Land Use Assumptions, Infrastructure Improvements Plan, and Development Fee Report

Prepared for:
Glendale, Arizona

January 9, 2024

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EXECUTIVE SUMMARY

The City of Glendale, Arizona, contracted with TischlerBise to document land use assumptions, prepare the Water and Wastewater Facilities Infrastructure Improvements Plan (hereinafter referred to as the "IIP"), and update water and wastewater facilities development fees pursuant to Arizona Revised Statutes ("ARS") § 9-436.05 (hereafter referred to as the "Enabling Legislation"). Municipalities in Arizona may assess development fees to offset infrastructure costs to a municipality for necessary public services. The development fees must be based on an Infrastructure Improvements Plan and Land Use Assumptions. The Water and Wastewater Facilities IIP located is in the middle section of this document, and the proposed water and wastewater facilities development fees are displayed in the Development Fee Report in the next section.

Development fees are one-time payments used to construct system improvements needed to accommodate new development. The fee represents future development's proportionate share of infrastructure costs. Development fees may be used for infrastructure improvements or debt service for growth related infrastructure. In contrast to general taxes, development fees may not be used for operations, maintenance, replacement, or correcting existing deficiencies. This update of Glendale's Water and Wastewater Facilities Infrastructure Improvements Plan and associated update to its water and wastewater facilities development fees includes all necessary elements required to be in full compliance with SB 1525.

ARIZONA DEVELOPMENT FEE ENABLING LEGISLATION

The Enabling Legislation governs how development fees are calculated for municipalities in Arizona.

Necessary Public Services

Under the requirements of the Enabling Legislation, development fees may only be used for construction, acquisition or expansion of public facilities that are necessary public services. "Necessary public service" means any of the following categories of facilities that have a life expectancy of three or more years and that are owned and operated on behalf of the municipality: water, wastewater, storm water, library, street, fire, police, and parks and recreational. Additionally, a necessary public service includes any facility that was financed before June 1, 2011, and that meets the following requirements:

1. Development fees were pledged to repay debt service obligations related to the construction of the facility.
2. After August 1, 2014, any development fees collected are used solely for the payment of principal and interest on the portion of the bonds, notes, or other debt service obligations issued before June 1, 2011, to finance construction of the facility.

Infrastructure Improvements Plan

Development fees must be calculated pursuant to an IIP. For each necessary public service that is the subject of a development fee, by law, the IIP shall include the following seven elements:

1. A description of the existing necessary public services in the service area and the costs to update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.
2. An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.
3. A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved Land Use Assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.
4. A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial, and industrial.
5. The total number of projected service units necessitated by and attributable to new development in the service area based on the approved Land Use Assumptions and calculated pursuant to generally accepted engineering and planning criteria.
6. The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years.
7. A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved Land Use Assumptions and a plan to include these contributions in determining the extent of the burden imposed by the development.

Qualified Professionals

The IIP must be developed by qualified professionals using generally accepted engineering and planning practices. A qualified professional is defined as “a professional engineer, surveyor, financial analyst or planner providing services within the scope of the person’s license, education, or experience.” TischlerBise is a fiscal, economic, and planning consulting firm specializing in the cost of growth services. Our services include development fees, fiscal impact analysis, infrastructure financing analyses, user fee/cost of service studies, capital improvement plans, and fiscal software. TischlerBise has prepared over 800 development fee studies over the past 30 years for local governments across the United States.

Conceptual Development Fee Calculation

In contrast to project-level improvements, development fees fund growth-related infrastructure that will benefit multiple development projects, or the entire service area (usually referred to as system improvements). The first step is to determine an appropriate demand indicator for the particular type of infrastructure. The demand indicator measures the number of service units for each unit of development. For example, an appropriate indicator of the demand for parks is population growth and the increase in population can be estimated from the average number of persons per housing unit. The second step in the development fee formula is to determine infrastructure improvement units per service unit, typically called level-of-service (LOS) standards. In keeping with the park example, a common LOS standard is improved park acres per thousand people. The third step in the development fee formula is the cost of various infrastructure units. To complete the park example, this part of the formula would establish a cost per acre for land acquisition and/ or park improvements.

Evaluation of Credits/Offsets

Regardless of the methodology, a consideration of credits/offsets is integral to the development of a legally defensible development fee. There are two types of credits/offsets that should be addressed in development fee studies and ordinances. The first is a revenue credit/offset due to possible double payment situations, which could occur when other revenues may contribute to the capital costs of infrastructure covered by the development fee. This type of credit/offset is integrated into the fee calculation, thus reducing the fee amount. The second is a site-specific credit or developer reimbursement for dedication of land or construction of system improvements. This type of credit is addressed in the administration and implementation of the development fee program. For ease of administration, TischlerBise normally recommends developer reimbursements for system improvements.

DEVELOPMENT FEE REPORT

METHODOLOGY

Development fees for the necessary public services made necessary by new development must be based on the same level of service (LOS) provided to existing development in the service area. There are three basic methodologies used to calculate development fees. They examine the past, present, and future status of infrastructure. The objective of evaluating these different methodologies is to determine the best measure of the demand created by new development for additional infrastructure capacity. Each methodology has advantages and disadvantages in a particular situation and can be used simultaneously for different cost components.

Reduced to its simplest terms, the process of calculating development fees involves two main steps: (1) determining the cost of development-related capital improvements and (2) allocating those costs equitably to various types of development. In practice, though, the calculation of development fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities within the designated service area. The following paragraphs discuss basic methodologies for calculating development fees and how those methodologies can be applied.

Cost Recovery (past improvements) - The rationale for recoupment, often called cost recovery, is that new development is paying for its share of the useful life and remaining capacity of facilities already built, or land already purchased, from which new growth will benefit. This methodology is often used for utility systems that must provide adequate capacity before new development can take place.

Incremental Expansion (concurrent improvements) - The incremental expansion methodology documents current LOS standards for each type of public facility, using both quantitative and qualitative measures. This approach assumes there are no existing infrastructure deficiencies or surplus capacity in infrastructure. New development is only paying its proportionate share for growth-related infrastructure. Revenue will be used to expand or provide additional facilities, as needed, to accommodate new development. An incremental expansion cost method is best suited for public facilities that will be expanded in regular increments to keep pace with development.

Plan-Based (future improvements) - The plan-based methodology allocates costs for a specified set of improvements to a specified amount of development. Improvements are typically identified in a long-range facility plan and development potential is identified by a land use plan. There are two basic options for determining the cost per demand unit: (1) total cost of a public facility can be divided by total demand units (average cost), or (2) the growth-share of the public facility cost can be divided by the net increase in demand units over the planning timeframe (marginal cost).

DEVELOPMENT FEE COMPONENTS

Figure 1 summarizes service areas, methodologies, and infrastructure cost components for each necessary public service.

Figure 1: Proposed Development Fee Service Areas, Methodologies, and Cost Components

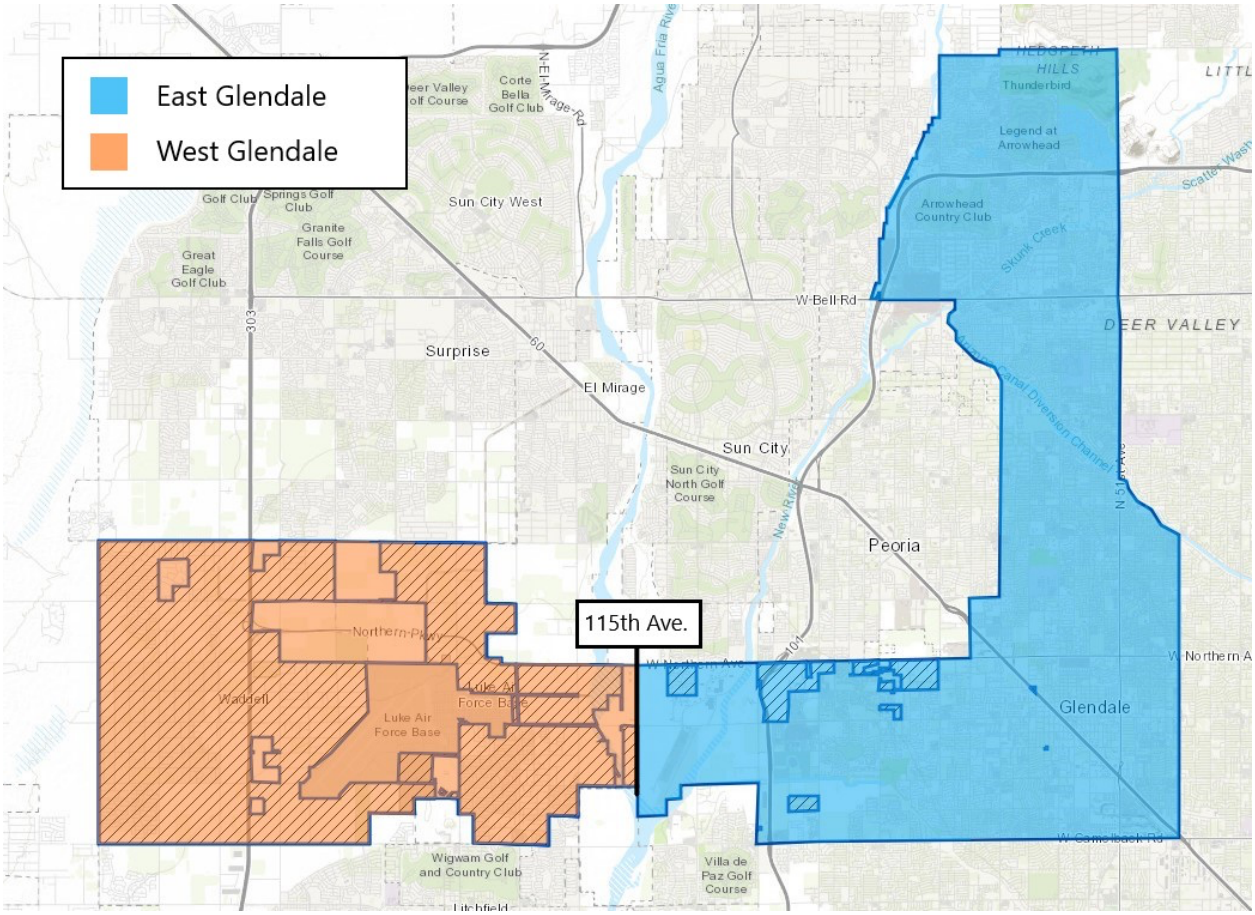
Necessary Public Service	Service Area	Cost Recovery	Incremental Expansion	Plan-Based	Cost Allocation
Water Facilities	East Glendale	Water Treatment	N/A	Water Supply, Wells, Distribution Lines, Development Fee Report	Gallons
	West Glendale	N/A	N/A	N/A	N/A
Wastewater Facilities	East Glendale	Wastewater Treatment	N/A	Lift Station, Collection Lines, Development Fee Report	Gallons
	West Glendale	N/A	N/A	N/A	N/A

Calculations throughout this report are based on an analysis conducted using Excel software. Most results are discussed in the report using two, three, and four decimal places, which represent rounded figures. However, the analysis itself uses figures carried to their ultimate decimal places; therefore, the sums and products generated in the analysis may not equal the sum or product if the reader replicates the calculation with the factors shown in the report (due to the rounding of figures shown, not in the analysis).

