APPENDIX E

Shalako Detention Basin Alternative



TECHNICAL MEMORANDUM

Date: July 28, 2010

To: Bob Shattuck, Lennar Communities

From: Ken Giberson, MacKay & Somps

TM No.: Technical Memorandum No. 4

Subject: Shalako Detention Basin Alternatives SunCreek Specific Plan Rancho Cordova, CA

Job No.: 7991-10

Task No.: Task B.3

A. Introduction

The Shalako property is located in the most southwestern corner of the SunCreek Specific Plan area. The southern boundary of the Shalako property abuts the northwestern portions of the Arboretum project. Figure 1 depicts the Shalako and the northwestern portions Arboretum projects.

A tributary to Laguna Creek, Kite Creek, bisects the Shalako property in a northsouth direction dividing the development into two separate areas – a western area and an eastern area. The southern portion of the western area Shalako property naturally drains towards the Arboretum project.

Development of the Shalako property will redirect this southern portion of the western area watershed easterly to a proposed detention basin located at the western edge of the Kite Creek preserve area near the south boundary of the Shalako property. This redirection would assure that the Shalako property will not drain onto the Arboretum project post development.

This redirection is, also, required to conform to the requirements of the Conceptual Level Strategy for wetland preservation for the SunCreek Specific Plan area that, in part, mandates that runoff from the developed portions of the SunCreek project not drain directly to the preserve area. Instead, these flows are to be directed to strategically located detention basins for water quality treatment and peak flow attenuation prior to discharge to Kite Creek and the preserve areas.

In order to accomplish this redirection, several feet of fill will need to be placed along the most southern tier of lots of the Shalako property. The resulting lot pad

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7991-00



PROPOSED STORM DRAIN (DEDICATED TO OPEN SPACE) PROPOSED STORM DRAIN (INCLUDES OFFSITE DEVELOPED FLOWS)

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elevations would be $2\pm$ to $6\pm$ feet higher than the adjoining tier of lots on the Arboretum site.¹

This difference in elevations between adjoining lots will create a significant slope between adjoining lots, an undesirable condition requiring slopes and excessive lot depths on the lower lots or the construction of expensive retaining walls to retain the slope.

In an effort to resolve this situation, the question has been raised whether a redesign of the basic grading/drainage concepts incorporated into the Storm Drainage Master Plan (SDMP) for SunCreek in this portion of the Shalako property could alleviate this problem. The intent would be to achieve a more compatible grading interface between the two projects.

The solution to this problem lies in determining whether the detention basin (Basin 12) that will serve this portion of the Shalako development can be reduced in size (depth) to lower the pad grades of the most southern tier of lots along the south boundary of the Shalako development. Figure 1 also shows the location of the Shalako detention basins in relation to the grading interface problem area, as well as the wetland preserve and Kite Creek areas. To compensate for the loss in flood storage volume in Basin 12, Basins 9, 10 and 11 will be increased in the size to over-detain post development flows sufficiently to compensate for the elimination of the 100-year peak flow storage volume of the basin in question (Basin 12).²

The intent of this technical memorandum is to document the analysis necessary to determine whether redistribution of storage volumes in these four detention basins is feasible. For purposes of this analysis, a compliance point in Kite Creek at the southern boundary of the Shalako property will be used to test whether reconfiguration of the flood control volumes of these four basins is feasible. The test for feasibility will be whether one can achieve a "no-net change" condition in the flows exiting the site at the point Kite Creek crosses the south boundary of the Shalako property.

B. Methodology

Building on the storm drainage Sac-Calc Baseline Conditions modeling contained in the SDMP, the approach to this analysis is briefly summarized as follows:

1. The stand-alone hydromodification flow duration control volume requirements for Basin 12 will be quantified and separated from the total

¹ Personal Conversation with Sean Davis of RJA Engineers on July 27, 2010.

 $^{^{2}}$ Water quality and hydromodification flow duration control volumes in Basin 12 would not change under this scenario.

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detention volume of the basin.

- 2. Basin 12 will be reduced in size sufficiently to allow the overland release from the southwestern portion of the Shalako property to pass through the basin unattenuated and discharge directly into Kite Creek while retaining the requisite water quality and hydromodification volumes. This will allow the magnitude of filling that is needed to occur along the common property line between the two adjoining projects to be reduced to minimize and/or eliminate the grading interface problem.
- 3. The flood control volumes in the three remaining basins will be increased on an incremental basis until the hydraulic model reflects a "no net change" condition at the compliance point mentioned above.
- 4. Compare the magnitude of the flows at the compliance point to demonstrate a "no net change" condition at the compliance point.

C. Analysis

In accordance with the methodology outlined above, the following analysis was performed:

1. Determine Requisite Stand-Alone Hydromodification Flow Duration Control Volumes For Basin 12.

The detention basins shown on the Baseline Conditions Model for SunCreek were designed as combined water quality, hydromodification flow duration control and flood control basins. As such, because of the timing of flows entering these detention basins from the developed portions of the SunCreek project some of the storage volume above the 1.5 foot deep hydromodification weir is jointly used for additional hydromodification storage and peak flow attenuation storage for the 100year design event.

Since hydromodification includes design events up to the 10-year design event, Basin 12 can only be reduced by the amount of the jointly used volume. Based on the hydromodification analysis performed by CBEC for the SDMP, CBEC estimated that magnitude of this joint storage volume to be approximately 50% of the flood storage volume of the detention basin plus the 1.5 foot high hydromodification weir.³⁴

³ Personal communication between Ken Giberson of MacKay & Somps and Chris Campbell of CBEC on December 14, 2009 (approximately 50% for 10-year/24-hour storm).

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> This joint storage volume was then estimated for each of the four basins under study. Also, the water quality and 1.5' pool volumes of each of the basins were determined. The results of this analysis are summarized in Table 1.

Basin No.	1.5' Hydro- Modification Storage Volume (AF)	Baseline Conditions Model 100- Year Storage Volume (AF)	Total Storage Volume (AF)	Joint Detention Volume (AF)	Water Quality Volume (AF)
9	3.0	14.0	17.0	5.5	1.5
10	1.5	10.1	11.5	7.1	1.7
11	0.2	1.0	1.2	0.4	0.4
12	3.5	13.0	16.5	4.8	3.0
Total	8.1	38.8	46.1	17.8	6.6

Table 1 Requisite Detention Basin Volumes (Assuming Baseline Conditions Model)

2. Redesign Basin 12 To Minimize And/Or Eliminate The Grading Interface Problem.

An effort was then undertaken to redesign Basin 12 to lower the overland release elevation for the southwest portion of the Shalako property and, thereby, lower the basin depth and the pad elevations of the southern tier of Shalako lots along the common boundary line with the Arboretum property. This redesign effort reduced the pad elevations in question in the magnitude of $1\pm$ to $3\pm$ feet.⁵ This effectively eliminated and/or minimizes the grading interface problem between the two projects.

3. Determine Additional Peak Flow Storage Volumes in Basins 9, 10 and 11 Required To Achieve A "No Net Change" Condition.

The storage volumes of Basins 9, 10 and 11 were then incrementally increased and the model re-run each time until a "no-net change" condition was achieved at the compliance point. Figure 2 is a tabular

⁴ Design level analysis should be performed prior to approval of improvement plans for the project to verify this accuracy of this analysis.

⁵ Personal conversation with Sean Davis at RJA Engineers on July 27, 2010.

Figure 2

Shalako Detention Requirements Excluding Basin 12 For Flood Detention SunCreek Drainage Master Plan

					-		Baseli	ine Condition	ns Model											Cu	Irrent Scena	rio		ii aa a taraha a Bhire		
<u>Basin No.</u>	<u>Acreage</u>	Bottom (Ac)	<u>100-Yea</u> Vol	r Flood	Detention		Hydro	Mod Volume	<u>e (AcFt.)</u>		Subtotal Flood	Volume +	<u>Water</u> Quality Volume	Total	<u>100-Yea</u> Vol	ar Flood	Detention		<u>Hydrol</u>	lod Volume,	AcFt. (2)		Subtotal Flood	<u>Volume +</u> Ft.) (3)	<u>Water</u> <u>Quality</u> Volume	Total (AcFt.)
		1.07				Total	<u>(1)</u>	Joint Use	<u>1.5' F</u>	2001		<u>to. 1 t.j</u>	(AcFt.)	<u>1730.1 1.1</u>			<u></u>	Tota	1	Joint Use	<u>1.5' P</u>	<u>'ool</u>			(AcFt.)	•
9	4.00	2.00	14.0	82%	100 Year/ 24 Hour	8.5	50%	5.5	3.0	18%	17.0	100%	1.5	18.5	26.0	90%	100 Year/ 10 Day	8.5	29%	5.5	3.0	10%	29.0	100%	1.5	30.5
10	2.50	1.00	10.0	87%	100 Year/ 10 Day	5.8	50%	4.3	1.5	13%	11.5	100%	1.7	13.2	20.0	93%	100 Year/ 10 Day	5.8	27%	4.3	1.5	7%	21.5	100%	1.7	23.2
11	0.80	0.12	1.0	85%	100 Year/ 24 Hour	0.6	50%	0.4	0.2	15%	1.2	100%	0.4	1.6	2.3	93%	100 Year/ 10 Day	0.6	24%	0.4	0.2	7%	2.5	100%	0.4	2.9
12	<u>4.20</u>	2.30	<u>13.0</u>	<u>79%</u>	100 Year/ 24 Hour	<u>8.2</u>	50%	<u>4.8</u>	<u>3.5</u>	21%	<u>16.5</u>	100%	<u>3.0</u>	<u>19.5</u>	<u>0.0</u>	0%	n/a	<u>8.2</u>	100%	<u>4.8</u>	<u>3.5</u>	<u>n/a</u>	<u>8.2</u>	100%	<u>3.0</u>	<u>11.2</u>
																-										
Total	11.50	5.42	38.0	82%		23.1		14.9	8.1		46.1		6.6	52.7	48.3			23.1		14.9	8.1		61.2		6.6	67.8

Notes:

1. HydroMod Volume for Current Scenario = Approx. 50% of "Subtotal Flood Volume + 1.5' Pool" for 10-Year/24 Hour Storm (Approx. 75% for 100-Year/10 Day Storm).

