CAPITAL IMPROVEMENTS PLAN
FOR DRAINAGE IMPACT FEES

JANUARY, 2013 UPDATE

In conjunction with the 2012 update of County Code Chapter 46, Impact Fees, the Bernalillo County Public Works Division has reviewed the 2007 Drainage IFCIP that was approved by the Bernalillo County Board of Commissioners. The purpose of this review is to assess the 2007 IFCIP and to consider any issues that have come up since that 2007 IFCIP was approved.

As has been the case since the original adoption in 1995, the drainage portion of the impact fee ordinance has performed well with minimal problems. The original IFCIP was prepared jointly for Bernalillo County and the City of Albuquerque. Minor modifications in the adopted version accommodated the differences between the two jurisdictions, being tailored to account for those processes and procedures that are particular to Bernalillo County. At the time, the City of Albuquerque did not pass legislation addressing impact fees within the incorporated limits. In 2005, the City of Albuquerque adopted impact fee legislation; however, this analysis does not do any comparison with that legislation.

The basic assumptions underlying the original IFCIP remain valid today and the analysis that generated the impact fee amounts is still comprehensive and correct. The cost information, as presented, was based on mid-90's and late-2006 dollars and this update will account for the increase in construction costs that have occurred since adoption of the revised ordinance.

Cost Increase

Several methods for documenting this construction cost increase were presented to the original Advisory Committee and the consensus of the committee was to use the *Construction Price Index for construction projects prepared by the Engineering News Record (ENR). Previous updates proposed this same concept and were subsequently approved by those Advisory Committees. To better approximate construction cost increases in the Mountain West area, the 2012 Advisory Committee recommended using the Denver area values as documented by ENR. **Table 1** Construction Cost Increase documents these increases from January, 1996 through December, 2012:

Table 1
Construction Cost Increase

	20 City	Increase	Denver area	Increase
ENR – January, 1996 Construction Cost Index	5523	------	------	------
ENR – December, 2000 Construction Cost Index	6283	13.76%	------	------
ENR – December, 2006 Construction Cost Index	7888	25.54%	5714	------
ENR – December, 2012 Construction Cost Index	------	------	6979	22.14%

Percentage increase from 12/06 to 12/12 = 22.14%

Using the ENR-Construction Cost Index multiplier of 122.14 (Denver area) for the 2013 update, **Table 2** contains the 1995, 2002, current, and proposed Drainage Impact Fees by service area:

Table 2
Drainage Impact Fees by Service Area

Service Area	1996 Ordinance Fee	2002 Fee Revision	2007 Fee Revision	Proposed 2013 Fee Revision
East Mesa	$11,528	$13,114	$16,463	$20,108
Valley	$10,856	$12,352	$15,507	$18,940
Mesa del Sol	$11,528	$13,114	$16,463	$20,108
SW Mesa	$11,528	$13,114	$16,463	$20,108
NW Basalt	$16,778	$19,090	$23,966	$29,272
NW Other	$11,528	$13,114	$16,463	$20,108

Previous Revisions

As discussed above, minimal problems with the drainage procedures have resulted since the inception of the ordinance. The most frequent issue continues to be paying the drainage impact fee for a development that is retaining its runoff on-site. Since drainage impact fees would be used to construct the regional systems that allow such on-site ponds to be eliminated, it is appropriate to collect the fee. However, a procedure has been developed that will be implemented when the revised ordinance is adopted that effectively defers a portion of the drainage impact fee. This deferral accounts for the land that the pond itself occupies, until the time that the pond can be reclaimed and redeveloped when the regional system is constructed that accepts the runoff from the development. This deferral is documented in the Impact Fee Administrator's records and Bernalillo County's permitting data base.

Other than the cost increase, no other revisions to the drainage portion of the impact fee ordinance were adopted through the 2006 update and no other revisions are proposed with this update other than the change to the Denver area ENR values.

Drainage Impact Fee Credits

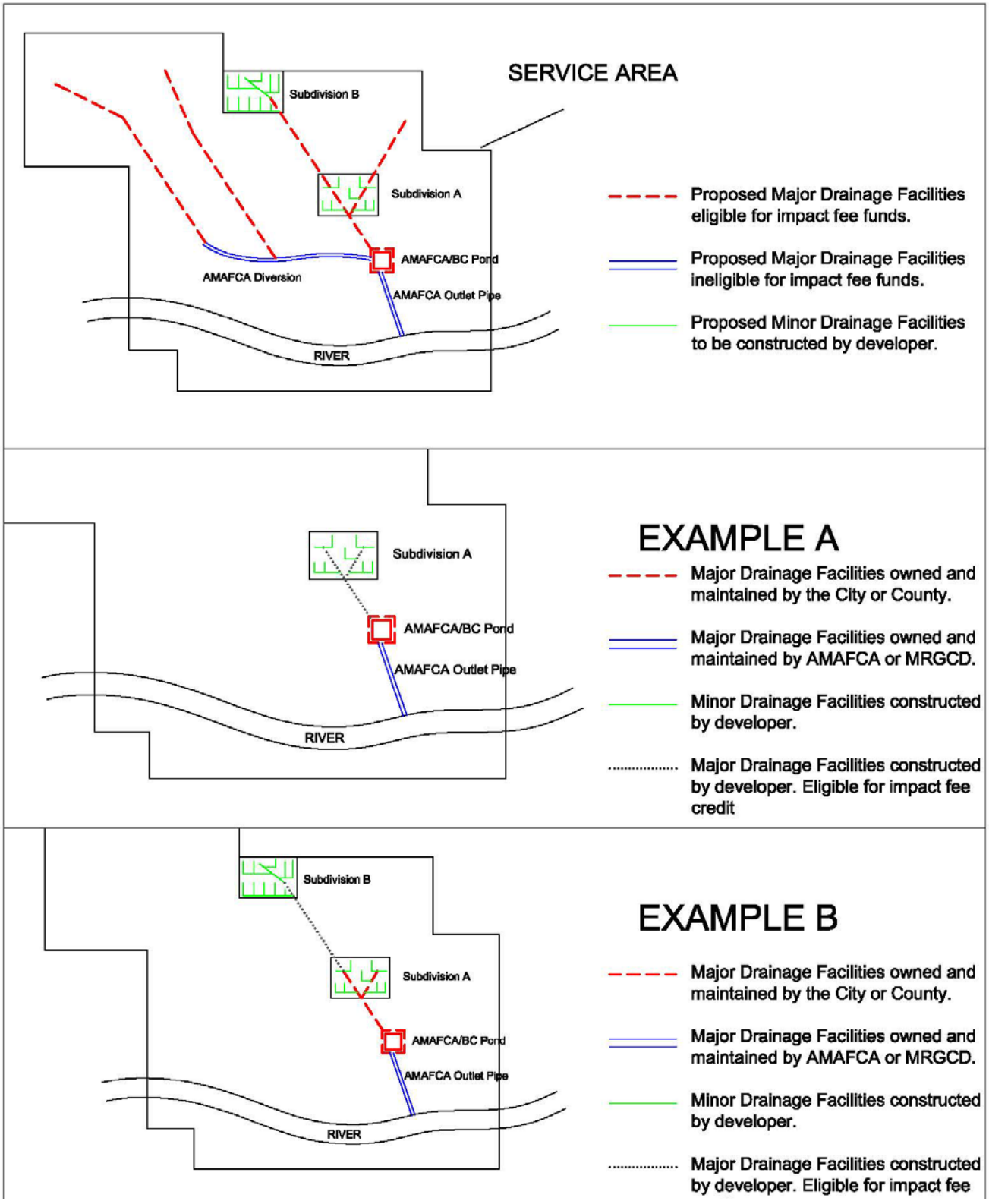
With the County Code requirement that a development build drainage infrastructure for fully developed conditions, a frequent question involves the provision for crediting that development for the capacity that exceeds that development's runoff. **Figure 1** provides examples to help clarify when drainage impact fee credits are applicable.

