APPENDICES

E) STORMWATER PROTOTYPICAL WATERSHED MODEL

Memo

To: Angeleo Obertello, P.E. (Carlson, Barbee & Gibson)

From: Edward Ballman, P.E. CFM

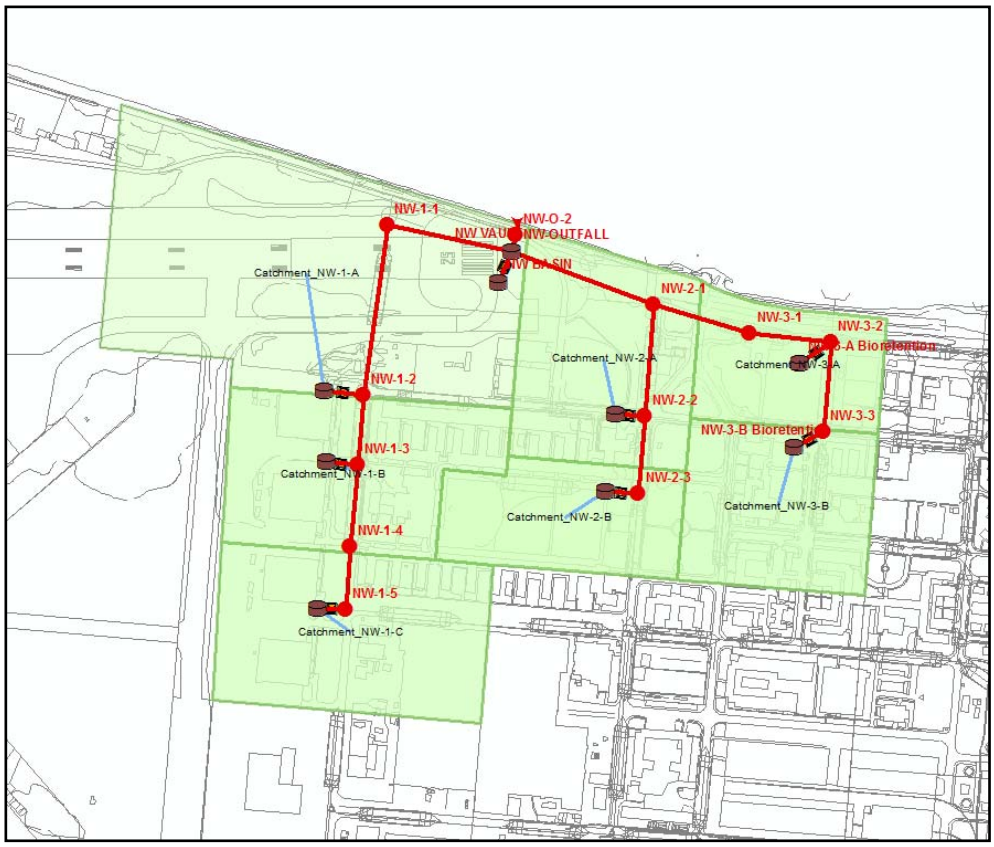
Date: June 13, 2013

Subject: Mike URBAN Modeling Output for the Northwest Drainage Area, Alameda Point, City of Alameda

Attached are output summaries from the Mike URBAN modeling of a prototypical storm drain, basin, and pump configuration for the low-lying northwest portion of the Alameda Point site.

All modeling was done using protocols established in the City's storm drain master planning project. Attachment A presents output for the present case (e.g. no sea level rise). Attachment B presents output for future conditions with 4.6 feet (55 inches) of sea level rise. Both output files include references to the southeast basin as well, which were originally included in the model domain, but were not optimized when it became clear that higher elevations in that drainage area were far less constraining and that the prototypical approaches framed in the northwest area could readily be adapted to other locations at the site. The catchments include small storage elements that represent the stormwater detention volume that will be provided by LID infrastructure in the final configuration of the drainage network.

