Model-Projected Existing Conditions With Adjusted 1994 Typical Year Rainfall and 12-Hour Inter-Event Time				
Alternative 2 Facility	**Controlled Racks**	**Annual Number of Events - Existing Conditions**	**Annual Overflow Volume (MG) - Existing Conditions**	
			By Individual Rack	**By Facility**
Rack 3 Storage Basin	3	38	17.7	17.7
Rack 5&7 Storage Basin	5	20	2.9	
	7	26	4.3	7.3
Rack 10&11 Storage Basin	10	32	8.8	
	11	17	15.9	24.7
Rack 12 Storage Basin	12	36	49.8	49.8
Rack 14 Storage Basin	14	51	28.1	28.1
Rack 15 Storage Basin	15	45	16.1	16.1
Rack 22 Storage Basin	22	20	13.3	13.3
Rack 26&28 Storage Basin	26	48	11.3	
	28	41	14.4	25.7
Rack 27&29 Storage Basin	27	24	2.6	
	29	44	12.0	14.7
Rack 40&31 Storage Basin	31	(1)	NA	(1)
	40			
Rack 36 Storage Basin	36	36	8.8	8.8
Ohio Canal Tunnel	16	38	124.2	
	17	42	150.4	
	18	27	212.5	
	19	13	4.9	
	20	33	5.6	
	23	4	0.1	
	24	50	43.7	541.3
Northside Tunnel	32	37	16.8	
	33	3	0.0	
	34	28	3.1	
	35	49	50.3	70.3

DRAFT - Submitted as part of Cost Benefit Interim Submission #1 ("Preliminary Modeling Report") - to be finalized in "Proposed LTCP Update and Report."

Notes:
(1) Current performance of in-place Rack 40 basin is dependent on detailed facility operating scheme, which will be modeled as part of the remaining alternatives analysis under the Long Term Control Plan Update.

Table 1.1 - Cost Benefit Presentation Table for Storage Basins
Rack 3

Alternative description, Rack 3	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	2,454,000	
Storage Basin - Opt 1	1	808,000	1,963,000	
Storage Basin - Opt 2	2	943,000	1,595,000	
Storage Basin - Opt 3	3	2,962,000	1,227,000	
Storage Basin - Opt 4	4	4,040,000	982,000	
Storage Basin - Opt 5	5	4,833,000	834,000	
Storage Basin - Opt 6	6	5,154,000	613,000	
Storage Basin - Opt 7	7	5,371,000	491,000	
Storage Basin - Opt 8	12	8,528,000	270,000	
Existing Conditions	38	17,730,000		

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Table 1.2 - Cost Benefit Presentation Table for Storage Basins
Rack 5&7

Alternative description, Rack 5&7	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	1,580,000	
Storage Basin - Opt 1	1	1,197,000	711,000	
Storage Basin - Opt 2	2	1,541,000	632,000	
Storage Basin - Opt 3	3	1,900,000	553,000	
Storage Basin - Opt 4	4	2,394,000	474,000	
Storage Basin - Opt 5	5	2,933,000	395,000	
Storage Basin - Opt 6	6	3,486,000	316,000	
Storage Basin - Opt 7	7	4,833,000	158,000	
Storage Basin - Opt 8	12	5,828,000	76,000	
Existing Conditions	26	7,264,000		

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Table 1.3 - Cost Benefit Presentation Table for Storage Basins
Rack 10&11

Alternative description, Rack 10&11	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	3,358,000	
Storage Basin - Opt 1	1	1,818,000	1,959,000	
Storage Basin - Opt 2	2	3,269,000	1,399,000	
Storage Basin - Opt 3	3	3,950,000	1,259,000	
Storage Basin - Opt 4	4	4,908,000	1,119,000	
Storage Basin - Opt 5	5	5,753,000	979,000	
Storage Basin - Opt 6	6	9,950,000	420,000	
Storage Basin - Opt 7	7	10,623,000	350,000	
Storage Basin - Opt 8	12	12,418,000	196,000	
Existing Conditions	32	24,687,000		

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Table 1.4 - Cost Benefit Presentation Table for Storage Basins
Rack 12

Alternative description, Rack 12	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	8,830,000	
Storage Basin - Opt 1	1	3,853,000	4,816,000	
Storage Basin - Opt 2	2	4,878,000	4,415,000	
Storage Basin - Opt 3	3	10,548,000	3,211,000	
Storage Basin - Opt 4	4	11,820,000	3,010,000	
Storage Basin - Opt 5	5	14,663,000	2,609,000	
Storage Basin - Opt 6	6	21,919,000	1,605,000	
Storage Basin - Opt 7	7	23,640,000	1,405,000	
Storage Basin - Opt 8	12	30,747,000	843,000	
Existing Conditions	36	49,823,000		