Summary

Generally, the drainage impact fee processes/procedures have worked well since the adoption of the ordinance with minimal complaints being received from the development community. Other than the cost increase and including information on fee credits, the drainage IFCIP and the drainage portion of the ordinance will not be modified. At this time, the City of Albuquerque is revising the procedures used in Chapter 22.2 of the Development Process Manual. The next revision of this document should address those changes.

FIGURE 1

Example senario of impact fee charges and credits



CAPITAL IMPROVEMENTS PLAN
FOR DRAINAGE IMPACT FEES

The *Development Fees Act* authorizes local governments to adopt impact fees to finance "storm water, drainage and flood control facilities." This document calculates the impact fees that may be imposed by Bernalillo County for drainage facilities.

Before an impact fee may be adopted, the *Act* requires that a "capital improvements plan" must first be prepared. This document is intended to meet this requirement of the *Act* for the adoption of drainage impact fees by the County. The *Act* requires that the capital improvement plan address the following:

> *(1) A description, as needed to reasonably support the proposed impact fee, which shall be prepared by a qualified professional, of the existing capital improvements with the service area and the costs to upgrade, update, improve, expand or replace the described capital improvements to adequately meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards;*
>
> *(2) An analysis, which shall be prepared by a qualified professional, of the total capacity, the level of current usage and commitment for usage of capacity of the existing capital improvements;*
>
> *(3) A description, which shall be prepared by a qualified professional, of all or the parts of the capital improvements or facility expansions and their costs necessitated by and attributable to new development in the service area based on the approved land use assumptions;*
>
> *(4) A definitive table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of capital improvements or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial;*
>
> *(5) The total number of projected service units necessitated by and attributable to new development with the service area based on the approved land use assumptions and calculated in accordance with generally accepted engineering or planning criteria;*
>
> *(6) The projected demand for capital improvements or facility expansions required by new service units accepted over a reasonable period of time, not to exceed ten years; and*
>
> *(7) Anticipated sources of funding independent of impact fees.*

Eligible Facilities

Major drainage works in Bernalillo County are constructed and maintained by four separate public entities: the City of Albuquerque, Bernalillo County, the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) and the Middle Rio Grande Conservancy District (MRGCD). In general, the division of responsibilities is that the City and County construct, improve and maintain surface drainage channels, storm drains, detention basins and storm water pump stations within their jurisdictions, while AMAFCA primarily constructs and maintains major dams and channels within the Albuquerque area. MRGCD is responsible for maintaining channels that were constructed within easements by the Bureau of Land Management for the purpose of supplying agricultural lands with irrigation water and lowering the water table in the Rio Grande Valley; in general, MRGCD does not make capital improvements.

The City and County drainage impact fees will not address the cost of facilities constructed by AMAFCA or MRGCD, except for projects in which there is City or County financial participation. AMAFCA and MRGCD are not authorized to impose impact fees by the terms of the *Development Fees Act*, which allows impact fees to be charged only for capital improvements that are "owned and operated by or on behalf of a municipality or county."

The impact fees will only address the cost of drainage facilities defined as a "major facility" by the County's drainage ordinance. A major facility is defined as any facility, including a street or alley that would collect, divert or convey a peak discharge of more than 50 cubic feet per second (cfs) or store more than two acre-feet of runoff in the event of a 100-year design storm. Based on an analysis of average grades in the Albuquerque area, most storm drain pipes of less than 30 inches in diameter would not meet this definition and would be classified as minor facilities.

The drainage impact fees include the cost of bridges, culverts and other structures associated with road crossings of arroyos and other major drainage facilities. To avoid double charging, such costs have been excluded from the road impact fees. The drainage impact fees also include the cost of major drainage facilities, including manholes, located within roadway rights of way.

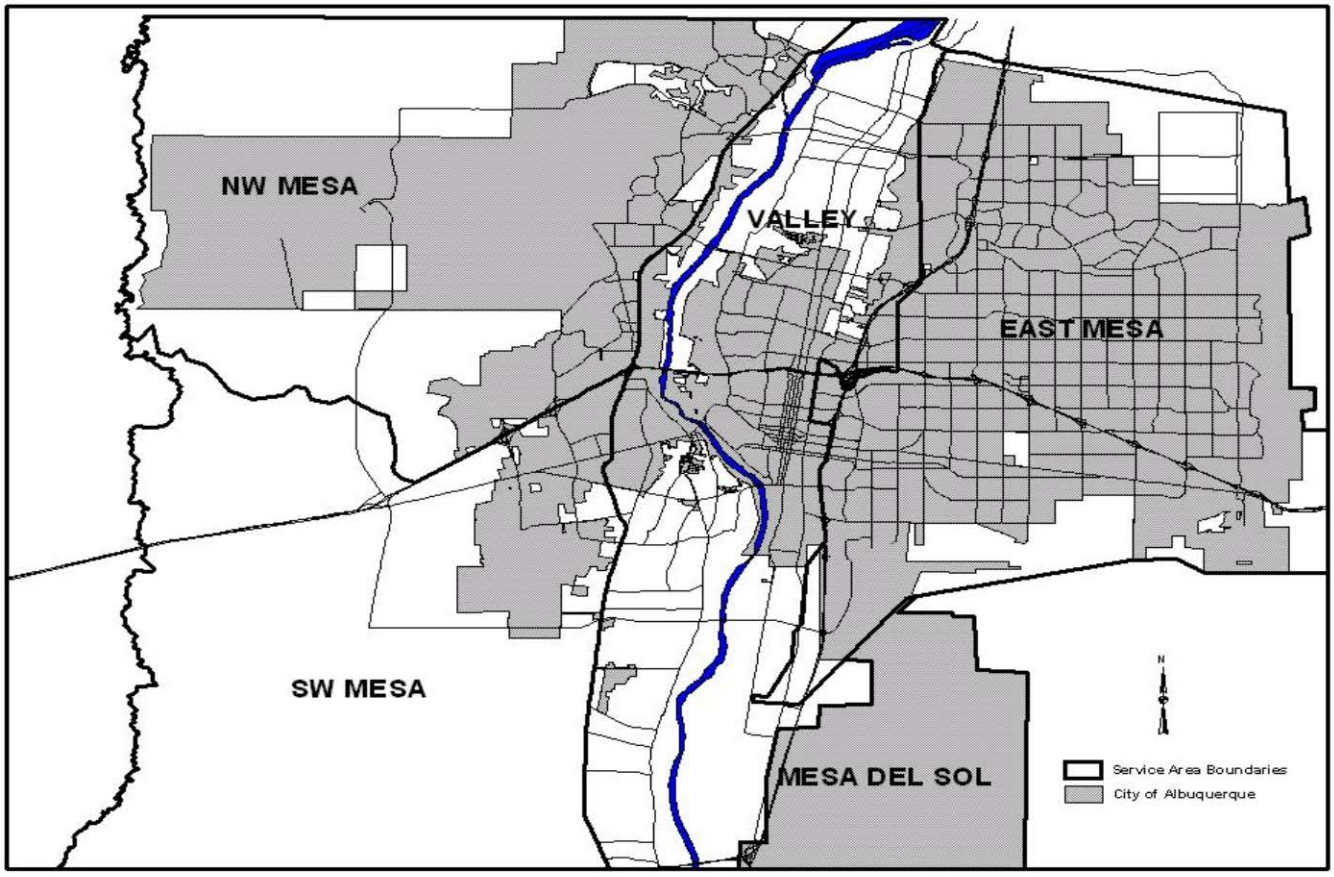
Service Areas

Impact fees must be assessed uniformly within defined "service areas." The *Development Fees Act* defines a service area as "the area within the corporate boundaries or extraterritorial jurisdiction of a municipality or the boundaries of a county to be served by the capital improvements or facility expansions specified in the capital improvements plan designated on the basis of sound planning and engineering standards."

