



City of Phoenix

Northeast Storm Drainage Development Impact Fee Supporting Documentation

Final Report

January 13, 2020



January 13, 2020

Mr. Douglas Frost
Principal Planner
City of Phoenix
200 W. Washington Street
Phoenix, AZ 85003

Subject: Supporting Documentation for Northeast Phoenix Storm Drainage DIF

Dear Mr. Frost,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this report that details our findings, recommendations and supporting documents regarding establishing a Northeast Storm Drainage Development Impact Fee to be assessed to new and/or increased development. The City of Phoenix (City) engaged Raftelis to provide research, analysis and calculation support for a potential new storm drainage impact fee for a service area west of Scottsdale Road, near the 101 Loop, generally known as the Rawhide Wash area. The analysis and calculation support was completed consistent with the requirements of Arizona Revised States §9-463.05.

The objective of the potential Northeast Storm Drainage Development Impact Fee is recovery of the City's portion of planned capital costs to alleviate flood risks within the service area and reduce the cost of on-site improvements required for development in the current floodplain. Also, planned system improvements will benefit property owners/renters by eliminating or reducing ongoing costs for flood insurance.

Thank you for the opportunity to assist you, Adam Miller, and the City to complete this important project as well as for your collective assistance throughout the project.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Andrew Rheem'.

Andrew Rheem
Senior Manager

A handwritten signature in blue ink, appearing to read 'Dwayne Guthrie'.

Dwayne Guthrie, AICP
Manager

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Overview

The City of Phoenix (City) engaged Raftelis to provide research, analysis and calculation support for a potential new storm drainage Land Use Assumptions (LUA), Infrastructure Improvements Plan (IIP) and Development Impact Fee (DIF) for a service area west of Scottsdale Road, near the 101 Loop, generally known as the Rawhide Wash area.

Stormwater, drainage and flood control facilities, including any appurtenances for those facilities, are listed as a “necessary public service” in Arizona’s impact fee enabling legislation for municipalities. The facilities can be owned by the flood control district, if they are operated on behalf of the City. The proposed impact fee will be used to partially fund the Rawhide Wash Flood Control Project, hereafter referred to as the “Project.” Storm drainage improvements in Rawhide Wash require intergovernmental coordination between the City of Phoenix, Maricopa County Flood Control District, and the City of Scottsdale. Improvements are being designed to mitigate flood threats to property and people during 100-year storm events. The conceptual design for the Project involves channeling and other necessary drainage facilities to manage stormwater that flows over an extensive alluvial flood plain across a large area in NE Phoenix.

City of Phoenix staff prepared the required LUA, IIP, and DIF documents for adoption of a proposed NE Phoenix storm drainage impact fee. The service area contains approximately 3,127 acres, with a combination of private and public land owners. The major owner is the State of Arizona, that intends to eventually sell land for future private sector development.

Preliminary drainage impact fee costs to be funded by the City of Phoenix are estimated to be \$21,446,067. Dividing the total cost by the total land area yields a preliminary cost of \$6,859 per acre. The City assumes four Equivalent Dwelling Units (EDUs) per acre, which yields a preliminary cost of \$1,715 per EDU.

Survey of Storm Drainage Impact Fees

Phoenix has drainage impact fees in its southwestern growth areas (Estrella and Laveen) that have been largely successful for funding 100-year drainage channels and basins. Fees in Estrella and Laveen are assessed on an acreage basis (i.e., gross land area to be altered when new development occurs). In Laveen and Estrella most storm water is “local capture” (i.e., falling on-site) with a small percentage coming from outside the area. In northeast Phoenix (i.e., the Rawhide Wash area) most storm water comes from outside the service area with a small percentage from on-site rainfall. The proposed stormwater facilities are needed primarily to collect and channelize storm water falling within the entire basin, thus enabling removal of the service area from the alluvial flood plain.

Stormwater Impact Fees in Arizona

Raftelis reviewed the latest DIF survey tabulated by the Arizona Municipal League. Based on data from approximately 90 cities and towns, the only jurisdictions in addition to Phoenix that currently collect stormwater impact fees are Chandler and Mesa. In both cases, the stormwater impact fees are only being used to repay bonds, notes, or other debt obligations authorized prior to June 1, 2011 (see ARS 9-463.05.R). This section of Arizona’s impact fee enabling legislation essentially allows jurisdictions to continue collecting “old” impact fees (i.e., existing prior to the effective date of the new legislation) if the revenues are used solely for principal and interest payments. Apparently, the City of Phoenix is the only municipality in Arizona that collects a stormwater DIF under the extensive requirements that became effective on August 1, 2014.

