POSTED 8-2-2024 (REVISED 9-19-2024)

WATER TREATMENT INFRASTRUCTURE IMPROVEMENTS PLAN

Water Treatment Impact Fee Methodology

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

- Determine the need for water treatment facilities necessary to serve new development anticipated during the period of 2025 – 35. The Land Use Assumptions used for the Water 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 water demand (volume) to inform treatment capacity requirements. The Water Services Department retained Keen Independent Research to update water demand 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).

- Since the production capacity for Advanced Water Purification (AWP) is effectively constrained by wastewater influent volumes, it was decided to employ the 'incremental expansion' method using 230 gallons per EDU per day (the same volume used for wastewater treatment).

- The costs for advanced water purification (AWP) are based on the weighted average unit cost estimates for 91st Ave WWTP ultimate improvements, Cave Creek WRP Phase II, and North Gateway WRP Phase I (See supplemental report: *Water and Wastewater Unit Cost Study*, Carollo Engineers, June 2024). Cost assumptions have been escalated at 3% per year to 2028 dollars. The Capital Cost per EDU for water treatment is calculated by multiplying the incremental demand per EDU by the unit cost per EDU.

- An analysis of the existing fund balance is performed to determine the amount, if any, that needs to be applied toward the 10-Year Plan. Any portion of the existing fund balance that is needed or reserved for current service deficiencies or earmarked in the city's approved CIP for an impact fee eligible facility that is not included in the proposed fee update, is not applied to the 10-Year Plan. Any fund balance that does not meet that criteria is divided by the 10-Year EDU to determine the fund balance adjustment (see supplemental report: *2025 Development Impact Fee Update, Draft Fund Balance Adjustment Report, September 2024*, or as amended).

- Alternative revenue offsets are calculated and applied for water rate revenue that is applied toward facilities provided through the water treatment impact fee program. This includes water rate revenue to pay outstanding debt service, as well as water rate revenue to pay for AWP. The offset per EDU is calculated by dividing the existing and potential debt service attributed to AWP 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 water rate 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*, September 2024, or as amended).

- Elimination of the existing Water Development Occupational Fee (DOF) will be proposed in-conjunction with the citywide water treatment impact fee. If approved this will also eliminate the offset that is currently applied for DOF charges.

- 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 treatment system.

LEVEL OF SERVICE (LOS)

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. 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 strives to always provide reliable and high-quality water services to all customers. 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 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 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 water treatment plant or advanced water purification facility).

- 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 transmission 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 transmission network after water has left treatment plants.

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-demand' adjustment factor of 1.5** is applied for water treatment capacity requirements.

Table WP.1 – Water Demand Assumptions and Planning EDU Factors

Land Use	Gal/Unit/Day	EDU Factor
Single-Family	289	**1.00**
Multifamily	162	**0.56**
Retail	52	**0.47**
Office	28	**0.25**
Industrial	57	**0.51**
Public	41	**0.37**
Other/Institutional	59	**0.53**

WATER TREATMENT PLANT 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 water 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 water demand 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 WP.2 – Citywide, Equivalent Demand Units

	SF	MF	Retail	Office	Industrial	Public	Other	Total
Planning EDU Factor	*1.00*	*0.56*	*0.47*	*0.25*	*0.51*	*0.37*	*0.53*	
Estimate Year	401,806	151,798	45,300	28,624	94,795	36,138	33,194	791,655
10-Year Growth	32,816	24,792	3,342	2,861	12,947	861	1,957	79,576
End of Planning Horizon	434,622	176,590	48,642	31,485	107,742	36,998	35,151	871,230
End of Forecast Horizon	479,006	201,989	58,337	39,964	128,122	38,897	37,580	983,895
Buildout	515,877	207,977	63,378	43,919	139,756	39,697	38,241	1,048,845

