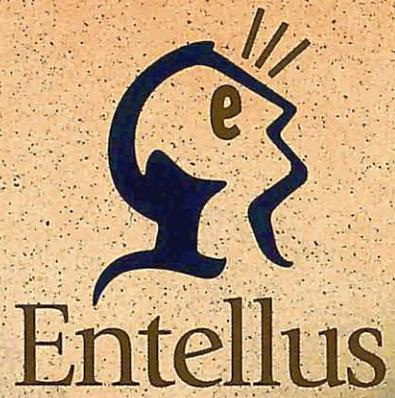




LEVEL II REPORT

VOLUME AA



January 29, 2001

VOLUME DESIGNATION

VOLUME ID	Volume Name	Number
DC	Data Collection	1
HY	Hydrology	2
PA	Potential Alternatives	3
AA	Alternative Analysis (Level II)	4
RA	Recommended Alternatives (Level III)	5
ZA	Zone A Floodplain Delineation	6
DS	Detailed (Section 15)	7
AL	Arrowhead Lakes Hydrology	8
AR	Administrative Report (Correspondence)	9

Note: Volume ID will be used for Section, Plate, Figure, and Table identifiers.



LEVEL II REPORT

VOLUME AA

Contract FCD 99-44

MAY 30, 2001

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Intelligent Engineering
Environmental Solutions



Entellus™

2255 N. 44th Street
Suite 125
Phoenix, AZ 85008
Phone (602) 244 2566
Fax (602) 244 8947
Web: www.entellus.com

In association with:



LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

Glendale/Peoria Area Drainage Master Plan Update

FCD 99-44

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**Glendale/Peoria Area Drainage Master Plan Update
FCD No. 99-44**

LEVEL II REPORT

SECTION AA-1: EXECUTIVE SUMMARY

1.1 Report Objectives

The purpose of the overall study is to update a portion of the existing Glendale/Peoria ADMP Study (**Reference 1**) by quantifying the extent of flooding problems, developing alternative solutions, selecting the most desirable solutions, and preparing preliminary designs for the selected alternatives.

The purpose of the Level II phase of the ADMP Update is to identify and evaluate the alternative solutions for the focus areas identified in the *Glendale/Peoria Area Drainage Master Plan – Potential Alternatives - Volume PA*. The Level II evaluation depends on many factors, including: costs, engineering feasibility, future recreation facilities and the flood safety needs for these facilities. The ADMP Update team reviewed the alternatives in the Level II analysis to decide which alternatives to bring to the Level III analysis.

The decision-making process used in the evaluation, the preliminary cost estimates, and the results of the evaluation are all documented in this Level II report.

1.2 Recommended Alternatives to take to Level III Analysis

Based on evaluation of Level II alternatives, the following alternatives have been recommended to take to the Level III analysis.

1.2.1 Northwest Region – Recommended Alternative

The Recommended Alternative for the Northwest Region consists of many components. The first is a Pinnacle Peak Road storm drain and channel

from 87th Avenue to the Agua Fria River. The second component is a Deer Valley Road channel from 91st Avenue to Lake Pleasant Parkway then south to Rose Garden Lane. This will also incorporate a Rose Garden Lane channel from 107th Avenue to the Agua Fria River. The next component will be to improve the Beardsley Road channel. The final piece of this alternative is the preservation of natural washes by performing a Zone A delineation.

1.2.2 Rock Springs Region – Recommended Alternative

The Recommended Alternative for the Rock Springs Region is to enforce the floodplain and floodway delineations that were performed by Stantec Consulting (**Reference 11**).

1.2.3 83rd Avenue Region – Recommended Alternative

The Recommended Alternative for the 83rd Avenue Region has four elements. The first element is a regional detention basin located at 83rd Avenue and Pinnacle Peak Road. The next element is a channel along the north side of Pinnacle Peak Road from 87th Avenue east into the detention basin. The third element is a channel along the west side of 83rd Avenue from Calle Lejos south into the detention basin. The last element is a relief storm drain from the detention basin south under 83rd Avenue that outlets into the existing 83rd Avenue channel south of Williams Drive.

1.2.4 67th Avenue and Pinnacle Peak Road Region – Recommended Alternative

The Recommended Alternative for the Pinnacle Peak Road and 67th Avenue Region has one main component. This component is a channel along the east side of 67th Avenue from just south of West Wind Drive to Pinnacle Peak Road. A box culvert under 67th Avenue collects the flow from the channel and empties it into a channel along the north side of Pinnacle Peak Road west into the New River.

SECTION AA-2: INTRODUCTION

2.1 Scope of Work

The Scope of Work for the Glendale/Peoria Area Drainage Master Plan Update is included in Appendix B of the *Glendale/Peoria Area Drainage Master Plan - Data Collection – Volume DC*.

2.2 Previous Studies

Flooding within the Study Area was documented as early as 1963, when the U.S. Army Corps of Engineers (COE) documented, in detail, the storm and flood event of August 16, 1963 (**Reference 2**). The COE documented flooding in the northern areas of Glendale, portions of which fall within the study area.

The District prepared reports on flooding in the early 1960s as well. These two reports were the *Flood Control Survey Report* (**Reference 3**) and the *Comprehensive Flood Control Program Report* (**Reference 4**). These reports identified flood hazards along Grand Avenue. The second report also documented plans for a number of flood control facilities, including the ACDC and New River Dam. Several of these regional flood control facilities, documented in that report, were built in the last thirty years.

The District sponsored two studies within the project area in 1987; the first study was the *Glendale/Peoria Area Drainage Master Plan* (**Reference 1**). This study documented flooding hazards and flood control alternatives for a large portion of the study area. The flood control alternatives evaluated in that study were mainly networks of storm drain systems. The second study was the *Bell Road Project Drainage Study* (**Reference 5**), which was a stormwater/floodwater management plan for the expansion of Bell Road.

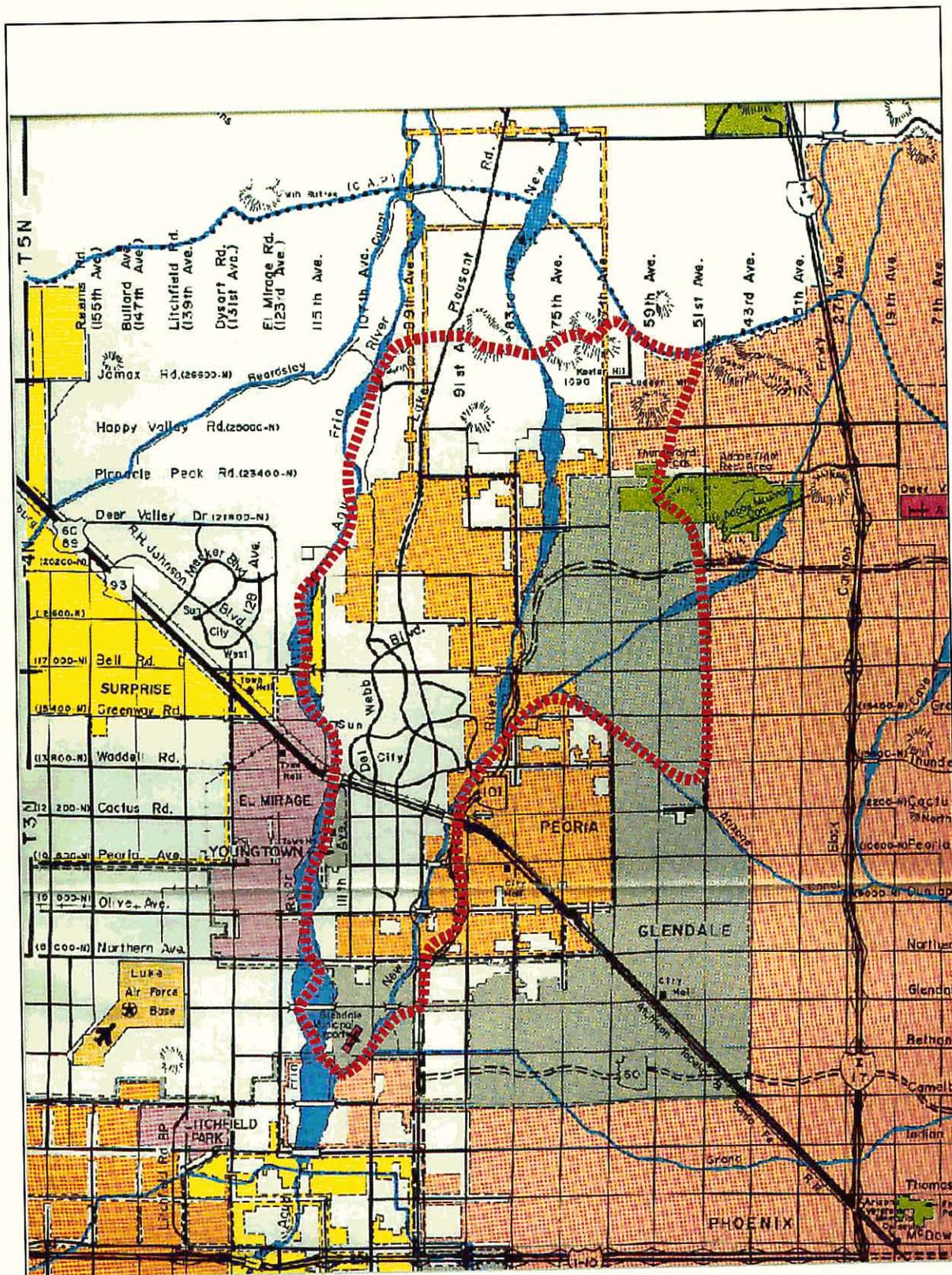
In the 1990's, the District prepared three notable reports within the project area. The first was the *Hydrology for Beardsley Channel Extension* (**Reference 6**). This report was used for the extension of the Beardsley Road channel from 111th Avenue to the Agua Fria River. The second study was *Sun City Area Hydrologic Study* (**Reference 7**). This study was performed to estimate peak flows at concentration points within the Sun City Area. The third study was the *91st Avenue Drain Hydrology Update* (**Reference 8**). This study was performed to analyze the effects of upstream urbanization to the 91st Avenue channel in the City of Peoria.

The District also sponsored three major projects within the project area in the 1990's. The first project was the *Final Design Report Skunk Creek Channel Improvements* (**Reference 9**). The findings were used to construct bank protection and a drop structure in Skunk Creek. The second project was the *Middle New River Watercourse Master Plan* (**Reference 10**). This watercourse master plan updated the hydrology and floodplains for the New River from the New River Dam to the confluence with Skunk Creek. The third project was the *Floodplain and Floodway Delineation for Rock Springs Creek* (**Reference 11**). This study delineated the floodplain and floodway of Rock Springs Creek.

2.3 Study Areas

The overall study area for the Glendale/Peoria ADMP Update is approximately 80 square miles in size and includes portions of the cities of Peoria, Glendale, Youngtown, Phoenix, and unincorporated Maricopa County. The study area is located between 51st Avenue and the Agua Fria River and between Dynamite Boulevard and Bethany Home Road in northern Maricopa County as shown in **Figure AA-1**.

The study area consists of several regions in different stages of development. North of Pinnacle Peak Road, the area is mainly undeveloped and is characterized by steep hills draining into flat valleys. This area contains several washes that have not been significantly affected by development. However, several developments are either



LEGEND

--- - PROJECT AREA BOUNDARY



IN ASSOCIATION WITH
PENTACORE
 ANTIKOSHA
 CONSULTANTS

CTM ENGINEERING, INC.
 253 EAST BROADWAY, SUITE 201
 PHOENIX, ARIZONA

Entellus
 2225 N. 40th Street, Suite 125
 Phoenix, AZ 85018-2779
 Tel: 602.944.2200
 Fax: 602.944.2097
 Project No. 201007

GLENDALE/PEORIA ADMP UPDATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 FCD PROJECT NO. 99-44

VICINITY MAP
 FIGURE AA-1

under construction or in the planning stage, and the entire area will most likely be completely developed within the next ten years.

Between Pinnacle Peak and Beardsley Roads the area is more heavily developed and all natural drainage paths have been significantly altered. The drainage system in this area is mainly man-made and has been constructed by individual developers.

Consequently, there are non-continuous channels and inconsistencies in the system.

Between Beardsley Road and Northern Avenue, the area is mostly fully developed and includes the master planned communities of Sun City and Youngtown, as well as portions of Glendale and Peoria. For the most part, the drainage infrastructure in this area is already in place. However, the growing development upstream may increase runoff to the area and overwhelm this system.

South of Northern Avenue, the area is mostly industrial or undeveloped. This area is located between the Agua Fria River and the New River. The entire area is a mile or less from a river outfall and flooding problems are rare.

2.4 Study Approach

The study encompasses a significant geographical area. Additionally, the drainage problem areas are spread throughout the study area. This resulted in numerous options or a combination of options that were possible to alleviate the drainage problem areas. To select the most practical option in an opportune manner, a three-level analysis was performed as follows:

Level I: The alternatives formulation included an initial stage of research, which identified focus areas where historic drainage problems have been identified by the District or client agencies. The historic drainage problem focus areas were combined with data collected on existing facilities and environmental, social and cultural resources in the study area. In addition, the alternatives formulation included the

development of a hydrologic model, identification of screening parameters and identification of initial “seed” alternative solutions for each focus area.

Level II: The alternative solutions selected in the Level I analysis were then further evaluated. This detailed evaluation included the hydraulic design, cost and conflicts with existing major utilities. The results of the Level II analysis are included in this report and were used to select the alternatives to take to the Level III analysis.

Level III: The recommended alternative solutions from the Level II analysis will be described in more detail in the Level III analysis. The results of this analysis will result in a preliminary design for the selected alternatives.

2.5 Drainage Problem Areas

The detailed hydrology for the study area has been performed in the Hydrology Task of this ADMP, and is documented in the *Glendale/Peoria Area Drainage Master Plan – Hydrology – Volume HY*.

As shown in the *Glendale/Peoria Area Drainage Master Plan – Potential Alternatives - Volume PA*, eleven drainage problem areas or “focus areas” were identified. These focus areas are shown in **Figure AA-2** and are listed below:

1. North Side of the Arizona Canal Diversion Channel (ACDC).
2. 91st Avenue and Greenway Alignment Channel.
3. 91st Avenue to the Agua Fria River along Beardsley Road and 115th Avenue to Bell Road.
4. 83rd Avenue to the New River north of Beardsley Road.
5. Rock Springs Creek.
6. Channel along north side of Grand Avenue.
7. Drainage along 99th Avenue and Bell Road to the Agua Fria River.
8. Lake Systems North of Beardsley Road (Ventana Lakes).

9. Pinnacle Peak Road and 67th Avenue.
10. Weir Wash.
11. Williams Drive from 91st Avenue to 83rd Avenue

The detailed description of these areas is located in Subsection 2.4 of the
Glendale/Peoria Area Drainage Master Plan - Data Collection – Volume DC.

LEGEND

FOCUS AREA



STUDY AREA BOUNDARY

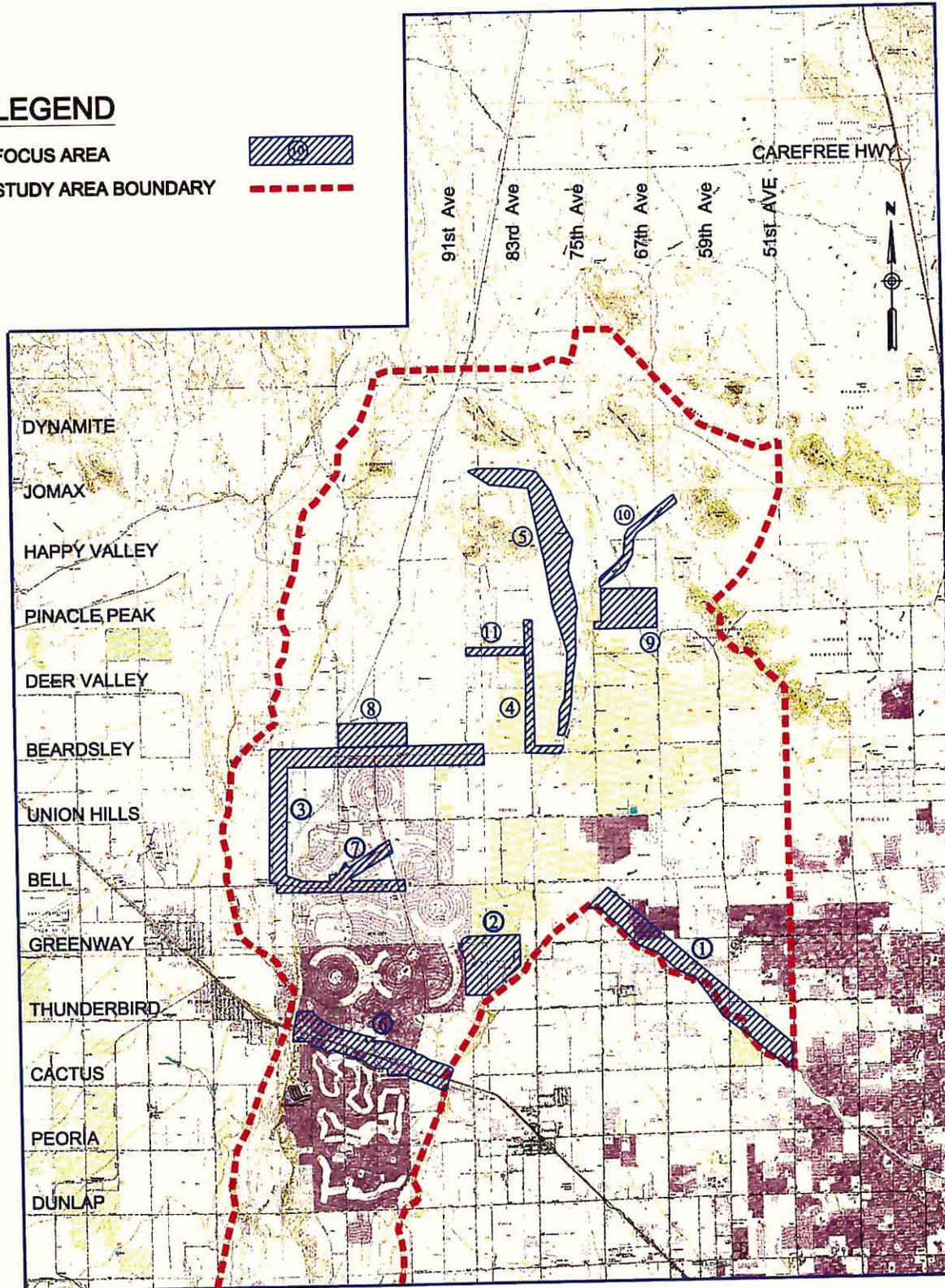


FIGURE AA-2 FOCUS AREA MAP

Glendale  Peoria
Area Drainage Master Plan



SECTION AA-3: EXISTING AND FUTURE DRAINAGE FACILITIES

As part of the alternatives evaluation, a tremendous amount of data was collected in order to identify and characterize the existing and future drainage facilities in the project study area. These facilities, identified from drainage reports, studies, and field visits, were documented and entered into the project database, and used to develop an existing/planned facilities exhibit. The existing/planned facilities exhibits are included in the *Glendale/Peoria Area Drainage Master Plan - Data Collection – Volume DC*.

SECTION AA-4: HYDROLOGY

A detailed hydrologic model was prepared by Entellus as part of this study, which was based on the Kaminski Hubbard model prepared in 1987 as part of the original ADMP (Reference 1). Reference was also made to the hydrologic model prepared for the Sun City area by the District (Reference 7). Both models were completely redone and updated to the Flood Control District's latest design and analysis criteria as part of this study. The complete and detailed report for the hydrology task of this project was completed in December 2000.

4.1 Study Area Hydrologic Boundaries

As part of the development of the new hydrologic model for this project study area, a detailed review of as-built information, field data, mapping, and field investigation was made in order to determine new sub-regional watershed limits. It was important to determine these sub-regional watershed limits to establish the hydrologic connectivity of individual alternative solutions. By determining these watershed boundaries, the study team was able to ascertain if an upstream alternative solution may have a beneficial effect on drainage problems that were occurring downstream.

Figure AA-3 shows the hydrologic boundaries determined as part of this study. These ten regional watershed boundaries would naturally be independent of each other unless channels or conduits are constructed that would divert flows from one watershed to another. There are four natural north to south drainage paths traversing the project area, including the Agua Fria River on the west, New River in the center, Skunk Creek to the east, and the ACDC in the southeast portion of the watershed.

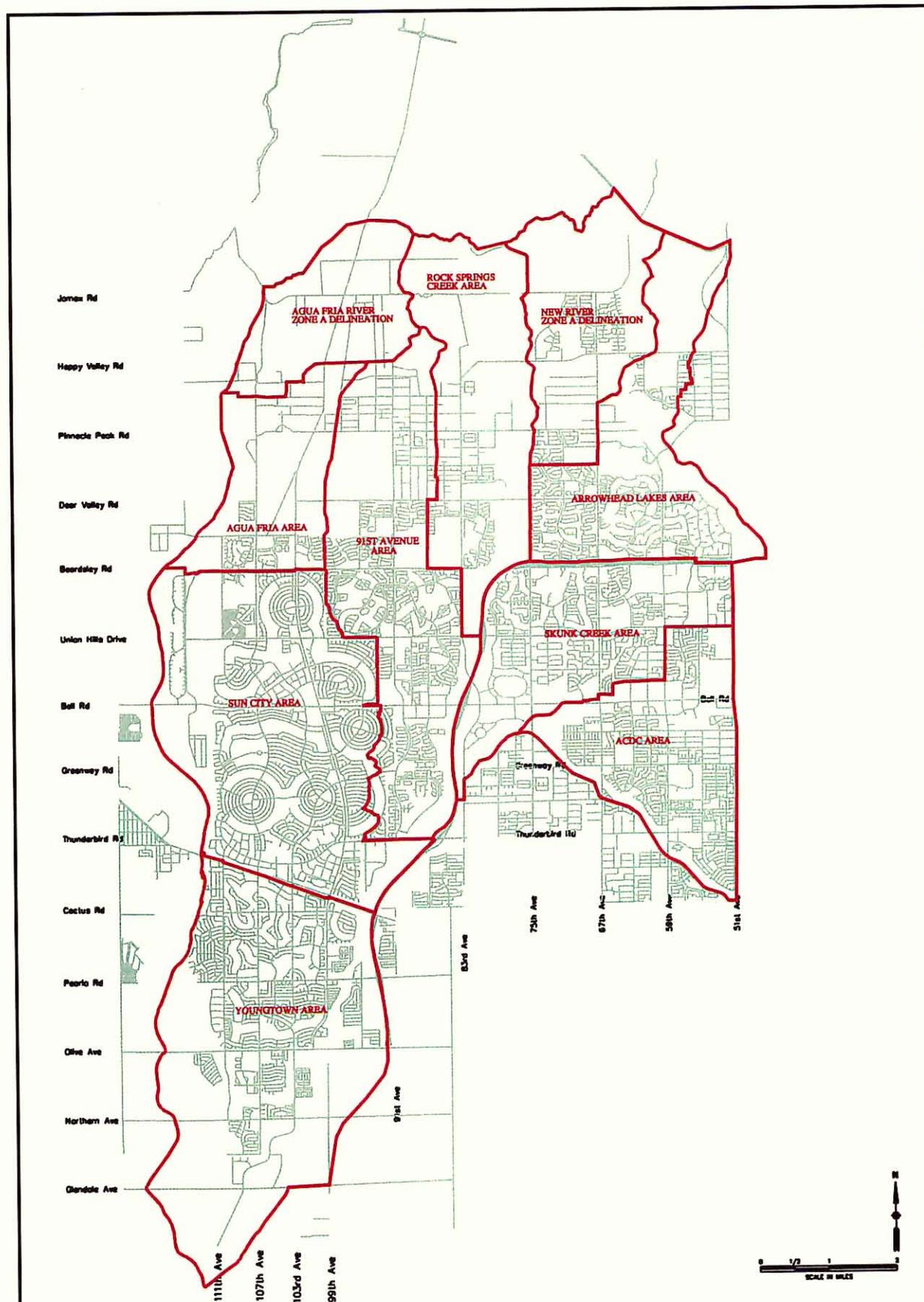


FIGURE AA-3 HYDROLOGIC BOUNDARIES

4.2 Summary of Key Flows and Channel Capacities

A specific list of peak flows at key locations was developed to facilitate the evaluation of drainage problems in the focus areas. **Table AA-1** shows a summary of key flows for the 100-year/6-hour storm event. **Table AA-2** shows the channel capacities based on Manning's normal depth calculations. The entire flow information is presented in **Appendix B**.

TABLE AA-1

Channel Capacity Data for the 100-Year 6-Hour Storm

Conveyance Location	Routing ID	HEC-1 Peak Flow Existing Conditions (cfs)	HEC-1 Peak Flow Future Conditions (cfs)	Calculated Capacity (cfs)	Capacity per Previous Drainage Reports (cfs)
Channel along 67 th Avenue	CN25D	455	460	50 *(1)	
115 th Avenue *(2)	CA08B	750	510	510 *(1)	
Channel along 115 th Avenue	CA08B *(3)	750	510	30 *(1)	
Channel along Rose Garden Lane	CX10 *(3)	570	520	670	620
Channel along 111 th Avenue	RX11S	465	420	680	620
Channel in 99 th Avenue	CS30B *(4)	595	585	320 *(1)	
99 th Avenue *(2)	CS10S *(4)	695	690	660 *(1)	
Channel in Del Webb Blvd	CS30A	990	995	510 *(1)	
Channel in 99 th Avenue	CS10D *(5)	2910	2650	935 *(1)	
Channel in 99 th Avenue	CS10D	2360	2100	810 *(1)	
Channel along Grand Avenue	CS10C	3330	3070	320 *(1)	
Channel along Grand Avenue	CS10C	3330	3070	285 *(1)	
Channel along Grand Avenue	CS10 *(4)	3380	3110	2340 *(1)	
Greenway Channel	CN09*	1370	1185	3730	750
91 st Avenue Channel	CN10	1270	1280	1430	
Channel along Beardsley Road	CA09C*	885	630	1075	
Channel along Beardsley Road	CA09C	885	635	980	
Channel along Beardsley Road	CA09A	900	650	805 *(1)	
Channel along 83 rd Avenue	CN21F	770	830	150 *(1)	
Channel along 83 rd Avenue	CN21E	825	890	505 *(1)	520
Channel along 83 rd Avenue	CN21E *(3)	825	890	1145	970
Channel along 83 rd Avenue	CN21C	1070	1150	460 *(1)	970

Notes: (1) Calculated peak flow exceeds channel capacity.

(2) Route capacity is the entire right-of-way for the street.