The modeling domain is illustrated below:



Attachment A

MOUSE HD Computation Engine x64 v2012 Release Version (13.0.0.6270)

MOUSE Pipe Flow Simulation --- Status Report ---Dynamic Wave

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File Overview

Working dir :	P:\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\	-
Sewer network data (UND) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Hydrological data (HGF) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Additional parameters file (ADP) :	-	-
Dry weather flow data (DWF) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Repetitive profile data (RPF) :	-	-
Runoff Hydrographs (CRF) :	25-yr Design StormBase.CRF	1/1/2013 12:47:12 PM
Hotstart file (PRF) :	-	-
Result File (PRF) :	25-yr Design StormBase.PRF	1/2/2013 8:21:04 AM
Reduced result file (PRF) :	-	-

Time Overview

Simulation start date :	2050-01-01 00:00:00	Calculation started :	2013-01-02 08:20:59
Simulation end date :	2050-01-01 23:50:00	Calculation ended :	2013-01-02 08:21:30
Save time step [hh:mm:ss] :	0:02:00	Calculation time [hh:mm:ss] :	0:00:31
Maximum time step [sec] :	1	Hotstart start date :	-
Minimum time step [sec] :	1		

Input Summary

Number of Manholes:	27
Number of Basins:	17
Number of Outlets:	2
Number of Storage Nodes:	0
Number of Circular Pipes:	48
Number of Rectangular pipes:	5
Number of CRS defined pipes:	0
Number of Pumps:	1
Number of Controlled Pumps:	0
Number of Weirs/Orifices:	15
Number of Controlled Weirs/Gates:	0
Number of Valves:	0
Number of Controlled Valves:	0

Nodes

Min Invert Level	NW-O-2	-8.00 ft
Max Invert Level	SE-1-A Bioret	2.50 ft
Min Ground Level	NW-3-1	1.90 ft
Max Ground Level	SE-2-2	7.80 ft
Min X Coordinate	NW-1-C Bioret	6.039E06 ft
Max X Coordinate	SE-1-6	6.0441E06 ft
Min Y Coordinate	SE-1-2	2.1081E06 ft

Max Y Coordinate	NW-1-1	2.1156E06 ft
Total Manhole Volume		9541.2 ft3
Total Basin Volume		1557066.6 ft3

Links

Total Circular Volume	174941.2 ft3
Total CRS Volume	30045.0 ft3
Total Length	18529.00 ft

Simulation Result Summary

Continuity Balance

1 :	**Start volume in Pipes, Manholes and Structures**			**98538.4 ft3**
2 :	**End volume in Pipes, Manholes and Structures**			**422305.5 ft3**
3 :	**Total inflow volume**			
	Specified inflows			
	Runoff :	3084599.2 ft3		
	Non-specified inflows			
	Outlets (inflow) :	13566.4 ft3		
		3098165.6 ft3	-->	**3098165.6 ft3**
4 :	**Total diverted volume**			
	Operational, non-specified outflows			
	Outlets :	2263159.6 ft3		
	Pumps :	489385.9 ft3		
		2752545.5 ft3	-->	**2752545.5 ft3**
5 :	**Water generated in empty parts of the system :**			**2122.8 ft3**
6 :	**Continuity Balance = (2-1) - (3-4+5) :**			**-23975.7 ft3**
	Continuity Balance max value :		0.0 ft3	
	Continuity Balance min value :		-25077.4 ft3	

Boundary Connections

Outlet levels

Boundary Condition ID	Location	Temporal variation	Value/TS name	Validity	Minimum Value	Maximum Value
					ft	ft
NW 25-yr Tide	NW-OUTFALL	Time Series	\\192.168.1.152\pacific\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\25-yr Coincident Tide.dfs0	Unlimited	-3.84	1.71

Nodes - Water level

G : Max level exceeds ground level

W : Max level exceeds weir crest level

C : Max level exceeds critical level

	Minimum	Maximum	Ground Level	Ground Level - Maximum	Time - Minimum	Time - Maximum	Note
	[ft]	[ft]	[ft]	[ft]			
NW-OUTFALL	-8.00	1.71	2.40	0.69	2050-01-01 00:00:00	2050-01-01 00:00:00	
NW-O-2	-8.00	0.50	2.40	1.90	2050-01-01 00:00:00	2050-01-01 13:10:00	
NW VAULT	-6.00	1.64	3.00	1.36	2050-01-01 00:00:00	2050-01-01 13:00:00	W
NW-2-1	-8.00	1.75	2.00	0.25	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-1-1	-6.00	1.93	2.40	0.47	2050-01-01 00:00:00	2050-01-01 13:02:00	
NW BASIN	-2.00	1.62	3.00	1.38	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-2-2	-6.00	1.77	2.00	0.23	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-3-1	-6.00	1.76	1.90	0.14	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-1-2	-5.00	2.31	2.50	0.19	2050-01-01 00:00:00	2050-01-01 13:04:00	
NW-2-3	-6.00	2.03	2.20	0.17	2050-01-01 00:00:00	2050-01-01 12:38:00	
NW-2-A Bioret	-1.50	2.14	2.50	0.36	2050-01-01 00:00:00	2050-01-01 12:34:00	W