SERVICE AREAS

Shown below, Figure 2 illustrates the services areas used to develop the Water and Wastewater Facilities Infrastructure Improvements Plan. Since new development west of 115th Avenue will not connect to Glendale's water and sewer systems, TischlerBise recommends using 115th Avenue as the border between the two service areas for water and wastewater facilities development fees. **Glendale will only assess water and wastewater facilities development fees to new development in East Glendale.**

Figure 2: Proposed Development Fee Service Areas



PROPOSED DEVELOPMENT FEES

Glendale will only assess water and wastewater development fees to development in East Glendale. Water and wastewater development fees will be assessed based on meter size. The proposed fees represent the maximum allowable fees. Glendale may adopt fees that are less than the amounts shown; however, a reduction in development fee revenue will necessitate an increase in other revenues, a decrease in planned capital improvements, and/or a decrease in Glendale's LOS standards. All costs in the Development Fee Report represent current dollars with no assumed inflation over time. If costs change significantly over time, development fees should be recalculated.

Figure 3: Proposed Development Fees

Fees per Meter					
Meter Size	Water	Wastewater	Proposed Fees	Current Fees	Increase / (Decrease)
0.75-inch	$3,330	$3,795	$7,125	$4,532	$2,593
1.00-inch	$5,561	$6,337	$11,898	$7,562	$4,336
1.50-inch	$11,089	$12,636	$23,725	$15,068	$8,657
2.00-inch	$17,748	$20,225	$37,973	$24,111	$13,862
3.00-inch	$35,530	$40,488	$76,018	$48,256	$27,762
4.00-inch	$55,509	$63,255	$118,764	$75,386	$43,378
6.00-inch	$110,986	$126,473	$237,459	$150,715	$86,744
8.00-inch	$177,584	$202,364	$379,948	$241,147	$138,801

WATER FACILITIES IIP

ARS § 9-463.05 (T)(7)(a) defines the facilities and assets that can be included in the Water Facilities IIP:

> *"Water facilities, including the supply, transportation, treatment, purification and distribution of water, and any appurtenances for those facilities."*

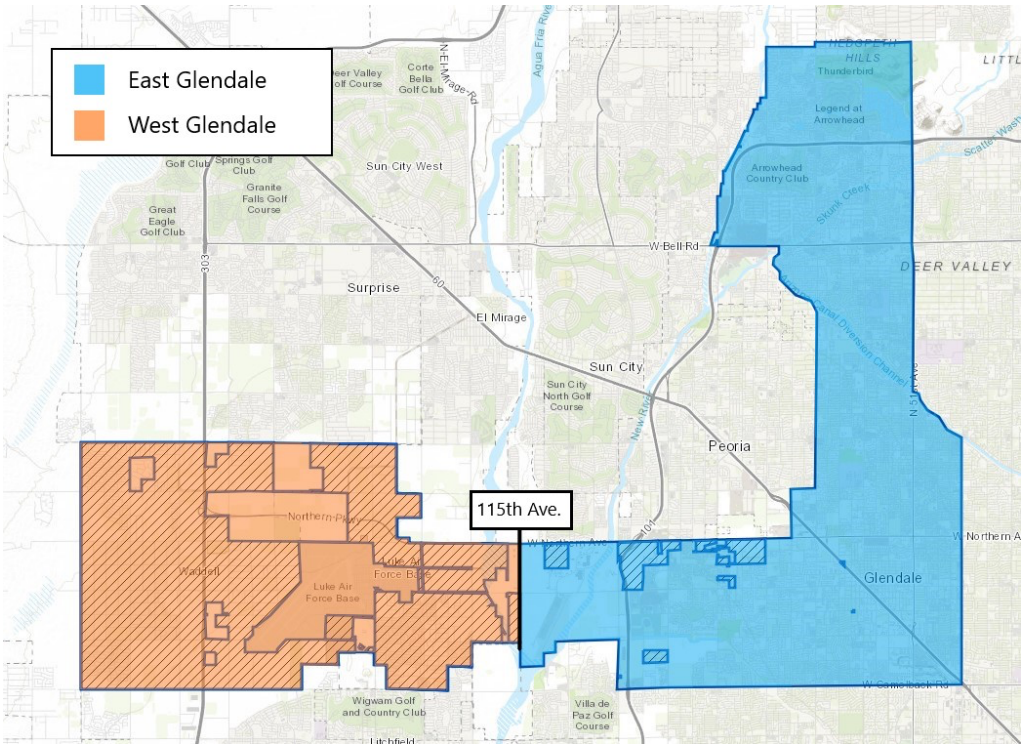
The Water Facilities IIP includes components for water supply, wells, water treatment, distribution lines, and the cost of preparing the Water Facilities IIP and related Development Fee Report. The cost recovery methodology is used to calculate the water supply component. The plan-based methodology is used for water supply, wells, distribution lines, and the Development Fee Report.

Proportionate Share

ARS § 9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to accommodate new development. The Water Facilities IIP and development fees will allocate the cost of necessary public services between both residential and nonresidential development using average day demand factors.

Service Area

Since new development west of 115th Avenue will not connect to Glendale's water system, TischlerBise recommends using 115th Avenue as the border between the two service areas for water facilities development fees. **Glendale will only assess water facilities development fees to new development in East Glendale.**



RATIO OF SERVICE UNIT TO DEVELOPMENT UNIT

ARS § 9-463.05(E)(4) requires:

> *"A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial."*

Water development fees are assessed by meter size, and the analysis uses average day demand from existing single-family units of 335 gallons as the demand factor for a 0.75-inch meter. For meters larger than 0.75 inches, average day demand is calculated by multiplying average day demand from existing single-family units by the capacity ratio for the corresponding meter size.

Figure W1: Water Ratio of Service Unit to Development Unit

Average Day Demand (Gallons)	
Single-Family Unit	335

Meter Size	Capacity Ratio[1]
0.75-inch	1.00
1.00-inch	1.67
1.50-inch	3.33
2.00-inch	5.33
3.00-inch	10.67
4.00-inch	16.67
6.00-inch	33.33
8.00-inch	53.33

1. AWWA Manual of Water Supply Practices M-1, 7th Edition

Analysis of Capacity, Usage, and Costs of Existing Public Services

ARS § 9-463.05(E)(2) requires:

> *"An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable."*

Existing Demand

Average day demand from Glendale water customers was 34,015,225 gallons in 2022. Residential customers represented 58 percent of average day demand, 93 percent of accounts, and consumed 335 gallons per day per account. Nonresidential customers represented 42 percent of average day demand, seven percent of accounts, and consumed 3,192 gallons per day per account.

Figure W2: Existing Demand

Customer Type	Annual Gallons	Average Day Gallons	Accounts	Avg Day Gallons per Account
Residential	7,216,400,000	19,770,959	59,005	335
Nonresidential	5,199,157,000	14,244,266	4,463	3,192
Total	12,415,557,000	34,015,225	63,468	536

Source: Glendale Water Services Department, 2022

Projected Demand for Services and Costs

ARS § 9-463.05(E)(1) requires:

> *"A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable."*

ARS § 9-463.05(E)(5) requires:

> *"The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria."*

ARS § 9-463.05(E)(6) requires:

> *"The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years."*

Projected Demand

Shown below, Figure W3 includes projections of water accounts and water demand. Projected residential accounts include all new single-family units in East Glendale. Projected nonresidential accounts include nonresidential development and multi-family development. Over the next 10 years, projections include an increase of 1,299 residential accounts and 2,801 nonresidential accounts.

To project future water demand, the analysis applies the average day gallons per account factors shown in Figure W2 to the projected accounts shown in Figure W3. Projected average day demand will increase by 435,000 gallons for residential development and 3,263,126 gallons for nonresidential development. As shown in Figure W3, projected water demand in East Glendale will increase by 3,698,126 gallons.

Figure W3: Projected Demand

Year		Average Day Gallons	Total Accounts	Annual Increase			
				Residential		Nonresidential	
				Gallons	Accounts	Gallons	Accounts
	2022	34,015,225	63,468				
Base	2023	34,376,563	63,842	85,410	255	275,929	119
1	2024	34,822,067	64,468	85,410	255	360,094	370
2	2025	35,330,193	65,280	85,410	255	422,716	557
3	2026	35,691,364	65,640	42,057	126	319,114	235
4	2027	36,050,557	65,994	42,057	126	317,135	229
5	2028	36,409,749	66,349	42,057	126	317,135	229
6	2029	36,768,941	66,703	42,057	126	317,135	229
7	2030	37,128,133	67,057	42,057	126	317,135	229
8	2031	37,443,652	67,352	17,965	54	297,554	241
9	2032	37,759,171	67,647	17,965	54	297,554	241
10	2033	38,074,689	67,942	17,965	54	297,554	241
10-Year Increase		3,698,126	4,100	435,000	1,299	3,263,126	2,801

Note: Glendale classifies connections as either residential or commercial. Residential connections inclue 0.75-inch meters used for single-family units, and commercial connections include all nonresidential meters and multi-family meters larger than 0.75 inches. The model uses single-family units as a proxy for residential connections and nonresidential floor area as a proxy for nonresidential connections.