(3) The upstream concentration point was used to determine the flow in the reach because flow decreases downstream due to an increase in area, which creates a larger aerial reduction.

(4) This concentration point is not available from the HEC-1 model. Temporary modifications were made in order to obtain flow for this reach.

(5) The diverted hydrograph was added to the downstream concentration point to get the flow in this reach.

TABLE AA-2

Channel Properties and Normal Depth Calculations

Routing ID	Manning's Coefficient	Channel Bottom Width (ft)	Slope (ft/ft)	Side Slopes	Depth (ft)	Flow Area (ft ²)	Wetted Perimeter (ft)	Flow *(1) (ft/s)
RN25ES	0.035	2	0.0050	3	2.0	16	14.65	51
RA09LS	0.035	10	0.0019	3	2.0	57	28.97	166
RA09AS	0.020	2 *(2)	0.0030	10	2	88	64.2	510
RA08B	0.035	4	0.0010	3	2.0	20	16.65	30
RX10W	0.020	7	0.0039	1	5.5	69	22.56	672
RX11S	0.020	7	0.0040	1	5.5	69	22.56	681
RS30D	0.020	10	0.0023	3	3.0	57	28.97	320
RS30BS	0.020	2 *(2)	0.0018	10	1.7	135	121.3	660
RS30BW	0.020	16	0.0008	1	5.0	105	30.14	508
RS10G	0.020	18	0.0028	3	4.0	120	43.30	933
RX40S	0.020	18	0.0021	3	4.0	120	43.30	808
RS10E*	0.020	10	0.0016	1	4.0	56	21.31	318
RS10F*	0.020	10	0.0013	1	4.0	56	21.31	286
RS10C	0.020	20	0.0045	1	6.5	172	38.38	2342
RN10E	0.020	25	0.0041	2	7.0	273	56.30	3730
RN11	0.020	14	0.0036	2	5.5	138	38.60	1434
RA09FW	0.020	14	0.0020	2	10	340	58.72	3653
RA09E	0.020	11	0.0041	2	5	105	33.36	1076
RA09C*	0.025	12	0.0083	3	4	96	37.30	979
RA09C	0.025	12	0.0056	3	4	96	37.30	804
RN21I	0.035	2	0.0063	3	3	33	20.97	151
RN21F	0.035	25	0.0039	4	3	111	49.74	504
RN21E	0.035	30	0.0051	4	4	184	62.98	1143
RN21DS	0.035	20	0.0046	4	3	96	44.74	461

Notes: (1) Flow is calculated using Manning's Formula. ($Q = 1.49/n * S^{1/2} * R^{2/3} * A$)

(2) Route capacity is the entire right-of-way for the street.

SECTION AA-5: POTENTIAL ALTERNATIVE DESCRIPTIONS AND SKETCHES

As discussed in the *Glendale/Peoria Area Drainage Master Plan – Potential Alternatives Report – Volume PA*, the potential alternatives were grouped into four geographical regions. These geographical regions are the Northwest Region, the 83rd Avenue Region, the Rock Springs Region, and the Pinnacle Peak Road and 67th Avenue Region. **Figure AA-4** shows the Regional areas in relation to the focus areas described in Subsection 2.5. Focus areas that are not located within a regional area were analyzed individually.

5.1 Northwest Region

The Northwest Region includes focus areas three, eight, and eleven shown in **Figure AA-4**. These focus areas are located in the northwest portion of the watershed. Focus area three is the Beardsley Road channel from 91st Avenue to the Agua Fria River, and 115th Avenue from Beardsley Road to Bell Road. Focus area eight is the lake systems north of Beardsley Road located in the Ventana Lakes development. Focus area eleven is Williams Drive from 91st Avenue to 83rd Avenue.

The problem in focus area eleven is that water ponds upstream from an old irrigation ditch along the Williams Drive alignment. During large storm events, water ponds until it is high enough to overflow the low spot and flow down 87th and 89th Avenues. The goal of the selected alternative is to eliminate ponding in the 87th Avenue and Williams Drive area. Storm runoff flows from north to south in this area. The flow line of the New River is approximately three to four feet lower than the ground at Deer Valley Road and 87th Avenue. However, the Agua Fria River is 80 feet lower at the same location. Therefore, an outlet to the Agua Fria is more feasible because it is much easier to construct.

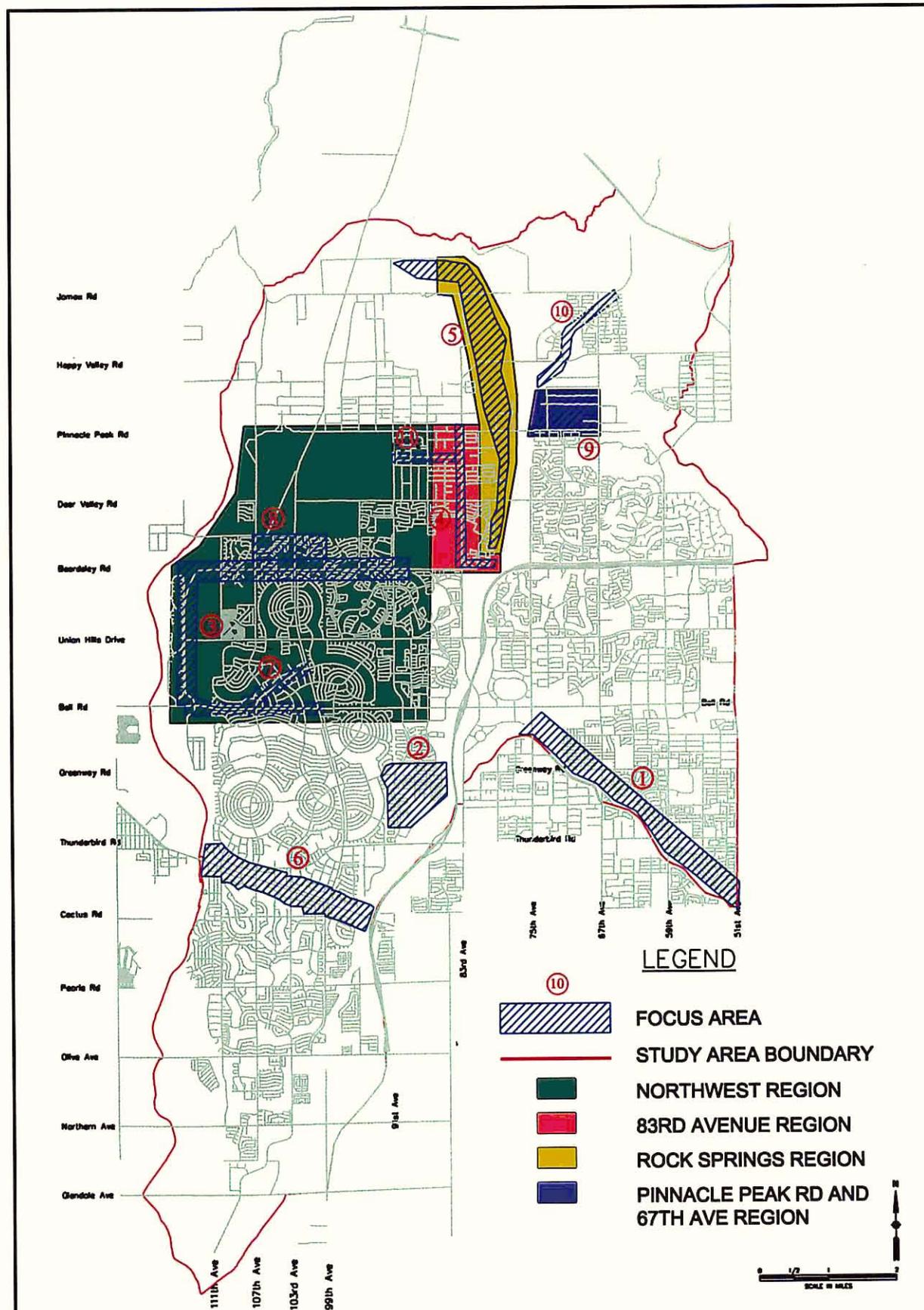


FIGURE AA-4 REGIONAL AREAS

The problem in focus area three is that the Beardsley Road channel does not have enough capacity and needs maintenance and repair in order to carry the contributing flows to or near the Agua Fria River. The entrance into a golf course at 115th Avenue constricts the flow, and the excess flow overtops the banks of the channel and flows south down 115th Avenue. The treatment facilities west of 111th Avenue need to be protected from channel overflows. The channel at Rose Garden Lane makes a ninety-degree turn south onto 111th Avenue, and flow overtops the channel during significant rainfall events. The goal of the selected alternative is to carry the flows to the Agua Fria River with no overflow or ponding and to reduce maintenance costs.

The problem in focus area eight is that runoff from inside Ventana Lakes development flows through the Ventana lakes' system into the Beardsley Road Channel. It is unclear how the lakes perform and what kind of storage can be expected given the existing operation procedures. The water quality in the lakes may be undesirable to combine with storm water runoff in the Beardsley Road channel and the Agua Fria River. The lakes on the south side of Beardsley Road have no true outlet, and their performance needs to be evaluated during 100-year storm events.

Table AA-3 shows the elements of potential alternative solutions brought to the Level II analysis located within the Northwest Region.

Appendix C contains the flier that was distributed in the Level II public meetings which shows the five regional alternatives that were analyzed in this report. Alternative D of focus area eleven was eliminated in the Level II analysis. The reason the alternative was eliminated was that the land at this location is already developed so any basin would have to be retrofitted. The cost would greatly outweigh the benefits at this location.

TABLE AA-3

Northwest Region – Elements of Level II Alternatives

Focus Area	Elements	Element Description
11	B	Relief channel or conduit along Pinnacle Peak Rd. to the Agua Fria River.
	E, F, & G	Detention basin near 91 st Avenue and Pinnacle Peak Rd. and an ordinance requiring development to maintain sheet flow.
	D	A regional detention basin near 83 rd Avenue and Williams Dr.
3	A	Channel along Deer Valley Road from Lake Pleasant Rd. to the Agua Fria River.
	B & C	Improve the Beardsley channel to carry existing flows and improve the outlet of the Beardsley channel into the golf course at 115 th Ave.
	E	Channel along Rose Garden alignment from Lake Pleasant Rd. to the Agua Fria River.

5.2 Northwest Region Alternatives

5.2.1 Northwest Regional Alternative One

The first regional alternative for the Northwest Region is a combination of many of the elements in **Table AA-3**. This regional plan consists of many components. The first component is a Pinnacle Peak Road storm drain and channel from 87th Avenue to the Agua Fria River, which is Element B for focus area 11. This element follows the City of Peoria’s Trail Master Plan (**Reference 12**), which calls for an equestrian trail along Pinnacle Peak Road from the New River to the Agua Fria River. The proposed channel can be incorporated into an equestrian trail. The second element is a Deer Valley Road channel from Lake Pleasant Road to 107th Avenue and then south to Rose Garden Lane, which is a slightly modified version of Element A in focus area 3. The modification to Element A is that the channel would turn south along 107th Avenue to Rose Garden Lane. This regional alternative will also incorporate a Rose

Garden Lane channel from the existing natural wash near the 95th Avenue alignment to the Agua Fria River; this is Element E of focus area 3. The next component of this regional alternative is to improve the Beardsley Road channel, including the outlet into the golf course. The final piece of the regional alternative is the preservation of the existing natural washes between Deer Valley Road and Pinnacle Peak Road. This preservation will be accomplished by performing a Zone A delineation on two washes.

5.2.2 Northwest Regional Alternative Two

The second regional alternative for the Northwest Region is the same as alternative one with the addition of a regional detention basin located near Pinnacle Peak Road and 91st Avenue. The intent would be to decrease the downstream flow, which would result in smaller downstream channels.

5.2.3 Northwest Regional Alternative Three

The third regional alternative for the Northwest Region is a different combination of the routes mentioned in **Table AA-3**. The first component of this regional alternative is the same channel and storm drain along Pinnacle Peak Road used in the first two regional alternatives. The improvements to the Beardsley Road channel and outlet are also included in this regional alternative. The channel along Deer Valley Road extends east and connects to the natural washes west of 91st Avenue. It follows the same alignment as in the first two regional alternatives, turning south along 107th Avenue and joining the Rose Garden Channel into the Agua Fria River. Under this alternative, the Rose Garden Channel begins at the intersection of 107th Avenue and Deer Valley Road and drains into the Agua Fria River.

5.2.4 Northwest Regional Alternative Four

The fourth alternative for the Northwest Region is exactly the same as the third alternative with the addition of the regional detention basin located in the vicinity of Pinnacle Peak Road and 91st Avenue.

5.2.5 Northwest Regional Alternative Five

The fifth alternative for the Northwest Region is to do nothing. This is not a feasible option because the flooding that occurs in the existing conditions is not corrected and will be compounded with further development.

5.3 Rock Springs Region

The Rock Springs Region is focus area five in **Figure AA-4**. The problem in the Rock Springs Region is that water runs down Rock Springs Creek and floods homes that are near or encroaching into the floodplain along the creek. Rock Springs Creek has been impinged and ends at a sand and gravel operation north of its original outfall into New River. One consideration of the alternatives is that the homes were built in the creek floodplain limits. Another consideration is that the water surface at New River would have to be checked against the water surface of any outfall channel. Stantec Consulting recently completed the *Floodplain and Floodway Delineation for Rock Springs Creek (Reference 11)*. The goal of the selected alternative is to prevent flooding and damage to existing structures from Rock Springs Creek, and to provide a suitable outlet into the New River.

Table AA-4 shows the potential alternative solutions brought to the Level II analysis located within the Rock Springs Region.

TABLE AA-4

Rock Springs Region – Elements of Level II Alternatives

Focus Area	Element	Element Description
5	A & C	Channel along Pinnacle Peak Rd. or Patrick Lane east to the New River. Improve Rock Springs Creek in combination with mutli-use opportunities.
	D	Detention basin located near Happy Valley Road.
	E	Enforce the Floodplain and Floodway delineation of Rock Springs Creek.

Appendix C contains the flier that was distributed in the Level II public meetings which shows the five regional alternatives that were analyzed in the Rock Springs Region.

5.4 Rock Springs Region Alternatives

5.4.1 Rock Springs Regional Alternative One

The first alternative for the Rock Springs Region is a relief channel into the New River along Patrick Lane. This alternative is a subset of Element A in focus area 5. The Patrick Lane alignment is just north of the sand and gravel operation.

5.4.2 Rock Springs Regional Alternative Two

The second alternative expands on the first alternative with the addition of a detention basin at the Happy Valley Road alignment. The detention basin is Element D for focus area 5.

5.4.3 Rock Springs Regional Alternative Three

The third regional alternative for the Rock Springs Region is a relief channel into the New River at Pinnacle Peak Road. This regional alternative is the second option of Element A in focus area 5. The relief channel would make a smooth transition from Rock Springs Creek to avoid a sharp bend.

5.4.4 Rock Springs Regional Alternative Four

The difference between the third and fourth alternative is the addition of a detention basin located at Happy Valley Road. This basin could have recreational possibilities.

5.4.5 Rock Springs Regional Alternative Five

The fifth alternative is the do-nothing option. This alternative has been modified into enforcing the Floodplain/Floodway delineations performed by Stantec Consulting.

5.5 83rd Avenue Region

The 83rd Avenue region is focus area 4 in **Figure AA-4**. The dilemma in this region is that development has routed flow along 83rd Avenue and created a default regional drainage corridor. The channel along 83rd Avenue was constructed in pieces and is discontinuous. The design requirements stipulate that the existing channel in conjunction with the roadway carries the 100-year flow. The solution to this focus area is to carry flow to the New River without excessive flooding and to maintain accessibility to 83rd Avenue. A detailed hydraulic analysis was performed on the 83rd Avenue channel. This analysis showed that the channel is currently undersized.

Table AA-5 shows the potential alternative solutions brought to the Level II analysis located within the 83rd Avenue Region.

TABLE AA-5

83rd Avenue Region – Elements of Level II Alternatives

Focus Area	Element	Element Description
4	A	Increase the size of the channel to convey the existing flow and construct a channel where does not exist currently.
4	B	Detention basin located one mile north of Pinnacle Peak Rd. or at Deer Valley Rd.
4	C	Straighten the bends within the existing channel.

Appendix C contains the flier that was distributed in the Level II public meetings which shows the three regional alternatives that were analyzed for the 83rd Avenue Region. Element C was eliminated in the Level II analysis because the channel was still undersized for the 100-year flow even if the bends were removed.

5.6 83rd Avenue Region Alternatives

5.6.1 83rd Avenue Regional Alternative One

The first alternative of the 83rd Avenue region is a modified version of Elements A and B. There are right-of-way conflicts in this region that limited the alternative plan. The detention basin's location was changed to Pinnacle Peak Road and 83rd Avenue. This regional basin decreases the downstream flow and the 83rd Avenue channel becomes adequate. Two channels from the west route flow into the basin. The first channel is along the Pinnacle Peak Road alignment and begins at 87th Avenue. The second channel also begins at 87th Avenue, just south of Calle Lejos, and flows southeast into the basin. A third contributing channel begins at Calle Lejos and follows the 83rd Avenue alignment into the regional basin. A storm drain outlet that drains the basin flows southerly along 83rd Avenue and empties into the existing 83rd Avenue channel just south of Williams Drive.

5.6.2 83rd Avenue Regional Alternative Two

The second alternative for the 83rd Avenue Region is essentially the same concept as the first alternative, except that the channel, which drains into the basin along 83rd Avenue, is replaced by a combination of channel and storm drain. The storm drain was proposed due to a conflict with existing right-of-way just north of the basin.

5.6.3 83rd Avenue Regional Alternative Three

The third alternative for the 83rd Avenue Region is to do nothing. This alternative is not desirable because the existing drainage problems would not be solved.

5.7 Pinnacle Peak Road and 67th Avenue Region

The Pinnacle Peak Road and 67th Avenue region is focus area 9 in **Figure AA-4**. The problem in this region is that significant offsite flows enter into the existing subdivision south of Pinnacle Peak Road at various locations. Ponding depths of one foot or more are expected for large storms. Any mitigation for this problem area should be done north of Pinnacle Peak Road because the area to the south is much more developed. The goal of the selected alternative is to minimize the amount of offsite flows entering the subdivision.

Table AA-6 below shows the potential alternative solutions brought to the Level II analysis that are located within the Pinnacle Peak Road and 67th Avenue Region.

Appendix C contains the flier that was distributed in the Level II public meetings which shows the five regional alternatives that were analyzed for the Pinnacle Peak Road and 67th Avenue Region.

TABLE AA-6
Pinnacle Peak Road and 67th Avenue Region
Elements of Level II Alternatives

Focus Area	Element	Element Description
9	A	Channel or storm drain along Pinnacle Peak Rd. to New River.
	B	Offline detention basin in combination with a smaller channel along Pinnacle Peak Rd. to the New River.
	C	Natural channel through property northwest of Pinnacle Peak Rd. and 67 th Ave. in a southwesterly alignment.

5.8 Pinnacle Peak Road and 67th Avenue Alternatives

5.8.1 Pinnacle Peak Road and 67th Avenue Alternative One

The first alternative for this region is a channel along 67th Avenue that transitions into a channel along the north side of Pinnacle Peak Road that drains into the New River. The transition is done through a small interceptor basin located at the northeast corner of 67th Avenue and Parkside Lane. An additional benefit of this basin is that it captures local storm water runoff flowing west on Parkside Lane. This is an expanded version of Element A, the channel segment now begins along 67th just south of West Wind Drive. The channel will then cross under 67th Avenue and continue along the north side Pinnacle Peak Road.

5.8.2 Pinnacle Peak Road and 67th Avenue Alternative Two

The second alternative for this region is the same as the first alternative, with the addition of a regional off-line detention basin located southeast of the intersection of Happy Valley Road and 67th Avenue. This basin would reduce the downstream flow, which decreases the size of the downstream channels and culverts. The basin could provide recreational opportunities such as a soccer field.

5.8.3 Pinnacle Peak Road and 67th Avenue Alternative Three

The third alternative for the region is a natural appearing channel along the existing wash alignment from 67th Avenue to Pinnacle Peak Road then west along Pinnacle Peak road into the New River. This is Element C for the focus area.

5.8.4 Pinnacle Peak Road and 67th Avenue Alternative Four

The fourth alternative for this region expands on the third alternative with the addition of a regional off-line detention basin located southeast of the intersection of Happy Valley Road and 67th Avenue. This basin would reduce the downstream flow, which in turn would decrease the size of the downstream natural channel.

5.8.5 Pinnacle Peak Road and 67th Avenue Alternative Five

The last alternative for this region is the do-nothing alternative. This alternative will not be considered because the downstream flooding concerns are not addressed.

5.9 ACDC Region

The ACDC region is focus area 1 in **Figure AA-4**. The problem in this area is that no provisions were made to convey storm water from subdivisions adjacent to the ACDC to the canal itself. This focus area was further subdivided into five sub-areas: 1) 59th Avenue and the ACDC, 2) 61st Avenue and Heard Road, 3) 63rd Avenue and Coral Gables Drive, 4) cul-de-sac at Maui Lane and the ACDC, and 5) Greenway Road and 70th Avenue.

The problem in sub-area one is that runoff exceeding the 10-year event is beyond the capacity of the storm drain systems. Excessive ponding occurs at the sag at 59th Avenue approximately 500 feet north of the ACDC. Runoff flows overland through a nursery on the west side of the street. This area is highly developed,

and the solution to this problem needs to be linear or nonstructural. The existing utilities in the area could be in conflict with any storm drain design. The goal of the selected alternative is to alleviate the flooding impact to the nursery and to ACDC recreational facilities that lie in the path of the overland flow.

The problem in sub-area two is the undersized catch basins and storm drain. Ponding is anticipated for most events and excessive ponding could result from larger magnitude flows. Flows exceeding the capacity of the sump will spill overland back to Hearn Road and then into the ACDC. The area is fully developed with no solution except linear or nonstructural. There could be utility conflicts in the area. The goal of the selected alternative is to alleviate potential flooding impacts to the homes adjacent to the sump.

The problem with sub-area three is that flows greater than the 10-year event would exceed the capacity of the storm drain system and excessive ponding occurs at the sag located at 63rd Avenue and Coral Gables Drive. The excess flow spills southeasterly within 63rd Avenue, or southwesterly through the recreational fields of Pioneer Elementary School. This area is also highly developed and an alternative solution needs to be linear or nonstructural. In consideration of Pioneer Elementary, a detention basin or excessive overland flows would not be desirable if they take away too much play area. The goal of the selected alternative is to alleviate flooding in this area and reduce the ponding.

The problem with sub-area four is that the capacity of the scupper and the sag at the cul-de-sac spill over the curb directly to the ACDC. The spillway is being eroded by runoff flowing parallel to it. The area is fully developed with no solutions except linear. The goal of the selected alternative is to minimize the erosion along the spillway.

The problem with sub-area five is that flows are concentrated at the intersection. The existing catch basins are undersized and seem to be filled with sediment. The flow at this location exceeds the capacity of the catch basins and flows overland to the ACDC. There is a large storm drain in the area, but it has insufficient capacity. The area is highly developed leaving little opportunity for solutions except linear and nonstructural. Utility conflicts will be likely with any storm drain design. The City of Glendale is planning on improving 67th Avenue from Union Hills Drive to the ACDC, which should reduce the runoff reaching Greenway Road and 70th Avenue. The goal of the selected alternative is to alleviate the flooding of the mobile homes adjacent to the sumped area. The City of Glendale is planning to improve Greenway Road from 67th Avenue to 71st Avenue.

Table AA-7 shows the potential alternative solutions brought to the Level II analysis located within the ACDC Region.

TABLE AA-7
ACDC Region – Elements of Level II Alternatives

Focus Area	Element	Element Description
1-1	B	Purchase the Nursery property and make it a parking lot for Thunderbird Park.
	C	Purchase a drainage easement thru the Nursery and construct a drainage path for excess flow to the east.
	D	Re-grade Eugie Ave. to carry flow south thru an easement in the parking lot.
1-2	C	Purchase a 20-foot easement through the residences to provide an outfall to the ACDC.
	D	Re-grade the street to remove sump and carry the flow north to the ACDC.
1-3	A	Replace storm drain with larger storm drain that minimizes the flooding.
	B	Construct an overland flow channel with a collection system that will remove the flooding from the street.
1-4	B	Armor the areas adjacent to the spillway, mitigate the erosion, and increase size of the scupper.
1-5	D	Perform a design analysis on 100-year flows and incorporate alternatives A, B, and C for this area.

5.10 ACDC Region Alternatives

The City of Glendale did not want the alternatives for the ACDC examined in the Level III analysis.

5.11 Miscellaneous Focus Areas

5.11.1 91st Avenue and Greenway Alignment Channel

The 91st Avenue and Greenway Alignment Channel is focus area 2 in **Figure AA-4**. There are no documented historical drainage problems for the Greenway Channel. However, there was documented flooding in the 91st Avenue channel segment in 1990. Improvements have been made to this channel since this flooding, but the contributing flows to the channel during a 100-year event might exceed the capacity of the channel. A hydraulic analysis will be performed in the Level III analysis to ensure the entire channel segment is adequate.

5.11.2 99th Avenue

When evaluating focus area 7, it was requested by the District that a hydraulic capacity analysis be performed on the channel in 99th Avenue in lieu of further evaluation of Bell Road. This hydraulic analysis will be performed on the channel to examine its performance during a 100-year rainfall event. The results of this hydraulic analysis will be presented in the Level III Report. There are no historical drainage problems reported for the channel, but the 100-year flows contributing to the channel are greater than the channel's capacity.

5.11.3 Grand Avenue

Grand Avenue is focus area 6 in **Figure AA-4**. A hydraulic analysis will be performed on the channel on the north side of Grand Avenue to examine its performance during a 100-year rainfall event. The results of

the hydraulic analysis will be presented in the Level III Report. There are no historical drainage problems reported for the channel, but the contributing flows to the channel are greater than the channel's capacity.

5.11.4 Weir Wash

Weir Wash is focus area 10 in **Figure AA-4**. A hydraulic analysis will be performed on the channel that replaced Weir Wash. The channel's performance during a 100-year rainfall event is unknown. It is believed that the channel has enough capacity, but that has never been documented. The results of the hydraulic analysis will be presented in the Level III Report.

SECTION AA-6: COST ESTIMATES

The Level II cost estimates summary is presented in **Table AA-8** below. The detailed cost estimate for each Level II alternative is presented in **Appendix D**.

