factor to account for the difference in the amount of raw water diverted into the supply system (e.g., from wells and surface water intakes) and the amount of water used or sold to customers. Losses occur during source water delivery, treatment and within the distribution system. All water systems experience some loss as part of normal operations. An updated water loss analysis conducted by WSD staff concluded that total losses within the City's water system are approximately 10 percent of diversions. Therefore, assuming a 10 percent adjustment for water losses, the effective conversion factor for all new connections, regardless of water service area, is **0.37 acre-feet/year per EDU**.
- **For planning purposes, the EDU factor for multifamily units is 0.52 per unit** and is calculated based on estimates of multifamily water use of 154 GPD for the low month in FY 2012/13 that includes both domestic and landscape meters taken from a sample of 6,742 units built in the City between 2002 and 2008.

- **EDU factors for industrial, commercial and institutional meters** were calculated from an analysis of millions of square feet of space and associated meters described in the Chapter 2, Service Units.
- **EDU factors for industrial, commercial and institutional meters are also calculated by using an additional adjustment factor that reflects the fact that these types of meters on average use far more water than a comparably-sized single-family water meter.** This adjustment factor, based on FY 12/13 water use data, is **2.12**, indicating that any given meter size/type supplying industrial and commercial customers will use 2.12 times as much water as a similar single family residential meter, as shown in **Table 11.1**.

Table 11.1: Water Use Ratio for Non-Single-Family EDU Adjustment Factor

Meter Type	Meter-Based EDU	CCF (FY13)	CCF/EDU/DAY
Single-Family Standard	365,706	59,404,322	0.4450
Non-Single-Family	121,701	41,903,665	0.9433
Non-SF EDU Adjustment Factor			**2.12**

Source: COP Water Services Department.

GENERAL WRAF CALCULATION METHODOLOGY

The WRAF is calculated using the ***incremental cost*** methodology. This method assigns to new development the incremental cost of water resource acquisition and delivery system expansion needed to serve new development projected to occur during the current WRAF period and is most suited to communities that have limited existing capacity and detailed growth-related capital project plans.

The general methodology for determining the proposed WRAF is a three-step process, as follows:

1. **Estimate Future Demands Based on Projected New Off-Project EDUs** – WSD staff has made projections of the number of new Off-Project EDUs that will be added to the system over the 2020-2029 period. The number of new EDUs is then multiplied by the effective conversion factor of 0.37 acre-feet/year per EDU to estimate future water demands.
2. **Determine the Capital Cost per Acre-Foot of Additional Water Resources** – this step involves calculating the cost per acre-foot to acquire and develop adequate water resources and related infrastructure to provide the selected level of service to new Off-Project customers.
3. **Convert the Capital Cost per Acre-Foot to a Cost per EDU** – the last step includes the application of a conversion factor to the capital cost per acre-foot of additional water resources. As described above, this conversion factor was determined to be **0.37 acre-feet per EDU** for all Off-Project areas based on WSD's analysis of historical customer billing records. This conversion factor expresses the costs of acquiring and developing water resources on a per-EDU basis.

EQUIVALENT DEMAND UNIT PROJECTIONS

WSD staff has made projections of the number of new Off-Project EDUs that will be added to the City's water system over the 2020-2029 timeframe. These EDU projections and corresponding demand factors are presented in **Table 11.2** below.

Table 11.2: Projected Ten-Year EDU for Water Resources Acquisition, 2020-2029

	SF	MF	Com/Retail	Office	Industrial	Other	Total
Off-Project DU (dwellings or *000's ft2*)	22,041	11,818	*5,873*	*3,999*	*2,016*	*8,200*	
EDU Ad. Factor	1.00	0.52	0.43	0.28	0.22	0.22	
Off-Project EDU	22,041	6,145	2,525	1,120	444	1,804	34,079