Water Supply – Plan-Based

The City of Glendale plans to increase its water supply through a lease purchase of 1,100 acre-feet of water from the White Mountain Apache Tribe. The lease purchase will be used to meet demand from future development. As shown in Figure W4, the cost to acquire 983,000 gallons (1,100 acre-feet) is $8,000,000. After deducting existing development fee revenue collections of $4,459,473, the adjusted cost is $3,540,527. For water supply, the cost is $3.60 per gallon. Since the lease purchase will be used to meet additional demand from new development, and the additional 10-year demand of 3,698,126 gallons exceeds the added capacity of the lease purchase, Glendale will need to eliminate the water supply portion of the water facilities development fee in approximately 2026 unless additional water supply projects are identified in the next development fee update.

Figure W4: Cost Factors

Water Supply	
White Mountain Apache Tribe 100-Yr Lease	$8,000,000
- Development Fee Revenue Collections	($4,459,473)
Adjusted Cost	$3,540,527
÷ Total Average Day Gallons	983,000
Cost per Gallon	$3.60

Wells – Plan-Based

The City of Glendale plans to activate additional wells over the next 10 years to meet demand from future development. The cost to increase well capacity by 9,300,000 gallons per day is $30,000,000. Dividing the total cost by the total capacity yields a cost of $3.23 per gallon. With an estimated increase in daily water demand of 3,698,126 gallons, the 10-year revenue collections equal $11,944,947, or approximately 40 percent of the planned costs.

Figure W5: Cost Factors

Wells	
New Site COG 50 and COG 51	$14,000,000
Future Well	$8,000,000
Future Well	$8,000,000
Total Cost	$30,000,000
÷ Total Capacity (Average Day Gallons)	9,300,000
Cost per Gallon	$3.23
10-Year Increase in Gallons	3,698,126
10-Year Revenue Collections	$11,944,947

Water Treatment – Cost Recovery

The City of Glendale operates four water treatment plants, and three of the treatment plants have outstanding debt. Since these three facilities have excess capacity to serve future development, Glendale will use development fees to repay a portion of the outstanding debt.

Average Day Water Treatment Capacity (Gallons)	
Cholla Water Treatment Plant	30,000,000
Oasis Water Treatment Plant[1]	25,000,000
Pyramid Peak Water Treatment Plant	30,000,000
Total	85,000,000

1. Includes a surface water treatment plant and a groundwater treatment plant

The City of Glendale spent $207,996,291 to provide 85,000,000 gallons of water treatment capacity, and the outstanding principal balance is $56,655,445. Dividing the total cost by the total capacity yields a cost of $2.45 per gallon. With an estimated increase in daily water demand of 3,698,126 gallons, the 10-year revenue collections equal $9,060,409, or approximately 16 percent of the remaining principal balance.

Figure W6: Cost Factors

Water Treatment	
Cholla Water Treatment Plant	$77,560,000
Oasis Water Treatment Plant	$82,625,598
Pyramid Peak Water Treatment Plant	$47,810,693
Total (Original Cost)	$207,996,291
÷ Total Capacity (Average Day Gallons)	85,000,000
Cost per Gallon	$2.45
10-Year Increase in Gallons	3,698,126
10-Year Revenue Collections	$9,060,409

Remaining Principal	
Cholla Water Treatment Plant	$20,381,567
Oasis Water Treatment Plant	$27,701,764
Pyramid Peak Water Treatment Plant	$8,572,114
Total Remaining Principal	$56,655,445

Distribution Lines – Plan-Based

The City of Glendale plans to spend $240,000 per year to oversize and/or extend water distribution lines to serve future development. Dividing the total cost of $2,400,000 by the 10-year demand increase of 3,698,126 gallons yields a cost of $0.65 per gallon.

Figure W7: Cost Factors

Distribution Lines	
Distribution Line Annual Cost	$240,000
10-Year Total Cost	$2,400,000
10-Year Increase in Gallons	3,698,126
Cost per Gallon	$0.65

Development Fee Report – Plan-Based

The cost to prepare the Water Facilities IIP and the related Development Fee Report totals $19,120. Glendale plans to update its report every five years. Based on this cost, proportionate share, and five-year projections of water demand, the cost is $0.01 per gallon.

Figure W8: IIP and Development Fee Report

Necessary Public Service	Cost	Proportionate Share		Service Unit	5-Year Change	Cost per Service Unit
Water Facilities	$19,120	All Development	100%	Gallons	2,033,186	$0.01
Wastewater Facilities	$19,120	All Development	100%	Gallons	887,051	$0.02
Total	$38,240					

WATER FACILITIES DEVELOPMENT FEES

Revenue Credit/Offset

A revenue credit/offset is not necessary for water facilities development fees, because costs generated by projected development exceed revenues generated by projected development. Appendix A includes a detailed explanation of the revenue credit/offset for water facilities development fees.

Water Facilities Development Fees

The cost per service unit is $9.94 per gallon for water facilities development fees, and Glendale will assess water facilities development fees by meter size to new development in East Glendale. The base 0.75-inch meter is equivalent to a single-family unit, and a capacity ratio is used to convert the base meter fee proportionately for larger meters. The capacity ratios are calculated based on data published in *AWWA Manual of Water Supply Practices M-1, 7th Edition*.

Water facilities development fees are calculated by multiplying the cost per gallon by the average day gallons per EDU (single-family unit) and the associated capacity ratio. For example, the single-family fee of $3,330 is calculated using a cost per service unit of $9.94 per gallon, multiplied by 335 average day gallons, multiplied by a capacity ratio of 1.00. For a 1.00-inch meter, the fee of $5,561 is calculated using a cost per service unit of $9.94 per gallon, multiplied by 335 average day gallons, multiplied by a capacity ratio of 1.67.

Figure W9: Water Facilities Development Fees

Fee Component	Cost per Gallon
Water Supply	$3.60
Wells	$3.23
Water Treatment	$2.45
Distribution Lines	$0.65
Development Fee Report	$0.01
Total	$9.94

Demand Indicator	
Residential Gallons per Day	335

Fees per Meter				
Meter Size	Capacity Ratio[1]	Proposed Fees	Current Fees	Increase / (Decrease)
0.75-inch	1.00	$3,330	$2,923	$407
1.00-inch	1.67	$5,561	$4,878	$683
1.50-inch	3.33	$11,089	$9,722	$1,367
2.00-inch	5.33	$17,748	$15,558	$2,190
3.00-inch	10.67	$35,530	$31,139	$4,391
4.00-inch	16.67	$55,509	$48,647	$6,862
6.00-inch	33.33	$110,986	$97,259	$13,727
8.00-inch	53.33	$177,584	$155,617	$21,967

1. AWWA Manual of Water Supply Practices M-1, 7th Edition

Water Facilities Development Fee Revenue

Appendix A contains revenue forecasts required by Arizona's Enabling Legislation (ARS § 9-463.05(E)(7)). Projected fee revenue shown in Figure W10 is based on projected water accounts in Figure W3 and the updated water facilities development fees. For nonresidential development, the analysis uses a 1.00-inch meter. If development occurs faster than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs slower than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Projected development fee revenue equals $19,900,667 and projected expenditures equal $26,965,004. Based on the actual mix of meter sizes used by future nonresidential accounts, the projected development fee revenue shown below will change.

Figure W10: Water Facilities Development Fees Revenue

Fee Component	Growth Share
Water Supply	$3,540,527
Wells	$11,944,947
Water Treatment	$9,060,409
Distribution Lines	$2,400,000
Development Fee Report	$19,120
Total	$26,965,004

		Single-Family $3,330 per meter	Nonresidential $5,561 per meter
Year		Accounts	Accounts
Base	2023	59,260	4,582
Year 1	2024	59,515	4,953
Year 2	2025	59,770	5,510
Year 3	2026	59,895	5,745
Year 4	2027	60,021	5,973
Year 5	2028	60,146	6,202
Year 6	2029	60,272	6,431
Year 7	2030	60,398	6,659
Year 8	2031	60,451	6,901
Year 9	2032	60,505	7,142
Year 10	2033	60,558	7,383
10-Year Increase		1,299	2,801
Projected Revenue		$4,324,030	$15,576,637

Projected Fee Revenue	$19,900,667

WASTEWATER FACILITIES IIP

ARS § 9-463.05 (T)(7)(b) defines the facilities and assets that can be included in the Wastewater Facilities IIP:

> *"Wastewater facilities, including collection, interception, transportation, treatment and disposal of wastewater, and any appurtenances for those facilities."*

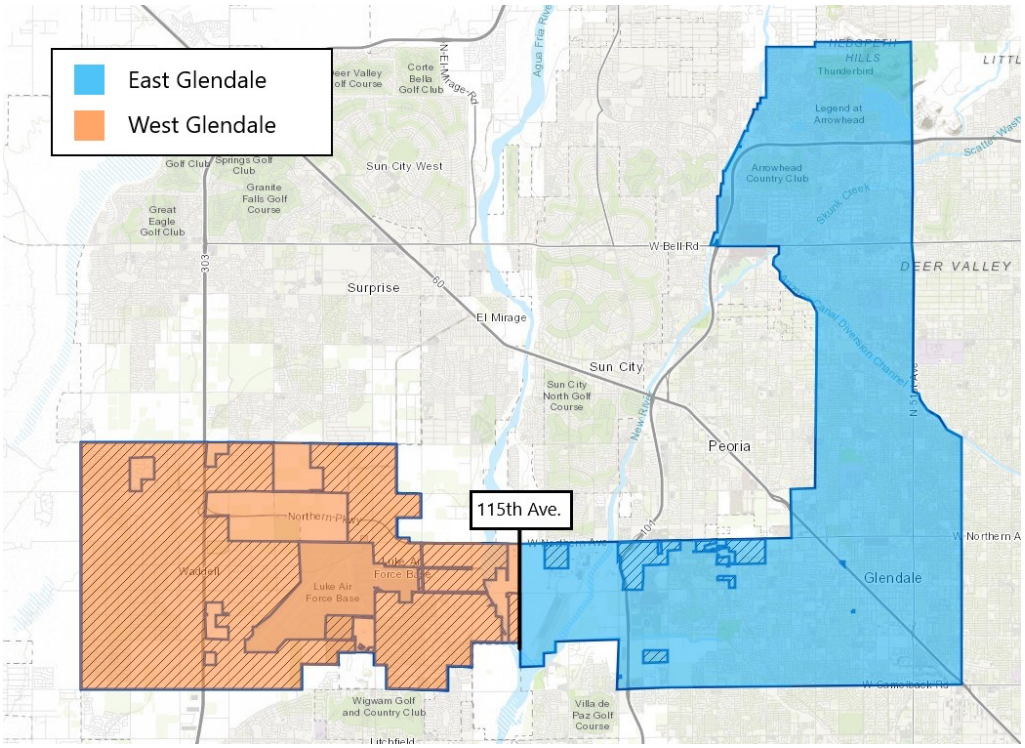
The Wastewater Facilities IIP includes components for wastewater treatment, lift station, collection lines, and the cost of preparing the Wastewater Facilities IIP and related Development Fee Report. The cost recovery methodology is used to calculate the wastewater treatment component. The plan-based methodology is used for lift station, collection lines, and the Development Fee Report.

