

WASTEWATER TREATMENT INFRASTRUCTURE IMPROVEMENTS PLAN

Wastewater Treatment Impact Fee Methodology

The steps to calculate the Wastewater Treatment Impact Fee can be summarized as follows:

- Determine the need for wastewater treatment facilities necessary to serve new development anticipated during the period of 2025 – 34. The Land Use Assumptions used for the Wastewater Treatment IIP provide a forecast of new development by land use type, location, and relative timing (see supplemental report: *Growth Projections and Land Use Assumptions 2024 Update*, Applied Economics, July 12, 2024).
- Land Use Assumptions are translated to wastewater generation (volume) to inform treatment capacity requirements. The Water Services Department retained Keen Independent Research to update wastewater generation estimates and calculate Equivalent Demand Units (EDUs) for ‘planning’ purposes (see supplemental report: *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024).
- The WSD Wastewater System Modeling Team uses the land use and wastewater generation forecasts to identify the treatment needs during the 10-year infrastructure planning horizon.
- The costs for wastewater treatment plant (WWTP) are based on the current cost of construction, using generic infrastructure types and quantities (See supplemental report: *Water and Wastewater Unit Cost Study*, Carollo Engineers, June 2024).
- As an alternative to estimating system capacity utilization, the city calculates a ‘buildout’ cost per EDU, or the cost of all wastewater treatment facilities divided by the total EDUs at buildout. This method controls for cost variability attributed to a specific planning horizon and serves as a check to avoid over-burdening one cohort of new development in favor of another. The lesser of the ‘10-Year’ and ‘buildout’ plan cost per EDU is selected as the potential wastewater treatment gross impact fee.
- Finally, offsets must be calculated and applied for alternative revenue sources that are applied toward facilities provided through the wastewater treatment impact fee program. This includes sewer rate revenue that will be used to pay outstanding debt service obligation. The offset per EDU is calculated by dividing the outstanding debt service by citywide EDUs. Arizona impact fee rules require cities to forecast the alternative revenue generated by new development over the 10-year infrastructure planning horizon. This is done by multiplying the offset per EDU by the anticipated 10-year EDUs in each designated impact fee service area (see supplemental report: *2025 Development Impact Fee Update, Draft Alternative Revenue Offsets Report*, Draft July 18, 2024, or as amended).
- The resulting ‘net’ impact fee per EDU is assessed to all new services connections within the designated impact fee service areas that will place demand on the city’s water transmission systems.

LEVEL OF SERVICE (LOS)

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

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.

The assumptions used to establish the proportionate amount of infrastructure required to serve an EDU are summarized below. Additional detail on the methods used to calculate ‘planning’ EDU Factors can be found in supplemental report: *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024). An additional ‘**peak-flow’ adjustment factor of 1.5** is applied for wastewater treatment plant sizing.

Table WWP.1 – Wastewater Generation Assumptions and Planning EDU Factors

Land Use	Gal/Unit/Day	EDU Factor
Single-Family	153	1.00
Multifamily	103	0.67
Retail	35	0.23
Office	19	0.12
Industrial	38	0.25
Public	27	0.18
Other/Institutional	39	0.26

WASTEWATER TREATMENT IMPACT FEE SERVICE AREAS

(see supplemental report: *Map #6, Impact Fee Service Area Maps*, July 17, 2024 or as amended)

- Citywide

LAND USE ASSUMPTIONS

The following tables display the forecasted wastewater treatment ‘planning’ EDUs for the required geographic areas and time periods.

Table Source Data and Calculation:

- Unit Counts are listed in the Land Use Assumptions Report and come from the Applied Economics study. They represent the amount of growth in housing units or 1,000 square feet of non-residential construction in an impact fee area (see supplemental report: *Growth Projections and Land Use Assumptions 2024 Update*, Applied Economics, July 12, 2024).
- The ‘planning’ EDU factors come from the Keen Independent study. EDU factors convert dwelling units and non-residential floor area to units equivalent to the average wastewater generation of a single family home (see supplemental report: *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024).
- The number of EDUs is calculated by multiplying development units (dwellings and non-residential floor area) from the Applied Economics’ study by the ‘planning’ EDU Factors from the Keen Independent Research study.