Stormwater Impact Fees in Other States

Given the lack of Arizona jurisdictions, Raftelis reviewed stormwater impact fee methods in other western states. In the adjacent states of California and Utah, stormwater impact fees are more common. Arizona's impact fee enabling legislation has several requirements like those in Utah, such as a capital facilities plan. Given the requirement to identify future improvements, a plan-based method is the most common impact fee method for stormwater facilities in Utah. New development in northern California, the coastal area of southern California, and the urbanizing Wasatch Front metropolitan area (extending north and south of Salt Lake City), generally receives more rainfall than Phoenix. Stormwater impact fees in those areas are primarily based on the need for infrastructure to accommodate stormwater falling within a development. Therefore, costs are generally allocated to land area, with weighting factors used to improve proportionality by type of land use. The next section provides an example of how impervious-surface weighting factors might be used, across a range of development scenarios, to derive storm drainage impact fees in northeast Phoenix.

Cost Allocation Alternatives

In this section, Raftelis demonstrates and evaluates hypothetical impact fees for stormwater facilities using three alternative cost allocation methods. Each alternative includes preliminary fee calculations to translate the concept into simple math formulas to better understand assumptions and relative strengths/weaknesses.

Gross Land Area

Allocating the growth cost (i.e., new development's proportionate share) of system improvements to total gross acres in the service area is easy to calculate and administer. As stated in the opening section of this report, storm drainage facilities to be funded by the City of Phoenix are estimated to cost \$21,446,067. Dividing the total cost by the total land area (3,127 acres) yields a preliminary cost of \$6,859 per acre. Allocating cost per acre is reasonable, equitable and simple to administer because gross land area is a known quantity not subject to variations in residential density or uncertainty regarding the intensity of nonresidential development (i.e., the ratio of floor area to lot area).

Impervious Surface Area

Figure 1 indicates how impervious surface weighting factors could be applied to three land use scenarios. The table varies the percentage of gross acres to be developed as attached residential or commercial development, versus land area developed as single family detached residential. The storm drainage IIP cost and total acres are from Table 8(A).19 in the City of Phoenix's Draft LUA and IIP posted 7/1/19. The middle scenario assumes 29% of the land area is used for attached residential or commercial development, which is consistent with Table 8(A).6 in the City of Phoenix's Infrastructure Financing Plan 2020 Update, posted 11/18/19. Multifamily and nonresidential development are grouped together because AECOM's Rawhide Wash technical support document indicates those land uses share similar runoff coefficients that are a reasonable proxy for impervious surface. As shown in the table below, Raftelis derived three scenarios that vary attached residential or commercial land use by plus or minus ten percent. Two conclusions are evident in Figure 1. First, the use of impervious surface weighting factors lowers the cost per acre for single family detached development, ranging from \$6,420 to \$6,638 per acre, compared to the simple average cost of \$6,859 per acre. The use of impervious surface weighting factors has the opposite effect for attached residential and commercial development. For these land uses, costs range from \$7,544 to \$7,799 per acre, which is higher than the simple average cost of \$6,859 per acre.

Figure 1: NE Phoenix Storm Drainage Cost per Acre Alternatives

	Single Family Detached	Attached Residential or Commercial	TOTAL
19% Attached Residential or Commercial			
IIP Costs			\$21,446,067
Future Gross Acres	2532.87	594.13	3127.00
Runoff Coefficient	0.80	0.94	
Future Impervious Acres	2026.30	558.48	2584.78
Proportionate Share	78.4%	21.6%	
Fee per Gross Acre	\$6,638	\$7,799	\$6,859
29% Attached Residential or Commercial*			
IIP Costs			\$21,446,067
Future Gross Acres	2220.17	906.83	3127.00
Runoff Coefficient	0.80	0.94	
Future Impervious Acres	1776.14	852.42	2628.56
Proportionate Share	67.6%	32.4%	
Fee per Gross Acre	\$6,527	\$7,669	\$6,859
39% Attached Residential or Commercial			
IIP Costs			\$21,446,067
Future Gross Acres	1907.47	1219.53	3127.00
Runoff Coefficient	0.80	0.94	
Future Impervious Acres	1525.98	1146.36	2672.33
Proportionate Share	57.1%	42.9%	
Fee per Gross Acre	\$6,420	\$7,544	\$6,859