Proportionate Share

ARS § 9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to accommodate new development. The Wastewater Facilities IIP and development fees will allocate the cost of necessary public services between both residential and nonresidential development using average day flow factors.

Service Area

Since new development west of 115th Avenue will not connect to Glendale's wastewater system, TischlerBise recommends using 115th Avenue as the border between the two service areas for wastewater facilities development fees. **Glendale will only assess wastewater facilities development fees to new development in East Glendale.**



RATIO OF SERVICE UNIT TO DEVELOPMENT UNIT

ARS § 9-463.05(E)(4) requires:

> *"A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial."*

Wastewater development fees are assessed by meter size, and the analysis uses average day flow from existing single-family units of 289 gallons as the demand factor for a 0.75-inch meter. For meters larger than 0.75 inches, average day flow is calculated by multiplying average day flow from existing single-family units by the capacity ratio for the corresponding meter size.

Figure WW1: Wastewater Ratio of Service Unit to Development Unit

Average Day Flow (Gallons)	
Single-Family Unit	289

Meter Size	Capacity Ratio[1]
0.75-inch	1.00
1.00-inch	1.67
1.50-inch	3.33
2.00-inch	5.33
3.00-inch	10.67
4.00-inch	16.67
6.00-inch	33.33
8.00-inch	53.33

1. AWWA Manual of Water Supply Practices M-1, 7th Edition

Analysis of Capacity, Usage, and Costs of Existing Public Services

ARS § 9-463.05(E)(2) requires:

> *"An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable."*

Existing Flow

Average day flow from Glendale wastewater customers was 19,444,389 gallons in 2022. Residential customers represented 82 percent of average day flow, 94 percent of accounts, and generated 289 gallons per day per account. Nonresidential customers represented 18 percent of average day flow, six percent of accounts, and generated 958 gallons per day per account.

Figure WW2: Existing Flow

Customer Type	Annual Gallons	Average Day Gallons	Accounts	Avg Day Gallons per Account
Residential	5,854,163,000	16,038,803	55,548	289
Nonresidential	1,243,039,000	3,405,586	3,556	958
Total	7,097,202,000	19,444,389	59,104	329

Source: Glendale Water Services Department, 2022

Projected Demand for Services and Costs

ARS § 9-463.05(E)(1) requires:

> *"A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable."*

ARS § 9-463.05(E)(5) requires:

> *"The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria."*

ARS § 9-463.05(E)(6) requires:

> *"The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years."*

Projected Flow

Shown below, Figure WW3 includes projections of wastewater accounts and wastewater flow. Projected residential accounts include all new single-family units in East Glendale. Projected nonresidential accounts include nonresidential development and multi-family development. Over the next 10 years, projections include an increase of 1,299 residential accounts and 2,443 nonresidential accounts.

To project future wastewater flow, the analysis applies the average day gallons per account factors shown in Figure WW2 to the projected accounts shown in Figure WW3. Projected average day flow will increase by 375,269 gallons for residential development and 1,139,676 gallons for nonresidential development. As shown in Figure WW3, projected wastewater flow in East Glendale will increase by 1,514,944 gallons.

Figure WW3: Projected Flow

Year		Average Day Gallons	Total Accounts	Annual Increase			
				Residential		Nonresidential	
				Gallons	Accounts	Gallons	Accounts
	2022	19,444,389	59,104				
Base	2023	19,586,753	59,444	73,682	255	68,682	85
1	2024	19,797,471	60,021	73,682	255	137,036	322
2	2025	20,059,047	60,774	73,682	255	187,894	498
3	2026	20,198,371	61,101	36,282	126	103,042	201
4	2027	20,336,088	61,422	36,282	126	101,435	196
5	2028	20,473,804	61,743	36,282	126	101,435	196
6	2029	20,611,521	62,065	36,282	126	101,435	196
7	2030	20,749,237	62,386	36,282	126	101,435	196
8	2031	20,866,724	62,653	15,498	54	101,989	213
9	2032	20,984,211	62,919	15,498	54	101,989	213
10	2033	21,101,697	63,186	15,498	54	101,989	213
10-Year Increase		1,514,944	3,742	375,269	1,299	1,139,676	2,443

Note: Glendale classifies connections as either residential or commercial. Residential connections inclue 0.75-inch meters used for single-family units, and commercial connections include all nonresidential meters and multi-family meters larger than 0.75 inches. The model uses single-family units as a proxy for residential connections and nonresidential floor area as a proxy for nonresidential connections.

Wastewater Treatment – Cost Recovery

The City of Glendale operates three wastewater treatment plants, and these treatment plants have outstanding debt. Since these facilities have excess capacity to serve future development, Glendale will use development fees to repay a portion of the outstanding debt.

Average Day Wastewater Treatment Capacity (Gallons)	
Arrowhead Water Reclamation Facility	4,500,000
West Area Water Reclamation Facility	11,500,000
91st Ave Wastewater Treatment Plant	13,200,000
Total	29,200,000

The City of Glendale spent $208,689,000 to provide 29,200,000 gallons of wastewater treatment capacity, and the outstanding principal balance is $39,797,500. Dividing the total cost by the total capacity yields a cost of $7.15 per gallon. With an estimated increase in daily wastewater flow of 1,514,944 gallons, the 10-year revenue collections equal $10,831,852, or approximately 27 percent of the remaining principal balance.

Figure WW4: Cost Factors

Wastewater Treatment	
Arrowhead Water Reclamation Facility	$42,725,000
West Area Water Reclamation Facility	$114,890,000
91st Ave Wastewater Treatment Plant	$51,074,000
Total (Original Cost)	$208,689,000
÷ Total Capacity (Average Day Gallons)	29,200,000
Cost per Gallon	$7.15
10-Year Increase in Gallons	1,514,944
10-Year Revenue Collections	$10,831,852

Remaining Principal	
Arrowhead Water Reclamation Facility	$5,380,647
West Area Water Reclamation Facility	$9,061,417
91st Ave Wastewater Treatment Plant	$25,355,436
Total Remaining Principal	$39,797,500

Lift Station – Plan-Based

The City of Glendale plans to expand an existing lift station within the next 10 years to serve future development. The cost to expand the lift station capacity by 3,348,000 gallons per day is $4,500,000. Dividing the expansion cost by the additional capacity yields a cost of $1.34 per gallon. With an estimated increase in daily wastewater flow of 1,514,944 gallons, the 10-year revenue collections equal $2,030,025, or approximately 45 percent of the planned costs.

Figure WW5: Cost Factors

Lift Station	
Expand 67th Ave and ACDC Lift Station	$4,500,000
÷ Additional Capacity (Gallons)	3,348,000
Cost per Gallon	$1.34
10-Year Increase in Gallons	1,514,944
10-Year Revenue Collections	$2,030,025

Collection Lines – Plan-Based

The City of Glendale plans to spend $700,000 per year to oversize and/or extend wastewater collection lines to serve future development. Dividing the total cost of $7,000,000 by the 10-year flow increase of 1,514,944 gallons yields a cost of $4.62 per gallon.

Figure WW6: Cost Factors

Collection Lines	
Collection Line Annual Cost	$700,000
10-Year Total Cost	$7,000,000
10-Year Increase in Gallons	1,514,944
Cost per Gallon	$4.62

Development Fee Report – Plan-Based

The cost to prepare the Wastewater Facilities IIP and the related Development Fee Report totals $19,120. Glendale plans to update its report every five years. Based on this cost, proportionate share, and five-year projections of wastewater flow, the cost is $0.02 per gallon.

Figure WW7: IIP and Development Fee Report

Necessary Public Service	Cost	Proportionate Share		Service Unit	5-Year Change	Cost per Service Unit
Water Facilities	$19,120	All Development	100%	Gallons	2,033,186	$0.01
Wastewater Facilities	$19,120	All Development	100%	Gallons	887,051	$0.02
Total	$38,240					

WASTEWATER FACILITIES DEVELOPMENT FEES

Revenue Credit/Offset

A revenue credit/offset is not necessary for wastewater facilities development fees, because costs generated by projected development exceed revenues generated by projected development. Appendix A includes a detailed explanation of the revenue credit/offset for wastewater facilities development fees.

Wastewater Facilities Development Fees

The cost per service unit is $13.13 per gallon for wastewater facilities development fees, and Glendale will assess wastewater facilities development fees by meter size to new development in East Glendale. The base 0.75-inch meter is equivalent to a single-family unit, and a capacity ratio is used to convert the base meter fee proportionately for larger meters. The capacity ratios are calculated based on data published in *AWWA Manual of Water Supply Practices M-1, 7th Edition*.