2. HydroMod Volume for Proposed Scenario = Baseline Model Volumes.

3. Basin 12 volume controlled by total hydromod volume requirement.

4. Numbers may not total due to round-off error.



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computation and pictorial representation of this analysis. Table 3 shows the resulting storage volumes in the basins under study.

	C.)	
		Current			
	1.5' Hydro-	Scenario			
	Modification	100-Year	Total	Joint	Water
	Storage	Storage	Storage	Detention	Quality
Basin	Volume	Volume	Volume	Volume	Volume
No.	(AF)	(AF)	(AF)	(AF)	(AF)
9	3.0	26.0	29.0	5.5	1.5
10	1.5	20.0	21.5	7.1	1.7
11	0.2	2.3	2.5	0.4	0.4
12	3.5	0.0	8.2	4.8	3.0
Total	8.1	48.3	46.1	17.8	6.6

Table 2 Requisite Detention Basin Volumes (Assuming Current Scenario)

4. Compare the Magnitude of the Flows at the Compliance Point to Demonstrate a "No Net Change" Condition at the Compliance Point.

The results of this analysis were then tabulated to demonstrate that a "nonet change" condition was achieved. Table 3 includes the results of this analysis demonstrating a "no-net change" condition. The final results of the Baseline Conditions Model SAC-CALC analysis are included in Appendix A.

D. Summary of Results

This technical memorandum demonstrates that it is technically feasible to achieve an increase the peak flow storage volumes of Basins 9, 10 and 11 such that the peak flow storage volume of Basin 12 can be reduced sufficiently to minimize and/or eliminate the grading interface problem between the Shalako and Arboretum projects. As shown in Table 2, this can be accomplished while meeting the "no-net change" requirement at the compliance point. Technical Memorandum July 28, 2010 Page 7 of 11

		100-Year/24 Hour
	10-Year Flow at	Flow at
Scenario	Compliance Point	Compliance Point
Baseline Conditions Model	617 cfs	1,024 cfs
Current Scenario	613 cfs	1,034 cfs ⁶

Table 3"No-Net Change" at Compliance Point Tabulation

One significant result of such a redistribution of storage volumes between Basins 9, 10, 11 and 12 is the significant increase in storage volumes in Basins 9, 10 and 11 required to achieve a "no-net change" condition. The increase in the aggregate storage volumes of Basins 9, 10 and 11 significantly exceed the reduction in volume in Basin 12.

This phenomenon is principally due the differences in response time of the drainage system and the fact that placing additional storage volumes upstream to compensate for the elimination of downstream storage volumes is inefficient. That is to say that it takes a greater amount of upstream storage to mitigate the effect of unattenuated downstream discharges.

E. Conclusion

Notwithstanding the adverse impacts on developable area within the Shalako property, it appears technically achievable to eliminate and/or minimize the grading interface problem. This can be done by reducing the size of Basin 12 and providing a compensating increase in storage volumes in Basins 9, 10 and 11 while still achieving a "no-net change" condition at the compliance point.

⁶ Based on professional experience this flow rate will actually be lower than the Baseline Conditions Model results when using HEC-RAS Unsteady State analysis. Accordingly, this result is acceptable and deemed to meet the "no-net change" standard utilized in this analysis.

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Appendix A

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Baseline Conditions Modeling

Sacramento Hydrologic Calculator Report July 28, 2010 11:24 Method: Sacra

 Project Title:
 Basin n Proposed Conditions
 Metho

 Comments:
 Proposed Conditions. with local detention - Baseline Condition 10 yr and 100 yr 24 hour storrms
 Date:

 Prepared by:
 KEC

Sacramento County HEC-1 method 8/6/2008

Watershed Hydrologic Summary Data

		Mean	Lag Ti	mes	Basin	"n"	Loss I	Rates	Percent I	mpervious
	Area	Elevation		Lag Time		Basin		Loss Rate		Impervious
Watershed	(acres)	(ft)	Method	(min)	Method	"n"	Method	(in/hr)	Method	Area (%)
KCOS1	16.8	203.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV2	120.2	199.7	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV3	76.9	185	Basin "n"	-	Computed	-	Computed	-	Computed	-
KCDV5	201.3	175	Basin "n"	-	Specified	0.051	Computed	-	Computed	-
KCDV4	134.1	174	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV7	52	153.5	Basin "n"	-	Specified	0.037	Computed	-	Computed	-
KCDV8	126.2	152.9	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV9	82.2	144.2	Basin "n"	-	Specified	.051	Computed	-	Computed	-
KCOS02	54.9	166.3	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS03	30.4	153	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
OSKC05	102.3	181.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV06	94.2	166.5	Basin "n"	-	Specified	0.039	Computed	-	Computed	-
KCOS04	29.3	145.2	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS06	20.3	166	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCA3	297.3	151	Basin "n"	-	Specified	0.049	Computed	-	Computed	-
KCOS11	11.1	157.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV11	13.8	145.1	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV10	68.4	140.1	Basin "n"	-	Specified	0.045	Computed	-	Computed	-
KCDV12	96.8	138.3	Basin "n"	-	Specified	.042	Computed	-	Computed	-
KCOS12	65	156.5	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS13	21	154	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS14	14	145.5	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS15	68.2	122.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS3A	168.5	213	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
EXKC13	73.3	140	Basin "n"	-	Computed	-	Computed	-	Computed	-
EXKC14	95.1	120	Basin "n"	-	Computed	-	Computed	-	Computed	-

Basin "n" Method Data for Lag Time Computation

	Channel	Centroid									Land	Use II	npervi	ious A	rea Pe	ercent						
Watershed	Length	Length	Slope	Channelization	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
watershed	<u>(II)</u>	(II)	(1011)	Undeveloped								50	-10		23	20	15	10		-	-	<u> </u>
KCOS1	1576	850	0.0159	Developed					-							-	-		-	-		
				Undeveloped	-	-		-	-		-	-	-		-	-	-	-	-	-	- 1	
KCDV2	3940	750	0.0156	Developed	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				Undeveloped	2.6	6.8					8.1	21.4							12.9	25.1		
KCDV3	1920	444	0.0042	Developed	0	0					0	0							0	0		
W CD US		1007	0.0102	Undeveloped	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
KCDV5	4464	1907	0.0103	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K CDV4	2207	017	0.003	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV4	5297	917	0.003	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV7	1655	580	0.0091	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV/	1055	500	0.0091	Developed	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-
KCDV8	4054	2363	0.0081	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	<u> </u>	-	-	-	-	-	-	-				-	-	-	<u> </u>
KCDV9	4360	2120	.0083	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	<u> </u>	<u> </u>	<u> </u>	<u> </u>		-	· ·
				Developed	-	-			-		-	-	-	-	-		-	-			-	<u> </u>
KCOS02	3900	2145	.005	Undeveloped	-	-		-		•	-	-	-	-	-	<u> </u>	-	<u> </u>	<u> </u>		-	
				Developed	<u> </u>	-									<u> -</u>	<u> </u>			<u> </u> _		-	<u> </u>
KCOS03	2089	415	.0048	Undeveloped	-		<u> </u>			-	-			-		-			<u> </u>			<u> </u>
				Undeveloped	-	-			-							<u> </u>		<u> </u>				<u> </u>
OSKC05	4804	2082	.0081	Developed	-		<u> </u>		-									+			-	
				Undeveloped		<u> </u>	<u> </u>			1 -	1					1.		1		-	-	
KCDV06	3313	1851	.0063	Developed	-		-	-	-	-	-	-	-	-	-	-	-	-	-		-	-
				Undeveloped	-	-		-	-	-	-	-	-	-	-	-	-	- 1	-	-	-	-
KCOS04	2745	1385	005	Developed		-	-	-	-	-	-	-	-	-	-	-	-	- 1	-	-	-	- 1
11 00000	00.77	1207	0007	Undeveloped	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
KCOS06	2377	1387	0027	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VCA2	7016	2800	006	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCAJ	7010	3099	.000	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-
KCOS11	726	572	0069	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- I
				Developed	-				<u> -</u>	-			-	-	-	<u> </u>	-	-			-	-
KCDV11	850	322	.0213	Undeveloped	-	-	-	-	-		-	· -	-		-	<u> </u>	<u> </u>			<u> -</u>	-	
				Developed	-	<u> -</u>		<u>-</u>				<u> </u>	-			<u> </u>	<u> -</u>	<u> -</u>				
KCDV10	2474	1482	.0178	Undeveloped	-		<u> - </u>		-	<u>-</u>	·		-			<u>ب</u>	-	<u> -</u>	<u> -</u>		· ·	
				Developed	-		<u> </u>	-	-		<u> </u>					<u> </u>		<u> </u>			<u> </u>	
KCDV12	3407	1720	.0119	Developed	-	<u> </u>	<u> </u>	<u>-</u>			<u> </u>	<u> </u>				<u> </u>						
				Undeveloped	-	-	<u> </u>	-	-			<u> </u>			+-	+	-	+	+ -			
KCOS12	2632	1237	.0057	Developed		-							1					+	+			
				Undeveloped		-			<u> </u>	-	-	<u> </u>	<u>† -</u>					+			-	
KCOS13	1370	566	.0088	Developed	-	-	<u>+</u>	<u> </u>	-	<u> </u>	<u> </u>	- 1	-	<u> </u>	1	-	-	1 -	+	- 1	-	<u>† </u>
				Undeveloped	-	-	-	-	-	-	-	-	-	-	-	1.	-	-	-	-	-	-
KCOS14	1990	908	.0085	Developed	-	-	-	- 1	- 1	-	-	-	-	1.	1.	1.	-	-	-	-	-	-
1100011	0015	1004	0.007	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOSIS	3317	1334	.0027	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VCOSA	2707	1555	0122	Undeveloped	-	-	-	-	-	- 1	-	-	-	-	-	-	-	-	-	-	-	-
ACOSSA	3/8/	1555	.0152	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXEC12	4651	2747	0105	Undeveloped																100		
				Developed									1					1		0		
EXKC14	79700	3064	.003	Undeveloped				L						ļ		1	1		1	100		L
		1		Developed				1												0		