**TABLE AA-8
LEVEL II COST ESTIMATE SUMMARY**

Region	Alternative	Year 2001 Construction Cost
Northwest	1	\$39,300,000
Northwest	2	\$44,060,000
Northwest	3	\$36,900,000
Northwest	4	\$44,420,000
83 rd Avenue	1	\$8,100,000
83 rd Avenue	2	\$9,310,000
Pinnacle Peak Rd & 67 th Avenue	1	\$6,370,000
Pinnacle Peak Rd & 67 th Avenue	2	\$11,090,000
Pinnacle Peak Rd & 67 th Avenue	3	\$5,160,000
Pinnacle Peak Rd & 67 th Avenue	4	\$11,410,000
Rock Springs	1	\$1,900,000
Rock Springs	2	\$5,920,000
Rock Springs	3	\$1,380,000
Rock Springs	4	\$5,400,000

SECTION AA-7: EVALUATION CRITERIA

As part of the Level II Alternatives Evaluation meeting, the original evaluation criteria used in the *Glendale/Peoria Area Drainage Master Plan – Potential Alternatives – Volume PA* were reviewed as well as the summary of the public comments and the Level II cost estimates. The areas were then discussed individually with a decision on what alternatives would be examined in the Level III Report. The discussion and decisions are presented in the next section. The criteria taken from the potential alternative analysis are listed below:

Traditional Criteria

1. Implementation Cost – Construction Cost, Right-of-Way Cost
2. O & M cost – Initial and long term efforts and maintenance costs willing to be accepted by an organization capable of providing the maintenance needed
3. Safety – Safety in design elements. Need for Flood warning system
4. Impact on traffic during and after construction
5. Politically consistent with ordinances and promises
6. Sound Design – Design is based on tested and economical engineering practices

Sustainability Criteria

7. Aesthetics – Will the improvements blend in and even enhance the visual character of the area?
8. Environmental considerations – Visual, biological, cultural, ecological
9. Multi-Use opportunity – Is this going to be a useable amenity?
10. Neighborhood Acceptance – Does the neighborhood want this solution?

The cost estimates used in this analysis are shown in **Appendix D** and the public comments are summarized in **Appendix E**.

SECTION AA-8: EVALUATION OF ALTERNATIVES

The alternatives were evaluated based upon all the traditional and sustainability criteria listed in the previous section. Input from the public was strongly considered when selecting the alternatives and making adjustments or modifications to the alternatives. Multi-use opportunities were considered whenever applicable to the potential alternatives.

The environmental considerations, which include the visual, biological, cultural, and ecological factors, were also strongly considered in the selection of the recommended alternative. These environmental considerations are documented in the *Glendale/Peoria Area Drainage Master Plan – Data Collection – Environmental Overview – Volume DC-A; Ecological Assessment – Volume DC-B; Class I Cultural Resource Survey – Volume DC-C.*

8.1 Pinnacle Peak Road and 67th Avenue Region

Five alternatives were presented for this region. The first four alternatives included some kind of structural solution while the last alternative was a do-nothing option.

8.1.1 Eliminated Alternatives

Alternative 2 was not taken to the Level III analysis because the regional detention basin has an insignificant effect on reducing the downstream flows. The detention basin has a large cost with negligible improvements to drainage problems. Alternative 3 was not selected because the natural appearing channel's alignment conflicted with existing properties. Alternative 4 was not selected for the same reasons as Alternatives 2 and 3. Alternative 5 was not selected because it does not solve the existing drainage problems.

8.1.2 Recommended Alternative

Alternative 1 was brought to the Level III analysis. The proposed channel along the east side of 67th Avenue in this alternative is located in the City of Phoenix. Although the City of Phoenix has not been involved in this project, this alignment on the east side is preferred because there are many homes fronting 67th Avenue along the west side that require driveway access.

8.2 Northwest Region

Five alternatives were presented for this region. The first four alternatives included some kind of structural solution while the last alternative was a do nothing alternative.

8.2.1 Eliminated Alternatives

Alternative 1 was not taken to the Level III Analysis because the alignment for Alternatives 3 and 4 is more beneficial to the new alignment of Lake Pleasant Parkway. Alternative 2 was not taken to the Level III analysis for the same reason as Alternative 1. Also, the regional detention basin has little benefit for reducing the 100-year peak flow downstream due to the controlling local runoff contributions in the area. The cost of the detention basin was high with virtually no benefit in the 100-year storm. Alternative 4 was not carried to the Level III analysis because the insignificant benefit of the regional basin. Alternative 5 was not selected because the drainage problems of this rapidly developing area need to be solved.

8.2.2 Recommended Alternative

Alternative 3 was taken to the Level III analysis. However, two modifications were discussed for this alternative. The first modification was to put a small detention area near Pinnacle Peak Road and 91st

Avenue. This detention area would provide an adequate outlet to the channel along Pinnacle Peak Road and an outlet to the natural channel through the state land. The second modification was that the channel along Deer Valley Road be moved to follow the existing north-south alignment of Lake Pleasant Road between Deer Valley Road and Rose Garden Lane. This section of Lake Pleasant Road will be abandoned by the City of Peoria once the new parkway is constructed. The right-of-way will be available for a drainage channel. The channel will then turn 90 degrees and flow westerly along Rose Garden Lane to 107th Avenue. A culvert/energy dissipater will be placed under 107th Avenue and the channel will continue west along its original alignment.

8.3 Rock Springs Region

Five alternatives were presented for this region. The first four alternatives included some kind of structural solution while the last alternative was a do nothing alternative.

8.3.1 Eliminated Alternatives

Alternative 1 through 4 were not taken to the Level III analysis. These alternatives have a significant cost, and they benefit very few residences. A Detailed Floodplain Delineation Study was recently completed for Rock Springs Creek (**Reference 11**). This study identified a floodplain and floodway area along most of the wash as well as other special hazard zones.

8.3.2 Recommended Alternative

Alternative 5 was the selected alternative. However, a Level III analysis is not required because it is a non-structural solution.

8.4 83rd Avenue Region

Three alternatives were presented for this region. The first two alternatives included some kind of structural solution while the last alternative was a do nothing alternative.

8.4.1 Eliminated Alternatives

Alternative 2 was not selected because it has a higher cost than Alternative 1. There would also be maintenance problems in the upstream culvert due to sediment from the open channel, in addition to disrupting the neighborhood aesthetics of a continuous channel along 83rd Avenue. Alternative 3 was not selected because it does not solve flooding problems along 83rd Avenue.

8.4.2 Recommended Alternative

Alternative 1 was carried to the Level III analysis because the cost was less and it did not disrupt the continuity of the channel along 83rd Avenue. Modifications may be needed to the channel from 87th Avenue and Villa Del Sol to the northwest corner of the detention basin. If the equestrian trail right-of-way is wide enough to accommodate a wider channel on Pinnacle Peak Road, the northwest channel could be eliminated. If there is not enough right-of-way in the equestrian trail, the channel alignment will be changed so that it follows the roadway or alley located in the area.

The purchase of land for the detention basin is paramount for either Alternative 1 or 2. This land needs to be acquired to prevent it from other uses. The cost of the land also needs to be verified.

8.5 ACDC Region

The Alternatives examined in the Level II analysis will not be brought to the Level III analysis per the City of Glendale's request.

APPENDIX A. REFERENCES

A.1. Data Collection Summary

The following Table AA-9 summarizes the data collected as part of this study.

A.2. Reference Documents

- 1 Kaminski-Hubbard Engineering, Inc. *Arizona Canal Diversion Channel Area Drainage Master Study*, Volumes 1.2, 1.3, & 1.5, May 1995.
- 2 U.S. Army Corps of Engineers, *Gila River and Tributaries in Arizona and New Mexico – Flood Damage Report Storm and Flood of August 16-17, 1963*, June 1964.
- 3 Flood Control District of Maricopa County, *Flood Control Survey Report*, 1962.
- 4 Flood Control District of Maricopa County, *Comprehensive Flood Control Program Report*, 1963.
- 5 Greiner Engineering Sciences, Inc. *Bell Road Project Drainage Study – Volume IV – Selected Stormwater/Floodwater Management Plans*, October 1987.
- 6 Flood Control District of Maricopa County, *Hydrology for Beardsley Channel Extension*, December 1990.
- 7 Flood Control District of Maricopa County, *Sun City Area Hydrologic Study*, November 1997.
- 8 Flood Control District of Maricopa County, *91st Avenue Drain Hydrology Update*, October 1994.
- 9 Simons, Li & Associates, Inc. *Final Design Report Skunk Creek Channel Improvements*, June 1998.
- 10 Stantec Consulting, Inc., *Middle New River Watercourse Master Plan*, June 1999.

- 11 Stantec Consulting, Inc., *Floodplain and Floodway Delineation for Rock Springs Creek*, March 2000.
- 12 Cella Barr Associates Inc., *Trails Master Plan – City of Peoria*, January 1999.

TABLE AA-9
DATA COLLECTION SUMMARY

Data Number	Data Description	Prepared by	Date
1	Hydrology Update on Glendale-Peoria Area Drainage Master Study	Maximo R. De Vera (FCDMC)	Jan. 1993
2	Master Grading and Drainage Plan	Carter Associates, INC.	May 1989
3	Glendale-Peoria Area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
4	Concept/Routing study	Wood, Patel and Assoc. Inc.	March 1996
5	Orangewood Storm Drain Location Study	Wood, Patel and Assoc. Inc.	March 1996
6	Preliminary Drainage Report	Coe and Van Loo Consultants Inc.	April 1994
7	Glendale-Peoria-Sun City Drainage Area no.1	Hydrology Branch Engineering Div.	Jan. 1995
8	Drainage Report on Union Hills Dr.	Erikson and Salmon, Inc.	August 1987
9	Flood Damage Report on storm and flood of Aug. 16-17 1963	U.S. Army Corps of Engineers	June 1964
10	Cactus Road Storm Drain	Stanley Franzoy Corey	Nov. 1992
11	Westbrook Village East Drainage Study	Goldman, Toy and Assoc. Inc.	Oct. 1998
12	91st Ave. Drain Hydrology Update	Maximo R. De Vera (FCDMC)	Oct. 1994
13	Desert Amethyst Drainage Project - 60% Plans	Wood, Patel and Assoc. Inc.	May 1999
14	Glendale-Peoria-Sun City Drainage Area no. 2	Hydrology Branch Engineering Div.	Jan. 1995
15	Arrowhead Ranch - Specific Area Plan and Storm Drainage Plan	Dibble and Associates	April 1992
16	Storm Water Master Plan - City of Peoria	JM Montgomery Inc.	April 1985
17	Desert Amethyst Drainage Master Plan	Montgomery Watson	July 1997
18	Preliminary Drainage Report for Intersection Improvements	Hendrich, Eberhart and Assoc., Inc	August 1995
19	500' Swath/Intersection Drainage Plan	Kaminski Hubbard Engineering Co.	July 1993
20	Storm Water Management Plan	Camp Dresser and McKee Inc.	Jan. 1986
21	Glendale General Plan	City of Glendale	Sept. 1987
22	City of Peoria Master Plan of Storm Drainage - Executive Summary	J.M. Montgomery Inc.	April 1988
23	Storm Water Management Plan Capitol Improvement Sum.	Camp Dresser and McKee Inc.	Jan. 1986
24	Storm Drain along Cactus Road - Proposal	Steve Corrales Engineering Co.	Sept. 1990
25	Concept/Routing study (43rd to 99th Ave and Glendale to Olive Ave)	Wood, Patel and Assoc. Inc.	March 1996
26	Final Drainage Report for Eagle Canyon	American Engineering Co.	Jan. 1998
27	Lake Pleasant Road Corridor Study	Kirkham Michael Engineers	May 1999
28	Glendale-Peoria area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
29	Revisions to Final Drainage Report Deer Village Unit 1	Coe and Van Loo Consultants Inc.	March 1997
30	Silverton Beazer Homes HEC-RAS and HEC-FDA summary	Sage Engineering Corporation	August 1997
31	Fletcher Heights - Final Drainage Plan	CMX Group Inc.	June 1996
32	Deer Village Units 5&6 - Final Drainage Report	CVL Consultants, Inc	Dec. 1996
33	Dove Valley Ranch - Final Drainage Report Parcels 2,3,5	Neil/McGill Consultants, Inc.	Oct. 1998
34	Deer Village Final Drainage Report Units 1,2,3,4	CVL Consultants, Inc	Dec. 1996
35	Alta Vista Estates - Drainage Report, Units 3 and 4	CMX Group Inc.	Jan. 1998
36	Orangewood Alignment Concept/Routing Study	Wood, Patel and Assoc. Inc.	Nov. 1995
37	Addendum to Glendale-Peoria area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
38	Marinette heading canal Floodplain Removal	Coe and Van Loo Consultants Inc.	Sept. 1995
39	Gila River Basin New River and Phoenix City Streams	U.S. Army Corps of Engineers	1982
40	Final Drainage Report for Parkridge at 95th Ave and Beardsley	Coe and Van Loo Consultants Inc.	Jan. 1994
41	Marinette Heading Canal floodplain removal Request for revision	Coe and Van Loo Consultants Inc.	March 1995
42	Drainage Report For Alta Vista Estates, Units 1 and 2	CMX Group Inc.	June 1995
43	Ironwood Final Drainage Plan	CMX Group Inc.	Oct. 1998
44	Peoria Desert Lands Conservation Master Plan	Dames & Moore	Aug 1999
45	City of Peoria Parks Master Plan	Planners Ink	Feb 1996
46	Rivers Master Plan - Executive Summary	Cella Barr Associates Inc.	March 1999
47	Rivers Master Plan	Cella Barr Associates Inc.	Jan 1999
48	Trails Master Plan - Executive Summary	Cella Barr Associates Inc.	March 1999
49	Trails Master Plan	Cella Barr Associates Inc.	Jan 1999
50	Sun City Hydrologic Study	FCDMC	Nov. 1997
51	Silverton Drainage Report	Sage Engineering Corporation	Aug. 1997
52	Fletcher Heights - Preliminary Drainage Plan, Phase III	CMX Group Inc.	June 1996
53	Deer Valley Estates Drainage Plan	CMX Group Inc.	Aug. 1996
54	Fletcher Heights - Preliminary Drainage Plan, Phase II	CMX Group Inc.	July 1996
55	Fletcher Heights - Preliminary Drainage Plan Concept Overview	CMX Group Inc.	June 1993
56	Drainage Report for Calbrisa	CVL Consultants, Inc	July 1993
57	Drainage Report for Calle Lejos Estates	CMX Group Inc.	Nov. 1994
58	Drainage Report for Parcel XI at Arizona Traditions	CVL Consultants, Inc	Oct. 1998
59	Drainage Report for Parcel VIII, IX, and X at Arizona Traditions	CVL Consultants, Inc	June 1998
60	Fletcher Heights - Preliminary Drainage Plan, Phase I Volume I of 2	CMX Group Inc.	June 1996
61	Fletcher Heights - Phase III - Evaluation of Offsite Drainage	CMX Group Inc.	Sept. 1996
62	Drainage Report for La Caille	CMX Group Inc.	Dec 1994
63	Boardwalk/Peoria Units 1&2 Preliminary Drainage Report	Erie and Associates	April 1994
64	Deer Village Final Drainage Report Units 1,2,3,4 PLATE	CVL Consultants, Inc	Dec. 1996
65	Deer Village Final Drainage Report Units 1 Revisions to Final Drainage Report	CVL Consultants, Inc	Dec. 1996
66	Final Drainage Report for Pinnacle Ranch	American Engineering Co.	Oct. 1994

TABLE AA-9
DATA COLLECTION SUMMARY

Data Number	Data Description	Prepared by	Date
68	Arrowhead Cove & Arrowhead Business Park Preliminary Drainage Report	Erie and Associates	July 1993
69	Ventana Lakes Final Drainage Report	Collar, Williams & White Engineering	
70	Bell Road Project Drainage Study Volume IV	Greiner Engineering Sciences	Oct 1987
73	New River Watercourse Master Plan-Report & Tech. Notebook	Stantech (draft)	June, 1999
74	Patrick Ranch - Final Drainage Report	Sage Engineering Corporation	March, 1994
75	Hillcrest Ranch - Master Drainage Report	Wood Patel & Associates, Inc.	August, 1991
76	Hillcrest Ranch - Phase 2 Drainage Improvements	Wood Patel & Associates, Inc.	August, 1992
77	Final Drainage for Fletcher Hts Phase 2a	CMX Group Inc.	Dec. 1997
78	Drainage Report for Arrowhead Horizons	DEA	May 1995
79	Drainage Report for Boardwalk	DEA	June, 1995
80	91st Channel plans	Dibble and Associates	Dec. 1998
81	Union Hills paving plans	Carter Associates ,INC.	1990
82	Walgreen Plans	Pasterneck	
83	Bell Rd Plans		
84	Desert Amethyst Drainage Project - 95% Plans	Wood, Patel and Assoc. Inc.	May 1999
85	Westbrook Village East Drainage Study	IMC Consultants	May 1993
86	Smith's Drainage Report	CBA	March 1998
87	Drainage Report for Hunter Ridge	DEA	Aug 1995
90	Hydrologic Analysis of Beardsley Channel extension project	FCDMC	Dec. 1990
91	Master Drainage Report for Terramar	CVL Consultants, Inc	Oct, 1996
93	West Valley Recreation Corridor Pasajes Del Rio Design Concept Report	Carter -Burgess	June, 1999
94	City of Glendale - Existing Structures Map	Unknown	Current
95	City of Glendale - General Plan	Glendale Planning Department	Current
96	87th Avenue Design Concept Report	Kimley-Horn and Assoc.	Oct 1999
97	Preliminary Drainage Report for Intersection Improvements		
98	Skunk Creek Channel Improvements - FEMA forms	FCDMC	Aug 1993
99	Final Design Report for Skunk Creek Channel Improvements	Simons, Li & Associates	June, 1998
100	ACDC / ADMS PHASE I - VOLUME 1.2	Kaminski Hubbard Engineering Co.	May 1995
101	ACDC / ADMS PHASE I - VOLUME 1.3	Kaminski Hubbard Engineering Co.	Feb. 1995
102	ACDC / ADMS PHASE I - VOLUME 1.5	Kaminski Hubbard Engineering Co.	March 1995
103	Hydrology Worksheets for Area between Skunk Creek and the ACDC	Kaminski Hubbard Engineering Co.	March 1995
104	Skunk Creek Hydrology Report	Coe and Van Loo Consultants Inc.	Nov. 1990
105	Drainage Infrastructure Report for Terramar	Coe and Van Loo Consultants Inc.	Nov. 1996
106	Area Drainage Master Study Little Deer Valley	Collar, Williams & White Engineering	July 1990
107	Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects	FCDMC	Dec. 1992
108	Final Drainage Report for Hunter Field Estates	Tobar	Feb 2000
109	Preliminary Drainage Report for Summit at Sunrise Mountain	American Engineering Co.	5-2000
110	Durango ADMP -Potential Alternatives Submittal	Dibble and Associates	3-31-2000
111	Lake Pleasant Parkway Detention Basin	Goldman, Toy and Assoc. Inc.	1-2000
112	Lake Pleasant Parkway Detention Basin - Plans and bid Documents	Goldman, Toy and Assoc. Inc.	1-2000
113	Lake Pleasant Parkway Detention Basin - Addendum #5	Goldman, Toy and Assoc. Inc.	1-2000
114	Floodplain and Floodway Delineation for Rock Springs Creek	Stantec Consulting	March 2000
115	Camino A Lago Specific Plan	Urban Lands Development	Feb 1997
116	87th Avenue Final Candidate Assesment Report	DMJM	Feb 1998
117	Pinnacle Peak Road Final Candidate Assesment Report	Entranco	Oct 1999
150	101 As-Built Information	Franzoy-Corey	1991
200	Kaminski Hubbard Drainage Basins	Kaminski Hubbard Engineering Co.	
201	MAG Landuse	FCDMC	
202	SOILS	FCDMC	
203	USGS Mapping	USGS	
204	1999 Aerials	FCDMC	
300	Peoria Zoning Map	City of Peoria	12-06-99

APPENDIX B. FLOW SUMMARY

TABLE HY-1
SUMMARY OF HEC-1 FLOWS

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
N21K	590	384	247	606	280	0.23
N21KI*	140	139	138	141	139	0.23
DN21KL	449	244	108	466	141	0.23
N21KI	164	98	47	169	61	0.23
DN21KO	285	146	61	297	80	0.23
RN21KS	207	89	43	182	43	0.23
N21I	223	135	51	369	77	0.28
LN21ID	81	31	44	44	38	0.28
LN21I	223	135	51	369	77	0.28
CN21I*	428	220	73	547	92	0.5
N21J	565	375	234	585	267	0.23
LN21JD(1)	*	*	*	108	149	0.23
LN21J(1)	*	*	*	585	267	0.23
DR21K*	140	139	138	141	139	0.23
LN21K	0	0	0	18	0	0.23
DRN21K	164	98	47	169	61	0.23
RN21KE	145	69	30	128	30	0.23
CN21J	648	416	237	680	283	0.46
N21JI	200	129	73	210	87	0.46
DN21JO	448	288	164	470	196	0.46
RN21JS	404	221	144	366	129	0.46
N21Z	249	173	108	227	96	0.11
LN21ZD	155	108	108	152	96	0.11
LN21Z	249	173	97	227	88	0.11
CN21Z	568	349	206	536	195	0.57
N21ZI	45	3	0	40	0	0.57
DN21ZO	522	347	206	496	195	0.57
N21ZI*	164	5	0	154	0	0.57
DN21Z*	376	342	206	379	195	0.57
RN21ZW	348	300	190	339	160	0.57
N11P	704	400	171	745	220	0.38
LN11PD(1)	*	*	*	261	212	0.38
LN11P(1)	*	*	*	745	215	0.38
RN11P	547	301	134	537	119	0.38
N11L	363	205	75	66	26	0.29
CN11L	709	466	164	537	120	0.68
N11LI	679	436	139	479	96	0.68
DN11L	30	30	25	30	24	0.68
RN11LE	30	27	24	27	16	0.68

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
CN21I	678	498	208	757	218	0.85
RN21I	663	446	177	706	189	0.85
N22B	455	317	211	452	213	0.19
N22BI	410	285	190	407	192	0.19
DN22B	46	32	21	45	21	0.19
RN22BE	24	16	9	24	10	0.19
N21F	158	113	74	158	74	0.1
CN21F	771	555	208	829	234	1.05
RN21F	693	522	198	748	220	1.05
N21G	121	87	60	122	60	0.06
DR21Z*	164	5	0	154	0	0.57
RN21ZS	124	2	0	101	0	0.57
CN21G	194	87	60	170	60	0.06
N21GI	105	1	0	80	0	0.06
DN21GO	89	86	60	89	60	0.06
RN21GS	89	75	56	89	52	0.06
N21E	93	66	45	95	46	0.06
LN21ED(1)	*	*	*	22	25	0.06
LN21E(1)	*	*	*	95	46	0.06
CN21E	823	643	248	888	276	1.18
RN21E	808	598	236	859	262	1.18
N21D	152	106	84	124	63	0.05
LN21DD	152	106	84	124	63	0.05
LN21D	126	52	0	101	0	0.05
N22BIX	410	285	190	407	192	0.19
RN22BS	385	276	177	372	169	0.19
N22A	368	257	182	352	172	0.18
CN22A	728	501	343	705	329	0.37
N22AI	109	75	51	106	49	0.37
DN22A	619	426	291	600	280	0.37
RN22AE	568	367	270	510	238	0.37
CN21D	1122	924	364	1234	402	1.6
N21DI	168	139	55	185	60	1.6
DN21D	954	785	309	1049	342	1.6
RN21DS	915	686	298	958	308	1.6
N21C	522	363	222	521	227	0.39
LN21CD	81	6	102	505	227	0.39
LN21C	522	363	222	521	186	0.39
CN21C	1069	845	365	1151	385	1.99
RN21C	1068	844	365	1151	385	1.99
N24Q	100	71	47	107	56	0.04
LN24QD(1)	*	*	*	107	56	0.04
LN24Q(1)	*	*	*	86	0	0.04
RN24Q	66	39	33	27	0	0.04
N24R	97	70	52	99	55	0.03

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LN24RD(1)	*	*	*	99	55	0.03
LN24R(1)	*	*	*	83	0	0.03
RN24R	75	47	44	33	0	0.03
N24O	374	256	145	398	178	0.16
LN240D(1)	*	*	*	398	178	0.16
LN240(1)	*	*	*	349	0	0.16
CN24O	401	287	162	350	0	0.22
RN24O	380	253	152	202	0	0.22
N24S	147	105	79	153	86	0.05
LN24SD(1)	*	*	*	147	86	0.05
LN24S(1)	*	*	*	153	0	0.05
RN24S	93	58	50	41	0	0.05
N24T	50	35	26	52	29	0.02
LN24TD(1)	*	*	*	43	29	0.02
LN24T(1)	*	*	*	52	13	0.02
RN24T	37	22	19	22	4	0.02
N24P	297	199	119	315	147	0.12
LN24PD(1)	*	*	*	313	147	0.12
LN24P(1)	*	*	*	284	0	0.12
CN24P	615	413	227	328	4	0.41
RN24P	614	411	226	327	4	0.41
N24U	333	238	166	349	186	0.11
LN24UD(1)	*	*	*	330	186	0.11
LN24U(1)	*	*	*	349	0	0.11
RN24U	293	171	139	139	0	0.11
CN24U*	883	577	354	456	4	0.52
RN24U*	849	524	332	382	3	0.52
N24V	116	80	49	124	59	0.05
LN24VD(1)	*	*	*	124	59	0.05
LN24V(1)	*	*	*	0	0	0.05
RN24V	74	43	34	0	0	0.05
CN24V*	848	538	332	382	3	0.57
RN24V*	811	510	315	335	2	0.57
N24M	504	336	173	527	212	0.25
LN24MD(1)	*	*	*	527	212	0.25
LN24M(1)	*	*	*	430	0	0.25
CN24M	996	685	366	442	2	0.82
RN24M	976	664	359	415	1	0.82
N24L	1077	766	514	1215	658	0.38
LN24LD(1)	*	*	*	1196	658	0.38
LN24L(1)	*	*	*	1185	0	0.38
RN24L	999	660	480	701	0	0.38
CN24I*	1211	975	376	438	1	1.2
RN24I*	1166	828	354	381	1	1.2
N24I	256	174	64	354	135	0.3