Wastewater facilities development fees are calculated by multiplying the cost per gallon by the average day gallons per EDU (single-family unit) and the associated capacity ratio. For example, the single-family fee of $3,795 is calculated using a cost per service unit of $13.13 per gallon, multiplied by 289 average day gallons, multiplied by a capacity ratio of 1.00. For a 1.00-inch meter, the fee of $6,337 is calculated using a cost per service unit of $13.13 per gallon, multiplied by 289 average day gallons, multiplied by a capacity ratio of 1.67

Figure WW8: Wastewater Facilities Development Fees

Fee Component	Cost per Gallon
Wastewater Treatment	$7.15
Lift Station	$1.34
Collection Lines	$4.62
Development Fee Report	$0.02
Total	$13.13

Demand Indicator	
Residential Gallons per Day	289

Fees per Meter				
Meter Size	Capacity Ratio[1]	Proposed Fees	Current Fees	Increase / (Decrease)
0.75-inch	1.00	$3,795	$1,609	$2,186
1.00-inch	1.67	$6,337	$2,684	$3,653
1.50-inch	3.33	$12,636	$5,346	$7,290
2.00-inch	5.33	$20,225	$8,553	$11,672
3.00-inch	10.67	$40,488	$17,117	$23,371
4.00-inch	16.67	$63,255	$26,739	$36,516
6.00-inch	33.33	$126,473	$53,456	$73,017
8.00-inch	53.33	$202,364	$85,530	$116,834

1. AWWA Manual of Water Supply Practices M-1, 7th Edition

WASTEWATER FACILITIES DEVELOPMENT FEE REVENUE

Appendix A contains revenue forecasts required by Arizona's Enabling Legislation (ARS § 9-463.05(E)(7)). Projected fee revenue shown in Figure WW9 is based on projected wastewater accounts in Figure WW3 and the updated wastewater facilities development fees. For nonresidential development, the analysis uses a 1.00-inch meter. If development occurs faster than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs slower than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Projected development fee revenue equals $20,410,109 and projected expenditures equal $19,880,998. Based on the actual mix of meter sizes used by future nonresidential accounts, the projected development fee revenue shown below will change.

Figure WW9: Wastewater Facilities Development Fees Revenue

Fee Component	Growth Share
Wastewater Treatment	$10,831,852
Lift Station	$2,030,025
Collection Lines	$7,000,000
Development Fee Report	$19,120
Total	$19,880,998

		Single-Family $3,795 per meter	Nonresidential $6,337 per meter
Year		Accounts	Accounts
Base	2023	55,803	3,641
Year 1	2024	56,058	3,963
Year 2	2025	56,313	4,461
Year 3	2026	56,438	4,662
Year 4	2027	56,564	4,858
Year 5	2028	56,689	5,054
Year 6	2029	56,815	5,250
Year 7	2030	56,941	5,445
Year 8	2031	56,994	5,658
Year 9	2032	57,048	5,871
Year 10	2033	57,101	6,085
10-Year Increase		1,299	2,443
Projected Revenue		$4,927,836	$15,482,272

Projected Fee Revenue	$20,410,109

APPENDIX A: FORECAST OF REVENUES OTHER THAN FEES

ARS § 9-463.05(E)(7) requires:

> *"A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved land use assumptions, and a plan to include these contributions in determining the extent of the burden imposed by the development as required in subsection B, paragraph 12 of this section."*

ARS § 9-463.05(B)(12) states,

> *"The municipality shall forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and shall include these contributions in determining the extent of the burden imposed by the development. Beginning August 1, 2014, for purposes of calculating the required offset to development fees pursuant to this subsection, if a municipality imposes a construction contracting or similar excise tax rate in excess of the percentage amount of the transaction privilege tax rate imposed on the majority of other transaction privilege tax classifications, the entire excess portion of the construction contracting or similar excise tax shall be treated as a contribution to the capital costs of necessary public services provided to development for which development fees are assessed, unless the excess portion was already taken into account for such purpose pursuant to this subsection."*

Glendale does not have a higher-than-normal construction excise tax rate; therefore, the required offset described above is not applicable. Shown in Figure A1 is the required forecast of non-development fee revenue from identified sources that can be attributed to future development over a period of five years. These funds are available for capital investments; however, the City of Glendale directs these revenues to non-development fee eligible capital needs including maintenance, repair, and replacement.

Figure A1: Revenue Projections

Source	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28
City Sales Tax	$174,018,883	$175,241,091	$177,675,643	$180,935,746	$184,395,530
Property Tax	$6,329,445	$6,392,739	$6,456,667	$6,521,233	$6,586,446
State Sales & Income Tax	$97,147,197	$98,323,894	$99,528,646	$100,745,341	$101,990,952
Other Fees	$32,678,324	$30,143,979	$28,698,950	$27,962,852	$27,321,707
Subtotal, General Fund	$310,173,849	$310,101,703	$312,359,906	$316,165,172	$320,294,635
Water Revenue	$64,680,215	$68,104,714	$69,567,524	$71,061,785	$71,061,785
Sewer Revenue	$44,430,807	$45,761,079	$46,446,169	$47,141,535	$47,376,801
Subtotal, Utility	$109,111,022	$113,865,793	$116,013,693	$118,203,320	$118,438,586
Total	$419,284,871	$423,967,496	$428,373,599	$434,368,492	$438,733,221

Source: FY23-24 Budget Book

APPENDIX B: PROFESSIONAL SERVICES

As stated in Arizona's development fee enabling legislation, "a municipality may assess development fees to offset costs to the municipality associated with providing necessary public services to a development, including the costs of infrastructure, improvements, real property, engineering and architectural services, financing and professional services required for the preparation or revision of a development fee pursuant to this section, including the relevant portion of the infrastructure improvements plan" (see ARS § 9-463.05.A). Because development fees must be updated at least every five years, the cost of professional services is allocated to the projected increase in service units, over five years (see Figure B1). Qualified professionals must develop the IIP, using generally accepted engineering and planning practices. A qualified professional is defined as "a professional engineer, surveyor, financial analyst or planner providing services within the scope of the person's license, education or experience".

Figure B1: Cost of Professional Services

Necessary Public Service	Cost	Proportionate Share		Service Unit	5-Year Change	Cost per Service Unit
Water Facilities	$19,120	All Development	100%	Gallons	2,033,186	$0.01
Wastewater Facilities	$19,120	All Development	100%	Gallons	887,051	$0.02
Total	$38,240					

APPENDIX C: LAND USE DEFINITIONS

RESIDENTIAL DEVELOPMENT

As discussed below, residential development categories are based on data from the U.S. Census Bureau, American Community Survey. Development fees will be assessed to all new residential units. One-time development fees are determined by site capacity (i.e., number of residential units).

Single Family:

1. Single-family detached is a one-unit structure detached from any other house, that is, with open space on all four sides. Such structures are considered detached even if they have an adjoining shed or garage. A one-family house that contains a business is considered detached as long as the building has open space on all four sides.
2. Single-family attached (townhouse) is a one-unit structure that has one or more walls extending from ground to roof separating it from adjoining structures. In row houses (sometimes called townhouses), double houses, or houses attached to nonresidential structures, each house is a separate, attached structure if the dividing or common wall goes from ground to roof.
3. Mobile home includes both occupied and vacant mobile homes, to which no permanent rooms have been added. Mobile homes used only for business purposes or for extra sleeping space and mobile homes for sale on a dealer's lot, at the factory, or in storage are not counted in the housing inventory.

Multi-Family:

1. Includes units in structures containing two or more housing units, further categorized as units in structures with "2, 3 or 4, 5 to 9, 10 to 19, 20 to 49, and 50 or more apartments."
2. Includes any living quarters occupied as a housing unit that does not fit the other categories (e.g., houseboats, railroad cars, campers, and vans). Recreational vehicles, boats, vans, railroad cars, and the like are included only if they are occupied as a current place of residence.

NONRESIDENTIAL DEVELOPMENT

The proposed general nonresidential development categories (defined below) can be used for all new construction. Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates and employment densities (i.e., jobs per thousand square feet of floor area).

Assisted Living: Establishments primarily providing either routine general protective oversight, assistance with activities necessary for independent living to mentally or physically limited persons, or establishments providing care for persons who are unable to care for themselves. By way of example, assisted living includes assisted living facilities, nursing homes, rest homes, chronic care homes, and convalescent homes.

Commercial: Establishments primarily selling merchandise, eating/drinking places, entertainment, and lodging uses. By way of example, commercial includes shopping centers, supermarkets, pharmacies, restaurants, bars, nightclubs, automobile dealerships, and movie theaters.

Industrial: Establishments primarily engaged in the processing or production of goods, along with warehousing, transportation, communications, and utilities. By way of example, industrial includes manufacturing plants, distribution warehouses, trucking companies, utility substations, power generation facilities, and telecommunications buildings.

Institutional: Public and quasi-public buildings providing educational, social assistance, or religious services. By way of example, institutional includes schools, universities, churches, and public buildings

Lodging: Establishments providing sleeping accommodations that may include supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retail and service shops. By way of example, lodging includes hotels, motels, resorts, and hostels.

Office and Other Services: Establishments providing management, administrative, professional, or business services; personal and health care services. By way of example, office and other services includes offices, health care, and business services.

APPENDIX D: LAND USE ASSUMPTIONS

Arizona's Development Fee Act requires the preparation of Land Use Assumptions, which are defined in Arizona Revised Statutes § 9-463.05(T)(6) as:

> *"projections of changes in land uses, densities, intensities and population for a specified service area over a period of at least ten years and pursuant to the General Plan of the municipality."*

The estimates and projections of residential and nonresidential development in this *Land Use Assumptions* document are for all areas within Glendale's city limits. The current demographic estimates and future development projections will be used in the Infrastructure Improvements Plan (IIP) and in the calculation of development fees. Current demographic data estimates for 2023 are used in calculating levels of service (LOS) provided to existing development in the City of Glendale. Arizona's Enabling Legislation requires fees to be updated at least every five years and limits the IIP to a maximum of 10 years.