DIFFERENCES BETWEEN EQUIVALENT DEMAND UNIT FOR PURPOSES OF PLANNING AND ASSESSMENT: The estimation of EDUs for purposes of projection can be somewhat different from the estimation of EDUs for purposes of assessment, which is the amount charged to a customer for new or larger water meters. The EDU projections for multi-family, industrial, office, retail and institutional developments are only estimates of how many and what type of meters would be associated on average with a multifamily unit or a thousand square feet of different kinds of commercial space. For purposes of assessment, new meters for single family dwellings will be charged at the rate of one EDU per ¾" or 1" meter, while other types of uses will pay fees based on the following ratios:

- **Multifamily developments** will pay **0.38 EDU** per multifamily unit for domestic meters and pay the non-residential charge associated with any landscape meters. This will ensure that new multifamily developments that have no outdoor irrigation or only limited outdoor irrigation will not pay the same as new multifamily developments that have significant amounts of irrigated landscape. This rate differs from the 0.52 factors used for projections, which is based on both domestic and landscape meters.
- **Non-residential developments** will pay the non-residential charge associated with the size and type of meters acquired, reflecting the amount of demand that will be placed on the water treatment and transmission system. Fees for different sizes and types of water meters will be assessed according to **Table 11.3**.

Table 11.3: Equivalent Demand Unit (EDU) Factors for Assessment Purposes, Water

Unit or Meter Type*	Max Rate Meter Scale**	Non-Residential Use Adjustment Factor***	Assessment EDU
Multifamily Unit	0.38	1.00	0.38
Single Family Unit - 3/4" or 1" Meters	1.00	1.00	1.00
Single Family Unit - 1.5" Meters	3.33	1.00	3.33
Single Family Unit - 2" Meters	5.33	1.00	5.33
3/4" Displacement (Non-Residential)	1.00	2.12	2.12
1.0" Displacement (Non-Residential)	1.67	2.12	3.54
1.5" Displacement (Non-Residential)	3.33	2.12	7.06
2.0" Displacement (Non-Residential)	5.33	2.12	11.30
2.0" Turbine Class II	6.33	2.12	13.42
3.0" Compound Class II	11.67	2.12	24.74
3.0" Turbine Class II	14.50	2.12	30.74
4.0" Compound Class II	20.00	2.12	42.40
4.0" Turbine Class II	25.00	2.12	53.00
6.0" Compound Class II	45.00	2.12	95.40
6.0" Turbine Class II	53.33	2.12	113.06
8.0" Compound Class II	53.33	2.12	113.06
8.0" Turbine Class II	93.33	2.12	197.86

*Landscape meters for multifamily projects are assessed separately at the standard non-residential level.
** Recommended maximum safe operating capacity cited in AWWA reference tables.
***Water use for any given meter size/type is 2.12 times as much for any non-res/landscape meter on average.

SUMMARY OF WATER RESOURCES ACQUISITION PROJECTS

Based on new Off-Project EDU projections and the amount of water required to serve an EDU, the estimated future water demand from new Off-Project development is **12,609 AF/yr** (34,079 new EDUs x 0.37 acre-feet/EDU). These new Off-Project demand projections include an adjustment for 10 percent water system losses to account for the full amount of supply that will be needed to meet end-use customer demands. WSD staff has identified water resources acquisitions that, if implemented in a timely manner, could mitigate these projected shortages. This section describes these projects, their estimated cost to implement, and their anticipated yield.

SERVICE AREA AQUIFER STORAGE AND RECOVERY (ASR) WELLS: Aquifer storage and recovery (ASR) wells provide a means to deliver water to an aquifer for temporary storage and subsequent recovery to the water distribution system. The City already operates ASR wells, and they are a demonstrated conjunctive water management tool. The development of additional ASR wells will enable the City to deliver and store surplus CAP supplies, when available, and recover the water in the future to mitigate surface water supply shortages. Based on recent well development experience, service area ASR wells can produce an average of 2,250 gallons per minute (gpm), or 3,600 acre-feet/year if operated continuously.

However, the duty cycle for a well is typically not more than 70 to 75 percent, so it is assumed that new ASR wells could produce roughly 2,600 acre-feet/year, each. This plan assumes the City will install up to four (4) new service area ASR wells over the 2020-2029 WRAF period, providing approximately **8,473 AF/yr** of the projected water resources needed to meet new Off-Project demand. WRAF funds would only be used to pay for the portion of the ASR well capacity needed to supply new Off-Project customers.

