APPROVED 12/18/2024

WATER TRANSMISSION INFRASTRUCTURE IMPROVEMENTS PLAN

Water Transmission Impact Fee Methodology

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

- Determine the need for water transmission facilities necessary to serve new development anticipated during the period of 2025 – 35. The Land Use Assumptions used for the Water Transmission IIP provides 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 19, 2024).

- Land Use Assumptions are translated to water demand (volume) to inform network capacity and specific facility size requirements. The Water Services Department (WSD) 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 transmission facilities that are needed during the 10-year infrastructure planning horizon.

- Existing and planned water transmission facility costs 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).

- For each impact fee service area, the existing and planned water transmission facility cost, is divided by the total EDUs expected at the end of the 10-year infrastructure planning horizon. This method provides a hybrid 'buy-in, plus 10-year' plan-based cost per EDU.

- As an alternative to estimating available capacity in the existing water transmission system, 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 'buy-in, plus 10-year' and 'buildout' cost per EDU is selected as the potential water transmission capital 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 those criteria is divided by the 10-Year EDU to determine a fund balance adjustment (see supplemental report: *2025 Development Impact Fee Update, Fund Balance Adjustment Report, December 6, 2024*). If applicable, the fund balance adjustment is subtracted from the capital cost per EDU to calculate the gross impact fee per EDU.

- Alternative revenue offsets are calculated for water rate revenue that is applied toward facilities provided through the water transmission impact fee program. This includes water rate revenue to pay outstanding debt service. The offset per EDU is calculated by dividing existing and forecasted debt service by citywide EDUs to determine the average water rate revenue generated per EDU for repaying debt service. 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, Alternative Revenue Offsets Report*, December 6, 2024).

- The Water Development Occupational Fee (DOF) will be phased out in conjunction with adoption of the citywide Water Treatment Impact Fee. As such, the offset previously applied for DOF charges will no longer be applicable.

- Total combined offsets per EDU are subtracted from the gross impact fee per EDU. 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 pressure (normal demand). The city maintains water pressures needed for typical uses and standard plumbing fixtures, which can routinely vary between 40 and 100 pounds per square inch (PSI), depending on the location within any of the City's 26 different water pressure zones.

- Water pressure (emergency demand) and associated water volumes. The city maintains adequate emergency water pressures and volumes during fire events, which can go as high as 3,000 gallons per minute (GPM) at fire-fighting incidents involving commercial or industrial structures.

- Uninterrupted water services. The city maintains system-wide water pressures and volumes at adequate levels during inevitable transmission and transmission line breaks and equipment failures or replacement.

- Water quality standards: water chemistry. The City achieves or exceeds minimum federal and state water quality standards in terms of water chemistry (usually measured in the form of dissolved salts, metals, or organic material at the point of discharge from a treatment plant, of which the City has five).

- Water quality standards: diseases and pathogens. The City also achieves or exceeds minimum water quality standards in terms of the presence of disease and pathogens that are a threat to customers, measured both at the treatment plants and throughout the transmission and 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.

While there are many different parameters that dictate the specific sizes, quantities, and locations of various types of facilities needed in the city's two Water Transmission Impact Fee Service Areas, the assumptions used to establish the proportionate amount of infrastructure required to serve an EDU are summarized below. Additional details can be found in supplemental report: *City of Phoenix 2024 Equivalent Demand Unit Study Final Report*, Keen Independent Research LLC, March 2024):

Table WT.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 / Other	41	**0.37**

WATER TRANSMISSION IMPACT FEE SERVICE AREAS

(see supplemental report: 2025 Development Impact Fee Update, *Impact Fee Service Area Maps*, Map #4, July 17, 2024 or as amended)

- Northern (Northwest, Deer Valley, Northeast, Paradise Ridge)
- Southern (Estrella N, Estrella S, Laveen W, Laveen E, Ahwatukee)

LAND USE ASSUMPTIONS

The following tables display the forecasted water transmission '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, August 21, 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 WT.2 – Northern Impact Fee Service Area, 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*	*0.37*	
Estimate Year	36,251	9,227	2,820	804	2,877	1,345	1,528	54,852
10-Year Growth	19,060	6,628	903	1,405	3,934	349	380	32,659
End of Planning Horizon	55,311	15,855	3,723	2,209	6,811	1,694	1,908	87,511
Buildout	126,894	32,936	10,554	11,190	23,755	3,136	2,449	210,914