SUMMARY OF GROWTH INDICATORS

Key land use assumptions for the City of Glendale Development Fee Report are population, housing units, employment, and nonresidential floor area projections. TischlerBise projects single-family housing units in East Glendale using 2020 – 2035 projections published by the Maricopa Association of Governments (MAG) and projects multi-family housing units in East Glendale using projections provided by projections provided by Glendale's Development Services Department. For housing units in West Glendale, TischlerBise uses projections provided by Glendale's Development Services Department. TischlerBise derives population estimates and projections by converting housing units to population using persons per housing unit factors. For nonresidential development in East Glendale, TischlerBise projects employment using 2020 – 2035 projections published by the Maricopa Association of Governments (MAG). Multiplying employment projections by employment density factors published by the Institute of Transportation Engineers (ITE) provides nonresidential floor area. For nonresidential development in West Glendale, TischlerBise uses projections provided by Glendale's Office of Economic Development. The projections contained in this document provide the foundation for the Development Fee Report. These metrics are the service units and demand indicators used in the Development Fee Report.

Development projections summarized in Figure D10 are used to estimate development fee revenue and to indicate the anticipated need for growth-related infrastructure. Development fee methodologies are designed to reduce sensitivity to development projections in the determination of the proportionate share fee amounts. If actual development is slower than projected, fee revenue will decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, fee revenue will increase, but Glendale will also need to accelerate infrastructure improvements to keep pace with the actual rate of development.

During the next 10 years, residential development projections in East Glendale indicate a resident population increase of 14,399 persons in an additional 6,303 housing units, and nonresidential development projections in East Glendale indicate an employment increase of 14,859 jobs in approximately 5,976,000 square feet of floor area.

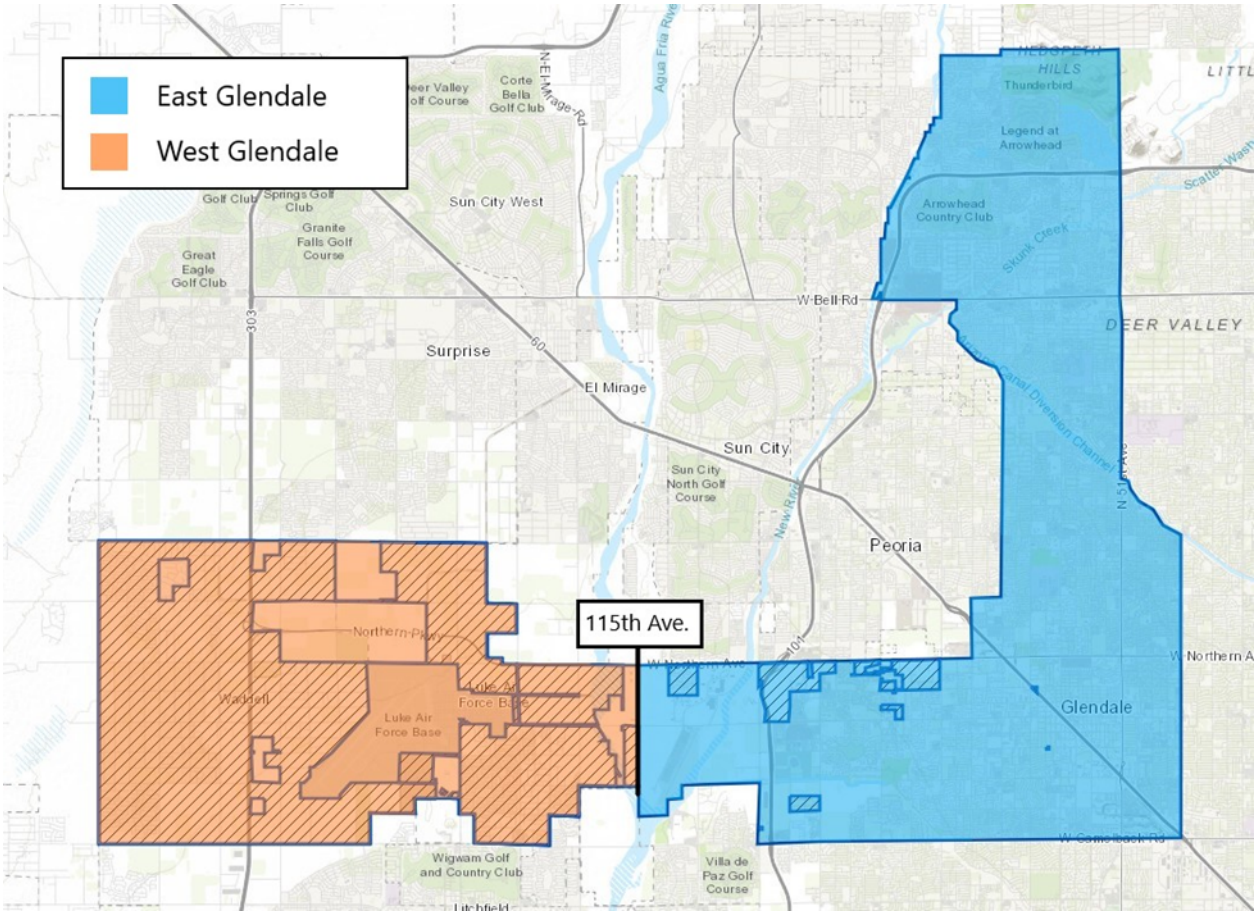
SERVICE AREAS

ARS § 9-63.05 defines "service area" as follows:

> *"Any specified area within the boundaries of a municipality in which development will be served by necessary public services or facility expansions and within which a substantial nexus exists between the necessary public services or facility expansions and the development being served as prescribed in the infrastructure improvements plan."*

Since new development west of 115th Avenue will not connect to Glendale's water and sewer systems, TischlerBise recommends using 115th Avenue as the border between the two service areas for water and wastewater facilities development fees.

Figure D1: Proposed Development Fee Service Areas



RESIDENTIAL DEVELOPMENT

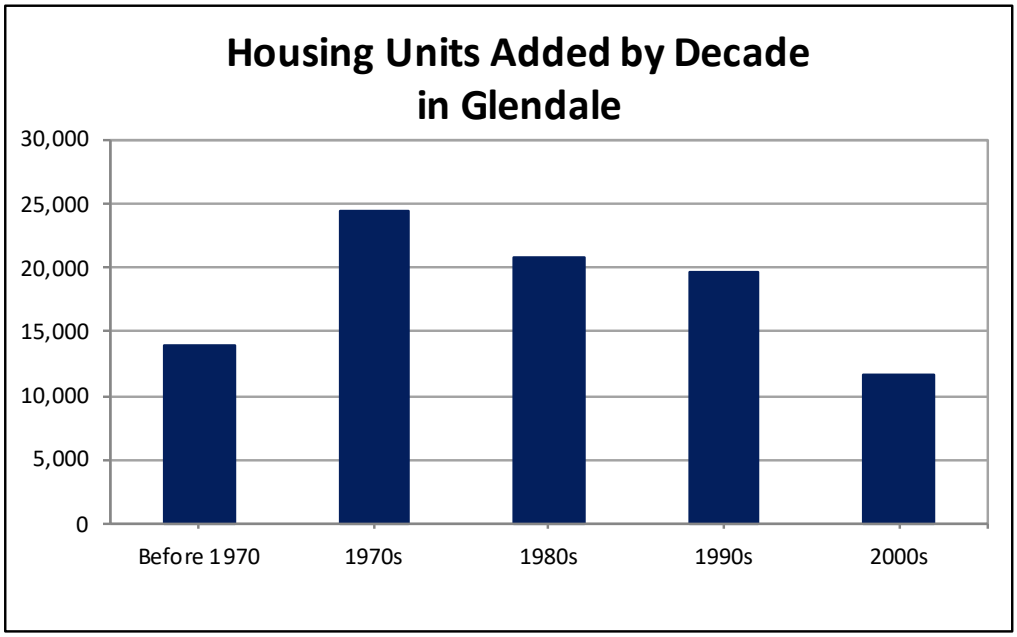
This section details current estimates and future projections of residential development.

Recent Residential Construction

Development fees require an analysis of current levels of service. For residential development, current levels of service are determined using estimates of population and housing units. Shown below, Figure D2 indicates the estimated number of housing units added by decade according to data obtained from the U.S. Census Bureau. In the previous decade, Glendale's housing stock grew by an average of 141 housing units per year.

Figure D2: Housing Units by Decade

Census 2010 Housing Units	90,505	Glendale's housing stock grew by an average of 141 housing units per year from 2010 to 2020.
Census 2020 Housing Units	91,912	
New Housing Units 2010 to 2020	1,407	



Source: U.S. Census Bureau, Census 2020 Summary File 1, Census 2010 Summary File 1, 2015-2019 5-Year American Community Survey (for 2000s and earlier, adjusted to yield total units in 2010).

Persons per Housing Unit

According to the U.S. Census Bureau, a household is a housing unit occupied by year-round residents. Development fees often use per capita standards and persons per housing unit (PPHU) or persons per household (PPH) to derive proportionate share fee amounts. When PPHU is used in the fee calculations, infrastructure standards are derived using year-round population. When PPH is used in the fee calculations, the development fee methodology assumes a higher percentage of housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. TischlerBise recommends that development fees for residential development in Glendale be imposed according to the number of persons per housing unit.

Occupancy calculations require data on population and the types of units by structure. The 2010 census did not obtain detailed information using a "long-form" questionnaire. Instead, the U.S. Census Bureau switched to a continuous monthly mailing of surveys, known as the American Community Survey (ACS), which has limitations due to sample-size constraints. For example, data on detached housing units are now combined with attached single units (commonly known as townhouses, which share a common sidewall, but are constructed on an individual parcel of land). For development fees in Glendale, detached units, attached units, and mobile home units are included in the "Single-Family" category. The "Multi-Family" category includes duplexes and all other structures with two or more units on an individual parcel of land.

Figure D3 below shows the occupancy estimates for Glendale based on 2015-2019 American Community Survey 5-Year Estimates. Single-family units averaged 3.15 persons per housing unit, and multi-family units averaged 2.06 persons per housing unit. The average occupancy for all housing units in Glendale was 2.85 persons per housing unit.

Figure D3: Persons per Housing Unit

Housing Type	Persons	Households	Persons per Household	Housing Units	Persons per Housing Unit	Housing Mix	Vacancy Rate
Single-Family[1]	199,345	59,391	3.36	63,368	**3.15**	72.7%	6.28%
Multi-Family[2]	49,016	21,674	2.26	23,820	**2.06**	27.3%	9.01%
Total	248,361	81,065	3.06	87,188	**2.85**	100.0%	7.02%

Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates, Tables B25024, B25032, B25033.