NW-3-2	-6.00	1.88	2.50	0.62	2050-01-01 00:00:00	2050-01-01 12:38:00	
NW-1-3	-5.00	2.39	2.50	0.11	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-1-A Bioret	-1.50	2.36	2.50	0.14	2050-01-01 00:00:00	2050-01-01 13:04:00	W
NW-2-B Bioret	-1.50	2.12	2.50	0.38	2050-01-01 00:00:00	2050-01-01 12:38:00	W
NW-3-3	-6.00	2.30	2.70	0.40	2050-01-01 00:00:00	2050-01-01 12:42:00	
NW-3-A Bioret	-0.50	3.10	3.50	0.40	2050-01-01 00:00:00	2050-01-01 12:34:00	W
NW-1-B Bioret	-1.50	2.41	2.50	0.09	2050-01-01 00:00:00	2050-01-01 13:06:00	W
NW-1-4	-4.00	2.40	4.20	1.80	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-3-B Bioret	-0.50	2.32	3.50	1.18	2050-01-01 00:00:00	2050-01-01 12:42:00	W
NW-1-5	-4.00	2.52	7.00	4.48	2050-01-01 00:00:00	2050-01-01 13:08:00	
NW-1-C Bioret	-1.50	2.54	2.50	-0.04	2050-01-01 00:00:00	2050-01-01 13:08:00	G W

Number of Critical level exceedings : 0

Number of Ground level exceedings : 1

Number of Weir Crest level exceedings : 8

Nodes - Volume spilled

No Spilling Nodes were found in the network

Weir/Orifice-Gate/Valve Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum
	[cfs]	[cfs]	[ft3]		
NW VAULT+BASIN	-43.306	47.295	7237.0	2050-01-01 13:04:00	2050-01-01 13:02:00
NW-1-A Overflow	0.000	52.657	308463.3	2050-01-01 00:00:00	2050-01-01 13:06:00
NW-1-B Overflow	0.000	27.374	61820.3	2050-01-01 00:00:00	2050-01-01 13:08:00
NW-1-C Overflow	0.000	26.231	66073.9	2050-01-01 00:00:00	2050-01-01 13:26:00
NW-2-A Overflow	0.000	28.739	102237.9	2050-01-01 00:00:00	2050-01-01 12:34:00

NW-2-B Overflow	0.000	19.570	80375.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-A Overflow	0.000	17.322	44889.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-B Overflow	0.000	21.531	71842.3	2050-01-01 00:00:00	2050-01-01 12:52:00

Pumps - Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum	Pump starts	Dry stops (1)	Speed	Operation total
	[cfs]	[cfs]	[ft3]			[Count]	[Count]		[Hr:Min:Sec]
NW PUMP	0.000	44.595	489385.9	2050-01-01 00:00:00	2050-01-01 12:08:00	2	0	Constant	3:02:54

(1) : Pump stops due to dry pump well.

Links - Result summary

LinkID	From Node	To Node	Qf	Hmax	Qmax	Hmax /D	Qmax/ Qf	Flow - Accumulated	Time - Hmax	Time - Qmax
			[cfs]	[ft]	[cfs]			[ft3]		
NW-1-1+V (1)	NW-1-1	NW VAULT	50.225	1.79	38.891	1.909	0.774	362221.6	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-1+V (2)	NW-1-1	NW VAULT	50.225	1.79	38.891	1.909	0.774	362221.6	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-2+1 (1)	NW-1-2	NW-1-1	50.002	2.20	38.868	1.829	0.777	370094.3	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-2+1 (2)	NW-1-2	NW-1-1	50.002	2.20	38.868	1.829	0.777	370094.3	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-3+2	NW-1-3	NW-1-2	50.071	2.34	40.251	1.703	0.804	415719.3	2050-01-01 13:04:00	2050-01-01 13:14:00
NW-1-4+3	NW-1-4	NW-1-3	50.082	2.39	26.438	1.638	0.528	223640.6	2050-01-01 13:06:00	2050-01-01 13:26:00
NW-1-5+4	NW-1-5	NW-1-4	23.395	2.45	26.565	2.054	1.136	226418.1	2050-01-01 13:08:00	2050-01-01 13:26:00
NW-1-A+2	NW-1-A Bioret	NW-1-2	0.692	2.36	0.850	14.194	1.228	34124.7	2050-01-01 13:04:00	2050-01-01 22:46:00
NW-1-B+3	NW-1-B Bioret	NW-1-3	2.391	2.40	2.881	8.736	1.205	133550.0	2050-01-01 13:06:00	2050-01-01 14:46:00