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

	Soil							L	and Use	Impervi	ious Are	a Percer	ıt						
Watershed	Cover	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
Watershed	B																		
KCOS1	C																4.8		
	D																12		
	В																		
KCDV2	С	1.1						26.2	12.2							8.2	2.2		
	D	2						36.7	21.6							2.2	7.8		
	В																		
KCDV3	С																		
	D	2.6	6.8					8.1	21.4							12.9	25.1		
	В																		
KCDV5	С															1.1			
	D	7.2					3.7	25.9	81.2							23.7	58.5		
	В																		
KCDV4	С																4.7		
	D						6.4	57.5	6.4	41						14	5.3		
	B																		
KCDV7	C	2.6				ļ										1			
	D	4.2	12.4	L		ļ	11.6	15.7						ļ		4.5			
	B																		
KCDV8		1.6						60.0	27.5							10.5			
		5				 		58.9	37.2							18.3	5.2		
KCDVO	B																		
KCDV9		16.2	25						24.5							0.0	- 28		
		10.2	2.3			<u> </u>			24.5	1						9.8	28		
VCOS02	D C																16.2		
KC0302																	38.6		
	B					<u> </u>													
KCOS03	C					<u> </u>										}	12.7		
	D					<u> </u>											17.7		
	B			<u> </u>															
OSKC05	С														<u> </u>				
	D																102.3		
	В					1													
KCDV06	С	0.9																	1
	D	23					10.9	46.9								5.5	7		
	В																		
KCOS04	С					1											20.4		1
	D				L				L							ļ	8.9		
	В					ļ													
KCOS06	C				ļ	ļ			ļ					ļ				 	
	D	ļ				 				L		<u> </u>		<u> </u>	I	<u> </u>	20.3		<u> </u>
ROLA					<u> </u>							<u> </u>	ļ		ļ				<u> </u>
KCA3						 			120				<u> </u>			0.6	26.3		
									/8.4				<u> </u>			4.4	07.0		<u> </u>
KCOSII															<u> </u>		50		
KCO311																	5.9		
}	R											<u> </u>	<u> </u>				J.2	 	
KCDV11	C C			<u> </u>	<u> </u>	<u> </u>			t		<u>├</u> ───		<u> </u>	1		<u> </u>			1
	D	2.1			<u> </u>	1			89			<u> </u>	<u> </u>	1	<u> </u>	28	t		1
	B			<u> </u>		<u> </u>			- <u></u>					1	1		<u> </u>	1	1
KCDV10	C				<u> </u>	1			<u> </u>			1		1					
	D	5	5	1		1			13.2	32.5			t	1	1	8	4.7		
	В					1						1	1	1	1	<u>† </u>		1	1
KCDV12	C	1.5			1	1			<u> </u>		<u> </u>	1		1	1	1	1	1	
	D	5.5	24			1			23.2	24.9	1	1			1	15.8	1.3	1	1
	В																		
KCOS12	С																27.1		
	D																37.9		
	В																		

VCOS12	С							1		1.3	
KCOS13	D									19.7	
	В										
KCOS14	С										
	D									14	
	В										
KCOS15	C										
	D									68.2	
	В										
KCOS3A	C									32.6	
	D									135.9	
	В										
EXKC13	С									6.5	
	D									66.8	
	В										
EXKC14	С									4.1	
L	D									91	

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
R1	DET03	J1	Pipe	2814	0.005	3	3:1	0.015
R6A	OSKC05	J06	Trapezoidal	555	0.007	20	4:1	0.030
R4	J03	J04	Trapezoidal	2319	0.0048	30	4:1	0.014
R5	J04	J05	Trapezoidal	2582	0.0039	20	3:1	0.015
R7	J06	J7	Trapezoidal	2058	0.0025	20	3:1	0.025
R2A	KCOS1	J02	Trapezoidal	1510	0.0159	05	3:1	0.03
R2	J1	J02	Trapezoidal	644	0.0047	5	3:1	0.03
R3	J02	J03	Trapezoidal	3485	.0313	5	3:1	0.03
R6	J05	J06	Trapezoidal	2283	0.0031	20	3:1	0.03
R8	J7	J08	Trapezoidal	95	0.0025	10	1:1	0.025
R8A	KCOS11	J08	Pipe	1147	0.005	3		0.015
R9	J08	J9	Trapezoidal	3214	0.0019	20	3:1	0.03
R10B	KCOS12	J10B	Trapezoidal	524	0.005	20	3:1	0.03
R10C	J10B	J10C	Trapezoidal	1398	0.005	10	3:1	0.03
R10D	J10C	J10	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	J1	Pipe	2628	0.005	5		0.015
R10	J10	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	J11	J12	Trapezoidal	2966	0.0022	15	2.5:1	0.07

Hydrograph Routing – Muskingum–Cunge (Standard)

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Detention Ba	asin Data													1			
Detention														Elev	Area	t Data	
Basin	Initial Co	ndition					Pond Sto	rage Rela	ation					(ft)	(sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	127.4	128.5	128.5	130.5	131.5						124.41	.54	.61	0.5
	(ft)		Area (ac)	6.38	6.61	6.89	7.23	7.81						128.50	84	2.6	1.5
								Pump	Data								
A3DET	Pump Hy	drogran	h Name		Pump D	ischarge		Pun	np 1	Pum	p 2	Pum	ър <u>3</u>	Pun	ip 4	Pur	ip 5
		BP		-	(cf	rsenarge rs)											
				Elevation	1 at whicl f	h Pump T t)	`urns On										
				Elevati	on at whi Off	ich Pump (ft)	Turns										
															Outle	t Data	
Detention Basin	Initial Co	ndition	1				Pond Sto	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	171	172	173	174	175	176	177				171.875	2.41	.61	0.5
	(ft)	171	Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344				176.5	230	2.6	1.5
			1	L				Pump	Data		L		L				
DET02	Dumn Hy	drogran	h Name		Dumm D			Pun	1p 1	Purr	1p 2	Pun	np 3	Pun	np 4	Pun	ıp 5
		uiogiap			Pump D (ci	fs)											
				Elevati	on at wh On	ich Pump (ft)	Turns										
				Elevati	on at wh	ich Pump	Turns							1			
			1		Off	(ft)								<u> </u>	Outle	et Data	
Detention								_						Elev.	Area	O Coef	Exponent
Basin	Initial Co	ndition	Elevation	170.5	171.5	172.5	173,5	orage Re	175.5	176.5	1			(ft) 171.	(sq ft) .785	.61	0.5
	Elevation (ft)	170.5	(II) Area	2.654	2.812	2.975	3.143	3.315	3.492	3.673				176	190	2.6	1.5
		<u> </u>	(ac)		l	1		Pump	Data	J			L		l		
DET03								Pu	np 1	Pur	np 2	Pu	mp 3	Put	np 4	Pun	np 5
	Pump Hy	drograp	h Name		Pump D	oischarge											
				Elevat	ion at wh	ich Pum	p Turns							-			
				Elevat	On ion at wh	(ft) hich Pum	p Turns					+	<u> </u>				
			Ι			. (11)		L		1				1	Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	lation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	161.5	Elevation (ft)	161.5	162.5	163.5	164.5	165.5	166.5	167.5				162.375	2.41	.61	0.5
	(ft)	101.5	Area (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18				167	251	2.6	1.5
DETO				1				Pump	Data	1 5		1 5				1 5	
DE104	Pump Hy	/drograp	h Name		Pump D	oischarge		Pur	np I	Pur	np 2	Pu	np 3	Pur	np 4	Pur	np 5
					(c	fs)		ļ		ļ							
				Elevat	ion at wh On	uch Pumj (ft)	p Turns	1						1			
				Elevat	ion at wh Off	iich Pum f (ft)	p Turns										
															Out	let Data	1
Basin	Initial Co	ndition					Pond St	torage Re	lation					Elev. (ft)	Area (sq ft)	Q Coef	Exponen
		156.5	Elevation (ft)	156.5	157.5	158.5	159.5	160.5	161.5	162.5				157.0	3.14	.61	0.5
1	Elevation	l I		1	1	1		1	1	1	1		1		1	1	1

