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 – 34. 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).

- The WSD Water System Modeling Team uses the land use and water demand forecasts to identify the treatment needs during the 10-year infrastructure planning horizon.

- The costs for water treatment plant (WTP) expansions and new advanced water treatment facilities (AWTF) 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 water transmission 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 water treatment gross impact fee.

- Finally, offsets must be calculated and applied for alternative revenue sources that are applied toward facilities provided through the water treatment impact fee program. This includes water 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 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

ADVANCED WATER TREATMENT FACILITY COSTS

Table WP.3 provides the estimated current cost of construction for advanced water 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 WP.3 – Advanced Water Treatment Facility Cost (Buildout Plan)

Cost Element	NGWRP Ph 1	NGWRP Ph 2	CCWRP Ph 2	91st Ave Ph 1	91st Ave Ph 2	All Plants
Advanced Water Treatment ($MM)	164	99	111	418	195	
Concentrate Management ($MM)	360	96	0	335	223	
Treated Water Conveyance ($MM)	109	34	0	517	176	
Combined AWTF Cost ($MM)	**633**	**229**	**111**	**1,270**	**594**	**2,837**
Escalation Factor (1/2028 Dollars)						*1.1091*
Inf-Adj Cost for Advanced Water Treatment ($MM)						**3,147**

ADVANCED WATER TREATMENT FACILITY COST PER EDU

Tables WP.4 and WP.5 provide the Advanced Water Treatment cost per EDU attributable to new development. The New Development EDU and water demand estimates are from the Applied Economics and Keen Independent studies (see supplemental reports: *Growth Projections and Land Use Assumptions 2024 Update*, Applied Economics, July 12, 2024. *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024), and includes the 1.5 peak demand adjustment.

Note the total peak demand of 430 gal/day/EDU is divided between advanced water treatment facilities (230 gal/day/EDU) and water treatment plant expansion (200 gal/day/EDU).

Table WP.4 – Required Advanced Water Treatment Capacity for New Development

New Development EDU (Buildout)	257,190
Max Day AWTF Gal/EDU/Day	230
Required AWTF Capacity	59.2
North Gateway Ph 1	8.0
North Gateway Ph 2	8.0
Cave Creek Ph 2	8.0
91st Ave Ph 1	27.3
91st Ave Ph 2	16.4
Total Planned Capacity	67.7
New Development Share of Planned AWTF Capacity	**87.38%**

Table WP.5 – Advanced Water Treatment Cost per EDU

Inf-Adj Cost for Advanced Water Treatment ($MM)	3,147
New Development Share of Planned AWTF Capacity	*87.38%*
New Development Share of Cost for AWTF ($MM)	2,749
Buildout EDU	257,190
AWTF Cost per EDU ($)	**10,690**

WATER TREATMENT PLANT EXPANSION UNIT COST

Table WP.6 provides the combined water treatment cost per EDU using the incremental expansion method for existing Water Treatment Plants. The water treatment cost estimates are from the Carollo Engineer's study (see supplemental report: *Water and Wastewater Unit Cost Study*, Carollo Engineers, June 2024).

Table WP.6 – Water Treatment Plant Expansion Cost

Cost Element	24th St	Deer Valley	All Plants
Water Treatment ($/gal)	7.60	6.60	
Concentrate Management ($/gal)	0.00	0.33	
Treated Water Conveyance	0.00	0.33	
Combined AWTF Cost ($/gal)	7.60	7.26	
Capacity (MGD)	60.0	50.0	
Total AWTF Cost	$456,000,000	$362,900,000	$818,900,000
Weighted Avg AWTF Capital Cost ($/Gal)			7.44
Escalation Factor (1/2028 Dollars)			*1.1091*
Inf-Adj WTP Expansion Capital Cost ($/Gal)			**8.26**

WATER TREATMENT PLANT EXPANSION COST PER EDU

Table WP.7 provides the water treatment cost per EDU using the incremental expansion method for existing water treatment plants. The 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).

Table WP.7 – Water Treatment Plant Expansion Cost per EDU

Inf-Adj WTP Expansion Capital Cost ($/Gal)	8.26
Unmet Peak W Demand (Gal per EDU)	200
WTP Expansion Cost per EDU ($)	**1,651**

POTENTIAL GROSS IMPACT FEE

The potential gross water treatment impact fee per EDU is the sum of the AWTF and WTP expansion cost per EDU.

Table WP.8 – Citywide, Potential Gross Water Treatment Impact Fee

AWTF Cost per EDU ($)	10,690
WTP Expansion Cost per EDU ($)	1,651
Gross Water Treatment Impact Fee ($ per EDU)	**12,341**

FUND BALANCE ADJUSTMENT

Table WP.9 – Water Treatment Fund Balance Adjustment

Estimated Available Fund Balance[1] ($MM)	78
Forecasted 10-year Water Treatment EDU	79,576
Fund Balance per EDU ($/EDU)	**980**

1) Estimated Fund Balance is 80% of the Northern & Southern Water Impact Fee 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 fund balance should be allocated as an adjustment to the proposed Water Transmission 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 WP.8. 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 WP.10 – Water Treatment, Potential Net Impact Fee per EDU

	($ per EDU)				
Impact Fee Service Area	**Gross Fee**	**Fund Balance**	**Rate Offset[1]**	**DOF Offset**	**Net Fee**
Citywide	12,341	980	209	0	**11,152**

1) Rate Offset is based on 2020 Water Impact Fee update and does not reflect any recent or future water-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 the purpose of 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 WP.11 – Water Treatment Planned Improvements

Planned Improvement	Amount ($MM)
Cave Creek Phase II	111
N. Gateway Phase I	633
91st Ave Phase I	1,270
24th Street WTP Expansion	457
Deer Valley WTP Expansion	346
Total Cost	**2,817**
Forecasted Impact Fee Revenue	(887)
Estimated Alternative Revenue	(17)
Fund Balance	(78)
Borrowing Requirement for Future Development[1]	**1,835**

1) A portion of the borrowing requirement may be the responsibility of rate payers. The planned advanced water treatment facilities at 91st Avenue benefit existing customer and new development. If it is determined that rate payers are responsible for a share of the cost shown in the table, then an additional offset against the water treatment impact fee would be applied. This will increase the Estimated Alternative Revenue and decrease the Borrowing Requirement for Future Development.