NW-1-C+5	NW-1-C Bioret	NW-1-5	2.664	2.53	3.555	7.376	1.334	161729.7	2050-01-01 13:08:00	2050-01-01 14:48:00
NW-2-1+V (1)	NW-2-1	NW VAULT	50.210	1.68	42.094	1.909	0.838	236461.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-1+V (2)	NW-2-1	NW VAULT	50.210	1.68	42.094	1.909	0.838	236461.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-2+1 (1)	NW-2-2	NW-2-1	50.144	1.75	24.432	1.746	0.487	120268.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-2+1 (2)	NW-2-2	NW-2-1	50.144	1.75	24.432	1.746	0.487	120268.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-3+2	NW-2-3	NW-2-2	23.343	1.80	19.653	2.153	0.842	99955.4	2050-01-01 12:38:00	2050-01-01 12:34:00
NW-2-A+2	NW-2-A Bioret	NW-2-2	0.992	2.05	1.142	13.453	1.152	49339.6	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-2-B+3	NW-2-B Bioret	NW-2-3	0.388	2.11	0.504	17.595	1.300	21608.5	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	49.834	1.75	17.927	1.746	0.360	127132.3	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	49.834	1.75	17.927	1.746	0.360	127132.3	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-2+1	NW-3-2	NW-3-1	50.397	1.79	35.897	1.629	0.712	263581.9	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-3+2	NW-3-3	NW-3-2	23.147	2.13	21.752	2.080	0.940	163562.1	2050-01-01 12:40:00	2050-01-01 12:52:00
NW-3-A+2	NW-3-A Bioret	NW-3-2	1.091	2.91	1.241	12.998	1.138	58896.7	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-3-B+3	NW-3-B Bioret	NW-3-3	1.948	2.31	2.078	10.206	1.067	93840.6	2050-01-01 12:42:00	2050-01-01 14:48:00
NW-B-V	NW BASIN	NW VAULT	158.570	1.64	11.851	1.034	0.075	7542.0	2050-01-01 13:00:00	2050-01-01 13:34:00
NW-O-2+OUT	NW-O-2	NW-OUTFALL	261.394	1.71	103.068	1.382	0.394	680727.7	2050-01-01 00:00:00	2050-01-01 12:40:00
NW-O-V+2 (1)	NW VAULT	NW-O-2	111.465	1.40	51.544	1.475	0.462	348366.4	2050-01-01 13:00:00	2050-01-01 12:40:00
NW-O-V+2 (2)	NW VAULT	NW-O-2	111.465	1.40	51.544	1.475	0.462	348366.4	2050-01-01 13:00:00	2050-01-01 12:40:00

Links - Data

LinkID	From Node	To Node	Up - Invert Level	Down - Invert Level	Length	Dimension (Max Height)	Slope	Qf