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LN24ID(1)	*	*	*	354	135	0.3
LN24I(1)	*	*	*	72	0	0.3
N24H	641	429	276	697	336	0.29
LN24HD(1)	*	*	*	685	336	0.29
LN24H(1)	*	*	*	662	45	0.29
N24N	214	140	67	301	134	0.13
LN24ND(1)	*	*	*	301	134	0.13
LN24N(1)	*	*	*	0	0	0.13
RN24N	117	103	59	0	0	0.13
N24J	101	69	25	123	24	0.12
LN24JD(1)	*	*	*	123	24	0.12
LN24J(1)	*	*	*	0	0	0.12
CN24J	202	155	83	0	0	0.25
RN24J	201	151	82	0	0	0.25
N24K	137	95	34	272	38	0.21
LN24KD(1)	*	*	*	272	38	0.21
LN24K(1)	*	*	*	0	0	0.21
CN24I	1510	1296	367	661	45	2.25
RN24I	1506	1282	366	428	3	2.25
DRN21J	200	129	73	210	87	0.46
RN21JE	165	91	65	147	55	0.46
CN24G*	1507	1348	360	507	26	2.71
RN24G*	1501	1344	337	443	17	2.71
N24G	503	341	135	560	126	0.44
LN24GD	55	35	35	400	126	0.44
LN24G	503	341	135	560	109	0.44
CN24G	1666	1521	363	723	33	3.15
DRN21Z	45	3	0	40	0	0.57
RN21ZE	13	0	0	11	0	0.57
CN24G+	1666	1521	363	723	33	3.15
RN24G	1658	1504	363	613	27	3.15
N24F	194	134	63	206	79	0.11
LN24FD(1)	*	*	*	98	77	0.11
LN24F(1)	*	*	*	206	77	0.11
CN24F	1670	1520	368	656	36	3.26
N24D	184	121	74	157	55	0.09
LN24DD(1)	*	*	*	157	55	0.09
LN24DX(1)	*	*	*	142	1	0.09
CN24D	1677	1533	374	675	36	3.34
LN24D	13	11	7	10	1	3.34
N21H	76	52	31	78	34	0.03
LN21HD(1)	*	*	*	7	12	0.03
LN21H(1)	*	*	*	78	34	0.03
DRN21G	105	1	0	80	0	0.06
RN21GE	83	1	0	47	0	0.06

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
CN21H	88	52	31	78	35	0.03
RN21H	55	36	22	56	24	0.03
N24E	24	16	6	40	15	0.02
LN24ED(1)	*	*	*	40	15	0.02
LN24E(1)	*	*	*	2	0	0.02
RN24E	22	14	4	1	0	0.02
CN24D*	55	52	22	56	24	3.4
N27F	649	423	258	696	320	0.28
LN27FD(1)	*	*	*	696	320	0.28
LN27F(1)	*	*	*	8	0	0.28
RN27F	621	382	241	6	0	0.28
N27G	485	317	166	530	218	0.26
LN27GD(1)	*	*	*	530	218	0.26
LN27G(1)	*	*	*	6	0	0.26
CN27G	1077	692	391	10	0	0.55
RN27G	1004	578	365	8	0	0.55
N27E	277	180	75	419	162	0.19
LN27ED(1)	*	*	*	419	162	0.19
LN27E(1)	*	*	*	0	0	0.19
RN27E	257	160	71	0	0	0.19
N27H	442	287	158	478	203	0.21
LN27HD(1)	*	*	*	478	203	0.21
LN27H(1)	*	*	*	0	0	0.21
RN27H	387	215	139	0	0	0.21
N27C	151	96	44	168	67	0.09
LN27CD(1)	*	*	*	168	67	0.09
LN27C(1)	*	*	*	146	0	0.09
CN27C	1376	987	413	84	0	1.03
RN27C	1339	944	400	66	0	1.03
N27I	404	279	171	427	203	0.17
LN27ID(1)	*	*	*	427	203	0.17
LN27I(1)	*	*	*	6	0	0.17
RN27I	338	188	138	3	0	0.17
N27B	104	69	28	120	45	0.08
LN27BD(1)	*	*	*	119	45	0.08
LN27B(1)	*	*	*	116	19	0.08
N27J	495	355	225	516	256	0.19
LN27JD(1)	*	*	*	483	256	0.19
LN27J(1)	*	*	*	516	2	0.19
N27JI	186	108	51	199	0	0.19
DN27J	309	247	174	318	2	0.19
RN27JW	267	171	140	141	1	0.19
CN27B	1692	1341	515	225	19	1.46
RN27B	1598	1280	502	195	4	1.46
N27D	149	99	56	143	56	0.09

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LN27DD	149	99	56	143	56	0.09
LN27D	110	49	0	113	0	0.09
DRN27J	186	108	51	199	0	0.19
RN27JS	171	86	41	111	0	0.19
CN27D	192	85	41	195	0	0.28
N27DI	87	74	37	88	0	0.28
DN27DO	104	11	5	108	0	0.28
RN27DW	68	6	1	25	0	0.28
DRN27D	87	74	37	88	0	0.28
RN27DS	83	47	25	45	0	0.28
N27K	588	428	157	702	203	0.63
LN27KD(1)	*	*	*	702	203	0.63
LN27K(1)	*	*	*	500	0	0.63
RN27K	571	401	155	372	0	0.63
N27L	700	482	230	794	302	0.47
LN27LD(1)	*	*	*	794	302	0.47
LN27L(1)	*	*	*	642	0	0.47
CN27L	960	760	261	439	0	1.09
RN27L	959	757	260	435	0	1.09
N25S	79	55	43	83	47	0.03
RN25S	75	47	40	75	40	0.03
CN25O*	976	773	263	436	32	1.12
RN25O*	969	754	261	425	24	1.12
N25O	252	162	97	237	93	0.13
LN25OD	245	162	97	237	93	0.13
LN25O	244	135	21	224	28	0.13
CN25O	1015	813	267	426	25	1.25
RN25O	1003	774	254	410	18	1.25
CN27*	1995	1873	516	427	15	2.99
N27	223	139	56	258	85	0.28
LN27DX(1)	*	*	*	258	85	0.28
LN27(1)	*	*	*	17	0	0.28
N27A	152	104	44	180	71	0.11
LN27AD(1)	*	*	*	180	71	0.11
LN27A(1)	*	*	*	150	7	0.11
N26B	308	206	109	278	106	0.22
LN26BD	308	206	109	278	106	0.22
LN26B	196	65	0	193	0	0.22
CN27	2102	2071	528	520	15	3.62
RN27	2077	1991	371	478	12	3.62
N26	76	50	24	96	42	0.04
LN26D(1)	*	*	*	96	42	0.04
LN26(1)	*	*	*	18	0	0.04
N26A	428	289	134	477	178	0.35
LN26AD	428	289	134	467	178	0.35

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LN26A	375	170	12	471	88	0.35
CN26*	2210	2108	369	542	12	4.01
N25R	288	205	159	312	179	0.09
RN25R	275	180	151	286	162	0.09
N25Q	87	60	47	93	53	0.03
RN25Q	82	53	45	83	47	0.03
N25P	497	353	260	525	298	0.17
LN25PD(1)	*	*	*	147	173	0.17
LN25P(1)	*	*	*	525	298	0.17
RN25P	469	290	239	477	247	0.17
N25M	529	355	241	559	268	0.24
LN25MD	529	355	241	553	268	0.24
LN25M	478	270	10	535	53	0.24
CN25M	1243	703	426	1313	438	0.53
N25MI	1062	633	398	1116	407	0.53
DN25M	181	70	28	196	31	0.53
RN25MW	126	47	18	112	8	0.53
N25N	48	33	20	48	20	0.03
LN25ND	48	33	20	48	20	0.03
LN25N	33	15	0	33	0	0.03
RN25N	27	12	0	23	0	0.03
CX3	148	51	18	127	8	0.55
X3I	81	28	9	70	4	0.55
DX3O	67	23	8	57	4	0.55
RX3W	41	10	3	28	2	0.55
CN26	2207	2108	368	541	13	4.56
RN26	2099	1957	342	505	11	4.56
N25L	126	85	49	121	48	0.06
LN25LD(1)	*	*	*	5	10	0.06
LN25L(1)	*	*	*	121	48	0.06
N25LI	68	44	25	65	25	0.06
DN25L	58	41	23	56	23	0.06
RN25LW	53	34	21	47	18	0.06
N25K	206	142	89	210	94	0.09
LN25KD(1)	*	*	*	2	5	0.09
LN25K(1)	*	*	*	210	94	0.09
CN25K	209	144	89	217	94	0.15
N25KI	179	114	59	187	64	0.15
DN25K	30	30	30	30	30	0.15
RN25KW	30	30	30	30	29	0.15
N25J	190	123	56	206	78	0.1
LN25JD(1)	*	*	*	2	6	0.1
LN25J(1)	*	*	*	206	78	0.1
CN25J	2110	1990	346	508	46	4.81
RN25J	2027	1832	332	489	33	4.81

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
N25G	110	73	37	119	46	0.06
DRN25K	179	114	59	187	64	0.15
RN25KS	133	54	34	108	26	0.15
CN25G	155	75	42	131	47	0.21
RN25G	125	49	35	96	29	0.21
N25I	201	131	58	228	82	0.12
CN25I	2028	1861	340	535	47	4.99
RN25I	1970	1787	325	524	46	4.99
N25E	244	165	71	288	53	0.27
LN25ED(1)	*	*	*	288	53	0.27
LN25E(1)	*	*	*	280	28	0.27
DRN25M	1062	633	398	1116	407	0.53
RN25MS	844	497	381	776	321	0.53
DRX3	81	28	9	70	4	0.55
RX3S	61	18	2	48	2	0.55
CN25E	951	651	394	935	320	0.82
N25EI	40	40	40	40	40	0.82
DN25E	911	611	354	895	252	0.82
RN25EW	853	548	322	774	208	0.82
N25F	187	127	65	204	85	0.09
DRN25L	68	44	25	65	25	0.06
RN25LS	44	24	19	35	15	0.06
CN25F	860	591	331	803	238	0.97
RN25F	801	533	313	695	197	0.97
N25D	435	291	160	453	181	0.2
DRN25E	40	40	40	40	40	0.82
RN25ES	40	40	40	40	40	0.82
CN25D	453	309	169	462	184	0.2
N25DI	247	162	91	253	99	0.2
DN25D	206	147	78	210	85	0.2
RN25DW	183	122	73	174	72	0.2
N25C	262	181	79	294	106	0.17
CN25C	410	283	148	433	169	0.37
N25CI	154	106	55	162	63	0.37
DN25C	257	177	93	271	106	0.37
RN25CW	252	174	92	266	105	0.37
N25B	140	97	41	154	52	0.11
CN25B	828	654	338	792	264	1.45
N25BI	310	244	126	297	99	1.45
DN25B	517	409	212	495	165	1.45
RN25BW	509	390	203	475	157	1.45
N25A	117	82	33	135	48	0.09
CN25A	532	427	212	519	180	1.55
N25AI	355	284	151	346	132	1.55
DN25A	178	143	62	173	49	1.55

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
N25	187	121	34	281	48	0.24
LN25D(1)	*	*	*	281	48	0.24
LN25(1)	*	*	*	188	0	0.24
N25H	72	50	19	86	29	0.07
CN25	1981	1931	308	507	66	6.85
RN25	1864	1793	283	464	60	6.85
N24B	129	88	47	136	52	0.07
DRN25D	247	162	91	253	99	0.2
RN25DS	205	132	85	183	80	0.2
CN24B	269	186	117	260	115	0.27
RN24B	266	182	115	257	112	0.27
DRN25C	154	106	55	162	63	0.37
RN25CS	149	100	54	155	60	0.37
CN24B*	393	280	157	393	161	0.64
N24BI	0	0	0	0	0	0.64
DN24B*	393	279	157	393	161	0.64
RN24BW	390	272	149	385	156	0.64
DRN25B	310	244	126	297	99	1.45
RN25BS	305	235	122	287	93	1.45
CN24C*	516	453	194	509	185	2.09
RN24C*	513	449	194	506	184	2.09
DRN25A	355	284	151	346	132	1.55
RN25AS	354	280	149	341	129	1.55
N24C	404	268	169	409	170	0.19
CN24C	782	750	301	792	295	3.73
RN24C	774	722	300	773	293	3.73
N24	153	97	42	280	144	0.11
N24A	356	243	141	387	168	0.24
LN24AD	337	199	141	387	168	0.24
LN24A	356	243	102	378	81	0.24
DRN24B	0	0	0	0	0	0.64
RN24BS	0	0	0	0	0	0.64
A21A	236	169	126	236	126	0.08
RA21A	213	140	113	213	113	0.08
X30	192	140	100	192	100	0.72
X30I	29	29	29	29	29	0.72
DX30	164	112	72	164	72	0.72
RX30W	117	75	42	117	42	0.72
CN24	2138	2263	315	1047	305	10.6
RN24	2087	2166	308	1018	274	10.6
DRX30	29	29	29	29	29	0.72
RX30S	26	25	24	26	24	0.72
N23A	1012	690	423	1021	435	0.49
LN23AD	614	308	423	623	435	0.49
LN23A	1012	690	386	1021	394	0.49

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
CN23A	843	703	287	852	280	1.13
N23AI	202	25	71	204	70	1.13
DN23A	642	678	215	648	210	1.13
RN23AW	601	545	157	513	136	1.13
N23	390	154	120	448	133	0.39
DRN21D	168	139	55	185	60	1.6
RN21DE	155	117	43	159	53	1.6
CN23	2127	2341	375	1364	385	13.72
RN23	2034	2211	363	1311	356	13.72
A21C	143	101	73	143	73	0.05
A21CRR	62	43	27	62	27	0.05
RA21C	61	43	26	61	26	0.05
A21D	63	47	37	63	37	0.02
RA21D	61	42	35	61	35	0.02
A21E	197	146	114	197	114	0.06
CA21E	254	187	144	254	144	0.08
A21ERR	194	136	99	194	99	0.08
A21EI	58	41	30	58	30	0.08
DA21E	136	95	69	136	69	0.08
RA21ES	132	89	67	132	67	0.08
A21K	198	143	105	198	105	0.07
CA21K	344	228	167	344	167	0.2
A21KRR	297	197	132	297	132	0.2
A21L	64	46	33	64	33	0.03
CA21L	354	234	158	354	158	0.23
A21LRR	262	185	134	262	134	0.23
RA21L	260	181	133	260	133	0.23
A21M	19	14	9	19	9	0.02
A21MRR	0	0	0	0	0	0.02
RA21M	0	0	0	0	0	0.02
DA21EW	58	41	30	58	30	0.08
A21F	152	111	87	152	87	0.05
RA21F	151	110	87	151	87	0.05
RA21F	149	103	86	149	86	0.05
A21G	128	96	73	128	73	0.04
CA21G	330	230	181	330	181	0.16
A21GRR	290	201	156	290	156	0.16
A21H	24	18	14	24	14	0.01
CA21H	304	214	163	304	163	0.17
A21HRR	249	168	128	249	128	0.17
A21I	119	88	67	119	67	0.04
RA21I	114	85	64	114	64	0.04
A21J	333	239	181	333	181	0.11
CA21J	622	430	323	622	323	0.32
A21JRR	583	395	299	583	299	0.32

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA21J	562	395	286	562	286	0.32
A21N	733	515	394	733	394	0.26
CA21N	1154	875	581	1154	581	0.75
A21NRR	1110	557	383	1110	383	0.75
A21O	34	25	20	34	20	0.01
CA21O	1120	563	386	1120	386	0.76
A21ORR	886	556	381	886	381	0.76
A21U	357	253	179	357	179	0.14
A21UR	64	5	77	64	77	0.14
LA21U	357	253	179	357	179	0.14
CA21U	1021	643	429	1021	429	0.9
A21URR	546	446	312	546	312	0.9
DA21US	15	15	15	15	15	0.9
DA21U	531	431	297	531	297	0.9
N21A36	21	14	7	21	7	0.02
N21AP3	11	8	5	11	5	0.01
C21AP3	538	439	301	538	301	0.92
L21AP3	537	438	300	537	300	0.92
N21A25	11	8	6	11	6	0
R21A25	11	8	6	11	6	0
N21A24	10	8	5	10	5	0.02
N21A26	25	17	8	25	8	0.03
N21A27	2	1	0	2	0	0
C21A27	47	33	18	47	18	0.05
L21A27	33	15	2	33	2	0.05
N21A23	26	17	8	26	8	0.03
R21A23	25	17	8	25	8	0.03
N21A28	1	0	0	1	0	0.01
N21A29	13	9	4	13	4	0.02
C21A28	68	31	14	68	14	0.1
L2A281	58	17	6	58	6	0.1
L2A282	38	13	6	38	6	0.1
N21A32	2	1	0	2	0	0
C21A32	39	13	6	39	6	0.11
L2A283	39	12	5	39	5	0.11
N21A31	24	16	8	24	8	0.02
N21A33	35	24	11	35	11	0.04
C21A33	61	43	22	61	22	0.16
N21A22	8	6	5	8	5	0.01
DRN23A	202	25	71	204	70	1.13
RN23AS	160	9	48	160	48	1.13
C21A22	196	14	64	197	63	0.01
21A22I	194	11	61	194	60	0.01
D21A22	3	3	3	3	3	0.01
N21A30	25	17	8	25	8	0.02

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
N21AP1	9	7	4	9	4	0.02
C21AP1	94	66	36	94	36	0.21
L21AP1	56	35	23	56	23	0.21
N21AP2	21	14	7	21	7	0.01
C21AP2	58	39	25	58	25	0.22
L21AP2	58	39	25	58	25	0.22
N21A37	18	12	6	18	6	0.01
C21APA	574	477	314	574	314	1.16
N21A34	22	15	8	22	8	0.02
N21A35	19	13	6	19	6	0.01
N21AP5	13	9	5	13	5	0.01
L21AP5	1	1	1	1	1	0.01
N21AP4	40	28	18	40	18	0.03
C21APB	591	495	323	591	323	1.23
L21AP4	555	464	305	555	305	1.23
N21A39	8	6	5	8	5	0.01
DR2122	194	11	61	194	60	0.01
R21A22	172	11	54	172	54	0.01
C21A39	695	478	320	696	319	1.24
R21A39	694	478	319	694	318	1.24
N21A40	45	31	13	45	13	0.05
C21A40	701	486	321	702	320	1.29
N21A41	27	19	9	27	9	0.03
N21A42	21	14	7	21	7	0.02
N21A43	5	3	1	5	1	0
C21A42	709	495	323	709	322	1.34
L21A43	724	497	325	724	324	1.34
A21P	79	58	44	79	44	0.04
A21PRR	16	16	16	16	16	0.04
RA21P	16	16	16	16	16	0.04
A21V	116	87	67	116	67	0.04
A21VR	116	87	67	116	67	0.04
LA21V	0	0	0	0	0	0.04
A21Q	71	52	34	71	34	0.04
CA21Q	87	67	50	87	50	0.11
A21QRR	81	62	46	81	46	0.11
A21R	22	16	12	22	12	0.01
CA21R	95	72	52	95	52	0.12
A21RRR	91	68	49	91	49	0.12
A21S	37	27	20	37	20	0.01
CA21S	116	82	58	116	58	0.14
A21SRR	113	80	57	113	57	0.14
A21T	107	77	59	107	59	0.04
CA21T	187	130	88	187	88	0.18
A21TRR	20	16	16	20	16	0.18

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA21T	20	16	16	20	16	0.18
A21AE	156	118	92	156	92	0.05
A21AER	149	101	92	149	92	0.05
LA21AE	155	90	0	155	0	0.05
A21AF	12	9	6	12	6	0
A21AFR	12	9	6	12	6	0
LA21AF	6	2	0	6	0	0
A21X	41	30	18	41	18	0.02
A21XR	41	30	18	41	18	0.02
LA21X	0	0	0	0	0	0.02
A21W	31	22	13	31	13	0.02
A21WR	31	22	13	31	13	0.02
LA21W	0	0	0	0	0	0.02
CA21AE	171	101	16	171	16	0.27
A21Y	142	102	81	142	81	0.05
A21YR	142	102	81	142	81	0.05
LA21Y	130	69	0	130	0	0.05
A21Z	184	132	100	184	100	0.06
A21ZR	184	132	100	184	100	0.06
LA21Z	141	76	0	141	0	0.06
RA21Z	122	64	0	122	0	0.06
A21AB	118	87	72	118	72	0.04
A21ABR	118	87	72	118	72	0.04
LA21AB	95	49	0	95	0	0.04
CA21AB	286	141	0	286	0	0.15
RA21AB	242	133	0	242	0	0.15
A21AC	77	58	47	77	47	0.02
A21ACR	77	58	47	77	47	0.02
LA21AC	65	42	0	65	0	0.02
A21AA	37	28	22	37	22	0.01
A21AAR	33	24	22	33	22	0.01
LA21AA	37	23	5	37	5	0.01
A21AD	140	102	79	140	79	0.05
A21ADR	140	101	79	140	79	0.05
LA21AD	126	78	9	126	9	0.05
CA21AD	383	216	9	383	9	0.24
RA21AD	345	195	8	345	8	0.24
A21AEC	408	230	24	408	24	0.51
RA21AE	379	218	24	379	24	0.51
A21AG	95	71	54	95	54	0.03
A21AGR	94	71	54	94	54	0.03
LA21AG	87	34	0	87	0	0.03
CA21AG	401	229	24	401	24	0.54
RA21AG	386	225	23	386	23	0.54
A21AH	75	56	42	75	42	0.03

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
A21AHR	75	56	42	75	42	0.03
LA21AH	57	26	0	57	0	0.03
A21AI	21	15	11	21	11	0.01
A21AIR	21	15	11	21	11	0.01
LA21AI	16	7	0	16	0	0.01
A21AJ	28	20	17	28	17	0.01
A21AIR	28	20	17	28	17	0.01
LA21AI	8	2	0	8	0	0.01
CA21AJ	72	31	0	72	0	0.04
A21AK	141	105	81	141	81	0.04
A21AKR	141	105	81	141	81	0.04
LA21AK	106	50	0	106	0	0.04
DA21US	15	15	15	15	15	0.9
RA21US	15	15	15	15	15	0.9
N21A38	23	15	7	23	7	0.02
L21A38	17	12	1	17	1	0.02
R21A38	15	11	1	15	1	0.02
CN21B	444	274	37	444	37	0.65
RN21B	434	261	36	434	36	0.65
N21A44	38	27	17	38	17	0.03
L21A44	0	0	0	0	0	0.03
R21A44	0	0	0	0	0	0.03
N21A90	8	6	4	8	4	0.01
C21A43	790	620	334	788	334	2.03
R21A43	775	615	333	774	333	2.03
N21A19	9	6	3	9	3	0.01
N21A91	6	4	3	6	3	0
C21A91	777	619	335	777	335	2.04
R21A91	776	619	334	775	334	2.04
N21A4	12	8	4	12	4	0.01
21A4I	5	3	2	5	2	0.01
D21A4	7	5	3	7	3	0.01
N21A2	11	8	4	11	4	0.01
N21A3	17	12	6	17	6	0.02
C21A3	36	24	12	36	12	0.03
R21A3	34	23	12	34	12	0.03
N21A1	38	28	17	38	17	0.02
R21A1	37	28	16	37	16	0.02
N21A5	5	3	1	5	1	0.01
C21A5	76	53	28	76	28	0.07
R21A5	75	53	28	75	28	0.07
DR21A4	5	3	2	5	2	0.01
R21A4	5	3	2	5	2	0.01
N21A6	29	19	10	29	10	0.02
C21A6	33	22	11	33	11	0.02

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
R21A6	32	22	11	32	11	0.02
N21A7	19	13	6	19	6	0.01
R21A7	16	11	6	16	6	0.01
N21A8	0	0	0	0	0	0.01
C21A8	116	81	44	116	44	0.11
L21A8	3	3	1	3	1	0.11
R21A8	3	3	1	3	1	0.11
N21A9	33	22	11	33	11	0.03
R21A9	31	22	11	31	11	0.03
N21A10	60	40	20	60	20	0.05
N21A11	9	6	1	9	1	0.01
N21A12	12	8	4	12	4	0.01
C21A11	108	72	35	108	35	0.21
L21A11	78	27	17	78	17	0.21
L21A14	51	27	17	51	17	0.21
R21A11	50	27	17	50	17	0.21
N21A14	30	18	5	30	5	0.06
C21A14	76	42	22	76	22	0.27
N21A13	28	19	9	28	9	0.02
N21A15	17	11	5	17	5	0.01
C21A15	91	59	29	91	29	0.3
L21A15	68	39	20	68	20	0.3
N21A17	6	4	1	6	1	0.01
L21A17	5	3	1	5	1	0.01
C21A17	72	41	21	72	21	0.32
N21A16	22	15	7	22	7	0.02
L21A16	22	14	12	22	12	0.02
C21A16	84	53	33	84	33	0.34
R21A16	84	53	33	84	33	0.34
N21A20	2	1	0	2	0	0
C21A20	85	54	33	85	33	0.34
L21A20	85	54	33	85	33	0.34
N21A18	27	18	9	27	9	0.03
C21A18	94	58	37	94	37	0.37
R21A18	94	58	37	94	37	0.37
N21A21	28	20	13	28	13	0.02
L21A21	11	9	3	11	3	0.02
N21A92	5	4	3	5	3	0.01
CN21A	776	674	344	776	344	3.72
RN21A	773	671	344	774	344	3.72
N21	626	433	229	850	258	0.62
LN21DX(1)	*	*	*	34	89	0.62
LN21(1)	*	*	*	850	258	0.62
CN21	2955	3237	904	2977	990	15.37
A09U	454	321	207	483	246	0.17

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LA09UD(1)	*	*	*	174	209	0.17
LA09U(1)	*	*	*	483	246	0.17
A09UI	91	64	41	97	49	0.17
DA09U	364	257	166	386	197	0.17
RA09US	309	181	137	267	94	0.17
N11N	700	458	300	726	341	0.26
LN11ND(1)	*	*	*	7	18	0.26
LN11N(1)	*	*	*	726	341	0.26
N11NI	661	429	276	686	316	0.26
DN11N	39	29	23	40	25	0.26
RN11NW	32	21	19	28	17	0.26
N11O	119	79	42	127	54	0.05
LN110D(1)	*	*	*	125	54	0.05
LN110(1)	*	*	*	120	0	0.05
N11OI	12	8	4	12	0	0.05
DN11O	107	72	38	108	0	0.05
RN11OS	85	41	28	35	0	0.05
N11M	234	153	22	246	101	0.1
LN11MD(1)	*	*	*	242	101	0.1
LN11M(1)	*	*	*	232	0	0.1
CN11M	410	282	146	391	106	0.32
N11MI	102	70	36	98	26	0.32
DN11M	307	211	109	293	79	0.32
RN11MS	294	181	96	225	62	0.32
N11K	301	203	99	309	102	0.19
LN11KD	50	4	63	57	67	0.19
LN11K	301	203	99	309	102	0.19
DRN11N	661	429	276	686	316	0.26
RN11NS	546	347	228	538	240	0.26
CN11K	823	534	326	831	341	0.45
N11KI	797	531	323	804	338	0.45
DN11K	26	10	10	26	10	0.45
RN11KW	17	6	5	13	6	0.45
N11J	492	320	173	495	177	0.24
LN11JD	102	38	118	78	103	0.24
LN11J	492	320	173	495	177	0.24
CN11J	518	375	171	481	170	0.56
N11JI	30	30	26	30	26	0.56
DN11J	488	345	145	451	144	0.56
RN11JS	442	272	119	325	89	0.56
N11G	716	494	192	920	365	0.52
LN11GD(1)	*	*	*	920	365	0.52
LN11G(1)	*	*	*	772	0	0.52
CN11G	851	649	195	770	89	1.08
N11GI	0	0	0	0	0	1.08