	(ft)		Area (ac)	5.739	5.971	6.208	6.449	6.694	6.944	7.199				162	315	2.6	1.5
			I					Pump I	Data		·						
	D							Pun	ıp 1	Pum	p 2	Pun	ър 3	Pum	p 4	Pum	p 5
DET05	Pump Hy	ulograpi	1 Name		Pump D (c	ischarge											
				Elevati	on at wh On	ich Pump (ft)	Turns										
				Elevati	on at wh Off	ich Pump (ft)	Turns										
						<u></u>		L							Outle	t Data	
Detention	Initial Co	ndition					Pond St	orage Rel	ation					Elev.	Area (sq ft)	Q Coef.	Exponent
Dasin		liaition	Elevation (ft)	152.5	153.5	154.5	155.5	156.5	157.5	158.5				153.	1.57	.61	0.5
	Elevation (ft)	152.5	Area	2.812	2.975	3.143	3.315	3.492	3.676	3.859				158	170	2.6	1.5
			(ac)					Pumn I	Data		L						
DET06					<u>_</u>			Pun	1p 1	Pun	np 2	Pur	np 3	Pum	ıp 4	Pum	p 5
	Pump Hy	drograpl	n Name		Pump D	ischarge											
				Elevati	ion at wh	ich Pumr) Turns										
					On	(ft)											
				Elevat	ion at wh Off	ich Pump (ft)	o Turns										
										L					Outle	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev.	Area (sq ft)	Q Coef.	Exponent
Dasiii	Thitlat CO		Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
	(ft)	139.5	Area	0.965	1.061	1.162	1.268	1.378	1.493	1.612				145	135	2.6	1.5
			()		[Pump I	Data	l	L	1	L			L	L
DET07								Pun	np 1	Pun	1p 2	Put	np 3	Pun	1p 4	Pun	ip 5
	Pump Hy	drograp	h Name		Pump D	vischarge											
				Elevat	ion at wh	ich Pumj (ff)	p Turns										
				Elevat	ion at wh Off	ich Pump (ft)	p Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition					Pond Ste	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	135.5	136.5	137.5	139.5	138.5	140.5	141.5				136.875	2.41	.61	0.5
	(ft)	135.5	Area (ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
			(40)		l		L	Pump 1	L Data		L			I			1
DET08								Pun	np 1	Pun	1p 2	Pur	np 3	Pun	np 4	Pun	np 5
	Pump Hy	drograp	h Name		Pump D (c	ischarge fs)								 			
				Elevat	ion at wh On	ich Pump (ft)	o Turns										
				Elevat	ion at wh Off	ich Pump (ft)	Turns										
								•							Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	131.5	132.5	133.5	134.5	135.5	136.5	137.5				132.125	1.23	.61	0.5
	(ft)	131.5	Area	2.425	2.576	2.732	2.893	3.058	3.228	3.403				137	130	2.6	1.5
DET09		1	()		l	I	I	Pump	L Data	I	1	I	L	<u>I</u>	J		I
								Pur	np 1	Pun	np 2	Pur	np 3	Pun	np 4	Pur	np 5
	Pump Hy	drograp	h Name		Pump D (c	oischarge fs)											
				Elevat	ion at wh	ich Pumj	p Turns										

				Elevati	On on at whi Off	(ft) ch Pump (ft)	Turns										
			1	0,000											Outle	t Data	
Detention Basin	Initial Co	ndition					Pond Sto	orage Rela	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	120.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				131.5	.785	.61	0.5
	(ft)	130.3	Area (ac)	0.112	0.147	0.186	0.23	0.278	0.331	0.388				136	50	2.6	1.5
								Pump I	Data								
DET11						4		Purr	ւթ 1	Pum	p 2	Pur	np 3	Pun	ıp 4	Pum	p 5
	Pump Hy	drograph	n Name		Pump D (ci	ischarge fs)											
				Elevati	on at wh On	ich Pump (ft)	Turns										
				Elevati	on at wh Off	ich Pump (ft)	Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition		Pond Storage Relation										Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	127.5	Elevation (ft)	127.5	128.5	129.5	130.5	131.5	132.5	133.5				128.0	1.57	.61	0.5
	(ft)	127.5	Area (ac)	1.493	1.612	1.736	1.865	1.998	2.136	2.278				133	150	2.6	1.5
	s			•	L			Pump I	Data					·			
DET10								Pun	np 1	Pum	ip 2	Pur	np 3	Pun	np 4	Purr	ıp 5
	Pump Hy	drograpl	h Name		Pump D (c	ischarge fs)	:										
				Elevati	ion at wh On	ich Pump (ft)	Turns										
				Elevati	on at wh Off	ich Pump (ft)	Turns										
															Outl	et Data	
Detention Basin	Initial Co	ndition					Pond Ste	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	126.5	Elevation (ft)	126.5	127.5	128.5	129.5	130.5	131.5	132.5				127.0	2.355	.61	0.5
	(ft)	120.5	Area (ac)	2.278	2.425	2.576	2.732	2.893	3.058	3.228				132	200	2.6	1.5
	[]		•				•	Pump l	Data	•	A				••••••	•	A
DET12								Pun	np 1	Pum	ip 2	Put	np 3	Pur	np 4	Pun	1p 5
	Pump Hy	drograpl	h Name		Pump D	ischarge											

Pump Discharge (cfs)

Elevation at which Pump Turns On (ft) Elevation at which Pump Turns Off (ft)

View HEC-1 output

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		<u>Sac</u> (Project: (19	ramento metho Basin n Propos 00-year, 1-day	od results sed Condition rainfall)	15)	
ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	82.	12:30	.11			
KCA3	338.	12:34	.46			
A3DET	278.	12:46	.46	130.	15.	
OSKC05	117.	12:33	.16			
R6A	117.	12:34	.16			
KCOS06	60.	12:04	.03			
KCOS02	61.	12:33	.09			
KCOS1	31.	12:14	.03			
R2A	31.	12:18	.03			
KCDV3	115.	12:21	.12			
DET03	7.9	16:02	.12	175.	14.	
R1	7.9	16:09	.12			
KCDV2	253.	12:11	.19			
DET02	24.	13:55	.19	176.	18.	
KCOS3A	225.	12:25	.26			
R3A	224.	12:28	.26			
J1	251.	12:28	.57			
R2	250.	12:30	.57			
J02	271.	12:29	.60			
R3	271.	12:33	.60			
KCDV4	239.	12:15	.21			
DET04	23.	15:07	.21	166.	22.	
J03	353.	12:33	.89			
R4	352.	12:37	.89			
KCOS03	54.	12:15	.05			
KCDV5	302.	12:21	.31			
DET05	32.	15:18	.31	161.	31.	
J04	404.	12:36	1.25			
R5	403.	12:40	1.25			
KCOS04	74.	12:07	.05			
KCDV06	170.	12:15	.15			
DET06	16.	15:15	.15	157.	16.	.00
J05	433.	12:40	1.45			
R6	428	12:45	1.45			
KCDV7	138	12:06	08			
	130,	12.00	.00			

DET07	16.	13:08	.08	144.	6.1	.00	
KCDV8	201.	12:19	.20				
DET08	22.	15:14	.20	140.	22.	.00	
J06	571.	12:44	1.92				
R7	567.	12:48	1.92				
J7	844.	12:48	2.38				
R8	844.	12:48	2.38				
KCOS11	23.	12:10	.02				
R8A	23.	12:13	.02				
KCDV9	119.	12:23	.13				
DET09	12.	15:27	.13	136.	14.		
KCDV11	43.	12:04	.02				
DET11	7.9	12:35	.02	136.	1.0		
J08	868.	12:48	2.55				
R9	851.	12:56	2.55				
J9	901.	12:55	2.66				
KCOS14	23.	12:18	.02				
KCOS13	40.	12:13	.03				
KCOS12	89.	12:23	.10				
R10B	89.	12:25	.10				
J10B	115.	12:23	.13				
R10C	115.	12:27	.13				
J10C	133.	12:26	.16				
R10D	132.	12:31	.16				
KCDV10	137.	12:12	.11				
DET10	16.	13:43	.11	132.	8.8	.00	
KCDV12	179.	12:14	.15				
DET12	24.	13:52	.15	131.	13.	.00	
J10	1020.	12:54	3.07				
R10	1007.	12:57	3.07				
EXKC13	151.	12:11	.11				
J11	1039.	12:57	3.19				
R11	1008.	13:07	3.19				
EXKC14	34.	15:09	.15				
J12	1024.	13:07	3.33				

(10-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)	
KCOS15	48.	12:30	.11				
KCA3	199.	12:34	.46				