Table WT.3 – Southern Impact Fee Service Area, 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*	*0.37*	
Estimate Year	73,172	7,809	4,686	452	34,841	2,672	703	124,335
10-Year Growth	8,954	3,066	731	92	5,308	130	307	18,588
End of Planning Horizon	82,126	10,875	5,417	544	40,149	2,802	1,010	142,923
Buildout	87,623	12,060	6,677	1,002	43,902	3,027	1,405	155,696

WATER TRANSMISSION UNIT COST

Tables WT.4 and WT.5 provide the estimated current cost of construction for existing, ultimate 'build-out' and 10-year planned water transmission improvements that are included in the impact fee program for both service areas. 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 WT.4 – Northern Impact Fee Service Area, Existing and Planned Facility Cost

Type of Facility	Cost
Existing Transmission Mains	$1,112,602,875
Existing Booster Stations	$213,161,250
Existing Pressure Reducing Stations	$126,430,000
Existing Storage	$204,257,474
Existing Wells	$65,674,250
Total Existing	**$1,722,125,849**
Ultimate Transmission Mains	$766,252,500
Ultimate Booster Stations	$60,687,500
Ultimate Pressure Reducing Stations	$23,029,916
Ultimate Storage	$46,215,000
Ultimate Wells	$121,273,750
Total Ultimate*	**$1,017,458,666**
10-Yr Transmission Mains	$351,021,250
10-Yr Booster Stations	$9,063,750
10-Yr Pressure Reducing Stations	$12,530,666
10-Yr Storage	$29,911,250
10-Yr Wells	$121,273,750
Total 10-Yr	**$523,800,666**

Table WT.5 – Southern Impact Fee Service Area, Existing and Planned Facility Cost

Type of Facility	Cost
Existing Transmission Mains	$987,144,563
Existing Booster Stations	$101,247,500
Existing Pressure Reducing Station	$48,516,250
Existing Storage	$157,690,499
Total Existing	**$1,294,598,812**
Ultimate Transmission Mains	$35,815,625
Ultimate Booster Stations	$0
Ultimate Pressure Reducing Station	$4,735,000
Ultimate Storage	$0
Total Ultimate*	**$40,550,625**
10-Yr Transmission Mains	$35,815,625
10-Yr Booster Stations	$0
10-Yr Pressure Reducing Station	$4,735,000
10-Yr Storage	$0
Total 10-Yr	**$40,550,625**

10-YEAR PLAN COST PER EDU

Tables WT.6 and WT.7 provide the total IIP capital cost per EDU using the 10-Year Plan method. Under this approach, the total cost of construction of planned improvements for the next 10 years is divided by

the estimated new EDUs over the 10-year planning horizon. These cost estimates are based on the Carollo unit cost study, including an escalation adjustment of 3% over 4 years. The escalation adjustment is incorporated as a proxy to convert the cost estimate to January 2028 dollars, or the approximate mid-point before the next IIP update.

Table WT.6 – Northern Impact Fee Service Area, 10-Year Plan Cost per EDU

Type of Facility	Cost
Cost of Existing & 10-Yr Plan Water Mains	$351,021,250
Cost of Existing & 10-Yr Plan Booster Stations	$9,063,750
Cost of Existing & 10-Yr Plan Pressure Reducing Stations	$12,530,666
Cost of Existing & 10-Yr Plan Water Storage Facilities	$29,911,250
Cost of Existing & 10- Yr Plan Wells	$121,273,750
Total 10-Yr Plan Facilities	**$523,800,666**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted 10-Yr Plan Cost	**$589,537,650**
10-Year EDUs	*32,659*
Cost per EDU	**$18,051**

Table WT.7 – Southern Impact Fee Service Area, 10-Year Plan Cost per EDU

Type of Facility	Cost
Cost of Existing & 10-Yr Plan Water Mains	$35,815,625
Cost of Existing & 10-Yr Plan Booster Stations	$0
Cost of Existing & 10-Yr Plan Pressure Reducing Stations	$4,735,000
Cost of Existing & 10-Yr Plan Water Storage Facilities	$0
Total 10-Yr Plan Facilities	**$40,550,625**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted 10-Yr Plan Cost	**$45,639,728**
10-Year EDUs	*18,588*
Cost per EDU	**$2,455**

HYBRID 'BUY-IN, PLUS 10-YEAR PLAN' COST PER EDU

Tables WT.8 and WT.9 provide the total IIP capital cost per EDU using the 'buy-in, plus 10-year plan' method. Under this approach, the total cost of construction for all existing water transmission improvements, and the cost of planned improvements for the next 10 years is divided by the total EDUs (existing and 10-year forecast) at the end of the infrastructure planning horizon.