WATER TREATMENT COST PER EDU

The following tables contain the water treatment cost per EDU using the incremental expansion method. 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 WP.3 provides the incremental capital cost for the water resiliency component, based on Advanced Water Purification. Table WP.4 provides the debt service cost per EDU that is attributed to existing capacity at Lake Pleasant WTP that will benefit future development. Water demand 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 WP.3 – Water Resiliency Cost per EDU

Description	North Gateway (Buildout)	Cave Creek (Phase 2)	91st Ave (Buildout)	All Plants
Advanced Water Treatment ($/gal)	16.00	14.00	15.00	
Concentrate Management ($/gal)[1]	29.00	0.00	0.00	
Treated Water Conveyance	8.94	0.00	0.00	
Combined Capital Cost ($/gal)	**53.94**	**14.00**	**15.00**	
Capacity (MGD)	16.0	8.0	43.7	
Weighted Avg. Water Resiliency Capital Cost ($/Gal)				**$24.08**
Escalation Factor (1/2028 Dollars)				*1.1091*
Inf-Adj Water Resiliency Capital Cost ($/Gal)				**$26.71**
Gal per EDU				230
Water Resiliency Capital Cost per EDU				**$6,144**

1) Concentrate Management for Cave Creek handled at 91st Ave WWTP

Table WP.4 – Debt Service Cost per EDU

Description		Amount
Total Outstanding Debt for Available WTP Capacity		182,443,784
Future Citywide EDU 2025 - Buildout	÷	257,190
Debt Service Cost ($/EDU)		**709**

POTENTIAL WATER TREATMENT CAPITAL COST PER EDU

The potential water treatment capital cost per EDU is the sum of the Water Resiliency Cost per EDU from Table WP.3 and Debt Service Cost per EDU from Table WP.4.

Table WP.5 – Citywide, Potential Water Treatment Capital Cost per EDU

Water Resiliency Cost per EDU ($)	6,144
Debt Service Cost per EDU ($)	709
Water Treatment Impact Fee ($ per EDU)	**6,853**

FUND BALANCE ADJUSTMENT AND POTENTIAL GROSS IMPACT FEE

The potential capital cost per EDU from Table WP.5 is adjusted by the qualifying fund balance to determine the Gross Fee per EDU. The fund balance adjustment calculation can be found in supplemental report: *2025 Development Impact Fee Update, Draft Fund Balance Report, September 2024*, or as amended.

Table WP.6 – Water Treatment, Potential Gross Impact Fee per EDU

	($ per EDU)		
Impact Fee Service Area	**Capital Cost**	**Fund Balance**	**Gross Fee**
Citywide	6,853	980	**5,873**

POTENTIAL NET IMPACT FEE

The potential net fee per EDU is calculated by subtracting alternative revenue offsets from the potential gross fees from Table WP.6. For a detailed breakdown of water treatment offsets, see supplemental report: *2025 Development Impact Fee Update, Draft Alternative Revenue Offsets Report, September 2024,* or as amended.

Table WP.7 – Water Treatment, Potential Net Impact Fee per EDU

	($ per EDU)			
Impact Fee Service Area	**Gross Fee**	**Rate Offset**	**DOF Offset**	**Net Fee**
Citywide	5,873	1,207	0	**4,666**

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 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:

- All forecasted EDUs will be developed in the ten-year planning period 2025-2035, and that all EDUs will pay net fees that are consistent with single family dwellings.
- All future water treatment facilities will be built within the ten-year planning period 2025-2035.

A summary of the planned improvements and costs for the ten-year planning period 2025-2035 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 treatment impact fee collections, as calculated within this Infrastructure Improvements Plan and Supplemental Reports.

Table WP.8 – Water Treatment Planned Improvements

Planned Improvement	Amount ($MM)
Debt Service (Lake Pleasant WTP)	182.4
Cave Creek Phase II	111
N. Gateway Phase I	633
Total Cost	**926.4**
Forecasted Impact Fee Revenue	(371.3)
Estimated Alternative Revenue	(96)
Fund Balance	(78)
Borrowing Requirement for Future Development[1]	**381.1**