Table WWP.2 – Citywide, Wastewater Treatment Equivalent Demand Units

	SF	MF	Retail	Office	Industrial	Public	Other	Total
<i>Planning EDU Factor</i>	1.00	0.67	0.23	0.12	0.25	0.18	0.26	
Estimate Year	401,806	181,616	22,168	13,739	46,468	17,580	16,284	699,661
10-Year Growth	32,816	29,662	1,636	1,373	6,346	419	960	73,212
End of Planning Horizon	434,622	211,278	23,803	15,113	52,815	17,999	17,244	772,874
End of Forecast Horizon	479,006	241,666	28,548	19,183	62,805	18,923	18,435	868,566
Buildout	515,877	248,830	31,015	21,081	68,508	19,312	18,760	923,383

WASTEWATER TREATMENT PLANT EXPANSION UNIT COST

Table WWP.3 provides the estimated current cost of construction for wastewater treatment facilities at Cave Creek Water Reclamation Plant, 91st Avenue Wastewater Treatment Plant, and the planned North Gateway Water Reclamation Plant. The cost estimates shown are based on the Carollo Engineers’ unit cost study. For a detailed breakdown of unit cost estimates, see supplemental report: *Water and Wastewater Unit Cost Study*, Carollo Engineers, June 2024.

Table WWP.3 – Wastewater Treatment Plant Expansion Cost

Cost Element	NGWRP Buildout	CCWRP Ph 2	91st WWTP Buildout	All Plants
Wastewater Treatment (\$/gpd)	37.125	23.00	0.00	
Solids Handling (\$/gpd)	3.75	3.75	3.75	
Combined Treatment Cost (\$/gpd)	40.88	26.75	3.75	
Capacity (MGD)	16.0	8.0	43.7	
Total WWTP Cost	\$654,000,000	\$214,000,000	\$163,875,000	\$868,000,000
Weighted Avg WWTP Cost (\$/Gal)				\$12.82
<i>Escalation Factor (1/2028 Dollars)</i>				1.1091
Inf-Adj WWTP Capital Cost (\$/Gal)				\$14.22

WASTEWATER TREATMENT PLANT EXPANSION COST PER EDU

Table WWP.4 provides the wastewater treatment cost per EDU using the incremental expansion method for existing wastewater treatment plants. The wastewater generation estimates are from the Keen Independent study (see supplemental report: *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024), and include the 1.5 peak flow adjustment factor (153 gal/day/EDU X 1.5 = 230 gal/day/EDU)

Table WWP.4 – Wastewater Treatment Plant Expansion Cost per EDU

Inf-Adj AWTF Capital Cost (\$/Gal)	\$14.22
Max Day WW Gal per EDU	230
WW Treatment Capital Cost per EDU	\$3,271

POTENTIAL GROSS WASTEWATER IMPACT FEE

The potential gross wastewater treatment impact fee is the expansion cost per EDU of \$3,271.

FUND BALANCE ADJUSTMENT

Table WWP.5 – Wastewater Treatment Fund Balance Adjustment

Estimated Available Fund Balance ¹ (\$MM)	17
Forecasted 10-year Wastewater Treatment EDU	73,212
Fund Balance per EDU (\$/EDU)	232

- 1) Estimated Fund Balance is 50% of the Northern and Estrella S fund balances, and 100% of the Deer Valley, Estrella N, Laveen W, Laveen E, and Ahwatukee fund balances as of 6-30-2024. This value will be updated to reflect future collections, the 2025/26 CIP, and other relevant information. For example, it may be determined that a portion of the Northern and Estrella S fund balance should be allocated as an adjustment to the applicable WW Collection Impact Fee.

POTENTIAL NET IMPACT FEE

The potential net fee per EDU is calculated by subtracting uncommitted fund balance and offsets from the potential gross fees from Table WWP.4. For a detailed breakdown of water transmission offsets, see supplemental report: *2025 Development Impact Fee Update, Draft Alternative Revenue Offsets Report*, Draft July 18, 2024, or as amended.

Table WWP.6 – Wastewater Treatment, Potential Net Impact Fee per EDU

Impact Fee Service Area	(\$ per EDU)				
	Gross Fee	Fund Balance	Rate Offset ¹	DOF Offset	Net Fee
Citywide	3,271	232	200	0	2,839

- 1) Rate Offset is based on 2020 Wastewater Impact Fee update and does not reflect any recent or future sewer-bond funded projects. This value will be updated upon completion of the rate offset analysis.

SUMMARY OF PLANNED IMPROVEMENTS

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 this analysis, the following assumptions have been made:

- All forecasted EDUs will be developed in the ten-year planning period 2025-2034, and that all EDUs will pay net fees that are consistent with single family dwellings.
- All future water transmission facilities will be built within the ten-year planning period 2025-2034.

A summary of the planned improvements and costs for the ten-year planning period 2025-2034 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 with water transmission impact fee collections, as calculated within this Chapter.

Table WWP.7 – Wastewater Treatment Planned Improvements

Planned Improvement	Amount (\$MM)
Cave Creek Phase II	221
N. Gateway Phase I	327
91 st Ave Phase I	72
Total Cost	620
Forecasted Impact Fee Revenue	(208)
Estimated Alternative Revenue	(15)
Fund Balance	(17)
Borrowing Requirement for Future Development	380