* assumed in Table 8(A).6 City of Phoenix LUA, IIP, and DIF dated 11/18/19

Total Floor Area

The final alternative evaluated is to derive stormwater impact fees based on anticipated floor area constructed within the service area. This alternative is reasonable because the need for storm drainage improvements in Rawhide Wash is primarily driven by rainfall within a much larger basin than the impact fee service area. Because the need for improvements is not a function of land area, the benefit to new development from storm drainage should extend to all floor area to be constructed in the service area. Even though there is a rational nexus to support the claim that benefits received extend to all floor space within the Rawhide Wash service area, key assumptions will have to be vetted before implementing this methodology. The most significant assumptions are reasonable and defensible Floor Area Ratios (FAR) to convert land area, by type of development, into climate-controlled building space (i.e., square feet of floor space). The Floor Area Ratio is simply the ratio of building area divided by parcel area, with both measured in square feet. In the table below, the IIP cost (fixed for each alternative) is allocated to future floor area. Therefore, as the intensity of development increases, the cost per square foot of floor area decreases.

In Figure 2, the land use mix is the same as shown above in Figure 1 and the FAR for attached residential and commercial development is held constant at 0.35, consistent with the assumption in Table 8(A).6 the City of Phoenix’s Infrastructure Financing Plan 2020 Update, posted 11/18/19. In contrast to the constant FAR assumed for attached residential and commercial development, the FAR for single family detached housing would likely change if residential land area increases. In the table below, the first scenario assumes 81% of the service area is Single Family Detached (SFD) residential, averaging 4500 square feet per dwelling with three dwellings per acre. The middle scenario assumes 71% SFD residential, averaging 3500 square feet per dwelling with four dwellings per acre. The last scenario assumes 61% SFD residential, averaging 2500 square

feet per dwelling with six dwellings per acre. Because all three scenarios have a fixed IIP cost, increasing the amount of projected floor area will decrease the infrastructure cost per development unit from \$0.50 to \$0.45 per square foot of floor area.

Figure 2: NE Phoenix Storm Drainage Alternatives per Square Foot of Floor Area

	Single Family Detached	Attached Residential or Commercial	TOTAL
19% Attached Residential or Commercial			
IIP Costs			\$21,446,067
Future Gross Acres	2532.87	594.13	3127.00
Floor Area Ratio	0.31	0.35	
Projected Floor Area	34,193,745	9,058,106	43,251,851
Proportionate Share	79.1%	20.9%	
Fee per Sq Ft of Building	\$0.50	\$0.50	\$0.50
29% Attached Residential or Commercial			
IIP Costs			\$21,446,067
Future Gross Acres	2220.17	906.83	3127.00
Floor Area Ratio	0.32	0.35	
Projected Floor Area	31,082,380	13,825,530	44,907,910
Proportionate Share	69.2%	30.8%	
Fee per Sq Ft of Building	\$0.48	\$0.48	\$0.48
39% Attached Residential or Commercial			
IIP Costs			\$21,446,067
Future Gross Acres	1907.47	1219.53	3127.00
Floor Area Ratio	0.34	0.35	
Projected Floor Area	28,612,050	18,592,954	47,205,004
Proportionate Share	60.6%	39.4%	
Fee per Sq Ft of Building	\$0.45	\$0.45	\$0.45

Evaluation of Alternatives

Raftelis will use the following bullet points to frame the consideration of alternatives for staff, stakeholders, and elected officials as they collaborate to select a recommended storm drainage impact fee for the Rawhide Wash service area.

-) Ability to generate required funds
-) Ease of comprehension and administration
-) Equity and proportionality

The City of Phoenix may retain its current methodology, as used in Estrella and Laveen, which is to simply allocate the growth cost of system improvements to gross land area. The resulting cost per acre does not require assumptions regarding residential density or the intensity of nonresidential development, so the City is confident the impact fees will generate fee revenue that matches the assumed infrastructure cost. The “Cost per Acre” alternative is easy to comprehend and administer. Although this alternative is very equitable, with every developed acre paying the same amount, it is the least proportionate of the three alternatives.

The second alternative, referred to as the “impervious surface area” alternative, will also collect fees based on the gross acreage of each parcel, but will not apply the same fee rate to every acre. This alternative will only

generate the required funds if the assumptions used to derive the fee match the actual characteristics of future development. Regarding ease of administration, this alternative will require at least two stormwater impact fee rates, which must be multiplied by the respect amount of land area to be developed as SFD residential versus all other land uses (i.e., attached residential and nonresidential development). The Impervious Surface Area alternative is easy to comprehend and typically improves proportionality. However, it might not be the best alternative for the Rawhide Wash service area because the cost of stormwater facilities is determined by off-site rainfall flowing through the service area, rather than the conveyance of stormwater generated on-site.