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
DN11G	851	649	195	770	65	1.08
RN11GS	779	567	188	575	57	1.08
N11F	452	305	137	534	229	0.24
LN11FD(1)	*	*	*	534	229	0.24
LN11F(1)	*	*	*	467	0	0.24
CN11F	792	631	185	605	57	1.33
RN11F	782	602	176	546	42	1.33
N11C	398	269	148	397	148	0.25
LN11CD	398	269	148	397	148	0.25
LN11C	339	178	9	340	5	0.25
CN11C	825	678	174	575	41	1.58
N11CWI	75	46	1	29	0	1.58
DN11CW	750	632	151	546	38	1.58
N11CEI	26	22	11	20	8	1.58
DN11CE	724	610	140	526	30	1.58
DRN11C	75	46	1	29	0	1.58
LN11CW	3	2	0	1	0	1.58
DR11C*	26	22	11	20	8	1.58
LN11CE	4	4	4	4	3	1.58
CN11C*	729	614	143	529	33	1.58
DRN11K	797	531	323	804	338	0.45
RN11KS	635	373	254	567	225	0.45
X5I	585	329	216	517	189	0.45
DX5	50	44	38	50	36	0.45
RX5W	50	43	37	49	35	0.45
N11H	603	411	166	740	296	0.44
LN11HD(1)	*	*	*	740	296	0.44
LN11H(1)	*	*	*	622	0	0.44
CN11H	518	407	131	427	35	0.89
RN11HW	442	329	117	290	26	0.89
N11D	662	446	225	533	158	0.51
LN11DD	662	446	225	533	158	0.51
LN11D	420	124	0	392	0	0.51
LN11D*	642	362	117	492	26	1.4
DRX5	585	329	216	517	189	0.45
RX5S	494	266	165	415	135	0.45
N11I	1112	813	443	1106	444	0.62
DRN11L	679	436	139	479	96	0.68
RN11LS	588	332	117	342	66	0.68
DRN22A	109	75	51	106	49	0.37
RN22AW	100	66	48	90	43	0.37
CN11I	1071	866	441	1105	442	1.3
N11II	489	433	192	486	194	1.3
DN11I	489	433	192	486	194	1.3
RN11IS	478	414	190	450	179	1.3

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
DRN11I	489	433	192	486	194	1.3
RN11IW	478	401	186	436	168	1.3
CX50	943	807	371	878	341	1.3
LX50	902	755	344	825	320	1.3
DX50I	651	552	274	599	258	1.3
DX50	251	204	70	226	63	1.3
RX50E	250	180	68	205	50	1.3
N22	579	403	244	720	343	0.47
LN22D	579	403	244	720	343	0.47
LN22	483	287	23	606	42	0.47
CN22	638	455	67	660	50	1.77
N22I	500	455	61	500	45	1.77
DN22	138	5	0	160	0	1.77
RN22W	89	1	0	76	0	1.77
DRX50I	651	552	274	599	258	1.3
RX50W	650	520	271	568	244	1.3
N11E	762	522	301	762	301	0.49
LN11ED	762	522	301	762	301	0.49
LN11E	596	307	0	596	0	0.49
CN11E	978	742	271	912	244	1.79
N11EI	500	500	257	500	232	1.79
DN11E	478	242	0	412	0	1.79
RN11EW	419	164	0	322	0	1.79
CX1	617	399	165	541	135	2.24
X1I	613	397	56	538	58	2.24
DX1	3	2	0	3	0	2.24
RX1W	1	1	0	1	0	2.24
CN11D	1193	947	144	885	40	2.97
RWBW1	1077	901	121	803	32	2.97
WBW	831	670	432	831	432	1
CWBW	1612	1426	334	1172	334	3.97
RBWB	25	25	24	25	23	3.97
RWBW2	25	25	24	25	23	3.97
DRN11E	500	500	257	500	232	1.79
R-WBE1	502	502	257	509	232	1.79
WB1	285	209	168	285	168	0.12
CPWB1	604	558	276	611	255	1.91
R-R3	586	542	273	575	246	1.91
WB2	156	116	93	156	93	0.1
CPWB2	700	620	319	684	306	2.01
R-4-5	686	621	306	683	282	2.01
WB3	35	27	21	35	21	0.01
CPWB3	689	623	307	686	283	2.02
R-6	686	619	306	682	282	2.02
DRN22	500	455	61	500	45	1.77

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
WB4	161	115	93	161	93	0.06
CPWB4	519	462	67	533	67	1.83
R-R1	526	448	32	545	25	1.83
WB5	178	129	103	178	103	0.08
CPWB5	555	459	88	596	88	1.91
R-R2	361	204	18	371	18	1.91
CPR6	852	637	306	886	282	3.93
RCR26	807	625	288	840	272	3.93
WB7	97	73	60	97	60	0.03
CR6W7	808	631	290	841	273	3.97
R-R7	808	631	289	840	273	3.97
WB6	178	132	107	178	107	0.08
R-R8	21	20	17	21	17	0.08
C7R8	824	651	304	857	288	4.05
RC78	819	648	303	847	286	4.05
WB8	103	77	63	103	63	0.03
CP-678	820	653	304	848	287	4.08
WB10	139	100	79	139	79	0.06
R-R9	24	21	19	24	19	0.06
WBEOT	837	673	317	866	300	4.14
TONRI	100	100	98	100	97	4.14
DVNR	737	573	220	766	203	4.14
DCLUB	156	117	33	163	29	4.14
CCLUB	581	456	187	603	174	4.14
RR287	580	455	186	602	174	4.14
DV87SI	162	122	34	169	30	4.14
DV87S	418	334	152	433	143	4.14
RR289	416	333	151	430	143	4.14
DV89I	135	94	5	143	1	4.14
DS89	280	239	146	288	142	4.14
TODET	279	239	146	286	141	4.14
DV91I	160	124	41	167	37	4.14
DV91	118	114	105	119	104	4.14
WB9	627	451	364	627	364	0.28
R-R10	331	40	28	331	28	0.28
DRIX1	613	397	56	538	58	2.24
RX1S	567	340	47	371	39	2.24
CN11B	467	497	166	414	165	6.49
RCP91	466	497	166	414	164	6.49
SB-G4a	142	103	78	142	78	0.06
DR91	160	124	41	167	37	4.14
R2DET	160	124	41	167	37	4.14
CPDET	507	605	169	486	174	10.63
S-DET	328	338	151	324	152	10.63
RDET	327	338	151	323	152	10.63

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RN11BS	326	338	151	321	151	10.63
N11	1231	947	540	1303	625	0.9
LN11DX(1)	*	*	*	1265	625	0.9
LN11(1)	*	*	*	1303	423	0.9
DRV87	162	122	34	169	30	4.14
RDV87S	161	121	34	168	30	4.14
R-G1	159	120	32	167	29	4.14
DX55I	142	120	32	142	29	4.14
DX55	19	0	0	25	0	4.14
DX56I	15	0	0	20	0	4.14
DX56	4	0	0	5	0	4.14
DX56W	1	0	0	1	0	4.14
DRV89	135	94	5	143	1	4.14
RDV89S	113	83	1	116	0	4.14
RDV89E	96	77	1	99	0	4.14
CN11	1231	1041	540	1805	388	11.53
RN11	909	944	450	945	325	11.53
N10	614	419	244	591	231	0.49
LN10D	*	*	*	127	158	0.49
LN10	*	*	*	591	231	0.49
S10R	37	26	15	35	13	0.03
S10RI	24	16	9	22	8	0.03
DS10RO	13	9	6	13	5	0.03
RS10RS	9	6	4	8	4	0.03
CN10	1268	1320	586	1278	406	12.05
N10I	30	1	1	33	1	12.05
DN10	1238	1320	586	1249	405	12.05
RN10E	1234	1303	583	1236	394	12.05
DR56	15	0	0	20	0	4.14
RDR56	3	0	0	5	0	4.14
N09	1068	772	492	1054	486	0.65
LN09D(1)	*	*	*	23	15	0.65
LN09(1)	*	*	*	1054	486	0.65
CN09*	1742	1864	804	1637	471	12.7
CN21	2955	3237	904	2977	990	15.37
RN21	2903	3214	875	2948	981	15.37
DRTONR	100	100	98	100	97	4.14
N20	472	317	191	565	250	0.36
LN20D(1)	*	*	*	332	250	0.36
LN20(1)	*	*	*	565	249	0.36
CN20	3017	3343	965	3113	1082	15.73
RN20	2988	3332	962	3091	1074	15.73
N12	475	319	194	412	188	0.51
LN12D	16	8	30	16	39	0.51
LN12	475	319	194	412	188	0.51

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
N13	184	146	111	194	119	0.5
LN13D(1)	*	*	*	86	96	0.5
LN13(1)	*	*	*	194	119	0.5
CN12	3239	3528	1064	3376	1199	16.73
RN12	3221	3516	1060	3275	1172	16.73
CN09+	3331	3942	1166	3468	1293	26.16
RN09*	3320	3933	1164	3464	1285	26.16
N19E	726	539	231	913	261	0.7
LN19ED(1)	*	*	*	913	261	0.7
LN19E(1)	*	*	*	612	0	0.7
N19F	323	223	86	383	106	0.37
LN19FD(1)	*	*	*	383	106	0.37
LN19F(1)	*	*	*	270	0	0.37
CN19E	937	755	266	647	0	1.08
RN19E	853	630	253	561	0	1.08
N19D	575	397	214	710	297	0.39
LN19DD(1)	*	*	*	710	297	0.39
LN19D(1)	*	*	*	538	0	0.39
CN19D	1029	792	285	576	0	1.47
RN19D	1013	753	278	453	0	1.47
N19C	1498	1159	581	1658	731	0.76
LN19CD(1)	*	*	*	28	51	0.76
LN19C(1)	*	*	*	1658	731	0.76
CN19C	1082	1184	387	1142	488	2.23
RN19C	1070	932	366	966	395	2.23
N19B	808	545	339	865	413	0.32
CN19B	1321	1190	429	1238	490	2.54
RN19B	1244	944	404	1047	394	2.54
N19A	903	634	339	903	339	0.47
A21B	42	30	15	42	15	0.02
RA21B	41	30	14	41	14	0.02
CN19A	1520	1171	547	1388	568	3.04
397RR	1259	1010	426	1171	441	3.04
398A	314	232	179	314	179	0.1
398B	197	145	98	197	98	0.14
C398B	1362	1100	462	1289	483	3.28
398BRR	1177	974	385	1107	395	3.28
398BI	392	325	128	369	132	3.28
D398B	784	649	257	738	263	3.28
398BSI	392	325	128	369	132	3.28
D398BE	392	325	128	369	132	3.28
398D	274	200	160	274	160	0.08
398E	336	249	189	336	189	0.11
398F	214	158	112	214	112	0.2
C398F	527	586	248	524	246	3.68

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
398FRR	307	267	106	259	103	3.68
D398BW	392	325	128	369	132	3.28
398C	84	63	42	84	42	0.09
C398C	449	369	152	430	157	3.27
398CRR	312	259	96	244	89	3.27
398BSW	392	325	128	369	132	3.28
398G	133	99	69	133	69	0.22
C398G	977	838	325	845	322	4.09
398GRR	824	730	268	638	243	4.09
RM399	820	728	267	635	242	4.09
N18	788	537	291	843	353	0.5
LN18D(1)	*	*	*	16	25	0.5
LN18(1)	*	*	*	843	353	0.5
CN18	820	735	267	635	248	4.59
RN18	808	729	263	627	233	4.59
N17	546	368	113	622	271	0.41
LN17D(1)	*	*	*	41	95	0.41
LN17(1)	*	*	*	622	271	0.41
CN17	822	754	270	859	352	5.01
RN17	804	740	270	851	350	5.01
N16	1155	895	442	1267	525	0.92
LN16D(1)	*	*	*	283	366	0.92
LN16(1)	*	*	*	1267	525	0.92
CN16	1483	1442	469	1602	660	5.93
RN16	1464	1353	463	1529	600	5.93
N15B	792	580	290	479	368	0.75
LN15BD(1)	*	*	*	271	302	0.75
LN15B(1)	*	*	*	479	368	0.75
RN15B	753	542	278	453	298	0.75
N15A	948	701	398	943	400	0.8
LN15AD	948	701	398	943	400	0.8
LN15A	697	460	9	676	6	0.8
CN15A	1287	991	278	735	296	1.54
RN15A	1247	927	247	712	258	1.54
N15	546	370	208	589	199	0.54
LN15D(1)	*	*	*	104	150	0.54
LN15(1)	*	*	*	589	199	0.54
CN15	2138	1867	718	1847	708	8.01
RN15	2124	1847	713	1797	667	8.01
N14A	458	309	177	466	156	0.44
LN14AD(1)	*	*	*	14	33	0.44
LN14A(1)	*	*	*	466	156	0.44
RN14A	454	300	176	451	153	0.44
N14	195	136	107	195	107	0.08
CN14	2347	2035	803	2120	775	8.53

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RN14	2299	1974	711	1905	710	8.53
N08B	750	541	298	737	253	0.7
LN08BD	750	541	298	737	253	0.7
LN08B	550	380	16	519	0	0.7
RN08B	389	295	5	220	0	0.7
N08A	702	499	293	835	366	0.74
LN08AD	702	499	293	835	366	0.74
LN08A	545	405	54	574	21	0.74
CN08A	604	545	27	570	10	1.43
RN08A	525	523	10	380	4	1.43
N08	918	678	385	843	366	0.79
LN08D(1)	*	*	*	295	335	0.79
LN08(1)	*	*	*	843	366	0.79
CN08	2592	2535	760	2275	785	10.75
RN08	2588	2526	759	2262	784	10.75
CN09	4662	5666	1570	4698	1737	36.91
RN09	4642	5635	1568	4674	1719	36.91
DRN10	30	1	1	33	1	12.05
RN10S	27	1	1	17	1	12.05
DX26I	21	0	0	11	0	12.05
DX26O	6	0	1	6	0	12.05
RX26S	5	0	0	4	0	12.05
DRX26	21	0	0	11	0	12.05
N07A	809	544	359	826	368	0.36
LN07AD	809	544	359	826	368	0.36
LN07A	723	357	0	716	0	0.36
CN07A	806	358	121	16	0	0.36
N07	962	702	369	1126	458	0.75
LN07D(1)	*	*	*	407	413	0.75
LN07(1)	*	*	*	1126	457	0.75
CN07	4658	5673	1572	4680	1716	38.15
RN07	4650	5657	1566	4623	1675	38.15
A11L	662	466	346	684	371	0.25
LA11LD(1)	*	*	*	663	371	0.25
LA11L(1)	*	*	*	677	67	0.25
RA11L	607	416	320	388	27	0.25
A11M	722	519	370	792	445	0.26
LA11MD(1)	*	*	*	239	310	0.26
LA11M(1)	*	*	*	792	445	0.26
RA11M	670	468	342	716	373	0.26
A11J	181	128	84	194	101	0.08
LA11JD(1)	*	*	*	194	101	0.08
LA11J(1)	*	*	*	171	2	0.08
A11N	210	150	95	240	124	0.08
LA11ND(1)	*	*	*	68	91	0.08

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LA11N(1)	*	*	*	240	124	0.08
RA11N	200	131	87	211	87	0.08
A11O	146	106	66	174	92	0.06
RA11O	136	88	59	153	75	0.06
CX21	334	218	145	363	161	0.14
RX21	290	165	123	272	107	0.14
A11K	777	530	315	860	438	0.3
LA11KD(1)	*	*	*	554	438	0.3
LA11K(1)	*	*	*	860	354	0.3
A11G	189	130	92	196	100	0.07
A11GI	0	0	0	0	0	0.07
DA11G	189	130	91	195	100	0.07
RA11GN	178	116	86	177	87	0.07
CA11K	1567	1235	673	1582	665	0.84
RA11K	1477	1055	631	1316	434	0.84
DRA11G	0	0	0	0	0	0.07
RA11GW	0	0	0	0	0	0.07
A11I	884	647	481	925	535	0.28
LA11ID(1)	*	*	*	880	535	0.28
LA11I(1)	*	*	*	925	4	0.28
CA11I	2019	1660	881	1538	424	1.37
RA11I	1957	1515	834	1338	262	1.37
A11E	542	354	173	599	231	0.3
A11F	898	584	323	989	136	0.47
LA11FD(1)	*	*	*	56	81	0.47
LA11F(1)	*	*	*	989	136	0.47
A11FI	1	1	1	1	0	0.47
DA11F	897	583	322	988	135	0.47
RA11FN	866	576	315	954	134	0.47
CA11E	2428	2210	917	1825	302	2.13
RA11E	2399	2029	901	1729	284	2.13
A11H	188	130	78	200	96	0.07
LA11HD(1)	*	*	*	42	62	0.07
LA11H(1)	*	*	*	200	96	0.07
RA11H	149	78	57	122	40	0.07
DRA09U	91	64	41	97	49	0.17
RA09UW	67	49	35	64	26	0.17
A09T	348	230	113	388	150	0.18
LA09TD(1)	*	*	*	379	150	0.18
LA09T(1)	*	*	*	370	19	0.18
CA09T	407	276	148	432	26	0.18
A09TI	197	66	0	222	0	0.18
DA09T	210	210	147	210	26	0.18
RA09TW	210	182	141	171	17	0.18
DRA11F	1	1	1	1	0	0.47

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA11FS	0	0	0	1	0	0.47
CX22	210	182	141	172	17	0.18
RX22	210	170	134	153	14	0.18
CX23	2596	2264	929	1885	291	2.38
RX23	2519	1965	874	1680	236	2.38
A99Z	333	210	156	367	164	0.16
RA99Z	302	170	142	274	112	0.16
A11D	313	201	107	334	135	0.15
CA11D	397	236	184	461	176	0.3
RA11D	357	181	138	312	117	0.3
A11B	196	131	56	224	74	0.15
A11A	659	478	176	734	249	0.59
LA11AD(1)	*	*	*	6	6	0.59
LA11A(1)	*	*	*	734	249	0.59
CA11A	2780	2346	847	2098	324	3.43
RA11A	2762	2322	833	2091	324	3.43
A11C	152	101	38	178	30	0.12
RA11C	140	83	33	148	25	0.12
CA11*	2817	2398	826	2149	331	3.55
RA11*	2768	2317	809	2096	327	3.55
A11	254	175	71	290	48	0.16
CA11	2776	2340	799	2097	336	3.71
DRN11O	12	8	4	12	0	0.05
RN11OW	3	2	1	2	0	0.05
DRA09T	197	66	0	222	0	0.18
RA09TS	69	11	0	29	0	0.18
A09R	173	118	46	201	69	0.14
LA09RD(1)	*	*	*	201	69	0.14
LA09R(1)	*	*	*	139	0	0.14
CA09R	176	118	47	140	0	0.32
A09RI	0	0	0	0	0	0.32
DA09R	176	118	47	140	0	0.32
RA09RS	161	98	43	75	0	0.32
DRN11M	102	70	36	98	26	0.32
RN11MW	93	57	30	68	17	0.32
DRN11J	30	30	26	30	26	0.56
RN11JW	30	30	26	30	25	0.56
CX4	123	86	56	98	39	0.39
RX4	115	74	44	81	37	0.39
A09O	200	136	54	231	47	0.19
LA09OD(1)	*	*	*	231	47	0.19
LA09O(1)	*	*	*	202	10	0.19
CA09O	290	218	90	167	37	0.9
A09OI	0	0	0	0	0	0.9
DA09O	289	218	90	167	31	0.9

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA09OS	249	211	87	155	23	0.9
DRN11G	0	0	0	0	0	1.08
RN11GW	0	0	0	0	0	1.08
A09K	524	360	142	672	264	0.41
LA09KD(1)	*	*	*	672	264	0.41
LA09K(1)	*	*	*	520	0	0.41
CA09K	524	360	142	520	0	0.41
A09KI	419	288	114	416	0	0.41
DA09K	105	72	28	104	0	0.41
RA09KW	93	58	27	56	0	0.41
CX7	274	265	86	169	23	1.31
X7I	0	0	0	0	0	1.31
DX7	274	265	83	169	20	1.31
RX7S	264	250	79	163	20	1.31
AX25I	85	82	21	50	5	1.31
DX25	179	167	58	113	15	1.31
RX25E	175	166	56	112	15	1.31
DRX25	85	82	21	50	5	1.31
RX25W	84	77	19	48	4	1.31
DRA09K	419	288	114	416	0	0.41
RA09KS	388	239	108	231	0	0.41
A09G	406	271	120	481	205	0.22
LA09GD(1)	*	*	*	481	205	0.22
LA09G(1)	*	*	*	406	0	0.22
A09GI	243	163	72	244	0	0.22
DA09G	162	109	48	162	0	0.22
CA09G	405	261	109	226	0	0.63
RA09GW	364	223	99	180	0	0.63
A09J	243	168	68	300	121	0.17
LA09JD(1)	*	*	*	300	121	0.17
LA09J(1)	*	*	*	237	0	0.17
DRX7	0	0	0	0	0	1.31
RX7W	0	0	0	0	0	1.31
CA09J	243	168	68	237	0	0.17
A09JI	1	1	0	1	0	0.17
DA09J	242	167	68	237	0	0.17
RA09JS	216	129	62	117	0	0.17
A09H	403	280	63	488	202	0.25
LA09HD(1)	*	*	*	488	202	0.25
LA09H(1)	*	*	*	422	0	0.25
CA09H	498	485	105	261	14	2.35
RA09H	488	472	103	249	12	2.35
DRA09G	243	163	72	244	0	0.22
RA09GS	205	113	47	95	0	0.22
A09F	577	395	216	607	251	0.37

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LA09FD	577	378	216	607	251	0.37
LA09F	561	330	92	547	39	0.37
CA09F	573	537	106	380	12	2.72
A09FI	142	111	1	56	0	2.72
DA09F	431	425	102	324	11	2.72
RA09FW	430	425	102	237	10	2.72
A09I	335	235	139	349	152	0.17
LA09ID	335	235	139	349	152	0.17
LA09I	284	146	0	289	0	0.17
A09II	283	145	0	288	0	0.17
DA09I	1	1	0	1	0	0.17
RA09IS	0	0	0	0	0	0.17
A09E	159	107	61	162	65	0.15
LA09ED	159	107	61	162	65	0.15
LA09E	122	66	0	131	7	0.15
CA09E	484	464	103	329	11	2.87
RA09E	483	461	98	265	10	2.87
A09S	142	97	49	160	73	0.07
LA09SD(1)	*	*	*	155	73	0.07
LA09S(1)	*	*	*	156	18	0.07
DRA09R	0	0	0	0	0	0.32
RA09RW	0	0	0	0	0	0.32
CA09S	142	98	49	156	18	0.07
A09SI	1	0	0	1	0	0.07
DA09S	142	97	49	155	18	0.07
RA09SS	119	69	40	74	7	0.07
A09Q	327	222	97	364	54	0.22
A09P	189	132	51	212	41	0.18
DRA09O	0	0	0	0	0	0.9
RA09OW	0	0	0	0	0	0.9
CA09P	189	132	51	212	41	0.18
RA09P	186	128	51	206	41	0.18
CA09Q	527	351	162	507	94	0.47
A09QI	1	1	1	1	0	0.47
DA09Q	526	351	162	507	94	0.47
RA09QS	509	337	156	482	93	0.47
A09M	540	361	200	505	209	0.25
LA09MD	503	359	200	505	209	0.25
LA09M	540	284	49	481	22	0.25
CA09M	556	400	161	670	98	0.71
RA09M	553	394	150	655	92	0.71
A09N	146	101	49	120	36	0.11
LA09ND	146	101	49	120	36	0.11
LA09N	122	57	0	96	0	0.11
CA09N	601	394	150	654	92	0.82

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA09N	561	390	132	604	86	0.82
DRA09J	1	1	0	1	0	0.17
RA09JW	1	0	0	0	0	0.17
A09L	188	129	68	178	69	0.14
LA09LD	188	129	68	178	69	0.14
LA09L	126	43	0	131	0	0.14
CA09L	593	406	131	652	85	1.13
A09LI	1	1	0	1	0	1.13
DA09L	592	405	112	651	75	1.13
RA09LS	566	400	107	501	68	1.13
DRA09I	283	145	0	288	0	0.17
RA09IW	227	119	0	210	0	0.17
CX10	568	428	107	517	68	1.34
X10I	550	330	9	472	6	1.34
DX10	259	261	88	260	57	1.34
A09D	745	525	383	746	389	0.25
LA09DD	728	470	383	728	389	0.25
LA09D	717	413	17	722	5	0.25
CA09D	467	391	88	426	57	1.59
DRX10	550	330	9	472	6	1.34
RX10W	542	318	9	464	6	1.34
X11I	58	9	0	36	0	1.34
DX11	484	309	9	428	6	1.34
RX11S	466	305	7	420	6	1.34
CA09C*	884	910	94	631	59	4.46
RA09C*	884	907	93	631	37	4.46
A09C	120	81	38	136	52	0.07
LA09CD(1)	*	*	*	135	52	0.07
LA09C(1)	*	*	*	131	8	0.07
CA09C	883	910	92	633	37	4.53
RA09C	882	907	92	630	36	4.53
A09B	130	95	73	135	77	0.04
LA09BD(1)	*	*	*	2	1	0.04
LA09B(1)	*	*	*	135	77	0.04
RA09B	106	60	26	104	56	0.04
A09A	80	54	28	109	42	0.08
LA09AD(1)	*	*	*	108	42	0.08
LA09A(1)	*	*	*	108	24	0.08
CA09A	898	930	94	651	58	4.66
A09AI	758	790	0	511	0	4.66
DA09AO	140	140	94	140	39	4.66
RA09AW	140	140	81	140	32	4.66
A99T	73	48	23	77	29	0.03
LA99TD	68	48	23	73	29	0.03
LA99T	73	22	0	77	0	0.03