In consultation with City and County public works staff, five drainage areas were identified in the Albuquerque area based on major watershed boundaries and hydrologic characteristics. The East Mountain area, the upper portion of the Tijeras Arroyo that stretches from Kirtland Air Force Base into the canyon, and the area to the west of the Rio Puerco divide were excluded from the drainage service areas because very little information is available in these areas and they are very different hydrologically from the rest of the area. The service areas are graphically illustrated in *Figure 1.* The boundaries of the service areas are described as follows:

- **East Mesa.** This service area is bounded on the north by the Sandia Pueblo, on the east generally by the Forest Service/City boundary, on the south generally by the Tijeras Arroyo and on the west by the North and South Diversion Channels.
- **Valley.** This service area is bounded on the north by the Sandia Pueblo, on the east by the North and South Diversion Channels, on the south by the Isleta Pueblo and on the west by Coors Boulevard and Corrales Road.
- **Mesa Del Sol.** This service area is bounded on the north by Kirtland Air Force Base, on the east by the City limits, on the south by the Isleta Pueblo and on the west by 1-25.
- **Southwest Mesa.** This service area is bounded on the north by 1-40, on the east by Coors Boulevard, on the south by the Isleta Pueblo and on the west by the Rio Puerco divide.
- **Northwest Mesa.** This service area is bounded on the north by the Sandoval County line, on the east by Coors Boulevard and Corrales Road, on the south by 1-40 and on the west by the Rio Puerco divide.

Figure 1



The same service areas will be used for both City and County drainage impact fees. City drainage fees will apply to the portion of each service area within its corporate limits, while County drainage impact fees will apply to the unincorporated area within each service area.

Service Unit

The storm water runoff resulting from the development of land can be measured in terms of the equivalent land area that would shed all of the storm water that falls on it. Runoff coefficients reflect the ability of various types of surfaces to shed water, and the runoff coefficient, even for impervious surfaces, is always less than one. However, the service unit for drainage impact fees is an acre that would theoretically turn all of the storm water that falls on it into runoff (i.e. it has a runoff coefficient of 1.00).

Although these procedures closely follow current City and County drainage design methodology, modifications were required to meet County drainage impact fee requirements. Therefore, these revised procedures are to be utilized for impact fees only and are not applicable for any other purpose.

The calculations of the number of service units that will be generated by a development will be based on the method described in Volume 2, Chapter 22.2 of the *Development Process Manual,* developed in cooperation with the City of Albuquerque, Bernalillo County and AMAFCA. The manual defines four types of land treatments, ranging from A (un-compacted soil on relatively level ground) to D (impervious cover). The first step in determining runoff potential of a site is to measure the acreage of the land in each of the four categories as described in **Table 1**.

Table 1
Land Treatments

Land Treatment	Land Condition
A	Soil un-compacted by human activity with 0 to 10 percent slopes. Native grasses, weeds and shrubs in typical densities with minimal disturbance to grading, groundcover and infiltration capacity. Croplands. Unlined arroyos
B	Irrigated lawns, parks and golf courses with 0 to 10 percent slopes. Native grasses, weeds and shrubs, and soils un-compacted by human activity with slopes greater than 10 percent and less than 20 percent.
C	Soil compacted by human activity. Minimal vegetation. Unpaved parking, roads, trails. Most vacant lots. Gravel or rock on plastic (desert landscaping). Irrigated lawns, parks with slope greater than 10 percent. Native grasses, weeds and shrubs, and soil un-compacted by human activity with slope at 20 percent or greater. Native grass, weed and shrub areas with clay or clay loam soils and other and other soils of very low permeability as classified by SCS Hydrologic Soil Group D.
D	Impervious areas, pavement and roofs.

Notes: Most watersheds contain a mix of land treatments. To determine proportional treatment, measure respective subareas. In lieu of specific measurement for treatment D, the areal percentages in Table A-5of the DPM may be employed.

Source: Table A-4, Section 22.2: Hydrology, City of Albuquerque Development Process Manual, Volume 2, January 1993.

While Land Treatments A, B and C can be measured relatively easily, more precise measurements are required to determine the area of impervious areas (Treatment D). As an alternative to precise measurement, the Manual provides the following methods for calculating the land area of Treatment D. The estimated percent of a lot or development site that can be assumed to be Treatment D ranges from a low of 7 percent for parks, to a high of 90 percent for street and commercial development, as shown in **Table 2**.

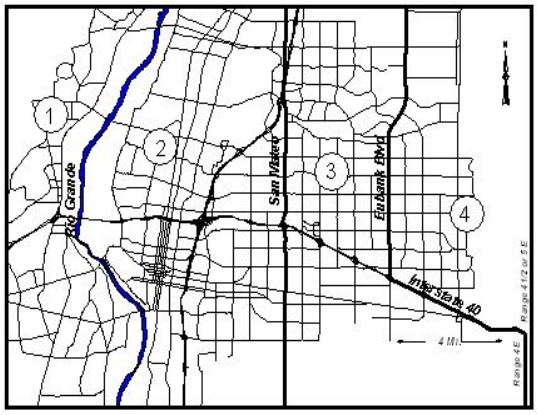
Table 2
Factors for Calculating Treatment "D"

Land use	Percent "D"
Commercial	90
Single Family Residential (N=units/acre, N $\leq$ 6)	$7(N^2 + 5N)^{1/2}$
Multiple Unit Residential Detached* Attached*	 60 70
Industrial Light* Heavy*	 70 80
Parks, Cemeteries	7
Playgrounds*	13
Schools*	50
Collector and Arterial Streets	90

** Includes local streets*

Source: Table A-5, Section 22.2: Hydrology, City of Albuquerque Development Process Manual, Volume 2, January 1993.

Figure 2
Precipitation Zones



Once the averages within each of the Land Treatment categories have been determined, they can be multiplied by runoff coefficients and summed to determine the number of drainage service units. The *Development Process Manual* divides the City of Albuquerque and surrounding area into four zones, reflecting major diffrences in rainfall characteristics. The precipitation zones are illustrated in **Figure 2**. The runoff coefficients by precipitation zone and land treatment are presented in **Table 3**.

Table 3
Runoff Coefficients

Precipitation Zones		Land Treatment			
No.	Description	A	B	C	D
1	W of River	0.27	0.43	0.61	0.93
2	River to San Mateo	0.31	0.45	0.62	0.93
3	San Mateo to Eubank/Range 4E	0.35	0.48	0.64	0.93
4	E of Eubank/Range 4E	0.39	0.52	0.66	0.94

Source: Section 22.2, Hydrology, City of Albuquerque Development Process Manual, Volume 2, January 1993.

This methodology was applied to the adopted Land Use Assumptions to determine existing and future drainage service units by jurisdiction in each service area. The detailed calculations are presented in Appendix A and the results are summarized in **Table 4**.

Table 4
Drainage Service Units
By Jurisdiction and Service Area, 1994-2002

Jurisdiction	Drainage Service Areas					Total
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa	
Pre-Development Service Units						
City	8,868	2,642	0	1,199	897	13,606
County	236	1,631	0	239	200	2,306
Total	9,104	4,273	0	1,438	1,097	15,912
1994 Service Unit (existing)						
City	20,375	6,726	0	3,442	2,463	33,006
County	526	3,956	0	658	550	5,690
Total	20,901	10,682	0	4,100	3,013	38,696
2002 Service Unit (Projected)						
City	21,606	7,011	464	4,614	3,911	37,606
County	882	4,331	0	946	1,022	7,181
Total	22,488	11,342	464	5,560	4,933	44,787
Increase, 1994-2002 (projected)-adjusted for pre-developed conditions						
City	720	185	280	788	944	2,917
County	198	218	0	182	297	895
Total	918	403	280	970	1,241	3,812

Source: Appendix A, Tables A-1 through A-4.