ARIZONA STATE LAND DEPARTMENT CAP ALLOCATION: The remaining water resources needed to meet the water demands of new development can be obtained through the transfer of Arizona State Land Department (ASLD) CAP water to the City. As part of the original process to allocate Colorado River water for distribution through the CAP, the ASLD received an allocation of CAP Municipal & Industrial (M&I) priority water from the Secretary of the Interior. Because the ASLD is not a municipal water provider, the allocation was intended to be transferred to water providers in order to benefit undeveloped State Trust lands that would eventually be annexed into adjacent municipalities that would provide water service to those lands upon future development. The water service subcontract executed by the United States, CAP and ASLD in 1987 included an explanatory addendum that identified the volumes of the allocation anticipated to be transferred to each of eight municipalities adjacent to the State Trust lands for which the allocation was made. The volume identified for transfer to the City of Phoenix is 12,000 acre-feet to serve State Trust lands located north of Jomax Road. Although an agreement has not yet been reached on how and when a transfer of CAP water rights from ASLD to Phoenix will take place, this report assumes that at least **4,136 AF** of the ASLD CAP M&I subcontract entitlements will be transferred to Phoenix during the 2020-2029 WRAF period.

Based on inherent uncertainties associated with forecasting water demands and obtaining new water resources, Arizona's development fee (impact fee) enabling act A.R.S. §9-463.05 and subsequent revisions provide the City with the flexibility to alter its plans and acquire different water resources than those contemplated herein as long as the development fees it collects result in a “beneficial use” to the City's water system, bear a reasonable relationship to the burden imposed by new development, and are assessed in a non-discriminatory manner.

SUMMARY OF WATER RESOURCES ACQUISITION COSTS AND FEE CALCULATION

Table 11.4 summarizes the estimated capital costs to acquire and develop the water resources described above to provide the City’s selected level of service to new Off-Project customers.

Table 11.4: Planned Water Resource Projects/Acquisitions and Estimated Costs, 2020-2029

Project/Acquisition	Estimated Capital Costs	Average Annual Supply (AF/yr)
Arizona State Land Department CAP Allocation	$3,237,661	4,136
New Service Area ASR Wells	$16,620,115	8,473
Totals	**$19,857,776**	**12,609**
Total Capital Cost per Acre-Foot of Water Resources	**$1,575**	

Table 11.5 presents the updated WRAF fee calculation for an Off-Project EDU based on the capital cost per acre-foot of additional water resources and current EDU conversion factor.

Table 11.5: Updated WRAF Fee Calculation, Off-Project Area, 2020-2029

Summary of WRAF Fee Calculation	
Total Estimated Cost of 10-Year IIP	$19,857,776
Total Acre-Feet of Additional Water Resources	12,609
Total Capital Cost per Acre-Foot of Water Resources	$1,575
EDU Conversion Factor (acre-feet per EDU)	0.37
Capital Cost per EDU	**$583**

This assessment methodology satisfies the requirements of ARS §9-463.05 by providing a non-discriminatory schedule of fees based on a reasonably proportionate relationship between the WRAF fee amount and the growth-related water resources capital improvements.

Table 11.6 and Table 11.7 on the following page presents the updated WRAF calculation by meter type, and proposed WRAF fee schedule for 2020-2029.