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA99T	42	10	0	40	0	0.03
A09	339	220	99	390	158	0.18
LA09D(1)	*	*	*	341	158	0.18
LA09(1)	*	*	*	390	69	0.18
CA09	141	216	81	148	32	4.86
DRA09F	142	111	1	56	0	2.72
RA09FS	141	110	1	47	0	2.72
S30D	271	191	126	275	127	0.13
CS30D	200	185	85	178	85	2.85
RS30D	157	133	82	150	64	2.85
S30B	373	252	137	393	111	0.4
S30C	591	406	264	619	274	0.46
CS30B	868	769	383	870	343	3.7
DS30BI	318	219	0	320	0	3.7
DS30BO	550	550	383	550	343	3.7
RS30BW	550	550	376	550	335	3.7
S30A	637	432	243	635	190	0.53
CS30A	988	929	524	994	467	4.23
DS30AI	438	379	3	444	0	4.23
DS30AO	550	550	521	550	467	4.23
RS30AW	550	550	520	550	466	4.23
S30	418	281	155	424	154	0.32
LS30D(1)	*	*	*	36	65	0.32
LS30(1)	*	*	*	424	154	0.32
CS30	806	792	574	813	517	4.56
RS30	806	789	574	813	517	4.56
A07G	685	483	352	644	336	0.26
LA07GD	655	483	352	644	336	0.26
LA07G	684	339	97	604	35	0.26
RA07G	681	169	51	301	17	0.26
A07F	232	157	88	230	61	0.23
LA07FD(1)	*	*	*	4	3	0.23
LA07F(1)	*	*	*	230	61	0.23
RA07F	230	155	88	226	60	0.23
A07E	524	361	264	518	253	0.23
CA07E	1136	502	269	738	247	0.72
RA07E	933	488	267	716	226	0.72
A07C	298	204	93	336	126	0.17
LA07CD(1)	*	*	*	336	126	0.17
LA07C(1)	*	*	*	284	0	0.17
CA07C	1109	649	322	867	226	0.89
RA07C	1104	644	320	859	216	0.89
A07H	268	179	131	289	154	0.09
LA07HD(1)	*	*	*	129	145	0.09
LA07H(1)	*	*	*	289	154	0.09

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA07H	254	156	117	245	103	0.09
DA09A	758	790	0	511	0	4.66
RA09AS	749	765	0	508	0	4.66
A08B	149	99	50	156	55	0.1
CA08B	748	770	18	510	21	4.75
RA08B	742	723	16	482	15	4.75
A07D	129	79	50	183	48	0.23
CA07D	1096	881	320	845	211	5.97
LA07DD(1)	*	*	*	398	211	5.97
LA07D(1)	*	*	*	811	184	5.97
RA07D	904	873	268	794	140	5.97
A07B	936	676	327	860	304	0.65
LA07BD	877	549	327	860	304	0.65
LA07B	923	676	208	661	2	0.65
CA07B	1826	1995	705	1621	560	11.17
RA07B	1825	1793	696	1518	549	11.17
A06A	541	361	207	518	213	0.28
LA06AD(1)	*	*	*	205	200	0.28
LA06A(1)	*	*	*	518	213	0.28
CA06A	1976	1869	719	1581	570	11.45
A07A	103	70	34	115	24	0.12
RA07A	103	69	34	112	24	0.12
A07	319	218	127	344	162	0.12
CA07	349	232	132	376	164	0.24
RA07	260	91	79	260	73	0.24
A06	605	382	175	734	319	0.28
LA06D(1)	*	*	*	314	299	0.28
LA06(1)	*	*	*	734	319	0.28
CA06	2111	1960	726	1644	576	11.97
RA06	2088	1934	723	1628	549	11.97
A99Q	345	241	159	365	193	0.12
CA99Q	2087	1934	722	1625	548	12.09
DUMMY1	3614	4044	1046	2829	689	20.66
DUMMYO	3614	4044	1046	2828	688	20.66
DUMMY	0	0	0	1	1	20.66
EMPTY	0	0	0	1	1	20.66
S10V	303	209	125	289	111	0.2
RS10V	289	185	122	191	75	0.2
S10U	136	94	48	141	49	0.11
CS10U	406	235	160	272	113	0.3
RS10U	396	213	152	257	105	0.3
S10T	470	320	190	460	177	0.34
CS10T	762	403	266	597	243	0.64
RS10T	754	400	264	593	241	0.64
DS30BX	318	219	0	320	0	3.7

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RS30BS	300	121	0	228	0	3.7
S10S	973	673	479	971	477	0.49
LS10SD(1)	*	*	*	15	10	0.49
LS10S(1)	*	*	*	971	477	0.49
CS10S	1201	1025	458	1093	456	4.84
RS10S	1176	981	456	1071	453	4.84
S10Q	369	253	169	366	164	0.25
CS10Q	1376	1216	576	1298	569	5.1
RS10Q	1364	1157	574	1264	564	5.1
DRS10R	24	16	9	22	8	0.03
RS10RW	22	15	9	19	8	0.03
S10O	1089	816	433	1070	411	0.79
CS10O	1990	1842	864	1901	837	5.89
S10J	163	111	72	162	70	0.08
S10JI	96	65	42	95	41	0.08
DS10JO	68	46	30	67	29	0.08
RS10JW	67	46	30	67	29	0.08
CS10KN	2010	1867	874	1920	846	5.97
RS10KN	2003	1858	871	1913	845	5.97
S10JX	96	65	42	95	41	0.08
RS10JS	93	60	41	88	37	0.08
S10I	211	144	85	210	83	0.13
CS10I	304	203	126	298	119	0.13
S10II	178	119	74	175	70	0.13
DS10IO	126	84	52	124	49	0.13
RS10IW	125	84	51	122	49	0.13
CS10KM	2055	1916	894	1964	868	6.11
RS10KM	2034	1883	886	1935	861	6.11
S10IX	178	119	74	175	70	0.13
RS10IS	173	114	72	163	64	0.13
S10N	210	146	87	200	77	0.14
CS10N	373	250	156	355	137	0.35
S10NI	187	125	78	178	69	0.35
DS10NO	187	125	78	178	69	0.35
RS10NW	187	125	78	178	68	0.35
S10K	499	340	220	496	213	0.34
CS10K	2397	2256	1064	2280	1028	6.58
RS10K	2376	2174	1053	2224	1008	6.58
S10NX	187	125	78	178	69	0.35
RS10NS	180	115	73	163	62	0.35
S10G	592	412	263	581	251	0.28
CS10G	2646	2418	1184	2470	1131	6.86
RS10G	2629	2355	1177	2425	1113	6.86
X40I	550	550	441	550	425	6.86
DX40	2079	1805	737	1875	689	6.86

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RX40S	2064	1758	732	1834	680	6.86
S10D	550	369	230	564	234	0.46
CS10D	2360	2029	872	2102	819	7.32
DS30X	438	379	3	444	0	4.23
RS30AS	419	355	1	376	0	4.23
S10P	439	295	181	443	182	0.33
CS10P	600	499	120	545	120	4.56
RS10P	566	356	112	524	96	4.56
S10E	369	259	181	384	177	0.63
CS10E	840	552	237	800	221	5.19
RS10E	831	546	235	784	218	5.19
S10M	722	502	348	709	336	0.35
RS10M	673	401	327	575	265	0.35
CS10E*	986	615	344	942	340	5.54
RS10E*	982	615	343	940	339	5.54
S10F	345	234	131	358	102	0.33
RS10F	337	219	129	331	97	0.33
CS10F*	1149	818	420	1114	400	5.88
RS10F*	1142	798	417	1111	396	5.88
S10C	330	223	152	315	137	0.37
CS10C	3328	2965	1249	3066	1149	13.57
RS10C	3317	2951	1248	3048	1144	13.57
DRX40	550	550	441	550	425	6.86
RX40E	550	550	440	550	422	6.86
S10B	197	137	88	197	88	0.14
CS10B	743	671	612	734	587	0.14
RS10B	739	668	612	729	585	0.14
S10A	46	33	18	47	19	0.05
S10	149	103	66	149	66	0.11
CS10	4032	3656	1743	3754	1618	13.87
RS10	4030	3649	1743	3753	1617	13.87
N06	952	668	398	1043	485	0.59
LN06D(1)	*	*	*	43	88	0.59
LN06(1)	*	*	*	1043	485	0.59
CN06	5701	6986	2247	5622	1822	52.61
RN06	5682	6948	2235	5609	1812	52.61
N05C	357	240	134	350	125	0.28
CN05C	5728	7020	2254	5638	1813	52.89
RN05C	5705	6981	2249	5610	1805	52.89
N05B	221	148	84	208	77	0.31
DN05BI	199	133	76	187	70	0.31
DN05B	22	15	8	21	8	0.31
RN05BE	22	15	8	21	8	0.31
N05A	330	226	145	331	145	0.17
LN05AD(1)	*	*	*	7	12	0.17

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LN05A(1)	*	*	*	331	145	0.17
N05	393	263	180	469	226	0.28
LN05D(1)	*	*	*	8	6	0.28
LN05(1)	*	*	*	469	226	0.28
CN05	5779	7099	2287	5652	1803	53.65
RN05	5775	7074	2281	5623	1794	53.65
DN05BX	199	133	76	187	70	0.31
RN05BS	198	130	75	183	67	0.31
N04A	101	69	45	97	42	0.07
CN04A	5869	7191	2318	5696	1807	53.72
RN04A	5832	7153	2310	5649	1805	53.72
N04	1090	457	454	1109	476	0.83
LN04D	426	88	426	817	476	0.83
LN04	1090	457	454	1109	426	0.83
CN04	5938	7461	2362	5705	1803	54.54
RN04	5936	7438	2359	5705	1803	54.54
S01G	469	324	214	473	212	0.28
RS01G	446	263	199	401	164	0.28
S01D	569	396	211	556	194	0.63
CS01D	941	645	378	891	334	0.91
RS01D	925	603	373	835	318	0.91
S01H	329	220	121	327	89	0.32
RS01H	323	209	120	309	87	0.32
S01E	342	235	130	345	128	0.23
CS01E	575	374	219	558	164	0.55
RS01E	566	358	216	534	158	0.55
S01C	526	359	208	545	215	0.4
CS01C	1599	1174	613	1494	526	1.87
RS01C	1596	1172	612	1487	524	1.87
S01I	333	228	137	329	132	0.23
RS01I	323	210	135	307	124	0.23
S01F	184	125	65	192	67	0.15
CS01F	494	321	198	484	187	0.38
RS01F	483	299	193	452	173	0.38
S01B	468	317	193	470	186	0.31
CS01B	2085	1632	796	1968	699	2.56
RS01B	2077	1615	794	1952	692	2.56
S01A	342	228	124	363	98	0.35
CS01A	2254	1796	850	2142	743	2.91
RS01A	2244	1785	849	2129	738	2.91
S01	221	148	85	220	65	0.26
LS01D(1)	*	*	*	4	3	0.26
LS01(1)	*	*	*	220	65	0.26
CS01	2374	1914	895	2258	774	3.16
RS01	2373	1911	894	2256	773	3.16

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
CN03*	6767	8577	2668	6256	1902	57.71
RN03*	6751	8518	2653	6238	1899	57.71
N03A	351	234	130	360	111	0.39
LN03AD(1)	*	*	*	5	3	0.39
LN03A(1)	*	*	*	360	111	0.39
RN03A	347	233	130	352	111	0.39
N03B	723	522	279	996	463	0.63
LN03BD(1)	*	*	*	965	463	0.63
LN03B(1)	*	*	*	983	301	0.63
RN03B	720	521	279	977	295	0.63
N03	464	316	184	569	211	0.6
LN03D(1)	*	*	*	319	209	0.6
LN03(1)	*	*	*	569	208	0.6
CN03	7052	8941	2753	6392	1928	59.33
RN03	7041	8898	2752	6382	1915	59.33
N02B	183	121	64	357	173	0.15
LN02BD	153	101	64	357	173	0.15
LN02B	183	121	55	298	4	0.15
CN02B	7050	8916	2753	6388	1915	59.48
RN02B	7044	8894	2750	6380	1915	59.48
N02	994	744	356	1037	415	0.76
LN02D(1)	*	*	*	30	66	0.76
LN02(1)	*	*	*	1037	415	0.76
N02A	361	237	149	285	107	0.18
CN02	7092	8974	2767	6421	1924	60.42
S20A	247	173	118	247	117	0.16
RS20A	245	172	117	244	116	0.16
S20	231	162	111	230	111	0.14
CS20	466	323	225	465	222	0.3
RS20	464	322	224	461	221	0.3
A05A	260	181	122	256	119	0.14
RA05A	249	156	113	239	106	0.14
A99N	341	235	160	345	162	0.16
CA99N	875	532	397	849	390	0.6
DRA09S	1	0	0	1	0	0.07
RA09SW	0	0	0	0	0	0.07
A99Y	410	277	110	474	82	0.32
CA99Y	410	277	110	474	82	0.32
A99X	723	487	345	430	65	0.26
LA99XD(1)	*	*	*	226	65	0.26
LA99X(1)	*	*	*	430	62	0.26
DRA09Q	1	1	1	1	0	0.47
RA09QW	1	0	0	1	0	0.47
A10A	423	293	160	455	55	0.19
CA10A	393	293	146	423	52	0.65

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA10A	355	239	132	350	50	0.65
A10	551	365	219	621	318	0.21
LA10D(1)	*	*	*	116	139	0.21
LA10(1)	*	*	*	621	318	0.21
CA10	631	507	208	719	263	0.87
DUMMY2	7165	9118	2783	6449	1939	62.47
DRX11I	58	9	0	36	0	1.34
RX11W	54	7	0	30	0	1.34
A99V	396	276	134	443	179	0.21
CA99V	396	276	134	443	179	0.21
DRA09L	1	1	0	1	0	1.13
RA09LW	1	1	0	1	0	1.13
A99W	312	218	109	350	137	0.22
LA99WD	304	197	109	350	137	0.22
LA99W	311	199	67	343	65	0.22
CA99W	311	199	67	343	65	0.22
A99U	100	64	26	112	12	0.07
A99S	66	44	15	94	34	0.08
LA99SD(1)	*	*	*	94	34	0.08
LA99S(1)	*	*	*	75	4	0.08
A08A	86	56	27	87	24	0.14
RA08A	85	54	27	84	24	0.14
A99R	88	58	33	100	45	0.04
RA99R	73	41	27	70	28	0.04
A08	218	151	92	227	107	0.08
CA08	227	158	95	248	111	0.25
DUMMY3	7176	9164	2780	6451	1939	63.29
A99P	959	682	375	991	390	0.57
LA99PD(1)	*	*	*	22	60	0.57
LA99P(1)	*	*	*	991	390	0.57
A05	368	252	170	375	180	0.13
A99O	299	201	147	303	154	0.1
A99M	193	140	110	199	113	0.06
A99L	255	184	138	256	141	0.08
DUMMY4	7197	9203	2787	6459	1938	64.24
A99K	240	162	111	243	112	0.11
A99J	242	164	109	235	102	0.14
A99I	319	212	139	308	127	0.14
A04A	412	282	176	398	70	0.22
RA04A	392	264	170	365	69	0.22
A04	124	75	31	133	42	0.08
CA04	499	337	201	483	83	0.3
RA04	463	274	190	406	78	0.3
A03D	96	58	17	119	24	0.13
LA03DD(1)	*	*	*	119	24	0.13

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LA03D(1)	*	*	*	86	0	0.13
CA03D	557	330	198	422	78	0.43
RA03D	520	256	189	342	69	0.43
A03E	216	144	80	216	82	0.15
LA03ED(1)	*	*	*	4	7	0.15
LA03E(1)	*	*	*	216	82	0.15
RA03E	208	137	78	202	78	0.15
A03B	153	97	50	161	62	0.07
LA03BD(1)	*	*	*	139	62	0.07
LA03B(1)	*	*	*	161	16	0.07
CA03B	304	193	108	307	91	0.23
RA03B	267	161	100	235	73	0.23
A03A	249	156	72	271	101	0.14
LA03AD(1)	*	*	*	270	101	0.14
LA03A(1)	*	*	*	254	1	0.14
CA03A	308	191	125	276	73	0.37
RA03A	303	183	122	264	68	0.37
A03	179	112	41	265	73	0.28
LA03D(1)	*	*	*	265	73	0.28
LA03(1)	*	*	*	216	5	0.28
CA03	824	540	258	628	108	1.07
DUMMY5	7299	9430	2830	6522	1965	65.69
A99G	63	44	29	66	33	0.02
LA99GD	62	44	29	65	33	0.02
LA99G	63	21	0	66	0	0.02
A99H	35	21	8	50	14	0.1
LA99HD	35	21	8	50	14	0.1
LA99H	18	2	0	38	0	0.1
RA99H	10	1	0	21	0	0.1
A02D	154	100	57	163	68	0.06
LA02DD	148	97	57	152	68	0.06
LA02D	154	48	0	163	7	0.06
RA02D	107	15	0	112	2	0.06
A99F	37	23	11	46	15	0.11
CA99F	109	23	11	115	16	0.28
A02	32	20	10	24	2	0.02
A01H	195	133	92	192	88	0.07
LA01HD	192	132	92	188	88	0.07
LA01H	195	67	0	192	0	0.07
A99E	74	53	39	74	38	0.02
LA99ED	71	51	39	71	38	0.02
LA99E	74	52	4	74	0	0.02
DUMMY6	7298	9442	2830	6522	1965	66.1
A99B	143	94	64	128	51	0.05
A99C	74	50	32	72	29	0.03

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
LA99CD	72	49	32	70	29	0.03
LA99C	74	25	0	72	0	0.03
A99D	91	65	47	90	45	0.03
LA99DD	88	42	47	68	44	0.03
LA99D	91	65	41	90	43	0.03
A01A	97	61	33	68	8	0.05
RA01A	82	43	27	51	7	0.05
A01	274	172	79	175	41	0.2
LA01DD(1)	*	*	*	175	41	0.2
LA01D(1)	*	*	*	143	0	0.2
CA01	337	204	104	185	7	0.25
A99A	366	253	184	340	160	0.13
LA99AD	351	234	184	334	160	0.13
LA99A	366	171	0	328	0	0.13
A99	161	96	38	103	23	0.14
LA99D(1)	*	*	*	103	23	0.14
LA99(1)	*	*	*	85	0	0.14
DUMMY7	7322	9523	2828	6512	1964	66.72
A01E	218	149	112	204	99	0.08
A01EI	131	89	67	122	60	0.08
DA01E	87	60	45	82	40	0.08
RA01ES	49	25	25	39	19	0.08
N01A	570	349	166	365	98	0.41
LN01AD(1)	*	*	*	365	98	0.41
LN01A(1)	*	*	*	302	0	0.41
RN01A	534	301	159	236	0	0.41
N01	951	273	380	803	319	0.65
CN01	1019	570	328	715	277	1.14
A03C	529	354	195	549	207	0.33
LA03CD (1)	*	*	*	37	63	0.33
LA03C (1)	*	*	*	549	207	0.33
RA03C	501	318	187	488	183	0.33
A02B	760	497	344	757	344	0.27
LA02BD(1)	*	*	*	327	315	0.27
LA02B(1)	*	*	*	757	344	0.27
RA02B	702	464	328	662	231	0.27
CA02A*	941	632	358	915	294	0.6
RA02A*	869	535	334	759	240	0.6
A02A	530	367	163	789	222	0.61
LA02AD(1)	*	*	*	789	222	0.61
LA02A(1)	*	*	*	674	44	0.61
A01G	599	428	333	596	328	0.19
LA01GD	585	425	333	590	328	0.19
LA01G	599	294	0	596	0	0.19
CA01G	932	725	330	955	236	1.39

Notes: (1) Retention based on future development

Route ID	100yr-6hr Flow (cfs)	100yr-24hr Flow (cfs)	10yr-6hr Flow (cfs)	Future 100yr-6hr Flow (cfs)	Future 10yr-6hr Flow (cfs)	Total Area (sq mi)
RA01G	904	708	252	830	151	1.39
A02C	462	309	169	429	156	0.33
LA02CD	460	309	169	429	156	0.33
LA02C	446	276	85	414	74	0.33
RA02C	334	132	58	200	29	0.33
A01F	436	293	165	368	133	0.28
LA01FD	324	159	165	332	133	0.28
LA01F	436	293	149	368	102	0.28
CA01F	416	290	131	353	90	0.61
RA01F	387	289	109	320	70	0.61
A01D	520	349	238	440	186	0.21
LA01DD	520	349	238	440	186	0.21
LA01D	453	193	0	362	0	0.21
DRA01E	131	89	67	122	60	0.08
RA01EW	124	79	63	108	52	0.08
CA01D	640	486	101	534	64	0.82
RA01D	555	414	85	428	52	0.82
A01C	472	312	225	458	210	0.22
LA01CD	472	305	225	458	210	0.22
LA01C	424	253	25	382	6	0.22
A01B	357	234	131	289	32	0.15
LA01BD	337	234	131	289	32	0.15
LA01B	357	100	0	252	0	0.15
CA01B	1379	1191	242	1125	147	2.58

Notes: (1) Retention based on future development

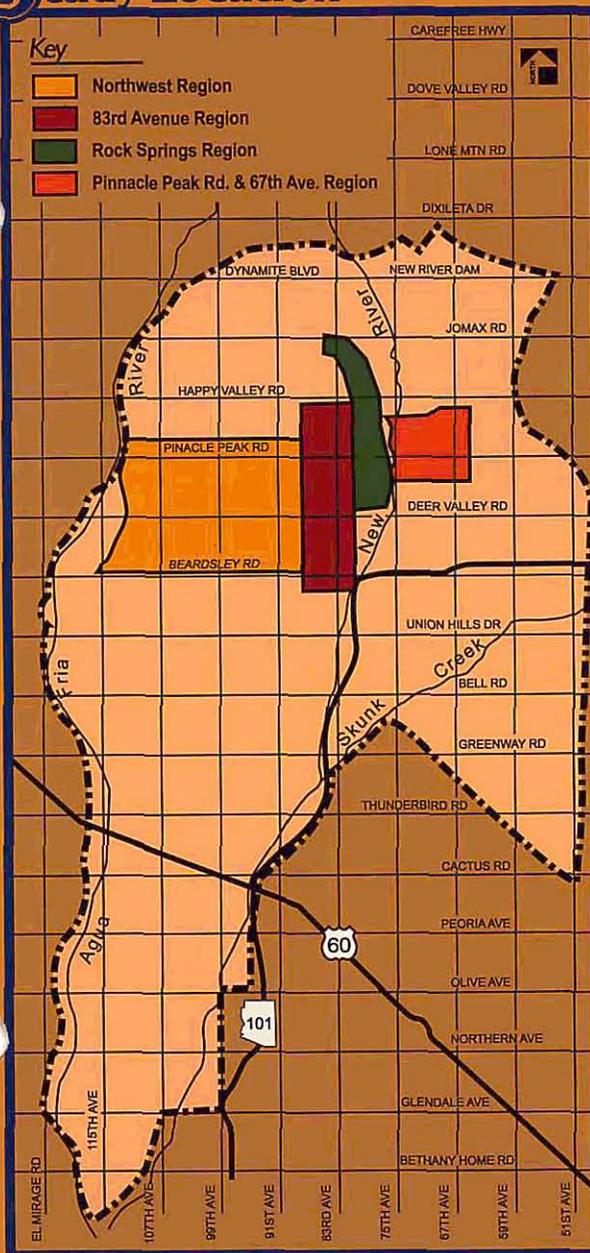
APPENDIX C. LEVEL II PUBLIC MEETING FLIER

Study Purpose

The Flood Control District (District) of Maricopa County has teamed up with the cities of Glendale and Peoria to prepare an area drainage master plan (ADMP) update for the Glendale/Peoria area of central Maricopa County. An area drainage master plan identifies drainage problems without consideration of political boundaries and develops a plan that will eliminate or minimize drainage problems. The Glendale/Peoria ADMP Update will:

- identify and evaluate existing regional and neighborhood drainage problems using "state of the art" engineering techniques;
- consider neighborhood character and community recreational needs;
- evaluate archaeological, biological, and other environmental factors;
- identify cost-effective drainage solutions that provide maximum community benefits; and
- involve the community in the development of the plan.

Study Location



Thunderbird Paseo Park, Glendale, Arizona

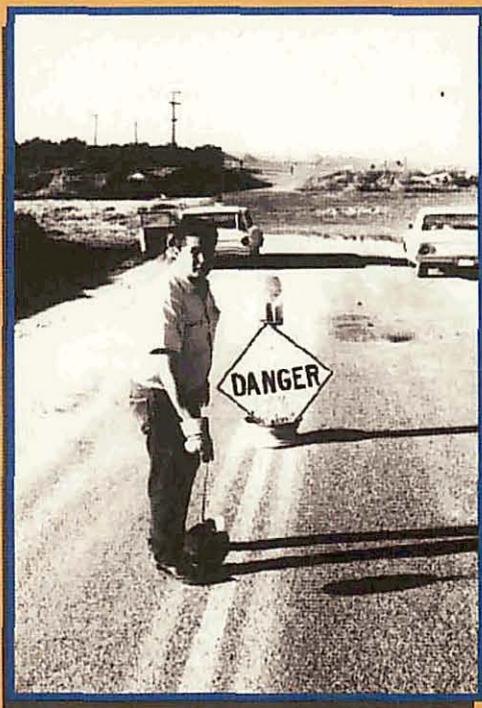
Study Goals

- Identify and evaluate existing regional and neighborhood drainage problems within the study area.
- Develop cost-effective solutions to drainage problems that are sensitive to natural and cultural resources, enhance the neighborhood's character, and are acceptable to the community.

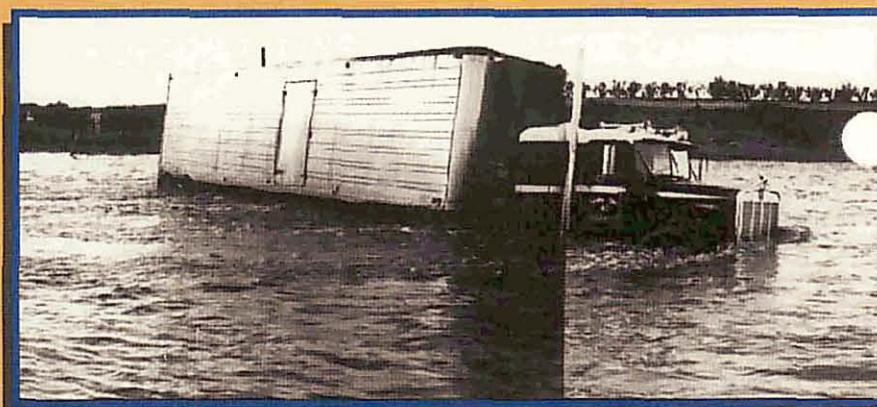
Work Underway

Your Glendale/Peoria ADMP Update study team has been very busy since the last set of public information meetings held in March 2000. The team completed the data collection phase of the project in March and has been busy compiling and analyzing the data. The team has developed a complete summary of important considerations including community needs and public opinion, existing biological and cultural resources, visual and landscape character, existing and proposed development, proposed zoning, proposed equestrian, multiple-use, and park facilities in the study area. In addition, the team analyzed how and where rainfall runoff flows within the project study area. The team has developed important hydrologic models leading to a solid understanding of the drainage characteristics of the watershed.