1. Includes detached, attached (i.e. townhouses), and mobile home units.
2. Includes dwellings in structures with two or more units or a boat, RV, van, etc.

Residential Estimates

East Glendale

Based on estimates provided by Glendale's Development Services Department, there were 55,470 single-family units and 38,759 multi-family units in East Glendale in 2021. Based on units under construction in 2021 and TischlerBise estimates of housing units constructed in 2022, the 2023 base year estimate for East Glendale includes 57,051 single-family units and 39,879 multi-family units.

West Glendale

TischlerBise estimates there are 873 single-family units and 1,844 multi-family units located in West Glendale in 2023. These units are located at Luke Air Force Base.

Residential Projections

For this study, the analysis assumes the occupancy factors shown in Figure D3 will remain constant throughout the 10-year projection period. Population and housing unit projections are used to illustrate the possible future pace of service demands, revenues, and expenditures. To the extent these factors change, the projected need for infrastructure will also change. If development occurs at a more rapid rate than projected, the demand for infrastructure will increase at a corresponding rate. If development occurs at a slower rate than projected, the demand for infrastructure will also decrease.

East Glendale

To project single-family housing units in East Glendale from 2023 through 2033, TischlerBise uses MAG housing unit projections for 2020, 2025, 2030, and 2035. To project interim years, the five-year increase is distributed equally. For example, the average annual increase from 2020 to 2025 is 255 single-family units. Adding those 255 units to the 2023 estimate of 57,051 single-family units results in a 2024 estimate of 57,306 single-family units in East Glendale. Glendale's Development Services Department projects an additional 5,004 multi-family units over the next 10 years.

To convert housing units to population, occupancy factors shown in Figure D3 are applied to the housing unit projections shown in Figure D4. For example, the 10-year increase of 1,299 single-family units multiplied by 3.15 persons per housing unit equals 4,090 persons in new single-family units. Based on these assumptions, the 10-year projections for East Glendale include an increase of 14,399 persons and 6,303 housing units.

Figure D4: Residential Development Projections – East Glendale

East Glendale	2023	2024	2025	2026	2027	2028	2033	10-Year
	Base Year	1	2	3	4	5	10	Increase
Resident Population								
Single Family	181,749	182,552	183,355	183,751	184,146	184,542	185,840	4,090
Multi-Family	83,107	84,685	87,078	87,893	88,682	89,471	93,416	10,308
Total	**264,857**	**267,238**	**270,434**	**271,644**	**272,828**	**274,013**	**279,255**	**14,399**
Housing Units								
Single Family	57,051	57,306	57,561	57,686	57,812	57,937	58,349	1,299
Multi-Family	39,879	40,645	41,807	42,202	42,585	42,968	44,883	5,004
Total	**96,930**	**97,951**	**99,368**	**99,889**	**100,397**	**100,906**	**103,233**	**6,303**

West Glendale

Glendale's Development Services Department projects construction of 1,265 single-family units over the next 10 years and 96 multi-family units over the next two years. To convert housing units to population, occupancy factors shown in Figure D3 are applied to the housing unit projections shown at the bottom of Figure D5. For example, the 10-year increase of 1,265 single-family units multiplied by 3.15 persons per housing unit equals 3,983 persons in new single-family units. Based on these assumptions, the 10-year projections for West Glendale include an increase of 4,181 persons and 1,361 housing units. There is no expected increase in housing units at Luke Air Force Base.

Figure D5: Residential Development Projections – West Glendale

West Glendale	2023	2024	2025	2026	2027	2028	2033	10-Year
	Base Year	1	2	3	4	5	10	Increase
Resident Population								
Single Family	2,395	2,837	3,280	3,722	4,165	4,607	6,378	3,983
Multi-Family	1,654	1,753	1,852	1,852	1,852	1,852	1,852	198
Total	**4,048**	**4,590**	**5,131**	**5,574**	**6,017**	**6,459**	**8,229**	**4,181**
Housing Units								
Single Family	873	1,013	1,154	1,294	1,435	1,575	2,137	1,265
Multi-Family	1,844	1,892	1,940	1,940	1,940	1,940	1,940	96
Total	**2,717**	**2,905**	**3,094**	**3,234**	**3,375**	**3,515**	**4,077**	**1,361**

NONRESIDENTIAL DEVELOPMENT

This section details current estimates and future projections of nonresidential development including jobs and nonresidential floor area.

Nonresidential Square Footage Estimates

TischlerBise uses the term jobs to refer to employment by place of work. In Figure D6, gray shading indicates the nonresidential development prototypes used by TischlerBise to derive employment densities. For nonresidential development, TischlerBise uses data published in Trip Generation, Institute of Transportation Engineers, 11th Edition (2021). The prototype for industrial development, Industrial Park (ITE 130), has 864 square feet of floor area per employee. Institutional development uses Government Office (ITE 730) and has 330 square feet of floor area per employee. For office & other services development, the proxy is General Office (ITE 710); it has 307 square feet of floor area per employee. The prototype for commercial development is Shopping Center (ITE 820), which has 471 square feet of floor area per employee.

Figure D6: Nonresidential Demand Units

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit[1]	Wkdy Trip Ends Per Employee[1]	Emp Per Dmd Unit	Sq Ft Per Emp
110	Light Industrial	1,000 Sq Ft	4.87	3.10	1.57	637
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	864
140	Manufacturing	1,000 Sq Ft	4.75	2.51	1.89	528
150	Warehousing	1,000 Sq Ft	1.71	5.05	0.34	2,953
254	Assisted Living	bed	2.60	4.24	0.61	na
310	Hotel	room	7.99	14.34	0.56	na
520	Elementary School	student	2.27	22.50	0.10	na
525	High School	student	1.94	21.95	0.09	na
565	Day Care	student	4.09	21.38	0.19	na
610	Hospital	1,000 Sq Ft	10.77	3.77	2.86	350
710	General Office (avg size)	1,000 Sq Ft	10.84	3.33	3.26	307
720	Medical-Dental Office	1,000 Sq Ft	36.00	8.71	4.13	242
730	Government Office	1,000 Sq Ft	22.59	7.45	3.03	330
750	Office Park	1,000 Sq Ft	11.07	3.54	3.13	320
770	Business Park	1,000 Sq Ft	12.44	4.04	3.08	325
820	Shopping Center (avg size)	1,000 Sq Ft	37.01	17.42	2.12	471

1. Trip Generation, Institute of Transportation Engineers, 11th Edition (2021).

Nonresidential Estimates

Based on data published by Esri Business Analyst, the 2021 employment estimate includes 81,970 jobs. Converting jobs to nonresidential floor area using the square feet per employee multipliers shown in Figure D6, the 2021 floor area estimate includes 34,577,073 square feet.

Figure D7: Nonresidential Estimates – 2021

Nonresidential Category	2021 Jobs[1]	Percent of Total Jobs	Square Feet per Job[2]	2021 Estimated Floor Area[3]	Jobs per 1,000 Sq. Ft.[2]
Industrial[4]	8,531	10%	864	7,370,784	1.16
Commercial[5]	26,221	32%	471	12,350,091	2.12
Office & Other Service[6]	31,554	38%	307	9,687,078	3.26
Institutional[7]	15,664	19%	330	5,169,120	3.03
Total	81,970	100%		34,577,073	

1. Esri Business Analyst, 2021.
2. Trip Generation, Institute of Transportation Engineers, 11th Edition (2021).
3. TischlerBise calculation (2021 jobs X square feet per job).
4. Major sectors include Manufacturing, Wholesale Trade.
5. Major sectors include Retail Trade, Accommodation & Food Services.
6. Major sectors include Health Care, Other Services.
7. Major sectors include Public Administration, Educational Services.

Nonresidential Projections

Employment and floor area projections are used to illustrate the possible future pace of service demands, revenues, and expenditures. To the extent these factors change, the projected need for infrastructure will also change. If development occurs at a more rapid rate than projected, the demand for infrastructure will increase at a corresponding rate. If development occurs at a slower rate than projected, the demand for infrastructure will also decrease.

East Glendale

To project nonresidential development in East Glendale from the 2021 Esri estimate to the 2023 base year, and then through 2033, TischlerBise uses compound annual growth rates calculated from MAG employment projections for 2020 to 2025, 2025 to 2030, and 2030 to 2035. For 2020 to 2025, the compound annual growth rate is 2.4 percent for industrial, 1.0 percent for commercial, 2.7 percent for office and other services, and 1.2 percent for institutional. Applying these growth rates to the 2021 Esri estimates results in a 2023 base year estimate of 8,250 industrial jobs, 26,491 commercial jobs, 33,057 office and other services jobs, and 10,987 institutional jobs. For the 2023 base year, the East Glendale employment estimate includes 78,784 jobs. TischlerBise repeats this calculation to project employment from 2023 to 2033. Over the next 10 years, East Glendale employment growth includes 14,859 jobs.

To convert employment to floor area, employment multipliers shown in Figure D6 are applied to the employment projections shown in Figure D8. For example, the 10-year increase of 2,203 commercial jobs multiplied by 471 square feet per job equals approximately 1,038,000 square feet of commercial floor area. Based on these assumptions, the 10-year projections for East Glendale include an additional 5,976,000 square feet of nonresidential floor area.

Figure D8: Nonresidential Development Projections – East Glendale

East Glendale	2023	2024	2025	2026	2027	2028	2033	10-Year
	Base Year	1	2	3	4	5	10	Increase
Employment								
Industrial	8,250	8,448	8,646	8,855	9,064	9,272	10,097	1,848
Commercial	26,491	26,760	27,029	27,265	27,501	27,737	28,694	2,203
Office & Other Services	33,057	33,927	34,796	35,775	36,754	37,733	42,838	9,781
Institutional	10,987	11,113	11,239	11,319	11,398	11,478	12,015	1,028
Total	**78,784**	**80,247**	**81,710**	**83,213**	**84,717**	**86,220**	**93,643**	**14,859**
Nonres. Floor Area (x1,000)								
Industrial	7,128	7,299	7,470	7,651	7,831	8,011	8,724	1,596
Commercial	12,477	12,604	12,731	12,842	12,953	13,064	13,515	1,038
Office & Other Services	10,149	10,416	10,682	10,983	11,283	11,584	13,151	3,003
Institutional	3,626	3,667	3,709	3,735	3,761	3,788	3,965	339
Total	**33,379**	**33,986**	**34,592**	**35,210**	**35,829**	**36,447**	**39,355**	**5,976**

West Glendale

To project nonresidential development in West Glendale from the 2021 Esri estimate to the 2023 base year, and then through 2033, TischlerBise uses development projections provided by Glendale's Office of Economic Development. For 2021, Luke Air Force Base accounted for the majority of jobs and nonresidential floor area located in West Glendale. Adding industrial development completed or under construction in 2021 to the 2021 estimate provides a 2023 base year estimate of 16,515,000 square feet of nonresidential floor area in West Glendale.