Costs per Service Unit

The drainage impact fees will be based on the capital cost to provide the drainage improvements necessary to accommodate a drainage service unit. To determine the unit cost, an analysis was undertaken of existing drainage infrastructure in two fully developed areas: a 26 square mile case study in the Northeast Heights and a 10 square mile case study in the Rio Grande valley. In addition, an analysis of geologic characteristics of the Northwest Mesa was undertaken to determine the additional drainage costs attributable to basalt formations in this area.

The Northeast Heights area of Albuquerque is generally representative of the hydrologic characteristics of most of the Albuquerque area outside of the valley. The major storm water flows are primarily controlled by the use of open channels, detention dams and training dikes. We rely on underground storm water pipes as a secondary use.

On both sides of the river, major facilities are required where storm water flows reach the edge of the flood prone valley. On the East Side of the river, the flows are routed around the valley by the North and South Diversion Channels. On the West Side of the river, major dams constructed by AMAFCA are used to contain peak flows and provide for their gradual release. The major facilities required to prevent flooding in the valley have been excluded from this analysis. On the West Side of the river, this was dictated by the fact that the dams are primarily constructed by AMAFCA, which is not authorized by state law to impose impact fees. On the East Side; the North and South Diversion Channels were constructed using Federal grants and local matching funds contributed by AMAFCA. Consequently, the cost per service unit derived from the Northeast Heights case study will reflect only the cost to convey storm water flows to the major facilities at the edge of the valley. These costs will be very similar for the East Mesa, Mesa del Sol, Southwest Mesa and Northwest Mesa service areas, although an adjustment is made to reflect higher excavation costs in the Northwest Mesa.

The methodology used to determine the cost per service unit is very conservative (i.e. on the low side), primarily because it does not include the cost of land or easements. The exclusion of land costs is primarily due to the difficulty in determining the land area required for individual facilities and the highly variable cost of land depending upon location. The conservative nature of the resulting cost per service unit (e.g. excluding land costs) makes it more defensible to apply cost estimates derived from limited case studies to entire service areas. Although land costs have generally been excluded from the impact fee calculations, new development will continue to be required to dedicate drainage easements and rights of way as prescribed by ordinance.

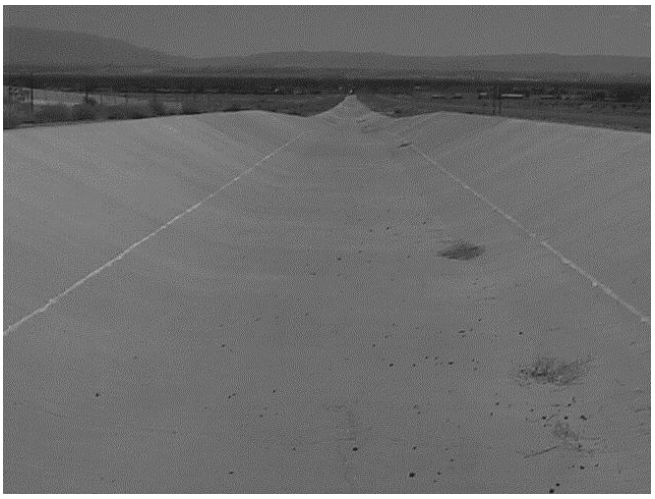
This conservatively low unit cost approach is dictated by the tremendous effort that would be required to gather, develop and analyze demand, capacity and cost data for all drainage facilities throughout the Albuquerque area that currently exist or that would be required to accommodate storm water flows under fully developed conditions. An effort to extract information on existing drainage facilities from the Albuquerque Geographic Information System (AGIS) did not yield the quality of information that was needed, and an analysis of all existing drainage studies conducted in the area revealed major data gaps. In light of the time constraint imposed by the *Development Fees Act* and the potential negative consequences of failing to adopt drainage impact fees by the July 1, 1995 deadline, the use of conservative unit costs derived from case studies appeared to be the most reasonable approach.

Northeast Heights Case Study

The Northeast Heights case study consists of an analysis of two areas totaling 26 square miles. The area includes a 15 square mile area covered by the *Far Northeast Heights Master Drainage Plan* prepared by Weston Engineering in January 1988 (" Far Northeast Heights study area"), and a separate 11 square mile area inventoried as part of this study ("Heights study area"). The drainage infrastructure required to accommodate development in these areas at build out was analyzed to determine the drainage cost that are typically of the East Mesa service area. The resultant unit costs are also applicable to most of the rest of the Albuquerque area outside the Rio Grande Valley.

The first part of the analysis consisted in developing an inventory of the existing drainage facilities that meet the definition of "major facilities" described earlier. These consisted of open channels with a capacity of 50 cubic feet per second or greater, storm drainage pipes of 30 inches or more in diameter along with appurtenances such as manholes, and structures associated with crossings of major drainage facilities by arterial, collector and local streets.

Figure 3
Surface Drainage Channel



The inventory analysis of the Far Northeast Heights study area was based on the inventory of existing facilities contained in the master plan, which were updated and verified with field inspections. The master plan area is located to the north of Montgomery Boulevard and stretches from the North Diversion Channel to the eastern City limit line. Since the area is not completely built out, with about two of the 15 square miles currently undeveloped, additional improvements recommended by the master plan to accommodate full development of the area were also included in the facility inventory.

The inventory of the fully developed 11 square mile Heights study area was based on analysis of City of Albuquerque drainage facilities systems maps and field inspections. The study area is comprised of Albuquerque Zone Atlas sheets G-18 thru G-22 and H-17 through H-22. It is bounded by Montgomery Boulevard on the north, Tramway on the east, Indian School on the south and Carlisle on the west.

The current costs to construct the existing facilities were estimated based on average unit costs compiled by the City of Albuquerque Public Works Department. The cost estimates do not include the cost of land or easements. The total facility cost was divided by the combined area of the two study areas to derive an average cost per acre. The resulting cost per acre was then divided by the average development service units per acre for the East Mesa service area to derive an average cost per drainage service unit. The average development service units per acre value were determined by subtracting the pre development value from the existing condition value. These calculations result in an average cost of $15,307 per service unit, as summarized in **Table 5**.

Table 5
Cost Per Service Unit
Northeast Heights Case Study

Cost Factor	Far NE Heights Study Area	Heights Study Area	Total
Open Channels (>50 cfs capacity)	$30,175,000	$11,930,600	$42,105,600
Storm Drain Pipe (>30" diameter)	$18,462,000	$18,917,800	$37,379,800
Roadway Crossing Structures	$26,052,000	$9,071,700	$35,123,700
Total Cost	$74,689,000	$39,920,100	$114,609,100
Area (Acres)	9,600	7,040	16,640
Cost per Acre			$6,888
Service Units per Acre			0.45
Cost per Service Unit			$15,307

Source: Leedshill-Herkenhoff, Inc.; Weston Engineering, Far Northeast Heights Master Drainage Plan, January 1988; City of Albuquerque Public Works Department, City Engineer's Estimated Unit Price for Contract Items, Spring 1992 revised (1992 unit costs were inflated by 15% to approximate 1995 costs); cost of road crossing structures based on $70 per square foot of bridge deck, excluding approaches; service units per acre derived from adopted Land Use Assumptions as shown in Table A- 1 and A-2 for East Mesa service area (sum of City and County 1994 service units divided by sum of City and County 1994 developed acres).

While the Northwest Mesa is hydrologically very similar to the other non valley service areas, drainage costs will be higher in some areas where the presence of basalt formations increases the cost of excavation. The areas affected by the higher excavation costs include the basalt areas themselves and the contributing areas upstream, where accommodating the runoff generated by development will necessitate larger drainage facilities within the basalt area. Soil Conservation Service maps indicates that basalt formations underlie approximately 13,600 acres within the Northwest Mesa service area, of which about 6,400 acres is developable land. The basalt area constitutes approximately one-third of the total area affected by the higher excavation costs, as shown in **Table 6**. The approximate location of the areas affected by basalt excavation costs is illustrated in **Figure 4**.