Table WT.8 – Northern Impact Fee Service Area, 'Buy-In, Plus 10-Year' Plan Cost per EDU

Type of Facility	Cost
Cost of Existing & 10-Yr Plan Water Mains	$1,463,624,125
Cost of Existing & 10-Yr Plan Booster Stations	$222,225,000
Cost of Existing & 10-Yr Plan Pressure Reducing Stations	$138,960,666
Cost of Existing & 10-Yr Plan Water Storage Facilities	$234,168,724
Cost of Existing & 10- Yr Plan Wells	$186,948,000
Total Existing & 10-Yr Plan Facilities	**$2,245,926,515**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted Buy-In + 10-Yr Plan Cost	**$2,527,790,292**
End of Planning Horizon EDUs	*87,511*
Cost per EDU	**$28,885**

Table WT.9 – Southern Impact Fee Service Area, 'Buy-In, Plus 10-Year' Plan Cost per EDU

Type of Facility	Cost
Cost of Existing & 10-Yr Plan Water Mains	$1,022,960,188
Cost of Existing & 10-Yr Plan Booster Stations	$101,247,500
Cost of Existing & 10-Yr Plan Pressure Reducing Stations	$53,251,250
Cost of Existing & 10-Yr Plan Water Storage Facilities	$157,690,499
Total Existing & 10-Yr Plan Facilities	**$1,335,149,437**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted Buy-In + 10 Year Plan Cost	**$1,502,710,691**
End of Planning Horizon EDUs	*142,923*
Cost per EDU	**$10,514**

ULTIMATE 'BUILDOUT PLAN' COST PER EDU

Tables WT.9 and WT.10 provide the total IIP capital cost per EDU using the 'buildout plan' method. This approach divides the current construction cost (adjusted to 2028 dollars) of all water transmission improvements through buildout, by the total anticipated EDUs at buildout. If the cost per EDU over a 10-year planning period is greater than the buildout cost per EDU, that may indicate that development in the 10-year planning period is subject to a disproportionate share of system expansion. This may also reflect growth forecasts that require major upfront infrastructure investments, opposed to growth forecasts that can be supported by incremental expansion of existing networks.

Table WT.9 – Northern Impact Fee Service Area, Ultimate 'Buildout' Plan Cost per EDU

Type of Facility	Cost
Cost of Ultimate Planned Water Mains	$1,878,855,375
Cost of Ultimate Planned Booster Stations	$273,848,750
Cost of Ultimate Planned Pressure Reducing Stations	$149,459,916
Cost of Ultimate Planned Water Storage Facilities	$250,472,474
Cost of Ultimate Planned Water Wells	$186,948,000
Total Existing & Ultimate Plan Facilities	**$2,739,584,515**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted Ultimate Plan Cost	**$3,083,402,371**
Buildout EDU	*210,914*
Cost per EDU	**$14,619**

Table WT.10 – Southern Impact Fee Service Area, Ultimate 'Buildout' Plan Cost per EDU

Type of Facility	Cost
Cost of Ultimate Planned Water Mains	$1,022,960,188
Cost of Ultimate Planned Booster Stations	$101,247,500
Cost of Ultimate Planned Pressure Reducing Stations	$53,251,250
Cost of Ultimate Planned Water Storage Facilities	$157,690,499
Total Existing & Ultimate Plan Facilities	**$1,335,149,437**
Escalation Factor (4 yrs @ 3%)	*1.1255*
Adjusted Ultimate Plan Cost	**$1,502,710,691**
Buildout EDU	*155,696*
Cost per EDU	**$9,652**

CAPITAL COST PER EDU

The water transmission capital cost per EDU is the lesser of the 10-Year Plan, the hybrid 'Buy-in, plus 10-Year Plan', and the Ultimate 'Buildout Plan' cost per EDU. Where the 'Buildout Plan' is considered as an alternative to estimating current system capacity utilization.

Table WT.10 – Northern Impact Fee Service Area, Potential Capital Cost per EDU

Water Plan-Based Fee Method	Cost per EDU
10-Year Plan	$18,051
Buy-In + 10-Year Plan	$28,885
Ultimate 'Buildout' Plan	$14,619
Capital Cost per EDU	**$14,619**

Table WT.11 – Southern Impact Fee Service Area, Potential Capital Cost per EDU

Water Plan-Based Fee Method	Cost per EDU
10-Year Plan	$2,455
Buy-In + 10-Year Plan	$10,514
Ultimate 'Buildout' Plan	$9,652
Capital Cost per EDU	**$2,455**

FUND BALANCE ADJUSTMENT AND GROSS FEE PER EDU

The capital cost per EDU from Tables WT.10 and WT.11 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, Fund Balance Adjustment Report*, December 6, 2024.