1					
A3DET	153.	12:51	.46	129.	12.
OSKC05	68.	12:33	.16		
R6A	68.	12:35	.16		
KCOS06	33.	12:04	.03		
KCOS02	36.	12:34	.09		
KCOS1	17.	12:14	.03		
R2A	17.	12:19	.03		
KCDV3	67.	12:21	.12		
DET03	6.1	15:28	.12	173.	8.4
R1	6.1	15:36	.12		
KCDV2	145.	12:11	.19		
DET02	18.	13:41	.19	174.	12.
KCOS3A	130.	12:25	.26		
R3A	130.	12:29	.26		
J1	150.	12:29	.57		
R2	150.	12:31	.57		
J02	162.	12:30	.60		
R3	162.	12:35	.60		
KCDV4	138.	12:15	.21		
DET04	18.	14:04	.21	165.	14.
J03	213.	12:35	.89		
R4	212.	12:39	.89		
KCOS03	30.	12:15	.05		
KCDV5	176.	12:21	.31		
DET05	24.	14:34	.31	160.	19.
J04	248.	12:38	1.25		
R5	247.	12:43	1.25		
KCOS04	41.	12:07	.05		
KCDV06	99.	12:15	.15		
DET06	13.	14:12	.15	156.	9.8
J05	268.	12:42	1.45		
R6	265.	12:49	1.45		
KCDV7	79.	12:06	.08		
DET07	13.	13:06	.08	143.	3.7
KCDV8	117.	12:19	.20		
DET08	16.	14:30	.20	139.	15.
J06	352.	12:48	1.92		
R7	350.	12:53	1.92		
J7	502.	12:53	2.38		
R8	502.	12:53	2.38		
KCOS11	13.	12:10	.02		

8.4		
12.		

165.	14.	.00

160.	19.	.00

.00

RSA	13	12.13	02			
KCDV0	70	12.15	.02			
	70. 0 2	12.23	.15	125	8.2	00
	9.5	13:00	.15	155.	8.3	.00
NCDVII DETII	24.	12:04	.02	124	(00
DETT	6.2	12:30	.02	134.	.6	.00
108	520.	12:53	2.55			
R9	510.	13:02	2.55			
J9	538.	13:01	2.66			
KCOS14	13.	12:18	.02			
KCOS13	23.	12:13	.03			
KCOS12	51.	12:23	.10			
R10B	51.	12:26	.10			
J10B	66.	12:24	.13			
R10C	66.	12:28	.13			
J10C	76.	12:27	.16			
R10D	76.	12:33	.16			
KCDV10	79.	12:12	.11			
DET10	13.	13:36	.11	131.	5.4	.00
KCDV12	104.	12:14	.15			
DET12	19.	13:41	.15	130.	7.8	.00
J10	613.	13:00	3.07			
R10	605.	13:04	3.07			
EXKC13	86.	12:11	.11			
J11	625.	13:04	3.19			
R11	607.	13:16	3.19			
EXKC14	20.	15:09	.15			
J12	617.	13:16	3.33			

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Current Scenario Modeling Results

Sacramento Hydrologic Calculator Report July 28, 2010 8:22 Method: Sacra

Project Title: Basin n Proposed Conditions Comments: Proposed Conditions. with local detention Basin 12 removed, Basins 9, 10 and 11 upsized Date: Dat Prepared by: KEC

Sacramento County HEC-1 method 8/6/2008

Watershed Hydrologic Summary Data

		Mean	Lag Tii	nes	Basin	"n"	Loss l	Rates	Percent I	mpervious
	Area	Elevation		Lag Time		Basin		Loss Rate		Impervious
Watershed	(acres)	(ft)	Method	(min)	Method	"n"	Method	(in/hr)	Method	Area (%)
KCOS1	16.8	203.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV2	120.2	199.7	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV3	76.9	185	Basin "n"	-	Computed	-	Computed	-	Computed	-
KCDV5	201.3	175	Basin "n"	-	Specified	0.051	Computed	-	Computed	-
KCDV4	134.1	174	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV7	52	153.5	Basin "n"	-	Specified 0.037 Computed		-	Computed	-	
KCDV8	126.2	152.9	Basin "n"	-	Specified	ied 0.043 Computed		-	Computed	-
KCDV9	82.2	144.2	Basin "n"	-	Specified	.051	Computed	-	Computed	-
KCOS02	54.9	166.3	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS03	30.4	153	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
OSKC05	102.3	181.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV06	94.2	166.5	Basin "n"	-	Specified	0.039	Computed	-	Computed	-
KCOS04	29.3	145.2	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS06	20.3	166	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCA3	297.3	151	Basin "n"	-	Specified	0.049	Computed	-	Computed	-
KCOS11	11.1	157.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV11	13.8	145.1	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV10	68.4	140.1	Basin "n"	-	Specified	0.045	Computed		Computed	-
KCDV12	96.8	138.3	Basin "n"	-	Specified	.042	Computed	-	Computed	-
KCOS12	65	156.5	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS13	21	154	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS14	14	145.5	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS15	68.2	122.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS3A	168.5	213	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
EXKC13	73.3	140	Basin "n"	-	Computed	-	Computed	-	Computed	-
EXKC14	95.1	120	Basin "n"	-	Computed	-	Computed	-	Computed	-

	Channel	Centroid		Land Use Impervious Area Percent																		
	Length	Length	Slope										(% OF	acres)					-			
Watershed	(ft)	(ft)	(ft/ft)	Channelization	95	90	85	80	_75	70	60	50	40	30	25	20	15	10	5	2	1	1
KCOS1	1576	850	0.0159	Undeveloped	-	-	-	-	-	-	-	-	•	-	-	-	-	-	•	-	-	
				Developed	-		•	-	-	-	-		-	-	-	-	-	-	-	-	-	
KCDV2	3940	750	0.0156	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	•	
				Developed	-		-		-	-	-	-	-					-	-	-	-	-
KCDV3	1920	444	0.0042	Undeveloped	2.6	6.8					8,1	21.4							12.9	25.1		
				Developed	0						0								0	0		
KCDV5	4464	1907	0.0103	Divideveloped	-		-	-	-		-		-		-	-			-	-	-	
				Developed			-	-	-	-		-	-	-	-		-	-	-	-	-	
KCDV4	3297	917	0.003	Developed				-	-	-	-		-	-			-	-	-	-	-	
				Undeveloped										-						-		
KCDV7	1655	580	0.0091	Developed						-	<u> </u>		-	÷		-	-			-	-	
				Undeveloped		<u> </u>																
KCDV8	4054	2363	0.0081	Developed	_	-	-				-	-			-	-	-				-	-
				Undeveloped	_		-	-		-	_	-	_	_	-	_	-	-	_		-	-
KCDV9	4360	2120	.0083	Developed	-				-	-	-	-	-	-	-	-		-	-		-	
				Undeveloped	_	-	-	-			_	<u> </u>		-	-	-	-	-	-	-	-	-
KCOS02	3900	2145	.005	Developed	-	-	-	-	-	-	-	- 1		-	-	-		-	-	-		-
				Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
KCOS03	2089	415	.0048	Developed	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OOVOOS	400.4	0000	0.001	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OSKCOS	4804	2082	.0081	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV06	2212	1051	0062	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV00	3313	1851	.0003	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TCOS04	2745	1385	005	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AC0304	2743	1565	003	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS06	2377	1387	0027	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Recourse	2511	1507	0027	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
КСА3	7016	3899	.006	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-
KCOS11	726	572	.0069	Undeveloped	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-	-
				Developed	-	-	-	-				-	-	-			-	<u> </u>		-	-	-
KCDV11	850	322	.0213	Undeveloped	-	-		-		-	-			-	-	-	<u> </u>	<u> </u>	-	-		<u> -</u>
				Developed	-	-	-							<u> </u>		-	·		-	-	-	<u> </u>
KCDV10	2474	1482	.0178	Undeveloped	-	-	-	-	-	-		-	-	-			-		-	-	-	
				Undeveloped						-		<u> </u>	-	-	-	<u> </u>		<u> -</u> -				<u> -</u>
KCDV12	3407	1720	.0119	Developed	-		-				<u> </u>						<u> </u>	<u> -</u>	<u> </u>	-		<u> </u>
				Undeveloped		<u> -</u>		-	-				-	-			-				-	<u> </u>
KCOS12	2632	1237	.0057	Developed					-	-	-	<u> </u>		-	-	<u> </u>		<u> -</u>				<u> </u>
				Undeveloped								<u> </u>						<u> </u>	<u> </u>			+
KCOS13	1370	566	.0088	Developed		<u> </u>														<u> </u>		<u> </u>
				Undeveloped				1		-	-				-						-	<u> </u>
KCOS14	1990	908	.0085	Developed		<u> </u>													<u> </u>		-	<u> </u>
				Undeveloped	-	-		-	-	-	1.	-	-	-	-	-	-	1.	<u> </u>	-	-	-
KCOS15	3317	1334	.0027	Developed	-	- 1		-	<u> </u>	-	-	- 1	-		-	- 1	<u> </u>	1	-	-	<u> </u>	<u>+</u>
				Undeveloped	-	-	-	-	- 1	-	-	- 1	-	-	- 1	-	-	1-	1_	- 1	1 -	- 1
KCOS3A	3787	1555	.0132	Developed	-	- 1	-	- 1	- 1	-	-	-	-	- 1	-	- 1	-	<u>† </u>	- 1	- 1	-	<u> </u> -
TWEAT	4671	07.17	0105	Undeveloped					1	1		1			1	1	1	1	1	100	1	1
EXKC13	4651	2/4/	0105	Developed		1		1	1		1	1		<u> </u>	1	1	1	1	1	0	1	†
EVEOU	70700	2014	002	Undeveloped		1			l		l	1				1	1		1	100	1	T
EXKC14	/9/00	3064	.003	Developed		1		1	1							1		1		0	1	<u> </u>