Figure 4
Areas Affected By Basalt Excavation Cost
Northwest Mesa Service Area

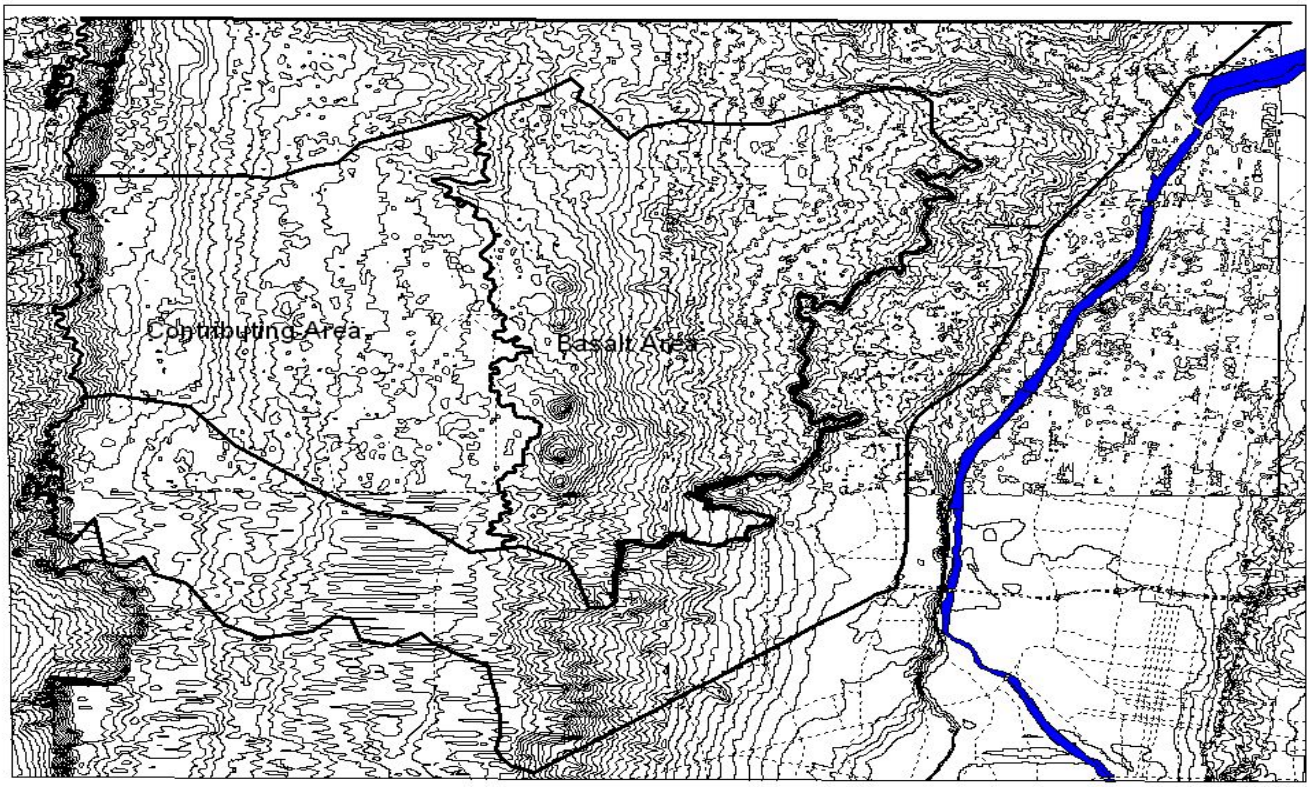


Table 6
Area Affected By Basalt Excavation Costs

Geologic Areas	Developable Acres	% of Developable Areas
Basalt Area	6,400	33.3%
Contributing Area	12,800	66.7%
Total Affected Area	19,200	100.0%

Source: Analysis of Soil Conservation Service maps by Leedshill-Herkenhoff, 1995.

The average cost of drainage improvements in basalt areas were estimated using current excavation costs from AMAFCA, local contractors, the amount of excavation required for the installation of storm pipes of varying sizes, and increased costs for testing, engineering and site inspections. The resulting average cost per linear foot was then compared to the average cost in non basalt areas. This analysis indicates that drainage costs in basalt areas will be at least twice as expensive as the cost of comparable improvements in non basalt areas. Adjusting the cost per service unit from the Northeast Heights Case Study to account for the higher costs of basalt excavation, results in an average cost of $20,404 per service unit for the area of the Northwest Mesa service area affected by basalt, as shown in **Table 7**.

Table 7
Cost Per Service Unit
Areas Affected by Basalt Excavation Costs

Geologic Areas	% of Affected Area	Cost/ Service Unit	Weight Cost Components
Basalt Area	33.3%	$30,614	$10,194
Contributing Area	66.7%	$15,307	$10,210
Average			$20,404

Source: Percent of service area in basalt areas from analysis of Soil Conservation Service maps; cost per service unit for non-basalt areas from Table 6; cost factor in basalt areas of 2.0 based on information from AMAFCA and local contractors.

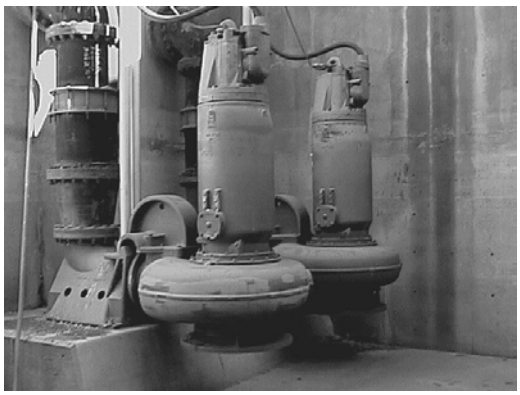
Valley Case Study

The Valley service area is very different hydrologically from the other service areas. The area is flat and can be lower than the mean elevation of the Rio Grande river. Open channels, other than MRGCD facilities, are generally impractical due to inadequate slope and the high water table. Storm water flows are conveyed primarily through a system of storm drainage pipes and pump stations. Roadway crossing structures are generally unnecessary. The cost per service unit for the Valley Service area is presented in **Table 8**.

Figure 5

To determine an appropriate cost per service unit for the Valley service area, a study was under taken of a fully developed ten square mile area. The area was comprised by Albuquerque Zone Atlas sheets F-14, G-13, G-14, H-13, H-14, J-11, J-13, J-14, K-11 and K-14. In general, the boundaries are Montano on the north, the railroad tracks on the east, the Rio Grande river on the west and Bridge Street and the Rio Grande river on the south. In addition, the study area included two square miles on the West side of the river, bounded on the north approximately by I-25, on the east by the Rio Grande river, on the south by Bridge Street and on the west by Coors Boulevard.

Figure 6 Alameda Pump Station



An inventory was compiled of all major drainage facilities within the study area based on analysis of City of Albuquerque Drainage Facilites Systems maps and field inspections. As with the Northeast Heights case study, only those facilities meeting the definition of "major facilities" and expressly designed for drainage purposes were included. The current costs of installing the facilites were estimated based on average unit costs compiled by the City of Albuquerque Public Works Department. With the exception of the actual 1993 acquisition cost of the six pump station sites, the estimates exclude the costs of land or easements.

Table 8
Cost Per Service Unit
Valley Service Area

Cost Factor	Value
Storm Drain Pipe (>30”diameter)	$23,553,000
Pump Stations	$15,842,000
Total Cost	$39,395,000
Study Area (Acres)	$6,400
Cost per Acre	$6,155
Service Units per Acre	$0.42
Cost per Service Unit	$14,655

Source: Leedshill-Herkenhoff, 1995. Service units per acre derived from adopted Land Use Assumptions as shown in Table A-1 and A-2 for Valley service area (sum of City and County 1994 service units divided by sum of City and County 1994 developed acres).