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Table 1.5 - Cost Benefit Presentation Table for Storage Basins
Rack 14

Alternative description, Rack 14	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	2,343,000	
Storage Basin - Opt 1	1	333,000	2,216,000	
Storage Basin - Opt 2	2	920,000	1,899,000	
Storage Basin - Opt 3	3	3,875,000	1,203,000	
Storage Basin - Opt 4	4	4,646,000	1,076,000	
Storage Basin - Opt 5	5	5,783,000	950,000	
Storage Basin - Opt 6	6	6,935,000	823,000	
Storage Basin - Opt 7	7	7,055,000	810,000	
Storage Basin - Opt 8	12	11,670,000	443,000	
Existing Conditions	51	28,129,000		

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Table 1.6 - Cost Benefit Presentation Table for Storage Basins
Rack 15

Alternative description, Rack 15	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	2,030,000	
Storage Basin - Opt 1	1	679,000	1,522,000	
Storage Basin - Opt 2	2	1,017,000	1,353,000	
Storage Basin - Opt 3	3	3,389,000	846,000	
Storage Basin - Opt 4	4	4,122,000	744,000	
Storage Basin - Opt 5	5	4,593,000	677,000	
Storage Basin - Opt 6	6	5,790,000	507,000	
Storage Basin - Opt 7	7	6,359,000	440,000	
Storage Basin - Opt 8	12	9,202,000	237,000	
Existing Conditions	45	16,084,000		

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Table 1.7 - Cost Benefit Presentation Table for Storage Basins
Rack 22

Alternative description, Rack 22	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	3,233,000	
Storage Basin - Opt 1	1	1,549,000	1,796,000	
Storage Basin - Opt 2	2	3,179,000	1,257,000	
Storage Basin - Opt 3	3	3,509,000	1,167,000	
Storage Basin - Opt 4	4	4,900,000	898,000	
Storage Basin - Opt 5	5	6,142,000	718,000	
Storage Basin - Opt 6	6	8,753,000	359,000	
Storage Basin - Opt 7	7	9,202,000	323,000	
Storage Basin - Opt 8	12	11,820,000	90,000	
Existing Conditions	20	13,316,000		

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Table 1.8 - Cost Benefit Presentation Table for Storage Basins
Rack 26&28

Alternative description, Rack 26&28	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	3,205,000	
Storage Basin - Opt 1	1	722,000	2,671,000	
Storage Basin - Opt 2	2	1,167,000	2,270,000	
Storage Basin - Opt 3	3	5,117,000	1,335,000	
Storage Basin - Opt 4	4	7,047,000	1,068,000	
Storage Basin - Opt 5	5	7,092,000	1,058,000	
Storage Basin - Opt 6	6	9,426,000	721,000	
Storage Basin - Opt 7	7	9,950,000	668,000	
Storage Basin - Opt 8	12	14,214,000	374,000	
Existing Conditions	48	25,660,000		

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Table 1.9 - Cost Benefit Presentation Table for Storage Basins
Rack 27&29

Alternative description, Rack 27&29	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	2,020,000	
Storage Basin - Opt 1	1	521,000	1,414,000	
Storage Basin - Opt 2	2	973,000	1,262,000	
Storage Basin - Opt 3	3	1,077,000	1,237,000	
Storage Basin - Opt 4	4	2,342,000	1,010,000	
Storage Basin - Opt 5	5	5,454,000	353,000	
Storage Basin - Opt 6	6	5,528,000	328,000	
Storage Basin - Opt 7	7	5,693,000	303,000	
Storage Basin - Opt 8	12	7,159,000	151,000	
Existing Conditions	44	14,678,000		

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Table 1.10 - Cost Benefit Presentation Table for Storage Basins
Rack 36

Alternative description, Rack 36	Benefits		Size of Storage Basin (gallons)	Cost (dollars)
	Number of overflows in a typical year	Volume of overflows (gallons)		
Storage Basin - Opt 0	0	-	1,333,000	
Storage Basin - Opt 1	1	628,000	848,000	
Storage Basin - Opt 2	2	763,000	788,000	
Storage Basin - Opt 3	3	1,586,000	606,000	
Storage Basin - Opt 4	4	2,334,000	485,000	
Storage Basin - Opt 5	5	2,775,000	424,000	
Storage Basin - Opt 6	6	3,217,000	364,000	
Storage Basin - Opt 7	7	4,130,000	242,000	
Storage Basin - Opt 8	12	5,813,000	118,000	
Existing Conditions	36	8,753,000		

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Table 2 - Cost Benefit Presentation Table for Ohio Canal Tunnel