Analysis of all the collected data allowed the team to develop and evaluate a host of potential drainage solutions appropriate for each region of the study area. The study team has given the potential drainage solutions an initial evaluation to identify any fatal flaws and are now presenting them to the community through this second set of public meetings for additional suggestions and ideas.



Closed road during 1965 flooding of New River



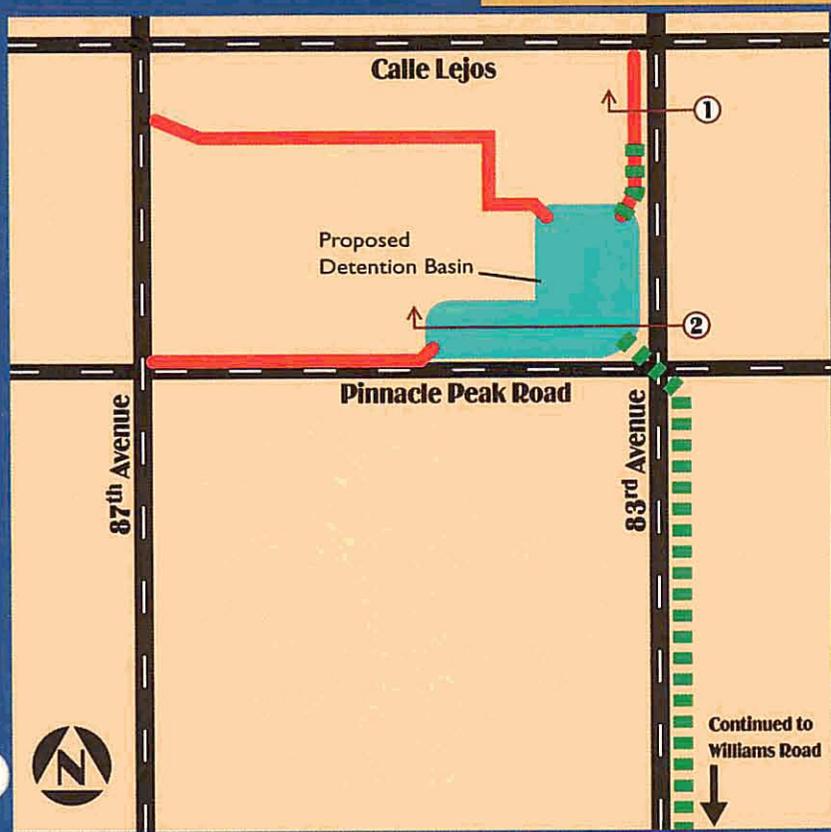
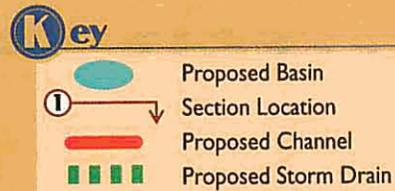
December 1965 flooding of New River at 83rd Avenue

Preliminary Alternatives

Evaluation of the environmental and visual resources, analysis of the hydrologic models, and assessment of the multiple-use opportunities in the study area led the study team to focus on four subregional planning areas (shown on front cover). These areas are referred to as the 83rd Avenue Region, the Northwest Region, the Rock Springs Region, and the Pinnacle Peak Road and 67th Avenue Region.

The team spent the past several months developing and evaluating potential drainage solutions for each subregional planning area. This phase of alternatives development and evaluation focused on designing cost-effective regional drainage solutions that are sensitive to natural and cultural resources, enhance the neighborhood's character, and are acceptable to the community. All proposed solutions will be able to safely convey the 100-year storm event (a storm that has a 1% chance of occurring in any given year), and compliment regionally planned trails and recreational facilities. The potential drainage alternatives for each subregional planning area are further previewed in this brochure.

83rd Avenue Region



Goal

Design a regional drainage solution that will safely convey flows to the New River by making efficient use of existing drainage facilities.

Description

83rd Avenue hosts several existing drainage channels and storm drains south of Williams Road. During larger storm events these existing channels will be easily overwhelmed by flows from as far north as Jomax and Happy Valley Roads.

Proposed drainage features include:

- a regional detention basin near Pinnacle Peak Road and 83rd Avenue to reduce peak flows;
- two open collector channels from 87th Avenue to the basin to intercept flows from the north;
- an open channel or storm drain collector along 83rd Avenue to intercept flows from the north; and
- a storm drain outlet from the basin connecting with existing 83rd Avenue facilities.

Alternatives

Alternative 1 - detention basin, open channels from 87th Avenue, storm drain outlet, open channel collector along 83rd Avenue from the north.

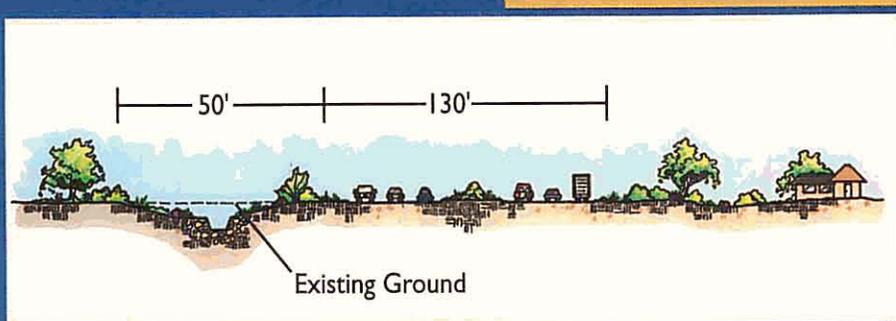
Alternative 2 - same as Alternative 1 except a combination storm drain and open channel collector along 83rd Avenue.

Alternative 3 - do nothing.

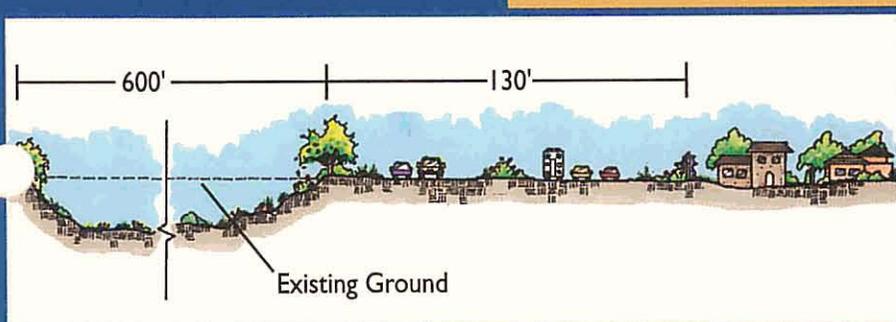
Advantages/Disadvantages

Open channels, as proposed in Alternative 1, are generally less expensive, easier to maintain, and offer multiple-use opportunities not provided by storm drains. Storm drains, as proposed in Alternative 2, can be constructed in existing rights-of-way.

Section 1



Section 2



Key

-  Proposed Basin
-  Existing Natural Wash
-  Section Location
-  Proposed Channel
-  Proposed Storm Drain

Northwest Region Alternatives 1 & 2

Goal

Design a regional drainage system to safely convey runoff to the Agua Fria River.

Description

Stormwater runoff from the northern portion of the subregion sheet flows south into the urbanizing areas. Runoff from larger storms will reach and overwhelm existing channels along Deer Valley and Beardsley Roads.

Proposed drainage features include:

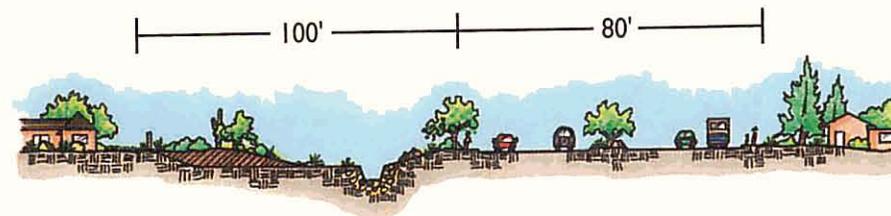
- a combination storm drain and open channel along Pinnacle Peak Road from 87th Avenue to 91st Avenue, then an open channel to the Agua Fria River to intercept flow from the north;
- an open channel along Deer Valley Road to intercept flows from south of Pinnacle Peak Road;
- an open channel along Rose Garden Lane to convey flows from the Deer Valley Road channel to the Agua Fria River;
- improvements to the existing channel along Beardsley Road;
- preservation of existing natural washes between Pinnacle Peak Road and Rose Garden Lane; and
- a regional detention basin near Pinnacle Peak Road and 91st Avenue to reduce peak flows thus reducing required outlet channel sizes.

Alternatives

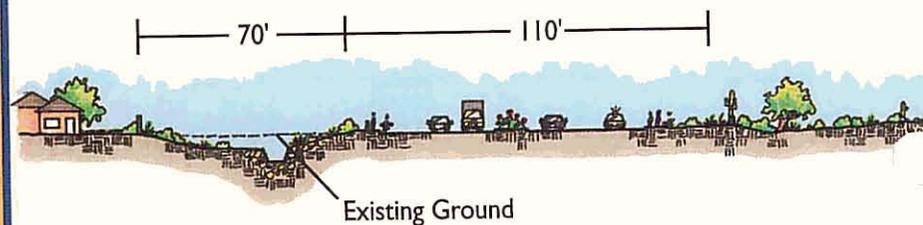
Alternative 1 - Pinnacle Peak Road storm drain and channel from 87th Avenue to the Agua Fria River, Deer Valley Road channel from Lake Pleasant Road to 107th Avenue then south to Rose Garden Lane, Rose Garden Lane channel from existing natural wash near 95th Avenue alignment to Agua Fria River, improvements to Beardsley Road channel, preservation of existing natural washes.



Section 1



Section 2



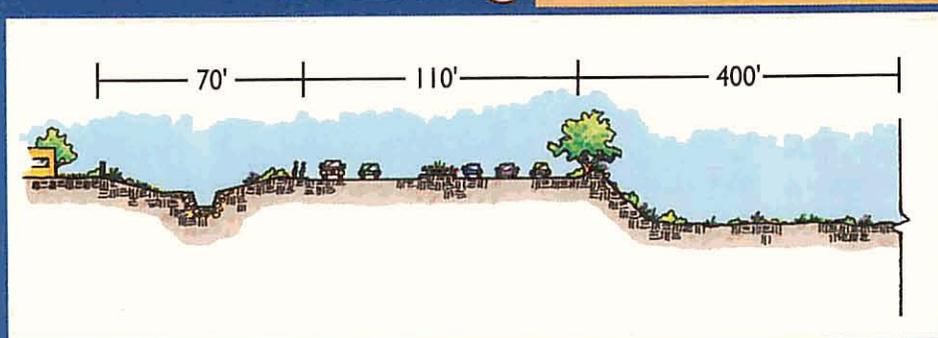
Northwest Region Alternatives 3 & 4

Key

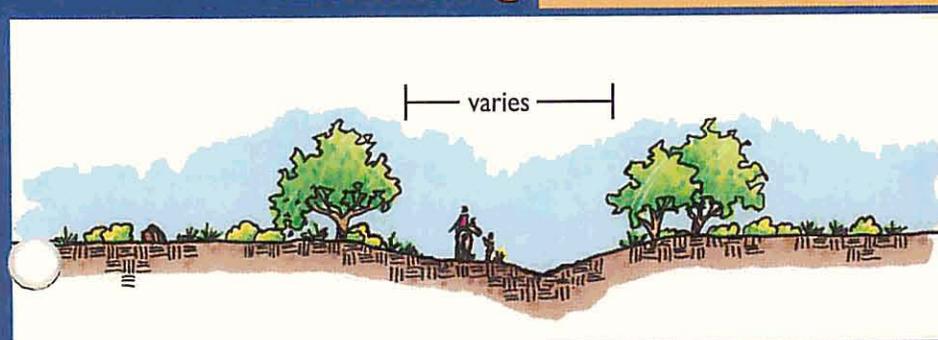
-  Proposed Basin
-  Existing Natural Wash
-  Section Location
-  Proposed Channel
-  Proposed Storm Drain



Section 3



Section 4



Description

Alternative 2 - same as Alternative 1 including the regional detention basin near Pinnacle Peak Road and 91st Avenue.

Alternative 3 - same as Alternative 1 except the Deer Valley Road and Rose Garden Lane channels are joined to create one long sinuous channel from the 95th Avenue alignment on Deer Valley Road to 107th Avenue then south to Rose Garden Lane and west to the Agua Fria River.

Alternative 4 - same as Alternative 3 including the regional detention basin near Pinnacle Peak Road and 91st Avenue.

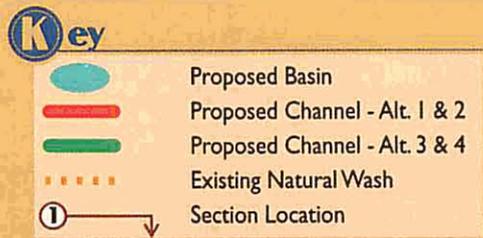
Alternative 5 - do nothing.

Advantages/Disadvantages

Capturing flows slightly farther north, as proposed in Alternatives 3 and 4, has the advantage of somewhat smaller channel designs. Flow in the existing natural washes is intercepted further north. However, more flow is allowed to reach the Beardsley Road Channel and the Westbrook Village detention areas as flows south of Deer Valley Road are not collected.

The detention basin included in Alternatives 2 and 4 has the advantage of reducing the peak flows entering the system, resulting in smaller channel designs, and of providing an open space or recreational amenity for the region. All the Alternatives, with the exception of Alternative 5, have the advantage of complimenting the regionally planned equestrian trail connecting the New and Agua Fria Rivers along Pinnacle Peak Road.

Rock Springs Region



Goal

Design a drainage solution to safely convey flows to the New River.

Description

Rock Springs Creek south of Patrick Lane has been disturbed by mining operations and residential construction leaving flows with no clearly defined outfall to the New River. Large flows in Rock Springs Creek will have no access to New River under current conditions and will flow south of Patrick Lane in an unpredictable manner.

Proposed drainage features include:

- an open channel along the Patrick Lane alignment connecting Rock Springs Creek with the New River;
- an open channel along a southeastern alignment connecting Rock Springs Creek near Pinnacle Peak Road with the New River near Patrick Lane; and
- a detention basin near the Happy Valley Road alignment to reduce peak flows.

Alternatives

Alternative 1 - open channel east to New River along Patrick Lane alignment.

Alternative 2 - same as Alternative 1 including detention basin.

Alternative 3 - open channel southeast from Pinnacle Peak Road to New River.

Alternative 4 - same as Alternative 3 including detention basin.

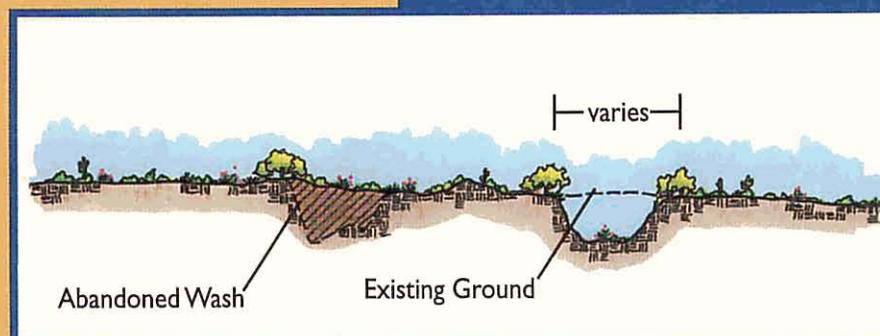
Alternative 5 - do nothing.

Advantages/Disadvantages

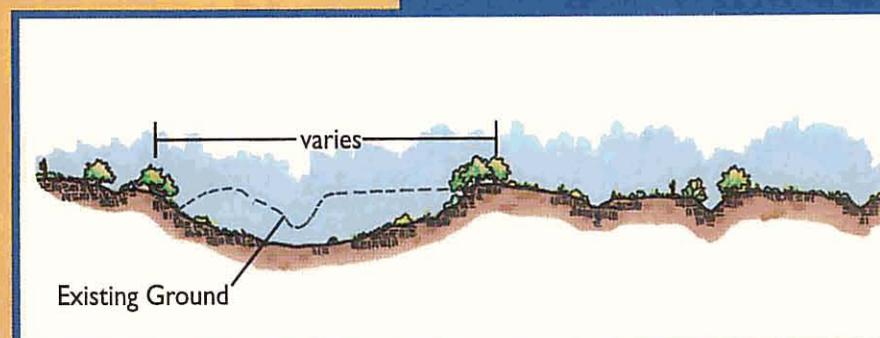
The Patrick Lane channel alignment, as proposed in Alternative 1, is the shortest route to the New River and the least disruptive of the natural watershed characteristics. The southeastern channel alignment, as proposed in Alternative 3, is slightly more disruptive of the watershed but has a more favorable slope. The detention basin included in Alternatives 2 and 4 has the advantage of reducing peak flows, resulting in smaller channel designs, and of providing a recreational amenity for the region.



Section 1



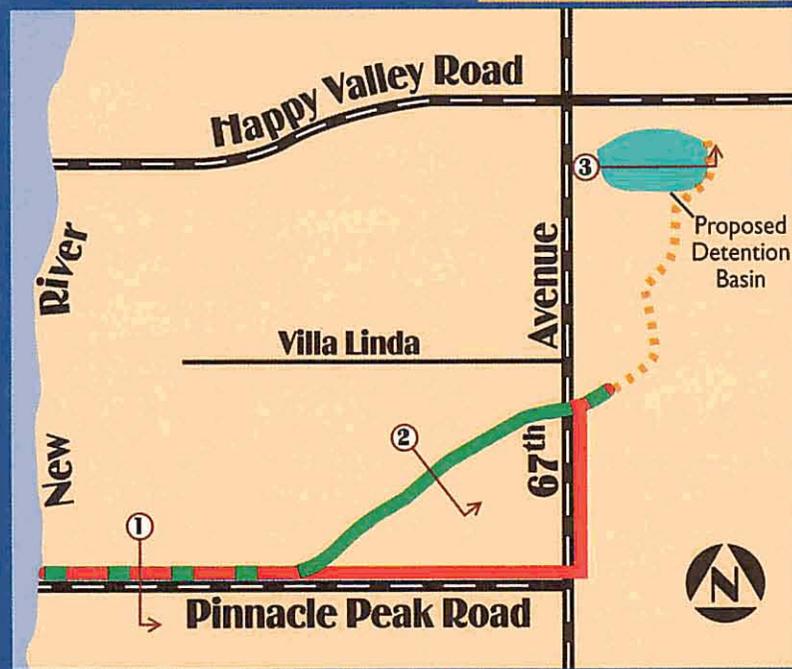
Section 2



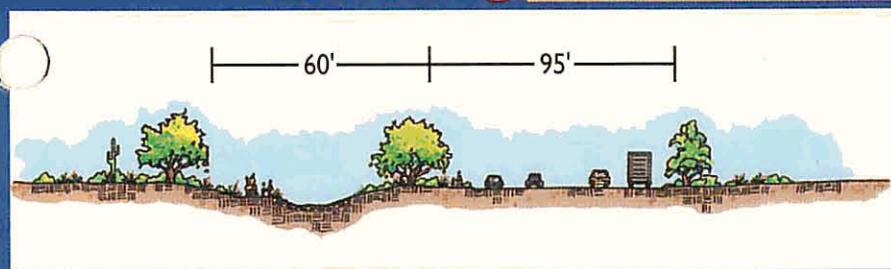
Pinnacle Peak Road and 67th Avenue Region

Key

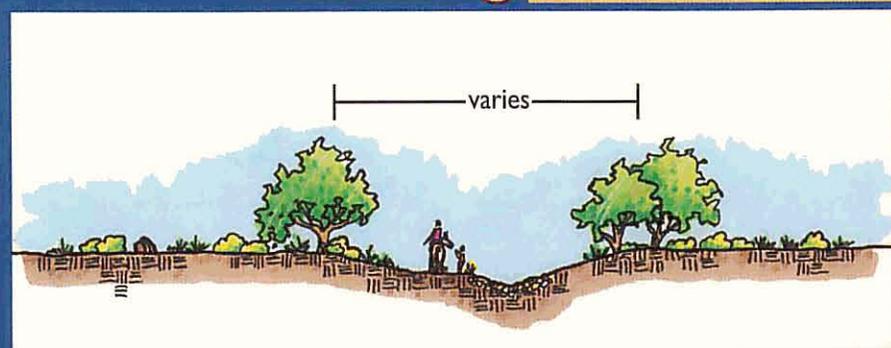
-  Proposed Basin
-  Proposed Channel - Alt. 1 & 2
-  Proposed Channel - Alt. 3 & 4
-  Existing Natural Wash
-  Section Location



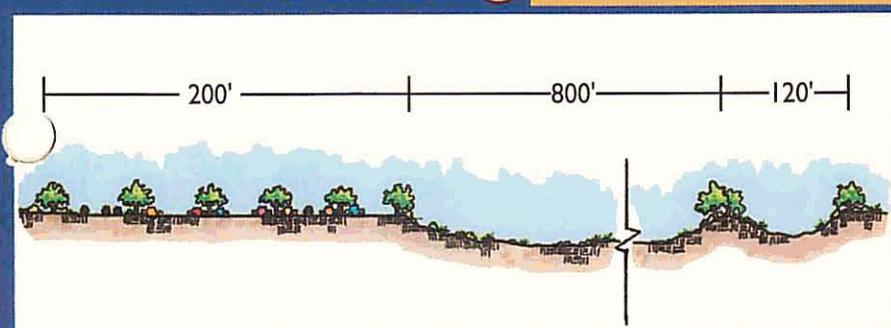
Section 1



Section 2



Section 3



Goal

Design a regional drainage system to safely convey flows to the New River.

Description

Runoff from north of Happy Valley Road flows south in poorly defined channels, joining runoff from the east to overwhelm existing drainage facilities southwest of Pinnacle Peak Road and 67th Avenue.

Proposed drainage features include:

- a drainage channel along 67th Avenue from near Villa Linda, south to Pinnacle Peak Road then west to the New River;
- a natural-appearing channel along the existing wash alignment between 67th Avenue to Pinnacle Peak Road then west to the New River; and
- a regional detention basin near Happy Valley Road and 67th Avenue to reduce peak flows thus reducing required channel sizes.

Alternatives

Alternative 1 - drainage channel along 67th Avenue and Pinnacle Peak Road.

Alternative 2 - same as Alternative 1 including detention basin.

Alternative 3 - natural-appearing channel along existing wash alignment from 67th Avenue to Pinnacle Peak Road then west along Pinnacle Peak.

Alternative 4 - same as Alternative 3 including detention basin.

Alternative 5 - do nothing.

Advantages/Disadvantages

Alternatives 1 and 2 have the advantage of using existing rights-of-way for channel construction. Alternatives 3 and 4 have the advantage of providing additional recreational potential for the region. All the Alternatives (with the exception of Alternative 5) compliment a regionally planned equestrian trail along Pinnacle Peak Road. The optional basin included in Alternatives 2 and 4 provides an opportunity for enhanced recreational uses within Thunderbird Park.

Study Schedule

	2000													'01
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	
Data Collection	///	///												
Environmental Considerations	///	///	///	///										
Alternatives Development			///	///	///									
Alternatives Evaluation					///	///	///	///	///					
Recommended Alternative(s)									///	///	///			
Implementation Plan												///	///	
Public Involvement	///	///	●	///	///	///	///	///	●	///	///	///	●	

● = Public Meetings

What's Next

The results of this second series of public meetings will allow the study team to finalize our alternatives evaluation for the Glendale/Peoria ADMP Update study area. Using your suggestions and ideas we will:

- reevaluate and adjust our drainage concepts;
- fine tune the hydrologic runoff model;
- refine our landscape concepts;
- develop final cost estimates; and
- complete preliminary design plans for the recommended solutions.