Revenue Credits

New development will be paying its share of growth related drainage capital costs through drainage impact fees. New development will also be generating additional property tax revenue that will be used to repay general obligation bonds used to construct facilities providing service to existing development. To ensure that new development is not required to pay more than its fair share, the impact fees must be reduced to account for such future property tax contributions.

The City and County combined have about $41 million in outstanding drainage bond debt. To the extent that this debt was used to build capacity that has already been used by existing development, or to remedy existing capacity deficiencies, the drainage impact fee should be reduced accordingly. To be conservative, credit will be provided for the entire amount of the outstanding debt.

The outstanding bonded indebtedness divided by the total number of development drainage service units result in a credit per service unit of $1,911 for the City and $1,299 for the County, as shown in **Table 9**. To avoid creating different fee structures between the City and County, and to be even more conservative for the County, where drainage information is more limited, it is recommended that the higher credit calculated for the City be applied to both jurisdictions.

Table 9
Drainage Debt Credit Per Service Unit

City of Albuquerque		Bernalillo County	
Drainage Bonds	Outstanding Dept	Drainage Bonds	Outstanding Dept
1988A Bond Issue	$545,000	1991 D Bond Issue	$2,065,000
1991B Bond Issue	$1,205,000	1992-93 Bonds	$2,330,000
1992C Bond Issue	$12,120,000		
1993C Bond Issue	$23,210,000		
Outstanding Debt	$37,080,000	Outstanding Debt	$4,395,000
1994 Service Units	19,400	1994 Service Units	3,384
Credit/Service Unit	$1,911	Credit/Service Unit	$1,299
Recommended City/County Credit		$1,911	

Source: City of Albuquerque, CIP Division, "G.O. Bonds Outstanding," August 9, 1994; Bernalillo County Treasurer, "Statement of Bonded Debt for the Month of December 1994;" 1994 drainage service units from Table 4.

In addition to outstanding debt, impact fees should also account for non-local funds that have been used in the past and are likely to be available in the future to finance drainage capital improvements. However, no such funds have been or are anticipated to be, available for drainage improvements, according to City and County public works staff.

Finally, drainage impact fees should be reduced to account for future revenues generated by new development that will be used to remedy existing drainage capacity deficiencies. Reconstruction and replacement projects identified as needed to build out in the *Far Northeast Heights Master Drainage Plan* were used as a basis for estimating the extent of existing deficiencies. Reconstruction costs; however, will be significantly higher than capacity deficiency costs, since some of the projects provide increased capacity needed for complete build out of the 15 square mile master plan area and other projects are needed for reasons other than inadequate capacity. Consequently, only one-half of reconstruction costs were assumed to represent capacity deficiencies. Using the same approach used to calculate growth related costs, deficiency costs are estimated to amount to $2,204 per service unit, as shown in **Table 10**.

Table 10
Drainage Deficiency Cost Per Service Unit
Far Northeast Heights Study Area

Deficiency Cost Factor	Value
Open Channels (>50 cfs capacity)	$5,175,000
Storm Drain Pipe (>30" diameter)	$4,350,000
Total Deficiency Cost	$9,525,000
Master Plan Area (Acres)	9,600
Deficiency Cost per Acre	$992
Service Units per Acre	0.45
Deficiency Cost per Service Unit	$2,204

Source: Weston Engineerring, Far Northeast Heights Master Drainage Plan, January 1988 (reconstruction project cost Estimates were inflated by 15% to approximate 1995 cost and divided by two to approximate capacity deficiencies); Service units per acre derived from adopted Land Use Assumptions as shown in Table A- 1and A-2 for East Mesa Service area (sum of City and County 1994 service units divided by sum of City and County 1994 developed acres).

Growth Related Costs

The net cost per service unit for each of the service areas is derived by subtracting the credits for outstanding debt and existing deficiencies from the gross cost, based on the case study analysis. Since the property tax or other payments made by new development to retire existing debt or remedy existing deficiencies will be the same throughout the jurisdiction, the credits are applied uniformly to all service areas. As shown in **Table 11**, the net cost per service unit ranges from a low of $10,540 in the Valley service area to a high of $16,289 in basalt affected areas of the Northwest Mesa service area.

Table 11
Net Cost per Drainage Service Unit

Net Cost Factor	Drainage Service Area					
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa	
					Basalt	Other
Cost per Service Unit	$15,307	$14,655	$15,307	$15,307	$20,404	$15,307
Debt Credit Per Service Unit	$1,911	$1,911	$1,911	$1,911	$1,911	$1,911
Deficiency Credit/Service Unit	$2,204	$2,204	$2,204	$2,204	$2,204	$2,204
Net Cost/Service Unit	$11,192	$10,540	$11,192	$11,192	$16,289	$11,192

Source: Cost per service unit for East Mesa, Mesa del Sol, Southwest Mesa and non basalt areas of the Northwest service area from Table 5; cost per service unit for basalt affected areas of the Northwest Mesa from Table 7; cost per service unit for Valley from Table 8; debt credit from Table 9; deficiency credit from Table 10.

Based on the net costs per service unit, the projected drainage capital costs attributable to new development in each service area are shown in **Table 12**. If drainage impact fees are adopted at 100 percent of the growth related cost per service unit, these are the estimated amounts of impact fee revenue that would be generated in each service area over the 1994-2002 period. The impact fee revenue could be used only for capacity expanding improvements to major drainage facilities within the service area in which the fees are collected. Some of the projected revenue may be realized in the form of developer installed facilities for which credit against impact fees would be given.

To the extent that funds from other revenue sources are available to the City or County over the planning horizon to fund drainage capital improvements, they could be spent within any service area for either impact fee-eligible or non-eligible projects. Local funds spent on impact fee-eligible projects in advance of impact fee revenues could be reimbursed with impact fee Funds as they become available.

Table 12
Growth Related Drainage Costs, 1994-2002

Jurisdiction	Drainage Service Area					Total
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa	
Increase in Service Units, 1994-2002						
City	720	185	280	788	944	2,917
County	198	218	0	182	297	895
Total	918	403	280	970	1,241	3,812
Net Cost/Service Unit						
Unit cost	$11,192	$10,540	$11,192	$11,192	$11,192	NA
Growth-Related Cost						
City	$8,058,240	$1,949,900	$3,133,760	$8,819,196	$10,565,248	$32,526,444
County	$2,216,016	$2,297,720	0	$2,036,944	$3,324,024	$9,874,704
Total	$10,274,256	$4,247,620	$3,133,760	$10,856,240	$13,889,272	$42,401,148

Note: Assumes all development in NW service area occurs in areas not affected by basalt excavation costs.
Source; New service units from Table 4; net cost/service unit from Table 11.

Drainage impact fees will be based on the number of new service units that will be generated by a development. To calculate drainage service units, the site acreage is classified into the four land treatment categories described in **Table 1**. If the amount of impervious cover or other high runoff land treatments are not known, the percent of the site to be classified as Treatment D can be estimated based on the land use as described in **Table 2**. The site acreage in each land treatment category is then multiplied by the appropriate runoff coefficient from **Table 3**, based on the precipitation zone in which the development is located. The sum of the products of the acreage and runoff coefficients is the number of drainage service units generated by the development. The number of development service units is determined by then subtracting the number of predevelopment service units.

A generalized example of an acre subdivision to be developed at a density of five single-family units per acre can be used to illustrate the calculation of drainage impact fees. The fees are based on the gross site area of the subdivision, including local streets to be dedicated. Based on the density of the proposed development, the formula from **Table 2** can be used to derive the estimated percent of impervious cover:

$7 \times (5^2 + 5 + 5)^{1/2} = 50$ %. Let's assume that the yards will be evenly divided between desert landscaping (Treatment C =25%) and irrigated lawns (Treatment B= 25%). Thus, the one-acre site will be developed with 0.50 acres of Treatment D, 0.25 acres of Treatment C and 0.25 acres of Treatment B. The number of pre-developed units would be determined by using Land Treatment A for the entire one-acre site.