Alternative description	Tunnel Benefits		Size of Tunnel		Tunnel Cost (dollars)		Size of Treatment to Treat Tunnel Overflow (gallons per minute)	Cost of Treatment to Treat Tunnel Overflow (dollars)	
	Number of Tunnel Overflows in a typical year	Volume of Tunnel Overflows (gallons)	Gallons	Dimensions (diameter and length, ft)[(1)]	Capital	Annual O&M		Capital	Annual O&M
Tunnel/EHRT - Opt 0	0	-	76,800,000	49			-		
Tunnel/EHRT - Opt 1	1	4,292,000	74,100,000	48			29,000		
Tunnel/EHRT - Opt 2	2	24,182,000	68,300,000	46			117,000		
Tunnel/EHRT - Opt 3	3	188,852,000	24,500,000	28			471,000		
Tunnel/EHRT - Opt 4	4	205,014,000	22,400,000	26			472,000		
Tunnel/EHRT - Opt 5	5	265,764,000	15,700,000	22			477,000		
Tunnel/EHRT - Opt 6	6	313,266,000	11,400,000	19			480,000		
Tunnel/EHRT - Opt 7	7	319,450,000	10,900,000	18			480,000		
Tunnel/EHRT - Opt 8	12	405,923,000	5,300,000	13			484,000		
Existing Conditions	50	541,335,000							

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Notes:

(1) PRELIMINARY, FOR RELATIVE COMPARISONS ONLY. Represents tunnel diameter for a fixed tunnel length of 5,480 feet to achieve required storage volume (storage only; does not account for inner dry-weather flow conduit). Larger storage volumes will ultimately dictate longer tunnels and/or parallel alignments, depending on site constraints and final configurations. Refined lengths and diameters will be included in final table with costing information.

Introduction to Tables 3.1, 3.2, and 3.3

- Table 3.1: Presents tunnel and treatment sizes to control Northside racks only (Racks 32-35). This is the original Alternative 2 concept for the Northside Tunnel, presented over the full range of control levels being examined in the current analysis (0 to 12 activations in the adjusted 1994 typical year). This information is relevant for comparison to historical presentations, and as a baseline to assess the cost-effectiveness of combining additional Rack 40 storage/treatment with future Northside Tunnel facilities.

- Table 3.2: Presents projected performance of the in-place Rack 40 basin assuming a range of control levels at upstream racks AND assuming a fixed dewatering scheme and duration for storage facilities. Note that unlike most racks in the system, activity at Rack 40 is influenced by the control level and dewatering assumptions at upstream racks. The information in Table 3.3 represents a single such scenario – global control levels at upstream racks, and fixed dewatering assumptions for all configurations. A change in the scenario assumptions (e.g., a mix of control levels at upstream racks, and/or a change in dewatering assumptions) would change the projected performance of the in-place Rack 40 basin. The City will further analyze the sensitivity of Rack 40 projections to these assumptions as part of the remaining alternatives analysis under the Long Term Control Plan Update.

- Table 3.3: Presents tunnel and treatment sizes to control Northside racks (32-35) AND the Rack 40 basin overflows presented in Table 3.2. As noted for Table 3.2, these values reflect a single potential scenario upstream of Rack 40 – global control levels at all racks and fixed dewatering assumptions. Additional scenarios are likely to be examined as part of the Long Term Control Plan Update.

Table 3.1 - Cost Benefit Presentation Table for Northside Tunnel
RACKS 32-35 ONLY (Original Concept for Northside Tunnel)

Alternative description	Tunnel Benefits		Size of Tunnel		Tunnel Cost (dollars)		Size of Treatment to Treat Tunnel Overflow (gallons per minute)	Cost of Treatment to Treat Tunnel Overflow (dollars)	
	Number of Tunnel Overflows in a typical year	Volume of Tunnel Overflows (gallons)	Gallons	Dimensions (diameter and length, ft)[(1)]	Capital	Annual O&M		Capital	Annual O&M
Tunnel/EHRT - Opt 0	0	-	9,100,000	13			-		
Tunnel/EHRT - Opt 1	1	3,207,000	6,200,000	11.0			49,000		
Tunnel/EHRT - Opt 2	2	4,229,000	5,800,000	10.7			50,000		
Tunnel/EHRT - Opt 3	3	6,309,000	5,300,000	10			94,000		
Tunnel/EHRT - Opt 4	4	9,946,000	4,600,000	9.5			95,000		
Tunnel/EHRT - Opt 5	5	13,083,000	4,100,000	9.0			95,000		
Tunnel/EHRT - Opt 6	6	21,643,000	2,900,000	8			96,000		
Tunnel/EHRT - Opt 7	7	23,287,000	2,700,000	7			96,000		
Tunnel/EHRT - Opt 8	12	32,899,000	1,800,000	6			97,000		
Existing Conditions	49	70,312,000							

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Notes:

(1) PRELIMINARY, FOR RELATIVE COMPARISONS ONLY. Represents tunnel diameter for a fixed tunnel length of 8,700 feet to achieve required storage volume (storage only; does not account for inner dry-weather flow conduit). Larger storage volumes will ultimately dictate longer tunnels and/or parallel alignments, depending on site constraints and final configurations. Refined lengths and diameters will be included in final table with costing information.