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

	Soil	Land Use Impervious Area Percent																	
Watershed	Cover	95	90	85	80	75	70	60	50	(% or 40	acres)	25	20	15	10	5	2	1	1*
Waterstied	B													13					
KCOS1	С																4.8		
	D																12		
	В																		
KCDV2	С	1.1						26.2	12.2							8.2	2.2		
	D	2			ļ			36.7	21.6							2.2	7.8		
	В										_			[
KCDV3	C																		
		2.6	6.8					8.1	21.4							12.9	25.1		
VCDV5	B															11			
KCDV5		72					37	25.0	81.2						 	23.7	58.5		
	B	1.2					<u> </u>	25.5	01.2							23.1	50.5		
KCDV4	C																4.7		
	D						6.4	57.5	6.4	41						14	5.3		
	В														1				
KCDV7	C	2.6														1			
	D	4.2	12.4				11.6	15.7							L	4.5			
	В												L						
KCDV8	C	1.6														10.0			
		5						58.9	37.2							18.3	5.2		
KCDVO					[
KCDV9		16.2	25						24.5	1						9.8	28		
	B	10,2	2.5						27.5			<u> </u>				2.0	20		
KCOS02	C														1		16.3		
	D														†		38.6		
	В																		
KCOS03	С																12.7		
	D																17.7		
	B												ļ			ļ			
OSKC05	C				L	ļ									 	 	102.0		
												<u> </u>					102.3		
RCDV06	B	0.0														<u> </u>			
KCD VOU		23					10.9	46.9			<u> </u>					55	7		
	B						10.5	10.5							1				
KCOS04	С														1	<u> </u>	20.4		
	D																8.9		
	В																		
KCOS06	С										[[<u> </u>				
	D										ļ		ļ				20.3		
NO42									100						<u> </u>	0.	26.2	<u> </u>	<u> </u>
KCA3									120						<u> </u>	0.6	20.3		<u> </u>
									/8.4		t			+		4.4	07.0		╂───
KCOS11							<u> </u>										5.9	1	<u> </u>
1.00011	D					1					1	1	1	1	1	1	5.2		†
	В						<u> </u>				1	1		1	1	1		1	1
KCDV11	С						T				1	1			1				1
	D	2.1							8.9							2.8			
	В																		
KCDV10	C		ļ	ļ							l			1	 	1			
		5	5						13.2	32.5	ļ		 			8	4.7	 	
KODUIC	B	1.5									<u> </u>					<u> </u>			
KCDV12		1.5	24						1222	240	<u> </u>					150	1 2	 	
		5.5						 	23.2	24.9	<u> </u>	<u> </u>	<u> </u>	+	+	13.8	1.5	<u> </u>	+
KCOS12	$\frac{1}{c}$						<u> </u>	<u> </u>			†	 	<u>+</u>	1	1	1	271	t	1
1.00012	D			 		1	 			<u> </u>	†	1	1	1	1	1	37.9	1	<u> </u>
	В	1					 				1		1		ŀ	1	1	1	1
1	1	1	t	1	1	+	+	I	1	1	+	+	+	1	+	+	1	1	-1

VCOSI2	С								1.3	
KC0315	D						-		19.7	
	В									
KCOS14	С									
	D								14	
	В									
KCOS15	С									
	D								68.2	
	В									
KCOS3A	С								32.6	
	D								135.9	
	В									
EXKC13	C								6.5	
	D								66.8	
	В									
EXKC14	С								4.1	
	D								91	

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
R1	DET03	J1	Pipe	2814	0.005	3	3:1	0.015
R6A	OSKC05	J06	Trapezoidal	555	0.007	20	4:1	0.030
R4	J03	J04	Trapezoidal	2319	0.0048	30	4:1	0.014
R5	J04	J05	Trapezoidal	2582	0.0039	20	3:1	0.015
R7	J06	J7	Trapezoidal	2058	0.0025	20	3:1	0.025
R2A	KCOS1	J02	Trapezoidal	1510	0.0159	05	3:1	0.03
R2	J1	J02	Trapezoidal	644	0.0047	5	3:1	0.03
R3	J02	J03	Trapezoidal	3485	.0313	5	3:1	0.03
R6	J05	J06	Trapezoidal	2283	0.0031	20	3:1	0.03
R8	J7	J08	Trapezoidal	95	0.0025	10	1:1	0.025
R8A	KCOS11	J08	Pipe	1147	0.005	3		0.015
R9	J08	J9	Trapezoidal	3214	0.0019	20	3:1	0.03
R10B	KCOS12	J10B	Trapezoidal	524	0.005	20	3:1	0.03
R10C	J10B	J10C	Trapezoidal	1398	0.005	10	3:1	0.03
R10D	J10C	J10	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	J1	Pipe	2628	0.005	5		0.015
R10	J10	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	J11	J12	Trapezoidal	2966	0.0022	15	2.5:1	0.07

Hydrograph Routing – Muskingum–Cunge (Standard)

Detention Basin Data

														Outlet Data			
Detention Basin	Initial Co	ndition					Pond Sto	rage Rela	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	127.4	128.5	128.5	130.5	131.5						124.41	.54	.61	0.5
	(ft)	0	Area (ac)	6.38	6.61	6.89	7.23	7.81						128.50	84	2.6	1.5
								Pump	Data								
A3DET	Dump Llu	dragran	h Nome		D			Pum	ip 1	Pum	p 2	Pun	ър 3	Pun	np 4	Pum	p 5
	Fullp I ly	ulogiap	ii ivaine		Pump Di (cf	ischarge (s)											
				Elevatior	at which	h Pump T	Turns On										
				Elevati	on at white Off	t) ich Pump (ft)	Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition					Pond Sto	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	171	Elevation (ft)	171	172	173	174	175	176	177				171.875	2.41	.61	0.5
	(ft)	1/1	Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344				176.5	230	2.6	1.5
		·						Pump	Data		· · · · · · · · · · · · · · · · · · ·		• • • • • • • • • • • • • • • • • • •		•		
DET02								Pun	np 1	Pum	np 2	Pur	np 3	Pun	np 4	Pun	np 5
	Pump Hy	drograp	h Name		Pump D	ischarge											
				Elevati	on at wh	ich Pump	o Turns										
]				On	(ft) .											
				Elevati	on at wh Off	ich Pumj (ft)	o Turns							[
	1		1			(1)				I		L		1	Outi	et Data	
Detention														Elev.	Area	O Coef	Exponent
Basin	Initial Co	ndition		1		1	Pond St	orage Re	lation	7	1	1	T	(ft)	(sq ft)		
	Elevation	170.5	Elevation (ft)	170.5	171.5	172.5	173.5	174.5	175.5	176.5	ļ			171.	.785	.61	0.5
			Area (ac)	2.654	2.812	2.975	3.143	3.315	3.492	3.673				176	190	2.6	1.5
		L	<u> </u>	1	L	1		Pump	Data	1		1	_1			I	L
DET03								Pur	np 1	Pur	np 2	Pu	mp 3	Put	np 4	Pur	np 5
	Pump Hy	drograp	h Name		Pump D	Discharge											
				Elevat	ion at wh On	nich Pum	p Turns										
				Elevat	ion at wł Ofi	nich Pum f (ft)	p Turns										
															Outl	et Data	1
Detention	Initial Co	ndition					Pond St	orage Re	ation					Elev.	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	161.5	162.5	163.5	164.5	165.5	166.5	167.5				162.375	2.41	.61	0.5
	(ft)	161.5	Area (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18				167	251	2.6	1.5
1		ł	1	L	I	1	1	Pump	L Data	I	1	1	<u> </u>	1		J	1
DET04								Pu	np 1	Pur	np 2	Pu	mp 3	Pu	np 4	Put	np 5
	Pump Hy	drograp	h Name		Pump D	Discharge											
	Elevation at which Pump Turn On (ft)						p Turns										
				Elevat	ion at wh	ich Pum	p Turns			1							
	1			L				1		.I		1		1	Out	let Data	
Detention														Elev.	Area	O Coef	Exponent
Basin	Initial Co	ndition		1	<u> </u>	1	Pond S	torage Re	lation	1	T		T	(ft)	(sq ft)		
	Elevation	156.5	Elevation (ft)	156.5	157.5	158.5	159.5	160.5	161.5	162.5				157.0	3.14	.61	0.5
I.	I Lievation	1	I	I	I	I	1	1	1	1	I I	1	I I	I	1 I	1	1

