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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 'incremental expansion' method uses the max day wastewater generation per EDU to determine the wastewater treatment capacity required to serve 1 EDU.

- The costs for wastewater treatment facilities needed to serve the North of CAP impact fee service area are based on the weighted average unit cost estimates for Cave Creek WRP Phase II, and North Gateway. Costs associated with expanding solids handling capacity, that will have citywide benefits, are based on 91st Ave WWTP ultimate improvements, (See supplemental report: *Water and Wastewater Unit Cost Study*, Carollo Engineers, June 2024). All cost assumptions have been escalated at 3% per year to 2028 dollars. The Capital Cost per EDU for wastewater 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 sewer rate revenue that is applied toward facilities provided through the wastewater treatment impact fee program. This includes sewer rate revenue to pay outstanding debt service. The offset per EDU is calculated by dividing the outstanding 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 wastewater 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 Sewer Development Occupational Fee (DOF) will be proposed in-conjunction with the citywide wastewater 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 wastewater treatment 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 #7, *Impact Fee Service Area Maps*, September, 2024 or as amended)

- North of CAP Canal
- South of CAP Canal

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 – North of CAP Canal, Wastewater Treatment Equivalent Demand Units

	Single-	Multi-	Retail	Office	Industrial	Public	Other	Total
EDU Factor	*1.00*	*0.67*	*0.59*	*0.32*	*0.65*	*0.47*	*0.47*	
Estimate Year	31,056	9,995	3,536	1,029	3,650	1,620	1,936	**52,822**
10-Year Growth	18,974	7,930	1,135	1,798	5,013	383	483	**35,716**
End of Planning Horizon	50,030	17,925	4,671	2,827	8,663	2,003	2,419	**88,538**
Buildout	121,360	38,318	13,246	14,324	30,259	3,836	3,105	**224,448**

Table WWP.3 – South of CAP Canal, Wastewater Treatment Equivalent Demand Units

	Single-	Multi-	Retail	Office	Industrial	Public	Other	Total
EDU Factor	*1.00*	*0.67*	*0.59*	*0.32*	*0.65*	*0.47*	*0.47*	
Estimate Year	374,278	174,510	53,125	35,958	118,886	44,369	27,776	**828,902**
10-Year Growth	13,864	21,229	3,875	1,990	12,836	691	1,171	**55,656**
End of Planning Horizon	388,142	195,739	57,000	37,948	131,722	45,060	28,947	**884,558**
Buildout	395,165	210,512	65,885	41,893	147,862	46,210	30,666	**938,193**

WASTEWATER TREATMENT PLANT EXPANSION COST PER EDU

The following tables contain the wastewater 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 WWP.4 provides the full incremental capital cost of wastewater treatment, including solids handling. The cost per EDU shown in Table WWP.4 may be assessed to areas north of the Central Arizona Project (CAP) canal. Table WWP.5 provides the incremental capital cost per EDU for solids handling only. The cost per EDU shown in Table WWP.5 may be assessed to areas south of the CAP canal. Table WWP.6 provides the debt service cost per EDU that is attributed to existing capacity at 91st Ave WWTP that will benefit future development. This cost may be assessed citywide (i.e. north and south of the CAP canal). 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

	North Gateway (Buildout)	Cave Creek (Phase 2)	91st Ave (Buildout)		All Plants
Wastewater Treatment ($/gpd)	37.125	23.00	0.00		
Solids Handling ($/gpd)	3.75	3.75	3.75		
Combined Treatment Cost ($/gpd)	**40.88**	**26.75**	**3.75**		
Capacity (MGD)	*16.0*	*8.0*	*50.0*		
Weighted Avg WWTP Capital Cost ($/Gal)					**$14.26**
Escalation Factor (1/2028 Dollars)				*x*	*1.1091*
Inf-Adj WWTP Capital Cost ($/Gal)					**$15.82**
Max Day WW Gal per EDU				x	230
WW Treatment Capital Cost per EDU					**$3,639**