			[ft]	[ft]	[ft]	[ft]	[‰]	[]
NW-1-1+V (1)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-1+V (2)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-2+1 (1)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-2+1 (2)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-3+2	NW-1-3	NW-1-2	-4.16	-4.50	341.00	4.00	0.997	50.071
NW-1-4+3	NW-1-4	NW-1-3	-3.76	-4.16	401.00	4.00	0.998	50.082
NW-1-5+4	NW-1-5	NW-1-4	-3.45	-3.76	307.00	3.00	1.010	23.395
NW-1-A+2	NW-1-A Bioret	NW-1-2	-1.50	-4.50	193.00	0.48	15.544	0.692
NW-1-B+3	NW-1-B Bioret	NW-1-3	-1.50	-4.16	155.00	0.75	17.161	2.391
NW-1-C+5	NW-1-C Bioret	NW-1-5	-1.50	-3.45	138.00	0.81	14.130	2.664
NW-2-1+V (1)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-1+V (2)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-2+1 (1)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-2+1 (2)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-3+2	NW-2-3	NW-2-2	-4.31	-4.69	378.00	3.00	1.005	23.343
NW-2-A+2	NW-2-A Bioret	NW-2-2	-1.50	-4.69	100.00	0.48	31.900	0.992
NW-2-B+3	NW-2-B Bioret	NW-2-3	-1.50	-4.13	100.00	0.35	26.300	0.388
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-2+1	NW-3-2	NW-3-1	-4.36	-4.76	396.00	4.00	1.010	50.397
NW-3-3+2	NW-3-3	NW-3-2	-3.93	-4.36	435.00	3.00	0.989	23.147
NW-3-A+2	NW-3-A Bioret	NW-3-2	-0.50	-4.36	100.00	0.48	38.600	1.091
NW-3-B+3	NW-3-B Bioret	NW-3-3	-0.50	-3.93	100.00	0.61	34.300	1.948
NW-B-V	NW BASIN	NW VAULT	-2.00	-2.50	50.00	4.00	10.000	158.570
NW-O-2+OUT	NW-O-2	NW-OUTFALL	-4.92	-5.20	55.00	5.00	5.091	261.394
NW-O-V+2 (1)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465
NW-O-V+2 (2)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465

Attachment B

MOUSE HD Computation Engine x64 v2012 Release Version (13.0.0.6270)

MOUSE Pipe Flow Simulation --- Status Report ---Dynamic Wave

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File Overview

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Repetitive profile data (RPF) :	-	-
Runoff Hydrographs (CRF) :	25-yr Design StormBase.CRF	1/1/2013 12:47:12 PM
Hotstart file (PRF) :	-	-
Result File (PRF) :	25-yr Design StormBase.PRF	1/1/2013 6:01:14 PM
Reduced result file (PRF) :	-	-

Time Overview

Simulation start date :	2050-01-01 00:00:00	Calculation started :	2013-01-01 18:01:09
Simulation end date :	2050-01-01 23:50:00	Calculation ended :	2013-01-01 18:01:43
Save time step [hh:mm:ss] :	0:02:00	Calculation time [hh:mm:ss] :	0:00:33
Maximum time step [sec] :	1	Hotstart start date :	-
Minimum time step [sec] :	1		

Input Summary

Number of Manholes:	27
Number of Basins:	17
Number of Outlets:	2
Number of Storage Nodes:	0
Number of Circular Pipes:	48
Number of Rectangular pipes:	5
Number of CRS defined pipes:	0
Number of Pumps:	1
Number of Controlled Pumps:	0
Number of Weirs/Orifices:	15
Number of Controlled Weirs/Gates:	0
Number of Valves:	0
Number of Controlled Valves:	0

Nodes

Min Invert Level	NW-O-2	-8.00 ft
Max Invert Level	SE-1-A Bioret	2.50 ft
Min Ground Level	NW-3-1	1.90 ft
Max Ground Level	SE-2-2	7.80 ft
Min X Coordinate	NW-1-C Bioret	6.039E06 ft
Max X Coordinate	SE-1-6	6.0441E06 ft
Min Y Coordinate	SE-1-2	2.1081E06 ft

Max Y Coordinate	NW-1-1	2.1156E06 ft
Total Manhole Volume		9541.2 ft3
Total Basin Volume		1930225.0 ft3

Links

Total Circular Volume	174941.2 ft3
Total CRS Volume	30045.0 ft3
Total Length	18529.00 ft

Simulation Result Summary

Continuity Balance

1 :	**Start volume in Pipes, Manholes and Structures**			**26565625.0 ft3**
2 :	**End volume in Pipes, Manholes and Structures**			**17610862.1 ft3**
3 :	**Total inflow volume**			
	Specified inflows			
	Runoff :	3084599.2 ft3		
	Non-specified inflows			
	Outlets (inflow) :	3480.3 ft3		
		3088079.5 ft3	**-->**	**3088079.5 ft3**
4 :	**Total diverted volume**			
	Operational, non-specified outflows			
	Outlets :	10937389.2 ft3		
	Pumps :	1175279.8 ft3		
		12112669.0 ft3	**-->**	**12112669.0 ft3**
5 :	**Water generated in empty parts of the system :**			**833.2 ft3**
6 :	**Continuity Balance = (2-1) - (3-4+5) :**			**68993.5 ft3**
	Continuity Balance max value :		69993.0 ft3	
	Continuity Balance min value :		0.0 ft3	