Glendale's Office of Economic Development projects an additional 9,800,000 square feet of industrial development over the next five years and an additional 4,000,000 square feet of industrial development from 2028 to 2033. Glendale's Office of Economic Development projects an additional 90,000 square feet of commercial development over the next five years and an additional 40,000 square feet of commercial development from 2028 to 2033. Based on these assumptions, the 10-year projections for West Glendale include an additional 13,930,000 square feet of nonresidential floor area.

To convert floor area to employment, employment multipliers shown in Figure D6 are applied to the floor area projections shown in Figure D9. For example, the 10-year increase of 13,800,000 square feet of industrial development divided by 864 square feet per job equals approximately 15,972 industrial jobs. Over the next 10 years, West Glendale employment growth includes 16,248 jobs.

Figure D9: Nonresidential Development Projections – West Glendale

West Glendale	2023	2024	2025	2026	2027	2028	2033	10-Year
	Base Year	1	2	3	4	5	10	Increase
Employment								
Industrial	7,874	10,420	12,966	15,513	18,059	19,216	23,846	15,972
Commercial	310	353	395	438	480	502	586	276
Office & Other Services	236	236	236	236	236	236	236	0
Institutional	4,930	4,930	4,930	4,930	4,930	4,930	4,930	0
Total	**13,350**	**15,939**	**18,528**	**21,116**	**23,705**	**24,884**	**29,598**	**16,248**
Nonres. Floor Area (x1,000)								
Industrial	16,515	18,715	20,915	23,115	25,315	26,315	30,315	13,800
Commercial	146	166	186	206	226	236	276	130
Office & Other Services	72	72	72	72	72	72	72	0
Institutional	1,627	1,627	1,627	1,627	1,627	1,627	1,627	0
Total	**18,361**	**20,581**	**22,801**	**25,021**	**27,241**	**28,251**	**32,291**	**13,930**

DEVELOPMENT PROJECTIONS

Provided below is a summary of development projections. Development projections are used to illustrate a possible future pace of demand for service units and cash flows resulting from revenues and expenditures associated with those demands.

Figure D10: Development Projections Summary – Total

Glendale, Arizona	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	10-Year Increase
	Base Year	1	2	3	4	5	6	7	8	9	10	
Resident Population												
Single Family	184,144	185,390	186,635	187,473	188,311	189,149	189,987	190,825	191,437	192,048	192,217	8,073
Multi-Family	84,761	86,438	88,930	89,745	90,533	91,322	92,111	92,900	93,689	94,478	95,267	10,506
Total	**268,905**	**271,828**	**275,565**	**277,218**	**278,845**	**280,472**	**282,099**	**283,726**	**285,126**	**286,527**	**287,485**	**18,579**
Housing Units												
Single Family	57,923	58,319	58,714	58,980	59,246	59,512	59,779	60,045	60,239	60,433	60,486	2,563
Multi-Family	41,723	42,537	43,747	44,142	44,525	44,908	45,291	45,674	46,057	46,440	46,823	5,100
Total	**99,647**	**100,856**	**102,461**	**103,123**	**103,772**	**104,421**	**105,070**	**105,719**	**106,296**	**106,873**	**107,310**	**7,663**
Employment												
Industrial	16,123	18,868	21,612	24,367	27,122	28,489	29,855	31,221	32,514	33,807	33,943	17,820
Commercial	26,801	27,113	27,424	27,703	27,981	28,238	28,496	28,753	28,936	29,119	29,280	2,479
Office & Other Services	33,293	34,163	35,032	36,011	36,990	37,969	38,947	39,926	40,975	42,024	43,074	9,781
Institutional	15,917	16,043	16,169	16,249	16,328	16,408	16,488	16,567	16,693	16,819	16,945	1,028
Total	**92,134**	**96,186**	**100,238**	**104,330**	**108,422**	**111,104**	**113,785**	**116,467**	**119,118**	**121,769**	**123,242**	**31,108**
Nonres. Floor Area (x1,000)												
Industrial	23,643	26,014	28,386	30,766	33,146	34,327	35,507	36,687	37,805	38,922	39,039	15,396
Commercial	12,623	12,770	12,917	13,048	13,179	13,300	13,421	13,543	13,629	13,715	13,791	1,168
Office & Other Services	10,221	10,488	10,755	11,055	11,356	11,656	11,957	12,257	12,579	12,902	13,224	3,003
Institutional	5,252	5,294	5,336	5,362	5,388	5,415	5,441	5,467	5,509	5,550	5,592	339
Total	**51,740**	**54,566**	**57,393**	**60,231**	**63,070**	**64,698**	**66,326**	**67,954**	**69,522**	**71,089**	**71,646**	**19,906**

East Glendale

Figure D11: Development Projections Summary – East Glendale

East Glendale	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	10-Year
	Base Year	1	2	3	4	5	6	7	8	9	10	Increase
Resident Population												
Single Family	181,749	182,552	183,355	183,751	184,146	184,542	184,937	185,333	185,502	185,671	185,840	4,090
Multi-Family	83,107	84,685	87,078	87,893	88,682	89,471	90,260	91,049	91,838	92,627	93,416	10,308
Total	**264,857**	**267,238**	**270,434**	**271,644**	**272,828**	**274,013**	**275,197**	**276,382**	**277,339**	**278,297**	**279,255**	**14,399**
Housing Units												
Single Family	57,051	57,306	57,561	57,686	57,812	57,937	58,063	58,189	58,242	58,296	58,349	1,299
Multi-Family	39,879	40,645	41,807	42,202	42,585	42,968	43,351	43,734	44,117	44,500	44,883	5,004
Total	**96,930**	**97,951**	**99,368**	**99,889**	**100,397**	**100,906**	**101,414**	**101,923**	**102,360**	**102,796**	**103,233**	**6,303**
Employment												
Industrial	8,250	8,448	8,646	8,855	9,064	9,272	9,481	9,690	9,826	9,962	10,097	1,848
Commercial	26,491	26,760	27,029	27,265	27,501	27,737	27,973	28,209	28,370	28,532	28,694	2,203
Office & Other Services	33,057	33,927	34,796	35,775	36,754	37,733	38,711	39,690	40,739	41,788	42,838	9,781
Institutional	10,987	11,113	11,239	11,319	11,398	11,478	11,558	11,637	11,763	11,889	12,015	1,028
Total	**78,784**	**80,247**	**81,710**	**83,213**	**84,717**	**86,220**	**87,723**	**89,226**	**90,699**	**92,171**	**93,643**	**14,859**
Nonres. Floor Area (x1,000)												
Industrial	7,128	7,299	7,470	7,651	7,831	8,011	8,192	8,372	8,489	8,607	8,724	1,596
Commercial	12,477	12,604	12,731	12,842	12,953	13,064	13,175	13,286	13,363	13,439	13,515	1,038
Office & Other Services	10,149	10,416	10,682	10,983	11,283	11,584	11,884	12,185	12,507	12,829	13,151	3,003
Institutional	3,626	3,667	3,709	3,735	3,761	3,788	3,814	3,840	3,882	3,923	3,965	339
Total	**33,379**	**33,986**	**34,592**	**35,210**	**35,829**	**36,447**	**37,065**	**37,684**	**38,241**	**38,798**	**39,355**	**5,976**

West Glendale

Figure D12: Development Projections Summary – West Glendale

West Glendale	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	10-Year
	Base Year	1	2	3	4	5	6	7	8	9	10	Increase
Resident Population												
Single Family	2,395	2,837	3,280	3,722	4,165	4,607	5,050	5,493	5,935	6,378	6,378	3,983
Multi-Family	1,654	1,753	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	198
Total	**4,048**	**4,590**	**5,131**	**5,574**	**6,017**	**6,459**	**6,902**	**7,344**	**7,787**	**8,229**	**8,229**	**4,181**
Housing Units												
Single Family	873	1,013	1,154	1,294	1,435	1,575	1,716	1,856	1,997	2,137	2,137	1,265
Multi-Family	1,844	1,892	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	96
Total	**2,717**	**2,905**	**3,094**	**3,234**	**3,375**	**3,515**	**3,656**	**3,796**	**3,937**	**4,077**	**4,077**	**1,361**
Employment												
Industrial	7,874	10,420	12,966	15,513	18,059	19,216	20,374	21,531	22,688	23,846	23,846	15,972
Commercial	310	353	395	438	480	502	523	544	565	586	586	276
Office & Other Services	236	236	236	236	236	236	236	236	236	236	236	0
Institutional	4,930	4,930	4,930	4,930	4,930	4,930	4,930	4,930	4,930	4,930	4,930	0
Total	**13,350**	**15,939**	**18,528**	**21,116**	**23,705**	**24,884**	**26,062**	**27,241**	**28,420**	**29,598**	**29,598**	**16,248**
Nonres. Floor Area (x1,000)												
Industrial	16,515	18,715	20,915	23,115	25,315	26,315	27,315	28,315	29,315	30,315	30,315	13,800
Commercial	146	166	186	206	226	236	246	256	266	276	276	130
Office & Other Services	72	72	72	72	72	72	72	72	72	72	72	0
Institutional	1,627	1,627	1,627	1,627	1,627	1,627	1,627	1,627	1,627	1,627	1,627	0
Total	**18,361**	**20,581**	**22,801**	**25,021**	**27,241**	**28,251**	**29,261**	**30,271**	**31,281**	**32,291**	**32,291**	**13,930**