The Glendale/Peoria ADMP Update study team will be presenting the results of the study and the recommended drainage solutions at our third, and final, series of public information meetings scheduled for January 2001. For current project information and updates please visit our web page at www.Entellus.com/GlendalePeoriaADMP

Contacts

Marilyn DeRosa, Project Manager
 Flood Control District of Maricopa County
 Phone: (602) 506-4766
 E-mail: mdr@mail.maricopa.gov

or

Mike Bonar, Project Manager
 Entellus, Inc.
 Phone: (602) 244-2566
 E-mail: bonarmj@Entellus.com



Entellus, Inc.
 2255 North 44th Street
 Suite 125
 Phoenix, Arizona 85008

APPENDIX D. COST ESTIMATES

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION:

Northwest Region Alt I (w/out Basin)

DRAINAGE IMPROVEMENT ELEMENTS:					
ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	383114	\$1,149,341.45
2	Pavement Replacement	\$50.00	S.Y.	15500	\$775,000.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	12	\$1,992,000.00
4	Channel Lining	\$5.00	S.F.	337600	\$1,688,000.00
5	Repair Channel Lining	\$10.00	L.F.	4030	\$40,300.00
6	36" RCP	\$110.00	L.F.	2650	\$291,500.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	1	\$250.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	1	\$280.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	3	\$600,000.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	95.5	\$9,554,049.49
21	Developed Residential	\$180,000.00	Acre	7.2	\$1,301,647.81
22	Undeveloped Commercial	\$300,000.00	Acre	0.0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. SAW & DW	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	S.F.	1813150	\$2,538,410.00
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	50000	\$70,000.00
42	Equestrial Trail	\$3.50	L.F.	0	\$0.00
43	Natural Wash Landscaping	\$1.40	S.F.	0	\$0.00
44	Natural Wash Seeding	\$1.10	S.F.	2625000	\$2,887,500.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	35935	\$3,593,500.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	8250	\$49,500.00
34	20-foot Drop Structure	\$45,000.00	EA.	3	\$135,000.00
35	10x4 Box Culvert	\$56,000.00	EA.	3	\$168,000.00
36	2-8x5 Structure	\$88,000.00	EA.	2	\$176,000.00
37	Diversion Structure	\$12,000.00	EA.	2	\$24,000.00
38	3-10x6 Storm Drain	\$1,200.00	L.F.	800	\$960,000.00
39	Structural Backfill	\$40.00	C.Y.	1955.6	\$78,222.22

BASE ALTERNATIVE SUBTOTAL \$28,072,500.98

Construction Contingencies	27%	\$7,579,575.26
Engineering	7%	\$1,965,075.07
Construction Administration	6%	\$1,684,350.06

BASE ALTERNATIVE TOTAL \$39,301,501.37

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION:

Northwest Region Alt 2 (with Basin)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	383114	\$1,149,341.45
2	Pavement Replacement	\$50.00	S.Y.	15500	\$775,000.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	12	\$1,992,000.00
4	Channel Lining	\$5.00	S.F.	337600	\$1,688,000.00
5	Repair Channel Lining	\$10.00	L.F.	4030	\$40,300.00
6	36" RCP	\$110.00	L.F.	2650	\$291,500.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	1	\$250.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	1	\$280.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	3	\$600,000.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	114.7	\$11,470,000.00
21	Developed Residential	\$180,000.00	Acre	7.2	\$1,301,647.81
22	Undeveloped Commercial	\$300,000.00	Acre	0.0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. S/W & D/W	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	S.F.	1707470	\$2,390,458.00
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	1177115	\$1,647,961.00
42	Equestrial Trail	\$3.50	L.F.	0	\$0.00
43	Natural Wash Landscaping	\$1.40	S.F.	0	\$0.00
44	Natural Wash Seeding	\$1.10	S.F.	2625000	\$2,887,500.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	35935	\$3,593,500.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	8250	\$49,500.00
34	20-foot Drop Structure	\$45,000.00	EA.	3	\$135,000.00
35	10x4 Box Culvert	\$56,000.00	EA.	3	\$168,000.00
36	2-8x5 Structure	\$88,000.00	EA.	2	\$176,000.00
37	Diversion Structure	\$12,000.00	EA.	2	\$24,000.00
38	3-10x6 Storm Drain	\$1,200.00	L.F.	800	\$960,000.00
39	Structural Backfill	\$40.00	C.Y.	1955.6	\$78,222.22

BASE ALTERNATIVE SUBTOTAL \$31,418,460.49

Construction Contingencies	27%	\$8,482,984.33
Engineering	7%	\$2,199,292.23
Construction Administration	6%	\$1,885,107.63

BASE ALTERNATIVE TOTAL \$43,985,844.68

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION:

Northwest Region Alt 3 (w/out Basin)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	388051	\$1,164,153.00
2	Pavement Replacement	\$50.00	S.Y.	11944	\$597,200.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	14	\$2,324,000.00
4	Channel Lining	\$5.00	S.F.	337600	\$1,688,000.00
5	Repair Channel Lining	\$10.00	L.F.	4030	\$40,300.00
6	36" RCP	\$110.00	L.F.	2650	\$291,500.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side Inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	1	\$250.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	1	\$280.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	3	\$600,000.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	98.4	\$9,840,000.00
21	Developed Residential	\$180,000.00	Acre	7.2	\$1,301,647.81
22	Undeveloped Commercial	\$300,000.00	Acre	0.0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. SAW & D/W	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	S.F.	1937550	\$2,712,570.00
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	0	\$0.00
42	Equestrial Trail	\$3.50	L.F.	0	\$0.00
43	Natural Wash Landscaping	\$1.40	S.F.	0	\$0.00
44	Natural Wash Seeding	\$1.10	S.F.	1890000	\$2,079,000.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	33115	\$3,311,500.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	8250	\$49,500.00
34	20-foot Drop Structure	\$45,000.00	EA.	3	\$135,000.00
35	10x4 Box Culvert	\$56,000.00	EA.	3	\$168,000.00
36	2-8x5 Structure	\$88,000.00	EA.	0	\$0.00
37	Diversion Structure	\$12,000.00	EA.	4	\$48,000.00
38	3-10x6 Storm Drain	\$1,200.00	L.F.	0	\$0.00
39	Structural Backfill	\$40.00	C.Y.	0.0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$26,350,900.81

Construction Contingencies	27%	\$7,114,743.22
Engineering	7%	\$1,844,563.06
Construction Administration	6%	\$1,581,054.05

BASE ALTERNATIVE TOTAL \$36,891,261.14

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION:

Northwest Region Alt 4 (with Basin)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	490051	\$1,470,153.00
2	Pavement Replacement	\$50.00	S.Y.	11944	\$597,200.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	14	\$2,324,000.00
4	Channel Lining	\$5.00	S.F.	337600	\$1,688,000.00
5	Repair Channel Lining	\$10.00	L.F.	4030	\$40,300.00
6	36" RCP	\$110.00	L.F.	2650	\$291,500.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	1	\$250.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	1	\$280.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	3	\$600,000.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
<hr/>					
20	Undeveloped Residential	\$100,000.00	Acre	117.3	\$11,730,000.00
21	Developed Residential	\$180,000.00	Acre	7.2	\$1,301,647.81
22	Undeveloped Commercial	\$300,000.00	Acre	0.0	\$0.00
<hr/>					
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. SAW & DW	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	S.F.	2996545	\$4,195,163.00
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	1177115	\$1,647,961.00
42	Equestrial Trail	\$3.50	L.F.	0	\$0.00
43	Natural Wash Landscaping	\$1.40	S.F.	0	\$0.00
44	Natural Wash Seeding	\$1.10	S.F.	1890000	\$2,079,000.00
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28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	33115	\$3,311,500.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	8250	\$49,500.00
34	20-foot Drop Structure	\$45,000.00	EA.	3	\$135,000.00
35	10x4 Box Culvert	\$56,000.00	EA.	3	\$168,000.00
36	2-8x5 Structure	\$88,000.00	EA.	0	\$0.00
37	Diversion Structure	\$12,000.00	EA.	4	\$48,000.00
38	3-10x6 Storm Drain	\$1,200.00	L.F.	0	\$0.00
39	Structural Backfill	\$40.00	C.Y.	0.0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$31,677,454.81

Construction Contingencies	27%	\$8,552,912.80
Engineering	7%	\$2,217,421.84
Construction Administration	6%	\$1,900,647.29

BASE ALTERNATIVE TOTAL \$44,348,436.74

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE

Flood Control District of Maricopa County

Contract FCD 99-44

Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION: 83rd Ave. Alternative I (Channel along 83rd Avenue)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	172,920	\$518,760.55
2	Pavement Replacement	\$50.00	S.Y.	2,667	\$133,350.00
38	3-10x6 Storm Drain	\$1,200.00	L.F.	150	\$180,000.00
5	Repair Channel Lining	\$10.00	L.F.	0	\$0.00
6	36" RCP	\$110.00	L.F.	3,100	\$341,000.00
7	Transition Structures (Channel)	\$12,000.00	EA.	1	\$12,000.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	2	\$2,400.00
39	Structural Backfill	\$40.00	C.Y.	367	\$14,666.67
Land Use					
20	Undeveloped Residential	\$100,000.00	Acre	1.6	\$162,610.32
21	Developed Residential	\$180,000.00	Acre	4.2	\$750,740.27
22	Undeveloped Commercial	\$300,000.00	Acre	9.0	\$2,700,000.00
Landscaping					
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	S.F.	245,500	\$343,700.00
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	398,370	\$607,718.00
26	Park & Playground Equipment	\$10,000.00	EA.	1	\$10,000.00

SUBTOTAL \$5,776,945.81

Construction Contingencies	27%	\$1,559,775.37
Engineering	7%	\$404,386.21
Construction Administration	6%	\$346,616.75

TOTAL CONSTRUCTION \$8,087,724.14

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION: 83rd Ave. Alternative 2 (Combination channel/storm drain along 83rd Ave.)

<u>DRAINAGE IMPROVEMENT ELEMENTS:</u>						
ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT	
1	Excavation	\$3.00	C.Y.	169,238	\$507,712.58	
2	Pavement Replacement	\$50.00	S.Y.	3,333	\$0.00	
38	3-10x6 Storm Drain	\$1,200.00	L.F.	1,000	\$1,200,000.00	
4	Channel Lining	\$5.00	S.F.	0	\$0.00	
6	36" RCP	\$110.00	L.F.	3,100	\$341,000.00	
7	Transition Structures (Channel)	\$12,000.00	EA.	3	\$36,000.00	
8	Transition Structures (36" RCP)	\$1,200.00	EA.	2	\$2,400.00	
39	Structural Backfill	\$40.00	C.Y.	2,444	\$97,777.78	
LANDSCAPING						
20	Undeveloped Residential	\$100,000.00	Acre	1.6	\$160,000.00	
21	Developed Residential	\$180,000.00	Acre	3.2	\$576,000.00	
22	Undeveloped Commercial	\$300,000.00	Acre	9.0	\$2,700,000.00	
LANDSCAPING EQUIPMENT						
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00	
23	Desert Landscaping	\$1.20	S.F.	0	\$0.00	
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00	
40	Residential Desert Landscaping	\$1.40	S.F.	210,500	\$294,700.00	
41	Residential Basin Landscaping	\$1.40	S.F. + \$50K	398,370	\$557,718.00	
26	Park & Playground Equipment	\$10,000.00	EA.	1	\$10,000.00	
SUBTOTAL					\$6,483,308.36	
Construction Contingencies					27%	\$1,750,493.26
Engineering					7%	\$453,831.59
Construction Administration					6%	\$388,998.50
TOTAL CONSTRUCTION					\$9,076,631.71	

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION:

Rock Springs Alternative 1 (Channel along Patrick Lane)

<u>DRAINAGE IMPROVEMENT ELEMENTS:</u>					
ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	29720	\$89,160.75
2	Pavement Replacement	\$50.00	S.Y.	0	\$0.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	0	\$0.00
4	Channel Lining	\$5.00	S.F.	0	\$0.00
5	Repair Channel Lining	\$10.00	L.F.	0	\$0.00
6	36" RCP	\$110.00	L.F.	0	\$0.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	0	\$0.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	0	\$0.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	0	\$0.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	5	\$500,000.00
21	Developed Residential	\$180,000.00	Acre	0	\$0.00
22	Undeveloped Commercial	\$300,000.00	Acre	0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	450000	\$540,000.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. S/W & D/W	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	LF	0	\$0.00
41	Residential Basin Landscaping	\$1.40	LF	0	\$0.00
42	Equestrial Trail	\$3.50	LF	11000	\$38,500.00
43	Natural Wash Landscaping	\$1.40	LF	0	\$0.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	1890	\$189,000.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	0	\$0.00
34	20-foot Drop Structure	\$45,000.00	LF	0	\$0.00
35	10x4 Box Culvert	\$56,000.00	LF	0	\$0.00
36	2-8x5 Structure	\$88,000.00	LF	0	\$0.00
37	Diversion Structure	\$12,000.00	LF	0	\$0.00
39	Structural Backfill	\$40.00	LF	0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$1,356,660.75

Construction Contingencies	27%	\$366,298.40
Engineering	7%	\$94,966.25
Construction Administration	6%	\$81,399.65

BASE ALTERNATIVE TOTAL \$1,899,325.05

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION: Rock Springs Alternative 2 (Channel along Patrick Lane w/ basin)

<u>DRAINAGE IMPROVEMENT ELEMENTS:</u>					
ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	131943	\$395,829.00
2	Pavement Replacement	\$50.00	S.Y.	0	\$0.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	0	\$0.00
4	Channel Lining	\$5.00	S.F.	0	\$0.00
5	Repair Channel Lining	\$10.00	L.F.	0	\$0.00
6	36" RCP	\$110.00	L.F.	0	\$0.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	0	\$0.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	0	\$0.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	0	\$0.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	21	\$2,100,000.00
21	Developed Residential	\$180,000.00	Acre	0	\$0.00
22	Undeveloped Commercial	\$300,000.00	Acre	0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	450000	\$540,000.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. S/W & D/W	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	LF	0	\$0.00
41	Residential Basin Landscaping	\$1.40	LF	690072	\$966,100.80
42	Equestrial Trail	\$3.50	LF	11000	\$38,500.00
43	Natural Wash Landscaping	\$1.40	LF	0	\$0.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	1890	\$189,000.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	0	\$0.00
34	20-foot Drop Structure	\$45,000.00	LF	0	\$0.00
35	10x4 Box Culvert	\$56,000.00	LF	0	\$0.00
36	2-8x5 Structure	\$88,000.00	LF	0	\$0.00
37	Diversion Structure	\$12,000.00	LF	0	\$0.00
39	Structural Backfill	\$40.00	LF	0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$4,229,429.80

Construction Contingencies	27%	\$1,141,946.05
Engineering	7%	\$296,060.09
Construction Administration	6%	\$253,765.79

BASE ALTERNATIVE TOTAL \$5,921,201.72

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION: Rock Springs Alternative 3 (Channel along Patrick Lane w/o basin)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	32000	\$96,000.00
2	Pavement Replacement	\$50.00	S.Y.	0	\$0.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	0	\$0.00
4	Channel Lining	\$5.00	S.F.	0	\$0.00
5	Repair Channel Lining	\$10.00	L.F.	0	\$0.00
6	36" RCP	\$110.00	L.F.	0	\$0.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	0	\$0.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	0	\$0.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	0	\$0.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
Land Use					
20	Undeveloped Residential	\$100,000.00	Acre	6	\$600,000.00
21	Developed Residential	\$180,000.00	Acre	0	\$0.00
22	Undeveloped Commercial	\$300,000.00	Acre	0	\$0.00
Landscaping					
23	Desert Landscaping	\$1.20	S.F.	47000	\$56,400.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. SAW & DW	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	LF	0	\$0.00
41	Residential Basin Landscaping	\$1.40	LF	0	\$0.00
42	Equestrial Trail	\$3.50	LF	11000	\$38,500.00
43	Natural Wash Landscaping	\$1.40	LF	0	\$0.00
Other					
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	1890	\$189,000.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	0	\$0.00
34	20-foot Drop Structure	\$45,000.00	LF	0	\$0.00
35	10x4 Box Culvert	\$56,000.00	LF	0	\$0.00
36	2-8x5 Structure	\$88,000.00	LF	0	\$0.00
37	Diversion Structure	\$12,000.00	LF	0	\$0.00
39	Structural Backfill	\$40.00	LF	0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$979,900.00

Construction Contingencies	27%	\$264,573.00
Engineering	7%	\$68,593.00
Construction Administration	6%	\$58,794.00

BASE ALTERNATIVE TOTAL \$1,371,860.00

**Appendix D
LEVEL II COST ANALYSIS**

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
Flood Control District of Maricopa County

Contract FCD 99-44
Entellus No. 310.017

FLOOD MITIGATION OPTIONS

STUDY AREA LOCATION: Rock Springs Alternative 4 (Channel along Patrick Lane w/ basin)

DRAINAGE IMPROVEMENT ELEMENTS:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Excavation	\$3.00	C.Y.	133000	\$399,000.00
2	Pavement Replacement	\$50.00	S.Y.	0	\$0.00
3	Structures (3-10x6 RBC)	\$166,000.00	EA.	0	\$0.00
4	Channel Lining	\$5.00	S.F.	0	\$0.00
5	Repair Channel Lining	\$10.00	L.F.	0	\$0.00
6	36" RCP	\$110.00	L.F.	0	\$0.00
7	Transition Structures (Channel)	\$12,000.00	EA.	0	\$0.00
8	Transition Structures (36" RCP)	\$1,200.00	EA.	0	\$0.00
9	Inlet Structures	\$600.00	EA.	0	\$0.00
10	Outlet Structures	\$900.00	EA.	0	\$0.00
11	Side inlet	\$5,000.00	EA.	0	\$0.00
12	Grouted Riprap	\$65.00	C.Y.	0	\$0.00
13	Structural Concrete	\$300.00	C.Y.	0	\$0.00
14	3-foot Drop Structure - Concrete	\$250.00	EA.	0	\$0.00
15	3-foot Drop Structure - Grouted Riprap	\$350.00	EA.	0	\$0.00
16	3-foot Drop Structure - Earthen	\$280.00	EA.	0	\$0.00
17	5-foot Drop Structure	\$280.00	EA.	0	\$0.00
18	Culvert w/ Energy Dissapator 70' channel	\$200,000.00	E.A.	0	\$0.00
19	Culvert w/ Energy Dissapator 40' channel	\$120,000.00	E.A.	0	\$0.00
20	Undeveloped Residential	\$100,000.00	Acre	22	\$2,200,000.00
21	Developed Residential	\$180,000.00	Acre	0	\$0.00
22	Undeveloped Commercial	\$300,000.00	Acre	0	\$0.00
23	Desert Landscaping	\$1.20	S.F.	45400	\$54,480.00
24	Lush Desert Landscaping	\$1.30	S.F.	0	\$0.00
25	Drip Irrigation System	\$0.00	L.F.	0	\$0.00
26	Park & Playground Equipment	\$10,000.00	EA.	0	\$0.00
27	Conc. SAW & D/W	\$5.00	S.F.	0	\$0.00
40	Residential Desert Landscaping	\$1.40	LF	0	\$0.00
41	Residential Basin Landscaping	\$1.40	LF	690072	\$966,100.80
42	Equestrial Trail	\$3.50	LF	11000	\$38,500.00
43	Natural Wash Landscaping	\$1.40	LF	0	\$0.00
28	Fence	\$10.00	LF	0	\$0.00
29	Bridge crossing -	\$2,700.00	EA.	0	\$0.00
30	Box Culvert Crossing	\$2,500.00	EA.	0	\$0.00
31	Maintenance of Earthen Channel (30 years)	\$100.00	LF	2000	\$200,000.00
32	Maintenance of Riprap Channel (30 years)	\$50.00	LF	0	\$0.00
33	Maintenance of Concrete Channel (30 years)	\$6.00	LF	0	\$0.00
34	20-foot Drop Structure	\$45,000.00	LF	0	\$0.00
35	10x4 Box Culvert	\$56,000.00	LF	0	\$0.00
36	2-8x5 Structure	\$88,000.00	LF	0	\$0.00
37	Diversion Structure	\$12,000.00	LF	0	\$0.00
39	Structural Backfill	\$40.00	LF	0	\$0.00

BASE ALTERNATIVE SUBTOTAL \$3,858,080.80

Construction Contingencies	27%	\$1,041,681.82
Engineering	7%	\$270,065.66
Construction Administration	6%	\$231,484.85

BASE ALTERNATIVE TOTAL \$5,401,313.12

**Appendix D
LEVEL II COST ANALYSIS**

Area 9 Quantities

	Unit	Unit Cost	Altern. 1 Quant.	Altern. 1 Cost	Altern. 2 Quant.	Altern. 2 Cost	Altern. 3 Quant.	Altern. 3 Cost	Altern. 4 Quant.	Altern. 4 Cost
1 Excavation	C.Y.	\$3.00	54900	\$164,700.00	500000	\$1,500,000.00	69600	\$208,800.00	460600	\$1,381,800.00
2 Pavement Replacement	S.Y.	\$50.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
3 Structures (3-10x6 RBC)	EA.	\$166,000.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
4 Channel Lining	S.F.	\$5.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
5 Repair Channel Lining	L.F.	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
6 36" RCP	L.F.	\$110.00	850	\$93,500.00	850	\$93,500.00	850	\$93,500.00	850	\$93,500.00
7 42" RCP	L.F.	\$110.00	1920	\$211,200.00	3920	\$431,200.00	0	\$0.00	0	\$0.00
8 10' x 4' Concrete Box Culvert	L.F.	\$360.00	2000	\$720,000.00	0	\$0.00	0	\$0.00	0	\$0.00
9 Inlet Structures	EA.	\$600.00	3	\$1,800.00	3	\$1,800.00	1	\$600.00	1	\$600.00
10 Outlet Structures	EA.	\$900.00	3	\$2,700.00	3	\$2,700.00	1	\$900.00	1	\$900.00
11 Side inlet	EA.	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
12 Grouted Riprap	C.Y.	\$65.00	8600	\$559,000.00	7700	\$500,500.00	12000	\$780,000.00	12000	\$780,000.00
13 Structural Concrete	C.Y.	\$300.00	2233	\$669,900.00	0	\$0.00	0	\$0.00	0	\$0.00
14 3-foot Drop Structure - Concrete	EA.	\$250.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
15 3-foot Drop Structure - Grouted Riprap	EA.	\$350.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
16 3-foot Drop Structure - Earthen	EA.	\$280.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
17 5-foot Drop Structure	EA.	\$280.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
18 Culvert w/ Energy Dissapator	E.A.	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
19 Basin Landscaping	L.S.	\$50,000.00	1	\$50,000.00	2	\$100,000.00	1	\$50,000.00	2	\$100,000.00
0 ROW Aquisition	N/A									
20 Undeveloped Residential	Acre	\$100,000.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
21 Developed Residential	Acre	\$180,000.00	8	\$1,440,000.00	8	\$1,440,000.00	10	\$1,800,000.00	10	\$1,800,000.00
22 Undeveloped Commercial	Acre	\$300,000.00	1	\$300,000.00	10	\$3,000,000.00	1	\$300,000.00	10	\$3,000,000.00
0 Landsape/Environmental	N/A									
23 Basin Landscaping	S.F.	\$1.40	33900	\$47,460.00	424900	\$594,860.00	33900	\$47,460.00	424900	\$594,860.00
24 Channel Landscaping	S.F.	\$1.40	205000	\$287,000.00	181000	\$253,400.00	285000	\$399,000.00	285000	\$399,000.00
25 Drip Irrigation System	L.F.	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00	0	\$0.00
				\$4,547,260.00		\$7,917,960.00		\$3,680,260.00		\$8,150,660.00

APPENDIX E. PUBLIC COMMENTS

**Glendale / Peoria
Public Open House
September 20th and 21st 2000**

Questionnaires Summarized

September 20th, 2000 – Ventana Lakes

Three (3) people responded to the **Rock Springs Region Questionnaire**:

Howard and Rosemary Chambers only filled out the **Meeting Survey** portion on the back side:

Heard about the meeting -- Door Hanger
Rate overall knowledge and helpfulness -- Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Jackie Allen:

✓ Alt. 5 - do nothing – Leave Aqua Fria alone

Steve Campbell:

4 Alt 1
3 Alt 2
5 Alt 3
2 Alt 4
1 Alt 5

Two (2) people responded to the **83rd Avenue Region Questionnaire**:

Howard Chambers:

There is a flooding problem at 83rd Ave. & Union Hills (See map on back of survey)
Concerning bridge at New River, wants to know what is going to protect 83rd Ave?

Larry Moore:

2 Alt 1
*1 Alt 2
Not an option Alt 3

* Because this will handle the most water volume as well as keeping as much water as possible off 83rd Ave.

Moore said his house has been flooded twice since 1994

Under other comments, Moore said, purchase the property at 85th Ave and Deer Valley Road and install a Retention Basin, pave 85 Road between Via Montoya to Deer Valley and install storm drains

Moore continued . . .

Heard about the meeting -- Door Hanger
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Ten (10) people responded to the Northwest Region Questionnaire:

Sheldon J Stover:

Alt 4 more cost affective and utilized current retention basins on N side of Rose Garden Lane

Heard about the meeting -- Newspaper Notice
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner
Rate facility for future meetings -- Very Good

Charles F. Wackes:

3 Alt 1
*1 Alt 2
4 Alt 3
2 Alt 4
5 Alt 5

*Because it appears to be the best alternative presented
(#5) Not an alternative

Heard about the meeting -- Door Hanger / Newspaper Notice
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

George Horton:

4 Alt 1
3 Alt 2
2 Alt 3
1 Alt 4
5 Alt 5

I prefer having a detention basin and feel they are good for drainage. I also feel there is less distance for water to travel and not as much water will bet into Rose Gardens.

We need something done to prevent current problems at the corners of Rose Gardens and 111th and 111th and Beardsley.

Under other comments: When you schedule your next meetings and do door hangers, make mention the info is pertaining to the last held meeting because new people are involved, because of moving in and some of us older folks don't remember real well.

Local problem of water going over 111th and Union Hills. This may be a local problem but needs to be addressed. Looks like the Trailer Park pumps water out on road.

Thanks for giving us a chance for input.

Heard about the meeting -- Door Hanger
Rate overall knowledge and helpfulness -- Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Shirley Horton:

4 Alt 1
3 Alt 2
2 Alt 3
1 Alt 4
5 Alt 5

Under other comments: Local problem 111th Ave & Union Hills water sits when it rains. Trailer Park pumps water across the road or into road.

Heard about the meeting
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner
Rate facility for future meetings

Charles Yankowski:

 Alt 1
 Alt 2
✓ Alt 3
✓ Alt 4
 Alt 5

Because of shorter distance and retention basin

Heard about the meeting -- Newspaper Notice
Rate overall knowledge and helpfulness -- Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Good

Joan Yankowski:

- Alt 1
- Alt 2
- 1 Alt 3
- 2 Alt 4
- Alt 5

Short distance point to point and retention basin

Under other comments: Hernan said fill channel Who should fill channel on South side of Rose Garden, this is behind my home

Heard about the meeting -- Door Hanger
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Howard and Rosemary Chambers:

- ✓ Alt 3

Heard about the meeting -- Door Hanger
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Kurt Herr:

- ✓ Alt 2

Beardsley Channels need Improvements!

It prevents some of the problems of large amounts of water having to make 90 degree turns at 107th Ave and Rose Garden Lane

Heard about the meeting -- Other
Rate overall knowledge and helpfulness -- Very Good
Information presented/understandable manner -- Yes
Rate facility for future meetings -- Very Good

Jerry Timmerman:

- 2 Alt 1
- 1 Alt 2
- 4 Alt 3
- 3 Alt 4
- 5 Alt 5

Better protection of my property and increased recreational facilities.
To do nothing about floods is stupid.

Heard about the meeting -- Other/wife

Paul Powers:

X Alt 2

If draining ditch in on north side of Rose Garden as shown on sketch

Heard about the meeting – Other / VT Association

September 21st, 2000 – Sunrise Mountain High School

Two (2) people responded to the 83rd Avenue Region Questionnaire

Thomas Bertolon:

Under other comments:

- 1) Drainage problem across 83rd South of Union Hills
- 2) Now freeway interchange for Beardsley & 83rd east to 101 – do we know of this?

Mike Meinert

1 Alt 1

2 Alt 2

3 Alt 3

To lessen the expense of this portion, may free up monies for more projects in the area. Also horse/bike/walking paths would be aesthetically good for the area, and used for recreation.

Doing nothing won't fix the existing problems

Heard about the meeting – Other/McDot

Rate overall knowledge and helpfulness – Very Good

Information presented/understandable manner – Yes

Rate facility for future meetings – Very Good

One (1) person responded to the Rock Springs Region Questionnaire

Howard B. Weichsel

4 Alt 1

3 Alt 2

2 Alt 3

1 Alt 4

5 Alt 5

#4 The alternative that provides aesthetics (amenities) in a package with practical solutions is biggest benefit for \$ expended. However, as funding meets resistance the lessor solution may be more palatable to the residents of the community.

#5 Simple ignoring the problem is not acceptable, as cost and flood damage in the future might have been prevented.