Table 11.6: WRAF Fee Calculation by Meter Size and Type, 2020-2029

Single Family and Multifamily Domestic Meters[1]	Meter Capacity Ratio	EDU Adjustment Factor	Assessment EDU	Off-Project Fee / EDU	On-Project Fee / EDU
Single Family (3/4" and 1.0")	1.00	1.00	1.00	$583	$0.00
Single Family 1.5" Displacement	3.33	1.00	3.33	$583	$0.00
Single Family 2.0" Displacement	5.33	1.00	5.33	$583	$0.00
Multifamily and Mobile Home Domestic (indoor use only)		0.38	0.38	$583	$0.00
Commercial, Industrial, Institutional and Dedicated-Irrigation Meters[2]	**Meter Capacity Ratio**	**EDU Adjustment Factor**	**Assessment EDU**	**Off-Project Fee / EDU**	**On-Project Fee / EDU**
3/4" Displacement	1.00	2.12	2.12	$583	$0.00
1.0" Displacement	1.67	2.12	3.54	$583	$0.00
1.5" Displacement	3.33	2.12	7.06	$583	$0.00
2.0" Displacement	5.33	2.12	11.30	$583	$0.00
2.0" Turbine Class II	6.33	2.12	13.42	$583	$0.00
3.0" Compound Class II	11.67	2.12	24.74	$583	$0.00
3.0" Turbine Class II	14.50	2.12	30.74	$583	$0.00
4.0" Compound Class II	20.00	2.12	42.40	$583	$0.00
4.0" Turbine Class II	25.00	2.12	53.00	$583	$0.00
6.0" Compound Class II	45.00	2.12	95.40	$583	$0.00
6.0" Turbine Class II	53.33	2.12	113.06	$583	$0.00
8.0" Compound Class II	53.33	2.12	113.06	$583	$0.00
8.0" Turbine Class II	93.33	2.12	197.86	$583	$0.00

1) The WRAF is assessed per living unit.
2) The WRAF is assessed per equivalent demand unit (EDU).

Table 11.7: Proposed WRAF Fee Schedule, 2020-2029

Single Family and Multifamily Domestic Meters[1]	Off-Project	On-Project
Single Family (3/4" and 1.0")	$583	$0.00
Single Family 1.5" Displacement	$1,940	$0.00
Single Family 2.0" Displacement	$3,106	$0.00
Multifamily and Mobile Home Domestic (indoor use only)	$221	$0.00
Commercial, Industrial, Institutional and Dedicated-Irrigation Meters[2,3]	**Off-Project**	**On-Project**
3/4" Displacement	$1,235	$0.00
1.0" Displacement	$2,063	$0.00
1.5" Displacement	$4,114	$0.00
2.0" Displacement	$6,584	$0.00
2.0" Turbine Class II	$7,820	$0.00
3.0" Compound Class II	$14,416	$0.00
3.0" Turbine Class II	$17,912	$0.00
4.0" Compound Class II	$24,707	$0.00
4.0" Turbine Class II	$30,884	$0.00
6.0" Compound Class II	$55,590	$0.00
6.0" Turbine Class II	$65,881	$0.00
8.0" Compound Class II	$65,881	$0.00
8.0" Turbine Class II	$115,295	$0.00

1) The WRAF is assessed per liv ing unit.

2) The WRAF is assessed per equiv alent demand unit (EDU).

3) Purchase of a separate meter is required for landscape irrigation.

SUMMARY PLANNED IMPROVEMENTS AND COSTS, 2020-2029

A.R.S. 9-463.05 requires that impact fees collected must be spent on either 1) new projects that serve new development, or 2) to repay debt (interest and principal) incurred to fund the construction of projects that serve new development. It is anticipated that the funds collected in will be used to acquire the resources identified in this IIP, and no funds will be used to pay debt. It should be noted that A.R.S. 9-463.05 (and impact fee common law) also prohibit impact fee revenues from being spent on operations, maintenance, repair, rehabilitation, environmental or other non-capital expenditures.

For the purpose of this analysis, the following assumptions have been made:

- Development of residential units and non-residential space will take place at the pace assumed by Applied Economics projections;
- That all of the water resources identified in this IIP will be acquired within the ten-year planning period 2020-2029.

A summary of the planned improvements and expenditures is shown below.

Table 11.8: Water Resources Acquisition Fee Projected Revenues, 2020-2029

Number of 2020-29 EDUs	34,079
Net Fee Per EDU	$583
Anticipated Revenues, 2020-29	$19,857,776

Table 11.9: Water Resources Acquisition Fee Projected Expenditures, 2020-2029

Arizona State Land Department CAP Allocation	$3,237,661
New Service Area ASR Wells	$16,620,115
Total New Facilities 2020-29	$19,857,776
Projected Revenues 2020-29	$19,857,776
Funding from Other Sources	$0