Table WT.12 – Water Transmission, Gross Impact Fee per EDU

Water Transmission Service Area	*($ per EDU)* Capital Cost	Fund Balance Adj.	Gross Fee
Northern	14,619	-317	**14,302**
Southern	2,455	-496	**1,959**

ALTERNATIVE REVENUE OFFSET AND NET IMPACT FEE

The net Water Transmission fee per EDU is calculated for each service area by subtracting the offset amounts from the gross fees in Table WT.12. Details of the Water Transmission offsets can be found in supplemental report: *2025 Development Impact Fee Update, Alternative Revenue Offsets Report*, December 6, 2024.

Table WT.13 – Water Transmission, Net Impact Fee per EDU

Water Transmission Service Area	*($ per EDU)* Gross Fee	Debt Offset	Net Fee
Northern	14,302	-256	**14,046**
Southern	1,959	-256	**1,703**

WATER TRANSMISSION IMPACT FEE ASSESSMENTS

The Water Transmission fee schedule for single-family, multifamily, non-residential, and irrigation uses is shown below. Water Transmission fees for residential uses are assessed per dwelling unit. All other uses are assessed by water meter size.

Table WT.14 – Water Transmission, Net Impact Fee Schedule

Meter Type	EDU Factor	Northern Assessment	Southern Assessment
MFR (per DU)	0.36	$5,057	$613
SFR (per DU ≤ 1" meter)	1.00	$14,046	$1,703
SFR (per DU 1.5" meter)	2.18	$30,620	$3,713
3/4-Inch (per meter)	1.23	$17,271	$2,094
1-Inch (per meter)	2.12	$29,778	$3,610
1 1/2-Inch (per meter)	4.62	$64,915	$7,871
2-Inch (per meter)	6.17	$86,653	$10,506
3-Inch (per meter)	19.27	$270,678	$32,818
4-Inch (per meter)	33.92	$476,440	$57,766
6-Inch (per meter)	53.95	$757,838	$91,884
8-Inch (per meter)	107.93	$1,515,974	$183,803
10- or 12-Inch (per meter)	212.00	$2,977,752	$361,036

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 incurred to fund the construction of projects that serve new development.

A summary of planned improvements and anticipated funding for each water transmission service area is shown in the following tables. The planned improvements listed below are eligible to be funded with water transmission impact fee collections, as calculated within this IIP.

Table WT.15 – Northern Area Water Transmission Planned Improvements

Type of Facility	Quantify		Size		Amount
10-Yr Transmission Mains	40	miles	16 - 54	in.	
10-Yr Booster Stations	1	ea.	5	MGD	
10-Yr Pressure Reducing Station	3	ea.	5 - 32	MGD	
10-Yr Storage	3	ea.	.3 - 5	MG	
10-Yr Wells	10	ea.	2 - 3.6	MGD	
Combined 10-Year Improvement Cost					**$523,800,666**
Escalation Factor (4 yrs @ 3%)					*1.1255*
10-Year Plan Cost					**$589,537,650**
Anticipated 10-Year Impact Fee Revenue					*$458,728,314*
Anticipated Alternative Revenue					*$8,360,704*
Available Service Area Fund Balance					*$10,361,248*
Borrowing Requirement for Future Development					**$112,087,384**

Table WT.16 – Southern Area Water Transmission Planned Improvements

Type of Facility	Quantify		Size		Cost
10-Yr Transmission Mains	8	miles	16 - 24	in.	
10-Yr Booster Stations	0	ea.	5	MGD	
10-Yr Pressure Reducing Station	2	ea.	2.5 - 3	MGD	
10-Yr Storage	0	ea.	.3 - 5	MG	
Combined 10-Year Plan Cost					**$40,550,625**
Escalation Factor (4 yrs @ 3%)					*1.1255*
Total 10-Year Plan Cost					**$45,639,728**
Anticipated 10-Year Impact Fee Revenue					*$31,655,364*
Anticipated Alternative Revenue					*$4,758,528*
Available Service Area Fund Balance					*$9,215,157*
Borrowing Requirement for Future Development					**$10,679**