Table 3.2 - Projected Performance of Rack 40 Basin[1]
Rack 40 and 31 Control With Existing 9.5MG Basin

System-Wide Control Level	Remaining Activations At Rack 40 Basin		Control Requirements to Match System-Wide Control Level		
	Number of overflows in a typical year	Total volume of overflows (gallons)[2]	Additional Volume Capture (gallons) (Peak Event)	Peak Flow Treatment (mgd) (Peak Event)	Peak Flow Treatment (gpm) (Peak Event)
System-Wide at 0 activations	5	281,975,000	117,934,000	108.5	75,000
System-Wide at 1 activations	5	266,268,000	99,748,000	93.2	65,000
System-Wide at 2 activations	4	253,553,000	39,187,000	64.1	45,000
System-Wide at 3 activations	4	212,416,000	7,960,000	57.8	40,000
System-Wide at 4 activations	4	195,961,000	No Additional Control Required at Rack 40 Basin to Match System-Wide Control Level		
System-Wide at 5 activations	4	160,808,000			
System-Wide at 6 activations	4	129,394,000			
System-Wide at 7 activations	4	124,159,000			
System-Wide at 12 activations	4	91,997,000			

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Notes:

(1) Unlike most racks in the system, activity at Rack 40 is influenced by the control level and dewatering assumptions at upstream racks. The information in this table represents a single such scenario – global control levels at upstream racks, and fixed dewatering assumptions for all configurations. A change in the scenario assumptions (e.g., a mix of control levels at upstream racks, and/or a change in dewatering assumptions) would change the projected performance of the in-place Rack 40 basin.
(2) The only significant variable between the system-wide control levels in terms of Rack 40 performance as currently modeled is the dewatering rate for upstream storage. For higher control levels, a higher dewatering rate is required to empty the storage in a fixed amount of time. Therefore, higher system-wide control levels at upstream racks result in higher projected annual overflows at Rack 40 due to increased dewatering flows in the system.

Table 3.3 - Cost Benefit Presentation Table for Northside Tunnel
Combined Control for Racks 32-35 and Remaining Rack 40 Overflows[1]

Alternative description	Tunnel[2] Benefits		Size of Tunnel		Tunnel Cost (dollars)		Size of Treatment to Treat Tunnel Overflow (gallons per minute)	Cost of Treatment to Treat Tunnel Overflow (dollars)	
	Number of Tunnel Overflows in a typical year	Volume of Tunnel Overflows (gallons)	Gallons	Dimensions (diameter and length, ft)[3]	Capital	Annual O&M		Capital	Annual O&M
Tunnel/EHRT - Opt 0	0	-	127,034,000	50			-		
Tunnel/EHRT - Opt 1	1	20,323,000	105,948,000	46			65,000		
Tunnel/EHRT - Opt 2	2	134,996,000	44,987,000	30			50,000		
Tunnel/EHRT - Opt 3	3	184,058,000	13,260,000	16			94,000		
Tunnel/EHRT - Opt 4	4	205,907,000	4,600,000	9.5			95,000		
Tunnel/EHRT - Opt 5	5	173,891,000	4,100,000	9.0			95,000		
Tunnel/EHRT - Opt 6	6	151,037,000	2,900,000	8			96,000		
Tunnel/EHRT - Opt 7	7	147,446,000	2,700,000	7			96,000		
Tunnel/EHRT - Opt 8	12	124,896,000	1,800,000	6			97,000		

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Notes:

(1) Unlike most racks in the system, activity at Rack 40 is influenced by the control level and dewatering assumptions at upstream racks. The information in this table represents a single such scenario – global control levels at upstream racks, and fixed dewatering assumptions for all configurations. A change in the scenario assumptions (e.g., a mix of control levels at upstream racks, and/or a change in dewatering assumptions) would change the projected performance of the in-place Rack 40 basin.

(2) "Tunnel" refers to combined facility to control Racks 32-35 and remaining Rack 40 overflows.

(3) PRELIMINARY, FOR RELATIVE COMPARISONS ONLY. Represents tunnel diameter for a fixed tunnel length of 8,700 feet to achieve required storage volume (storage only; does not account for inner dry-weather flow conduit). Larger storage volumes will ultimately dictate longer tunnels and/or parallel alignments, depending on site constraints and final configurations. Refined lengths and diameters will be included in final table with costing information.