Table WWP.5 – Solids Handling Cost per EDU

Inf-Adj Solids Handling Capital Cost ($/Gal)		$4.16
Max Day WW Gal per EDU	x	230
Solids Handling Cost per EDU		**$957**

Table WWP.6 – Debt Service Cost per EDU

Total Outstanding Debt Service for Available WWTP Capacity		140,088,467
Future Citywide EDU 2025 - Buildout	÷	223,722
Debt Service Cost ($/EDU)		**626**

POTENTIAL WASTEWATER TREATMENT CAPITAL COST PER EDU

The potential wastewater treatment capital cost per EDU for areas north of the CAP canal is the sum of the Wastewater Treatment Capital Cost shown in Table WWP.4 and the Debt Service Cost shown in Table WWP.6.

Table WWP.7 – Potential Wastewater Treatment Capital Cost per EDU – North of CAP Canal

WW Treatment Capital Cost per EDU		3,639
Debt Service Cost per EDU	+	626
Potential Capital Cost per EDU		**4,265**

The potential wastewater treatment capital cost per EDU for areas south of the CAP canal is the sum of the Solids Handling Cost shown in Table WWP.5 and Debt Service Cost shown in Table WWP.6.

Table WWP.8 – Potential Wastewater Treatment Capital Cost per EDU – South of CAP Canal

Solids Handling Cost per EDU		957
Debt Service Cost per EDU	+	626
Potential Capital Cost per EDU		**1,583**

FUND BALANCE ADJUSTMENT AND POTENTIAL GROSS IMPACT FEE

The potential capital cost per EDU from Tables WWP.7 and WWP.8 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.9 – Wastewater Treatment, Potential Gross Impact Fee per EDU

	($ per EDU)		
Impact Fee Service Area	**Capital Cost**	**Fund Balance**	**Gross Fee**
North of CAP Canal	4,265	232	**4,033**
South of CAP Canal	1,583	0	**1,583**

POTENTIAL NET IMPACT FEE

The potential net fee per EDU is calculated by subtracting alternative revenue offsets from the potential gross fees from Table WWP.9. For a detailed breakdown of wastewater treatment offsets, see supplemental report: *2025 Development Impact Fee Update, Draft Alternative Revenue Offsets Report, September 2024*, or as amended.

Table WWP.10 – Wastewater Treatment, Potential Net Impact Fee per EDU

	($ per EDU)			
Impact Fee Service Area	**Gross Fee**	**Rate Offset[1]**	**DOF Offset**	**Net Fee**
North of CAP Canal	4,033	200	0	**3,833**
South of CAP Canal	1,583	200	0	**1,383**

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 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 wastewater 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 wastewater treatment impact fee collections, as calculated within this Infrastructure Improvements Plan and Supplemental Reports.

Table WWP.11 – Wastewater Treatment Planned Improvements – North of CAP Canal

	Amount ($MM)
Debt Service (91st Ave WWTP)	85.6
Cave Creek Phase II	214.0
N. Gateway Phase I	327.0
Total 10-Year Planned Cost	**626.6**
Forecasted Impact Fee Revenue	(137.0)
Estimated Wastewater Rate Revenue	(7.1)
Fund Balance	(8.3)
Total 10-Year Planned Revenue	**152.4**
Borrowing Requirement for Future Development	**474.2**

Table WWP.12 – Wastewater Treatment Planned Improvements – South of CAP Canal

	Amount ($MM)
Debt Service (91st Ave WWTP)	54.5
91st Ave WWTP Solids Handling	187.5
Total 10-Year Planned Cost	**242.0**
Forecasted Impact Fee Revenue	(77.0)
Estimated Wastewater Rate Revenue	(11.1)
Fund Balance	(0.0)
Total 10-Year Planned Revenue	**88.1**
Borrowing Requirement for Future Development	**153.9**