The third “Total Floor Area” alternative will only generate the required funds if the assumptions used to derive the fee match the actual characteristics of future development. This alternative is also more difficult to comprehend because the cost allocation rationale assumes all new development within the service area will equally benefit from the planned stormwater facilities. The Total Floor Area alternative would be easy to administer, requiring only one rate per square foot of floor area that would be applied to all types of development. This alternative is also more proportionate than the current methodology used in Phoenix because it applies the land use assumptions developed by Applied Economics to the service area to estimate total floor area. Total stormwater impact fee collected from a site would be a function of land area and the relative intensity of development. In other words, all development within the service area would pay the same impact fee per square foot of floor area, but the total impact fee would increase as the FAR increases.

Recommended Method

The alternative methods discussed by Raftelis (i.e., impervious surface area and total floor area) require greater confidence in accurate land use assumptions. Because the City of Phoenix and the Arizona State Land Department expect revisions to the master plan for Paradise Ridge, Raftelis recommends continued reliance on the City’s current methodology that imposes storm drainage impact fees per gross acre. Also, the City and development community have experience with the current acreage approach.

Cost and Benefits to Protected Properties

Raftelis conducted research and analysis to answer the following question, “Do the benefits of the proposed storm drainage LUA, IIP and DIF (e.g. lowering site preparation costs and avoiding on-going flood insurance payments) exceed the costs of paying an impact fee to design/finance/construct the proposed Rawhide Wash engineering solution?” During phone interviews with representatives working in building and development industries, Raftelis asked for a simple qualitative rating, on a one to five scale, indicating whether they strongly opposed or strongly supported the City’s intent to implement a storm drainage fee in the northeast service area. Responses consistently indicated strong support for the draft LUA, IIP, and DIF.

While conducting our qualitative research, Raftelis consistently heard concerns about the slow pace of working with multiple governmental agencies to design, finance, build improvements and remove the Rawhide Wash area from the floodplain. Any development that occurs prior to removing the area from FEMA’s designated floodplain will face higher project-level costs and face greater uncertainty regarding the timing of improvements. Ideally, the entire process could be completed before Arizona State Land Department sells their holdings in the Rawhide Wash service area. This would avoid developers either waiting until the designation is modified or incurring additional costs to meet the requirements of the current flood plain designation.

To quantify costs and benefits, Raftelis analyzed projected costs and benefits over the next ten years. Figure 3 summarizes the cost of DIF payments, based on assumptions published in the City of Phoenix Infrastructure

Financing Plan: 2020 Update, posted on 11/18/19. In the Rawhide Wash service area, 969 to be developed over the next ten years, which is an average of approximately 97 acres per year. The City also assumes four Equivalent Dwelling Units (EDUs) per acre, or 388 EDUs per year. Over the next ten years, new development is expected to pay a total cost of \$6.65 million for storm drainage impact fees in northeast Phoenix.

Figure 3: Cost Summary

Cost Summary for Northeast Phoenix (Rawhide Wash) Storm Drainage Improvements						
Costs	2020	2021	2023	2025	2027	2029
DIF Payments by New Development	\$665,000	\$665,000	\$665,000	\$665,000	\$665,000	\$665,000
Program Grand Total Cost	\$6,650,000					
EDUs per Year =>	388	388	388	388	388	388
Acres per Year =>	97	97	97	97	97	97
DIF per EDU	\$1,715					

Site Preparation

Homebuilders interviewed by Raftelis indicated there are significant cost differentials between building inside or outside a floodplain. For example, in the Rawhide Wash area north of the 101 Loop and closer to Pinnacle Peak Road, developers expect to build upper-end housing on lots that average a third of an acre. To elevate a one-third acre residential lot by 1.5 feet requires importing dirt (at an estimated cost of \$12 per cubic yard), which is estimated to cost \$10,000. An estimated storm drainage impact fee of approximately \$1,700 per EDU represents a significant cost savings.

AECOM analyzed development prototypes to document expected cost savings per acre due to planned flood control improvements with the Rawhide Wash service area. Figure 4 summarizes the difference in site costs for detached residential, attached residential and office / retail categories.

Figure 4: Site Cost per Acre by Land Use Category

Effect of Flood Zone on Site Costs			
	Current (within flood zone)	Modified (outside flood zone)	Difference
Land Use Category	\$ / Acre	\$ / Acre	\$ / Acre
Detached Residential	\$103,000	\$43,000	\$60,000
Attached Residential	112,000	48,000	64,000
Retail / Office	214,000	105,000	109,000

Flood Insurance

National flood insurance rates are a function of the following factors:

1. Year of construction
2. Use of building
3. Number of floors
4. Location of contents
5. Flood risk
6. Location of the lowest floor in relation to the base flood elevation
7. Deductible and amount of coverage for buildings and contents

Based on phone interviews with major national home builders working in the Phoenix metro area, the cost of flood insurance is relatively minor (less than \$1,000 per year) for detached residential units, but this is an on-going expense that must be paid in perpetuity. For the purpose of the cost-benefit analysis, Raftelis assumed an average cost of \$50 per dwelling per month, which equates to \$600 per year. As shown in Figure 5, the benefit of avoided flood insurance grows larger every year as additional development is added to the Rawhide Wash service area. The cumulative benefit of avoided flood insurance will eventually surpass site preparation savings.