The runoff coefficients for Land Treatments A, B, C and D vary by precipitation zone (refer to **Table 3**). Multiplying the runoff coefficient for each Land Treatment by the acres of that Land Treatment within the development site and adding them together gives the number of total drainage service units resulting from the development.

While actual developments may vary from the assumptions in this example, it provides a general estimate of the maximum drainage impact per single-family unit for urban density subdivisions in each service area. As shown in **Table 13**, the net drainage costs per single-family lot for an urban density subdivision would range from a low of $873 in the East Mesa service area to a high of $1,499 in the basalt affected areas of the Northwest Mesa service area.

Table 13
NET DRAINAGE COST PER SINGLE-FAMILY UNIT
(Generalized Example for 5 Unit/Acre Subdivision)

Cost Factor	Drainage Service Areas				
	East Mesa	Valley	Mesa del Sol	SW/NW Mesa	NW Mesa (basalt)
Area of Subdivision	1.0	1.0	1.0	1.0	1.0
Single Family Lots	5	5	5	5	5
Gross Density (units/acre)	5.0	5.0	5.0	5.0	5.0
Acres, Treatment D	0.50	0.50	0.50	0.50	0.50
Acres, Treatment C	0.25	0.25	0.25	0.25	0.25
Acres, Treatment B	0.25	0.25	0.25	0.25	0.25
Precipitation Zone	3,4	1,2	2	1	1
Runoff Coeff., Treatment D	0.94	0.93	0.93	0.93	0.93
Runoff Coeff., Treatment C	0.65	0.62	0.62	0.61	0.61
Runoff Coeff., Treatment B	0.50	0.44	0.45	0.43	0.43
Runoff Coeff., Treatment A	0.37	0.29	0.31	0.27	0.27
Developed Service Units	0.39	0.44	0.42	0.46	0.46
Net Cost/Service Unit	$11,192	$10,540	$11,192	$11,192	$16,289
Net Cost/One-Acre subdivision	$4,365	$4,638	$4,701	$5,148	$1,499
Net Cost/Single-Family Unit	$873	$928	$940	$1,030	$1,499

Notes: Assumes 1-acre subdivision developed at 5 units/acre with equal front and back yards developed with desert landscaping (Treatment C) and irrigated lawn (Treatment B) respectively; units/acre from 1994 land use assumptions; percent Treatment D from Table 2, remaining site area assumed evenly divided between Treatments B and C; runoff coefficients from Table 3; total service units is the sum of the products of runoff coefficients and acres of land treatments minus the pre development service units; net cost per service unit from Table 11; net cost per unit is net subdivision cost divided by five units.

APPENDIX A

Table A-1
DRAINAGE SERVICE UNITS
City of Albuquerque, 1994

Factor	Drainage Services Area				
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa
1994 Dwelling Units	126,365	21,785	2	8,611	12,976
1994 Employment	162,164	56,412	0	5,136	6,477
Units/Ac.	7.25	3.47	NA	3.48	4.76
Residential Ac.	17,430	6,278	0	2,474	2,726
Percent Treatment D	53%	35%	0%	40%	46%
Res. Ac., Treatment D	9,238	2,197	0	990	1,254
Res. Ac., Treatment C	4,096	2,041	0	742	736
Res. Ac., Treatment B	4,096	2,040	0	742	736
Employees/Ac.	20.51	19.93	NA	2.61	10.83
Nonresidential Ac.	7,907	2,831	0	1,968	598
Percent Treatment D	90%	90%	90%	90%	90%
Nonres. Ac., Treatment D	7,116	2,548	0	1,771	538
Nonres. Ac., Treatment C	396	142	0	99	30
Nonres. Ac., Treatment B	395	141	0	98	30
Precipitation Zone	3&4	1&2	2	1	1
Runoff Coeff., Treatment D	0.93	0.93	0.93	0.93	0.93
Runoff Coeff., Treatment C	0.65	0.62	0.62	0.61	0.61
Runoff Coeff., Treatment B	0.50	0.44	0.45	0.43	0.43
Total Service Units	20,375	6,726	0	3,442	2,463
Runoff Coeff., Treatment A	0.35	0.29	0.31	0.27	0.27
Pre-Development Service Units	8,868	2,642	0	1,199	897
Development Service Unit	11,507	4,084	0	2,243	1,566

Notes: Population and employment by service area derived from adopted Land Use Assumptions by MRCOG and Southwest Land Research; units/acre and employees/acre from 1994 PIA-level Land Use Assumptions (see Table A-5 for calculation of residential density); percent Treatment D from Table 2 (see Table A-5 for calculation of residential % D), remaining site area assumed evenly divided between Treatments B and C; runoff coefficients from Table 3; total service units is the sum of the products of runoff coefficients and acres of land treatments.

Table A-2
DRAINAGE SERVICE UNITS
Bernalillo County, 1994

Factor	Drainage Service Area				
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa
1994 Dwelling Units	4,216	16,564	0	2,195	2,885
1994 Employment	1,864	16,960	0	663	1,474
Units/Ac.	7.25	3.47	NA	3.48	4.76
Residential Ac.	582	4,773	0	631	606
Percent Treatment D	53%	35%	0%	40%	46%
Res. Ac., Treatment D	308	1,671	0	252	279
Res. Ac., Treatment C	137	1,551	0	190	164
Res. Ac., Treatment B	137	1,551	0	189	163
Employees/Ac.	20.51	19.93	NA	2.61	10.83
Nonresidential Ac.	91	851	0	254	136
Percent Treatment D	90%	90%	90%	90%	90%
Nonres. Ac., Treatment D	82	766	0	229	122
Nonres. Ac., Treatment C	5	43	0	13	7
Nonres. Ac., Treatment B	4	42	0	12	7
Precipitation Zone	3&4	1&2	2	1	1
Runoff Coeff., Treatment D	0.93	0.93	0.93	0.93	0.93
Runoff Coeff., Treatment C	0.65	0.62	0.62	0.61	0.61
Runoff Coeff., Treatment B	0.50	0.44	0.45	0.43	0.43
Total Service Units	526	3,956	0	658	550
Runoff Coeff., Treatment A	0.35	0.29	0.31	0.27	0.27
Pre-Development Service Units	236	1,631	0	239	200
Development Service Units	290	2,325	0	419	350

<u>Notes:</u> Population and employment by service area derived from adopted Land Use Assumptions by MRCOG and Southwest Land Research; units/acre and employees/acre from 1994 PIA-level Land Use Assumptions (see Table A-5 for calculation of residential density); percent Treatment D from Table 2 (see Table A-5 for calculation of residential % D), remaining site area assumed evenly divided between Treatments B and C; runoff coefficients from Table 3; total service units is the sum of the products of runoff coeffficients and acres of land treatments.

Table A-3
DRAINAGE SERVICE UNITS
City of Albuquerque, 2002

Factor	Drainage Service Area				
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa
2002 Dwelling Units	130,498	22,123	1,080	10,179	18,505
2002 Employment	180,444	61,352	975	7,671	14,091
Units/Ac.	7.25	3.47	3.48	3.48	4.76
Residential Ac.	18,000	6,376	310	2,925	3,888
Percent Treatment D	53%	35%	38%	40%	46%
Res. Ac., Treatment D	9,540	2,232	118	1,170	1,788
Res. Ac., Treatment C	4,23	2,072	96	878	1,050
Res. Ac., Treatment B	4,230	2,072	96	877	1,050
Employees/Ac.	20.51	19.93	3.46	2.61	10.83
Nonresidential Ac.	8,798	3,078	282	2,939	1,301
Percent Treatment D	90%	90%	90%	90%	90%
Nonres. Ac., Treatment D	7,918	2,770	254	2,645	1,171
Nonres. Ac., Treatment C	440	154	14	147	65
Nonres. Ac., Treatment B	440	154	14	1 47	65
Precipitation Zone	3,4	1,2	2	1	1
Runoff Coeff., Treatment D	0.93	0.93	0.93	0.93	0.93
Runoff Coeff., Treatment C	0.65	0.62	0.62	0.61	0.61
Runoff Coeff., Treatment B	0.50	0.44	0.45	0.43	0.43
Total Service Units	21,606	7,011	464	4,614	3,911
Runoff Coeff., Treatment A	0.35	0.29	0.31	0.27	0.27
Pre-Development Service Units	9,379	2,742	184	1,583	1,401
Development Service Units	12,227	4,269	280	3,031	2,510

<u>Notes:</u> Population and employment by service area derived from adopted Land Use Assumption by MRCOG and Southwest Land Research; units/acre and employees/acre from 1994 PIA-level Land Use Assumptions (see Table A-5 for calculation of residential density, Mesa del Sol average of Valley and Southwest Mesa); percent Treatment D from Table 2 (see Table A-5 for calculation of residential % D, Mesa del Sol average of Valley and Southwest Mesa), remaining site area assumed evenly divided between Treatments B and C; runoff coefficients from Table 3; total service units is the sum of the products of runoff coefficients and acres of land treatments.