	(ft)		Area (ac)	5.739	5.971	6.208	6.449	6.694	6.944	7.199				162	315	2.6	1.5
			·				·	Pump I	Data								
DET05	Pump Hy	drograpl	n Name		Pump D	ischarge		Pun	np 1	Pum	p 2	Pun	np 3	Pum	ip 4	Pum	р 5
				Elevati	ion at wh On	ich Pump (ft)	Turns										
				Elevati	ion at wh Off	ich Pump (ft)	Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition					Pond Ste	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	152.5	Elevation (ft)	152.5	153.5	154.5	155.5	156.5	157.5	158.5				153.	1.57	.61	0.5
	(ft)	152.5	Area (ac)	2.812	2.975	3.143	3.315	3.492	3.676	3.859				158	170	2.6	1.5
								Pump I	Data	r							
DET06	Pump Hy	drograpi	h Name		Pump D	iccharge		Pun	ıp 1	Pun	np 2	Pun	np 3	Pun	1p 4	Pum	ip 5
	1 41119 119				(ci	fs)											
				Elevati	ion at wh	ich Pump	o Turns					1					
				Elevat	ion at wh Off	ich Pumj (ft)	o Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	120.5	Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
	(ft)	139.5	Area (ac)	0.965	1.061	1.162	1.268	1.378	1.493	1.612				145	135	2.6	1.5
DETOT								Pumpl	Data					1 5			
DEI07	Pump Hy	drograp	h Name		Pump D	ischarge		Pun		Pun	1p 2	Pur	np 3	Pun	np 4	Pun	1p 5
				Elevat	(c: ion at wh	fs) ich Pumj	o Turns										
				Elevat	On ion at wh	(ft) ich Pumj	p Turns										
			1		Off	(ft)				1			_	1	Outl	t Data	
Detention														Elev.	Area	Case	Emanant
Basin	Initial Co	ndition					Pond Sto	orage Rel	ation					(ft)	(sq ft)	Q Coer.	Exponent
	Elevation	135.5	Elevation (ft)	135.5	136.5	137.5	139.5	138.5	140.5	141.5				136.875	2.41	.61	0.5
	(11)		Area (ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
		L	́,		L		!	Pump l	Data	I	L		L	1	I		1
DET08								Pun	np 1	Pun	ap 2	Pun	np 3	Pun	1p 4	Pun	np 5
	Pump Hy	drograp	h Name		Pump D (cl	ischarge fs)											
				Elevat	ion at wh On	ich Pumj (ft)	o Turns									ļ	
	1			Elevat	ion at wh Off	ich Pumj (ft)	o Turns										
													-		Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev.	Area (sq ft)	Q Coef.	Exponent
	Flevation		Elevation (ft)	131.5	132.5	133.5	134.5	135.5	136.5	137.5				131.83	.349	.61	0.5
	(ft)	131.5	Area (ac)	4.753	4.954	5.18	5.4	5.625	5.855	6.089				137	130	2.6	1.5
DET09		•		·			•	Pump	Data	1	•	L	·			· · · · · · · · · · · · · · · · · · ·	4
	Denne Harden mente Manne				D			Pur	np 1	Pun	np 2	Pur	np 3	Pur	np 4	Pur	np 5
	r unip riy				Pump D	ischarge fs)										ļ	
	Elevation at which Pum				p Turns												

					On	(ft)									-		
				Elevat	ion at wh Off	ich Pump (ft)	Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition			Pond Storage Relation									Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	120.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				130.75	.197	.61	0.5
	(ft)	150.5	Area (ac)	0.304	0.359	0.418	0.483	0.552	0.625	0.703				136	50	2.6	1.5
				Pump Data													
DET11								Pun	np 1	Pum	ip 2	Pur	np 3	Pun	ւp 4	Pun	ър 5
	Pump Hydrograph Name Pump Discha (cfs) Elevation at which F On (ft)				Pump Discharge (cfs)												
					ich Pump (ft)	Turns											
				Elevat	ion at wh Off	ich Pump `(ft)	o Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition		-			Pond St	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	107.5	Elevation (ft)	127.5	128.5	129.5	130.5	131.5	132.5	133.5				127.83	.349	.61	0.5
	(ft)	127.5	Area (ac)	3.582	3.765	3.954	4.147	4.344	4.546	4.753				133	150	2.6	1.5
								Pump	Data	•							
DET10	DET10							Pur	np 1	Pum	np 2	Pur	np 3	Pun	np 4	Pun	np 5
	Pump Hy	h Name		Pump D (c	ischarge fs)												
		Elevation at which Pump Turns On (ft)					o Turns										
				Elevation at which Pump Turns Off (ft)													

View HEC-1 output

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Peak flow (fous) Time of peak (hous) Basin area (ge, mi) Peak stage (feet) Peak storage (ac-R) Diversion volume (ac-R) KCOS15 82. 12:30 1.1		(100-year, 1-day rainfall)										
KCOS15 82. 12:30 .11 KCA3 338. 12:34 .46 A3DET 278. 12:46 .46 OSKC05 117. 12:33 .16 R6A 117. 12:33 .09 KCOS06 60. 12:04 .03 KCOS01 31. 12:14 .03 KCOV3 11. 12:18 .03 KCDV3 11.5 12:21 .12 DET03 7.9 16:02 .12 R1 7.9 16:09 .12 KCDV2 253. 12:11 .19 DET02 24. 13:55 .19 176. R3A 224. 12:28 .26 J1 251. 12:28 .57 R2 250. 12:30 .57 J02 271. 12:29 .60 R4 352. 12:37 .89 R4 352. 12:37 .89 R4 352. 12:37 .89 R5 403.<	ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)					
KCA3 338. 12:34 .46 A3DET 278. 12:46 .46 130. 15. OSKC05 117. 12:33 .16	KCOS15	82.	12:30	.11								
A3DET 278. 12:46 .46 130. 15. OSKC05 117. 12:33 .16 R6A 117. 12:34 .16 KC0500 60. 12:04 .03 KC051 31. 12:14 .03 R2A 31. 12:14 .03 KCOV3 115. 12:21 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:02 .12 .175. 18. KCDV3 15. 12:25 .19 176. 18. VEOV2 253. 12:25 .26	KCA3	338.	12:34	.46								
OSKC05 117. 12.33 .16 R6A 117. 12.34 .16 KCOS06 60. 12.04 .03 KCOS02 61. 12.33 .09 KCOS1 31. 12.14 .03 R2A 31. 12.18 .03 KCDV3 115. 12.21 .12 DET03 7.9 16.02 .12 175. 14. R1 7.9 16.09 .12	A3DET	278.	12:46	.46	130.	15.						
R6A 117. 12.34 .16 KCOS06 60. 12.04 .03 KCOS02 61. 12.33 .09 KCOS1 31. 12.14 .03 R2A 31. 12.12 .12 DET03 7.9 16.02 .12 175. 14. R1 7.9 16.02 .12 .16. .18. KCOV3 253. 12.11 .19	OSKC05	117.	12:33	.16								
KCOS06 60. 12:04 .03 KCOS02 61. 12:33 .09 KCOS1 31. 12:14 .03 R2A 31. 12:18 .03 KCDV3 115. 12:21 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12	R6A	117.	12:34	.16								
KCOS02 61. 12:33 .09 KCOS1 31. 12:14 .03 R2A 31. 12:18 .03 KCDV3 115. 12:21 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12	KCOS06	60.	12:04	.03								
KCOS1 31. 12:14 .03 R2A 31. 12:18 .03 KCDV3 115. 12:21 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12	KCOS02	61.	12:33	.09								
R2A 31. 12:18 .03 KCDV3 115. 12:21 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12 .12 .14. KCDV2 253. 12:11 .19 .15 .14. DET02 24. 13:55 .19 176. 18. KCOS3A 225. 12:28 .26	KCOS1	31.	12:14	.03								
KCDV3 115. 12:1 .12 DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12	R2A	31.	12:18	.03								
DET03 7.9 16:02 .12 175. 14. R1 7.9 16:09 .12 KCDV2 253. 12:11 .19 DET02 24. 13:55 .19 176. 18. KCOS3A 225. 12:25 .26	KCDV3	115.	12:21	.12								
R1 7.9 16:09 .12 KCDV2 253 12:11 .19 DET02 24 13:55 .19 176. 18. KCOS3A 225. 12:25 .26	DET03	7.9	16:02	.12	175.	14.						
KCDV2 253. 12:11 .19 DET02 24. 13:55 .19 176. 18. KCOS3A 225. 12:25 .26	R1	7.9	16:09	.12								
DET0224.13:55.19176.18.KCOS3A225.12:25.26R3A224.12:28.26J1251.12:28.57R2250.12:30.57J0271.12:29.60R3271.12:33.60KCDV4239.12:15.21DET0423.15:07.21166.22.J03353.12:33.89KCOS0354.12:15.05KCDV5302.12:21.31DET0532.15:18.31161.31.J04404.12:361.25KCOS0474.12:07.05KCDV6170.12:15.15157.1600J05433.12:401.45R6428.12:451.45.45.45KCDV7138.12:06.08	KCDV2	253.	12:11	.19								
KCOS3A225.12:25.26R3A224.12:28.26J1251.12:28.57R2250.12:30.57J02271.12:29.60R3271.12:33.60KCDV4239.12:15.21DET0423.15:07.21166.22.J03353.12:33.89R4352.12:17.98KCOS0354.12:15.05KCDV5302.12:21.31DET0532.15:18.31161.31.J04404.12:361.25KCOS0474.12:07.05KCDV6170.12:15.15157.1600J05433.12:401.45R6428.12:451.45.45KCDV7138.12:06.08.	DET02	24.	13:55	.19	176.	18.						
R3A 224. 12:28 .26 J1 251. 12:28 .57 R2 250. 12:30 .57 J02 271. 12:29 .60 R3 271. 12:33 .60 KCDV4 239. 12:15 .21 DET04 23. 15:07 .21 166. 22. J03 353. 12:33 .89	KCOS3A	225.	12:25	.26								
J1 251. 12.28 .57 R2 250. 12:30 .57 J02 271. 12:29 .60 R3 271. 12:33 .60 KCDV4 239. 12:15 .21 DET04 23. 15:07 .21 166. 22. J03 353. 12:33 .89	R3A	224.	12:28	.26								
R2 250. 12:30 .57 J02 271. 12:29 .60 R3 271. 12:33 .60 KCDV4 239. 12:15 .21 DET04 23. 15:07 .21 166. 22. J03 353. 12:33 .89	J1	251.	12:28	.57								
J02271.12:29.60R3271.12:33.60KCDV4239.12:15.21DET0423.15:07.21166.22.J03353.12:33.89	R2	250.	12:30	.57								
R3 271. 12:33 .60 KCDV4 239. 12:15 .21 DET04 23. 15:07 .21 166. 22. J03 353. 12:33 .89	J02	271.	12:29	.60								
KCDV4239.12:15.21DET0423.15:07.21166.22.J03353.12:33.89	R3	271.	12:33	.60								
DET0423.15:07.21166.22.J03353.12:33.89R4352.12:37.89KCOS0354.12:15.05KCDV5302.12:21.31DET0532.15:18.31161.31.J04404.12:361.25KCOS0474.12:07.05KCDV6170.12:15.15DET0616.15:15.15157.16.J05433.12:401.45R6428.12:451.45KCDV7138.12:06.08	KCDV4	239.	12:15	.21								
J03353.12:33.89R4352.12:37.89KCOS0354.12:15.05KCDV5302.12:21.31DET0532.15:18.31161.31.J04404.12:361.25KCOS0474.12:07.05KCDV66170.12:15.15DET0616.15:15.15157.16.J05433.12:401.45R6428.12:451.45KCDV7138.12:06.08	DET04	23.	15:07	.21	166.	22.						
R4 352. 12:37 .89 KCOS03 54. 12:15 .05 KCDV5 302. 12:21 .31 DET05 32. 15:18 .31 161. 31. J04 404. 12:36 1.25	J03	353.	12:33	.89								
KCOS03 54. 12:15 .05 KCDV5 302. 12:21 .31 DET05 32. 15:18 .31 161. 31. J04 404. 12:36 1.25 R5 403. 12:40 1.25 KCOS04 74. 12:07 .05 KCDV66 170. 12:15 .15 DET06 16. 15:15 .15 157. 16. .00 J05 433. 12:40 1.45 R6 428. 12:45 1.45 KCDV7 138. 12:06 .08	R4	352.	12:37	.89								
KCDV5302.12:21.31DET0532.15:18.31161.31.J04404.12:361.25	KCOS03	54.	12:15	.05								
DET0532.15:18.31161.31.J04404.12:361.25R5403.12:401.25KCOS0474.12:07.05KCDV06170.12:15.15DET0616.15:15.15157.J05433.12:401.45R6428.12:451.45KCDV7138.12:06.08	KCDV5	302.	12:21	.31								
J04404.12:361.25R5403.12:401.25KCOS0474.12:07.05KCDV06170.12:15.15DET0616.15:15.15157.J05433.12:401.45R6428.12:451.45KCDV7138.12:06.08	DET05	32.	15:18	.31	161.	31.						
R5 403. 12:40 1.25 KCOS04 74. 12:07 .05 KCDV06 170. 12:15 .15 DET06 16. 15:15 .15 157. 16. .00 J05 433. 12:40 1.45 .45 .00 .00 KCDV7 138. 12:06 .08 .08 .00	J04	404.	12:36	1.25	·							
KCOS04 74. 12:07 .05 KCDV06 170. 12:15 .15 DET06 16. 15:15 .15 157. 16. .00 J05 433. 12:40 1.45 .15 .15 .15 .16. .00 KCDV7 138. 12:06 .08 .08 .01 .01 .01	R5	403.	12:40	1.25								
KCDV06 170. 12:15 .15 DET06 16. 15:15 .15 157. 16. .00 J05 433. 12:40 1.45 .15 .15 .15 .16. .00 R6 428. 12:45 1.45 .145 .16 .00 J05 433. 12:40 1.45 .145 .15	KCOS04	74.	12:07	.05								
DET06 16. 15:15 .15 157. 16. .00 J05 433. 12:40 1.45	KCDV06	170.	12:15	.15								
J05433.12:401.45R6428.12:451.45KCDV7138.12:06.08	DET06	16.	15:15	.15	157.	16.	.00					
R6428.12:451.45KCDV7138.12:06.08	J05	433.	12:40	1.45								
KCDV7 138. 12:06 .08	R6	428.	12:45	1.45								
	KCDV7	138.	12:06	.08								