In addition to the financial obligation for on-going flood insurance, another important consideration for buyers is the stigma/risk associated with purchasing a home within a floodplain. Knowing there is a small, but statistically valid chance of experiencing a flood every “monsoon” season, could drive away customers. In general, home builders prefer the option of paying a reasonable Storm Drainage DIF for the Rawhide Wash improvements, if the fee will remove the floodplain designation from the service area.

Cumulative Benefit Over Time

Figure 5 summarizes benefits from the proposed Rawhide Wash improvements over the next ten years. The first line item (Avoided Flood Insurance) increases each year as additional EDUs are constructed. By year 10, new develop will save approximately \$2.33 million annually by avoiding flood insurance premiums. Site preparation savings are estimated to be \$5.82 million per year, assuming 97 acres are developed each year within the Rawhide Wash service area. The cumulative benefit over ten years is approximately \$71 million.

Figure 5: Benefits Summary

Benefits Summary due to Northeast Phoenix (Rawhide Wash) Storm Drainage Improvements						
Year =>	1	2	4	6	8	10
Benefits	2020	2021	2023	2025	2027	2029
Avoided Flood Insurance	\$232,800	\$465,600	\$931,200	\$1,396,800	\$1,862,400	\$2,328,000
Site Preparation Savings	\$5,820,000	\$5,820,000	\$5,820,000	\$5,820,000	\$5,820,000	\$5,820,000
Total Benefits Per Year	\$6,052,800	\$6,285,600	\$6,751,200	\$7,216,800	\$7,682,400	\$8,148,000
Confidence Factor	100%	100%	100%	100%	100%	100%
Benefits Claimed for Analysis	\$6,052,800	\$6,285,600	\$6,751,200	\$7,216,800	\$7,682,400	\$8,148,000
Program Grand Total Benefit	\$71,004,000					
Cumulative EDUs =>	388	776	1,552	2,328	3,104	3,880
Acres Prepared per Year =>	97					
Savings per Acre =>	\$60,000					

Economic Analysis Findings

As summarized in Figure 6, the anticipated financial benefits from storm drainage improvements within Rawhide Wash are much greater than the anticipated cost of drainage impact fees. Undiscounted cash flows are listed at the top of the table. Discounted cash flows are shown at the bottom of the table, assuming an annual discount rate of 3%. The Net Present Value (NPV) of the cumulative benefit over ten years is approximately \$56 million. Allocating this amount to the projected total EDUs to be constructed in the Rawhide Wash service area yields an average benefit of \$14,444 per EDU over a ten-year period. The NPV of the project on a per EDU basis would be much higher over a longer period, such as a typical 30-year mortgage.

Figure 6: Summary of Costs and Benefits

Cost and Benefits Summary associated with Northeast Phoenix (Rawhide Wash) Storm Drainage Improvements						
Year =>	1	2	4	6	8	10
Description	2020	2021	2023	2025	2027	2029
Undiscounted Flows						
Costs	-\$665,000	-\$665,000	-\$665,000	-\$665,000	-\$665,000	-\$665,000
Benefits	\$6,052,800	\$6,285,600	\$6,751,200	\$7,216,800	\$7,682,400	\$8,148,000
Net Cash Flow	\$5,387,800	\$5,620,600	\$6,086,200	\$6,551,800	\$7,017,400	\$7,483,000
Discount Factors						
Discount Rate	3.00%					
Base Year	2020					
Discounted Flows						
Costs	-\$665,000	-\$645,631	-\$608,569	-\$573,635	-\$540,706	-\$509,667
Benefits	\$6,052,800	\$6,102,524	\$6,178,304	\$6,225,275	\$6,246,494	\$6,244,764
Net	\$5,387,800	\$5,456,893	\$5,569,735	\$5,651,640	\$5,705,788	\$5,735,096
Cumulative	\$5,387,800	\$10,844,693	\$21,931,819	\$33,197,809	\$44,585,593	\$56,044,064
Net Present Value (NPV)	\$56,044,064					
Total EDUs Over Ten Years	3,880					
Average NPV Benefit per EDU	\$14,444					