Table A-4
DRAINAGE SERVICE UNITS
Bernalillo County, 2002

Factor	Drainage Services Area				
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa
2002 Dwelling Units	6,894	18,229	0	3,240	5,637
2002 Employment	3,563	18,166	0	909	2,224
Units/Ac.	7.25	3.47	3.48	3.48	4.76
Residential A	951	5,253	0	931	1,184
Percent Treatment D	53%	35%	38%	40%	46%
Res. Ac., Treatment D	504	1,839	0	372	545
Res. Ac., Treatment C	224	1,707	0	280	320
Res. Ac., Treatment B	223	1,707	0	279	319
Employees/Ac.	20.51	19.93	3.46	2.61	10.83
Nonresidential Ac.	174	911	0	348	205
Percent Treatment D	90%	90%	90%	90%	90%
Nonres. Ac., Treatment D	157	820	0	313	185
Nonres. Ac., Treatment C	9	46	0	18	10
Nonres. Ac., Treatment B	8	45	0	17	10
Precipitation Zone	3,4	1,2	2	1	1
Runoff Coeff., Treatment D	0.93	0.93	0.93	0.93	0.93
Runoff Coeff., Treatment C	0.65	0.62	0.62	0.61	0.61
Runoff Coeff., Treatment B	0.50	0.44	0.45	0.43	0.43
Total Service Units	882	4,331	0	946	1,022
Runoff Coeff., Treatment A	0.35	0.29	0.31	0.27	0.27
Pre-Development Service Units	394	1,788	0	345	375
Development Service Units	488	2,543	0	601	647

<u>Notes:</u> Population and employment by service area derived from adopted Land Use Assumptions by MRCOG and Southwest Land Research; units/acre and employees/acre from 1994 PIA-level Land Use Assumptions (see Table A-5 for calculation of residential density, Mesa Del Sol average of Valley and Southwest Mesa); percent Treatment D from Table 2 (see Table A-5 for calculation of residential % D, Mesa Del Sol average of Valley and Southwest Mesa), remaining site area assumed evenly divided between Treatments B and C; runoff coefficients from Table 3; total service units is the sum of the products of runoff coefficients and acres of land treatments.

Table A-5
RESIDENTIAL DENSITY AND IMPERVIOUS COVER
Albuquerque and Bernalillo County, 1994

Factor	Drainage Service Area				
	East Mesa	Valley	Mesa del Sol	SW Mesa	NW Mesa
Single-Family Units	82,780	31,635	2	9,793	17,058
Multi-Family Units	47,801	6,714	0	1,703	1,698
Total Dwelling Units	130,581	38,349	2	11,496	18,756
Single-Family Units	5.16	2.96	NA	3.67	4.43
Multi-Family Units	24.24	18.03	NA	2.69	19.78
Average Units/Acre	7.25	3.47	NA	3.48	4.76
Single-Family Acres	16,043	10,688	0	2,668	3,851
Multi-Family-Acres	1,972	372	0	633	86
Total Residential Acres	18,015	11,060	0	3,301	3,937
Single-Family Impervious Cover	51%	34%	NA	39%	45%
Multi-Family Impervious Cover	70%	70%	NA	60%	70%
Average Impervious Cover	53%	35%	NA	40%	46%

Notes: Dwelling units by type and service area derived from adopted Land Use Assumptions by Southwest Land Research; single-family and multi-family densities derived from adopted Land Use Assumptions from Planning Information Areas (PlAs) approximating service areas: East Mesa (PlAs 3-5, 13-15), Valley (PlAs 1, 2, 7, 8), Southwest Mesa (PIA 9), Northwest Mesa (PlAs 10-12); average density is ratio of total units to total residential acres; residential acres estimated by dividing units by density; single-family impervious cover calculated based on single-family density and formula in Table 2; multi-family impervious cover from Table 2; average impervious cover is weighted average of single family and multi-family impervious cover, weighted by percent of residential acres in each category.

Attachment A
Capital Improvements Plan for
Drainage Impact Fees

Bernalillo County
Methodology Adjustment

During the initial presentation of the impact fees ordinances before the Bernalillo County Board of County Commissioners, several differences between Bernalillo County and the City of Albuquerque were noted in regard to the possible implementation of the proposed Drainage Impact Fee Ordinance. One specific difference is the noted trend toward larger acreage lots for residential development in Bernalillo County when compared to typical residential development in the City of Albuquerque. In Bernalillo County, a significant portion of residential construction occurs on lots that are three quarters of an acre or larger. Typical residential development in the City of Albuquerque occurs in subdivisions where lot size is generally less than one quarter of an acre.

Of particular concern was the financial burden the proposed Drainage Impact Fee Ordinance placed on these large acreage County residential lots. The Bernalillo County Board of County Commissioners directed staff to research potential solutions to address this concern. The recommended solution is described in this attachment to the Capital Improvements Plan for Drainage Impact Fees (CIP).

In the original CIP, the basic approach for determining drainage impact fees is to compute the amount of service units in a given service area, effectively quantifying the fully developed runoff conditions, and to apportion the cost of the drainage infrastructure necessary to provide the level of service prescribed by County drainage ordinances to each of these service units. For a developed service area, the amount of service units would account for the runoff generated from undeveloped land remaining in the service area as well as the additional runoff created by the new development in the service area.

The recommended solution to address the typical residential development patterns in Bernalillo County consists of modifying the approach for determining the actual drainage impact fees. The modification herein described utilizes the same infrastructure costs in the previous method; but uses only the additional service units created by development for the apportioning of these infrastructure costs. This modified approach effectively relieves the residential homeowner who builds a typical house on a large lot from paying a large portion of the cost for infrastructure needed to serve more densely developed areas. The specific sections of Bernalillo County's Impact Fees Ordinance that deal with drainage impact fees will incorporate this modification. **The procedures contained in the Bernalillo County Impact Fees Ordinance, are to be used only for computing drainage impact fees. These procedures are not applicable for any other purpose.**

This modified procedure results in changes to the information presented in the text and tables of the CIP. The most significant change is the change that results for using only the developed service units and is accomplished by reducing the service units per acre. This reduction results from subtracting the undeveloped service unit allocation from the total service units used in the CIP. The data presented in the "COST PER SERVICE UNIT" computations, **Tables 5** and **8**, are modified by reducing the "Service Units per Acre" to 0.45 and 0.42 respectively. Again, these lower values represent only the service units resulting from development. The outcome of this change is indicated by higher cost per service unit of $15,307 and $14,655 respectively. However, this higher "per unit" cost will be offset by having less service units for the individual developments.

In the CIP, the "cost per service unit" for each of the service areas was adjusted to account for debt credit and deficiency credit. The same procedural modification of using only developed service units was also applied to the computation of these values. The revised version of **Table 11** presents the results of this modified procedure. The revised "Net Cost/Service Unit" is the basis for the adjusted drainage impact fees in the ordinance.