<u>Sacramento method results</u> (Project: Basin n Proposed Conditions) (100-year, 1-day rainfall)

1							
DET07	16.	13:08	.08	144.	6.1	.00	
KCDV8	201.	12:19	.20				
DET08	22.	15:14	.20	140.	22.	.00	
J06	571.	12:44	1.92				
R7	567.	12:48	1.92				
J7	844.	12:48	2.38				
R8	844.	12:48	2.38				
KCOS11	23.	12:10	.02				
R8A	23.	12:13	.02				
KCDV9	119.	12:23	.13				
DET09	2.7	24:20	.13	135.	19.		
KCDV11	43.	12:04	.02				
DET11	2.1	15:06	.02	135.	2.2		
J08	854.	12:48	2.55				
R9	837.	12:56	2.55				
J9	887.	12:55	2.66				
KCDV12	179.	12:14	.15				
KCOS14	23.	12:18	.02				
KCOS13	40.	12:13	.03				
KCOS12	89.	12:23	.10				
R10B	89.	12:25	.10				
J10B	115.	12:23	.13				
R10C	115.	12:27	.13				
J10C	133.	12:26	.16				
R10D	132.	12:31	.16				
KCDV10	137.	12:12	.11				
DET10	2.8	24:06	.11	131.	16.		
J10	1025.	12:53	3.07				
R10	1013.	12:56	3.07				
EXKC13	151.	12:11	.11				
J11	1046.	12:56	3.19				
R11	1019.	13:05	3.19				
EXKC14	34.	15:09	.15				
J12	1034.	13:05	3.33				

(10-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)	
KCOS15	48.	12:30	.11				
KCA3	199.	12:34	.46				
A3DET	153.	12:51	.46	129.	12.		

영상 문화 중요

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1			
OSKC05	68.	12:33	.16
R6A	68.	12:35	.16
KCOS06	33.	12:04	.03
KCOS02	36.	12:34	.09
KCOS1	17.	12:14	.03
R2A	17.	12:19	.03
KCDV3	67.	12:21	.12
DET03	6.1	15:28	.12
R1	6.1	15:36	.12
KCDV2	145.	12:11	.19
DET02	18.	13:41	.19
KCOS3A	130.	12:25	.26
R3A	130.	12:29	.26
J1	150.	12:29	.57
R2	150.	12:31	.57
J02	162.	12:30	.60
R3	162.	12:35	.60
KCDV4	138.	12:15	.21
DET04	18.	14:04	.21
J03	213.	12:35	.89
R4	212.	12:39	.89
KCOS03	30.	12:15	.05
KCDV5	176.	12:21	.31
DET05	24.	14:34	.31
J04	248.	12:38	1.25
R5	247.	12:43	1.25
KCOS04	41.	12:07	.05
KCDV06	99.	12:15	.15
DET06	13.	14:12	.15
J05	268.	12:42	1.45
R6	265.	12:49	1.45
KCDV7	79.	12:06	.08
DET07	13.	13:06	.08
KCDV8	117.	12:19	.20
DET08	16.	14:30	.20
J06	352.	12:48	1.92
R7	350.	12:53	1.92
J7	502.	12:53	2.38
R8	502.	12:53	2.38
KCOS11	13.	12:10	.02
R8A	13.	12:13	.02

173.	8.4	
174.	12.	
165.	14.	.00
160.	19.	.00
156.	9.8	
143.	3.7	.00
139.	15.	

KCDV9	70.	12:23	.13				
DET09	2.1	19:59	.13	134.	12.		
KCDV11	24.	12:04	.02				
DET11	1.7	13:43	.02	134.	1.3	.00	
J08	509.	12:53	2.55				
R9	499.	13:02	2.55				
J9	527.	13:01	2.66				
KCDV12	104.	12:14	.15				
KCOS14	13.	12:18	.02				
KCOS13	23.	12:13	.03				
KCOS12	51.	12:23	.10				
R10B	51.	12:26	.10				
J10B	66.	12:24	.13				
R10C	66.	12:28	.13				
J10C	76.	12:27	.16				
R10D	76.	12:33	.16				
KCDV10	79.	12:12	.11				
DET10	2.2	18:42	.11	130.	9.7		
J10	607.	12:59	3.07				
R10	600.	13:03	3.07				
EXKC13	86.	12:11	.11				
J11	619.	13:03	3.19				
R11	603.	13:15	3.19				
EXKC14	20.	15:09	.15				
J12	613.	13:15	3.33				

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