Boundary Connections

Outlet levels

Boundary Condition ID	Location	Temporal variation	Value/TS name	Validity	Minimum Value	Maximum Value
					ft	ft
NW 25-yr Tide	NW-OUTFALL	Time Series	\\192.168.1.152\pacific\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\25-yr Coincident Tide SLR=4.6.dfs0	Unlimited	0.76	6.31

Nodes - Water level

G : Max level exceeds ground level

W : Max level exceeds weir crest level

C : Max level exceeds critical level

	Minimum	Maximum	Ground Level	Ground Level - Maximum	Time - Minimum	Time - Maximum	Note
	[ft]	[ft]	[ft]	[ft]			
NW-OUTFALL	-8.00	6.31	2.40	-3.91	2050-01-01 00:00:00	2050-01-01 00:00:00	G
NW-O-2	-8.00	1.88	2.40	0.52	2050-01-01 00:00:00	2050-01-01 14:06:00	
NW VAULT	-6.00	1.88	3.00	1.12	2050-01-01 00:00:00	2050-01-01 13:52:00	W
NW-2-1	-8.00	1.89	2.00	0.11	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-1-1	-6.00	2.00	2.40	0.40	2050-01-01 00:00:00	2050-01-01 13:40:00	
NW BASIN	-2.00	1.88	3.00	1.12	2050-01-01 00:00:00	2050-01-01 13:52:00	
NW-2-2	-6.00	1.89	2.00	0.11	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-3-1	-6.00	1.89	1.90	0.01	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-1-2	-5.00	2.22	2.50	0.28	2050-01-01 00:00:00	2050-01-01 13:18:00	
NW-2-3	-6.00	2.09	2.20	0.11	2050-01-01 00:00:00	2050-01-01 12:36:00	
NW-2-A Bioret	-1.50	2.14	2.50	0.36	2050-01-01 00:00:00	2050-01-01 12:34:00	W
NW-3-2	-6.00	1.90	2.50	0.60	2050-01-01 00:00:00	2050-01-01 13:50:00	

NW-1-3	-5.00	2.34	2.50	0.16	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-1-A Bioret	-1.50	2.27	2.50	0.23	2050-01-01 00:00:00	2050-01-01 13:06:00	W
NW-2-B Bioret	-1.50	2.15	2.50	0.35	2050-01-01 00:00:00	2050-01-01 12:36:00	W
NW-3-3	-6.00	2.34	2.70	0.36	2050-01-01 00:00:00	2050-01-01 12:42:00	
NW-3-A Bioret	-0.50	3.10	3.50	0.40	2050-01-01 00:00:00	2050-01-01 12:34:00	W
NW-1-B Bioret	-1.50	2.36	2.50	0.14	2050-01-01 00:00:00	2050-01-01 13:06:00	W
NW-1-4	-4.00	2.37	4.20	1.83	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-3-B Bioret	-0.50	2.36	3.50	1.14	2050-01-01 00:00:00	2050-01-01 12:42:00	W
NW-1-5	-4.00	2.52	7.00	4.48	2050-01-01 00:00:00	2050-01-01 13:08:00	
NW-1-C Bioret	-1.50	2.53	2.50	-0.03	2050-01-01 00:00:00	2050-01-01 13:08:00	G W

Number of Critical level exceedings : 0

Number of Ground level exceedings : 2

Number of Weir Crest level exceedings : 8

Nodes - Volume spilled

No Spilling Nodes were found in the network

Weir/Orifice-Gate/Valve Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum
	[cfs]	[cfs]	[ft3]		
NW VAULT+BASIN	-16.453	106.318	160280.5	2050-01-01 15:48:00	2050-01-01 12:40:00
NW-1-A Overflow	0.000	47.887	312129.3	2050-01-01 00:00:00	2050-01-01 12:46:00
NW-1-B Overflow	0.000	20.644	75158.2	2050-01-01 00:00:00	2050-01-01 12:38:00
NW-1-C Overflow	0.000	12.193	81817.2	2050-01-01 00:00:00	2050-01-01 12:50:00
NW-2-A Overflow	0.000	28.781	107383.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-2-B Overflow	0.000	19.101	82680.7	2050-01-01 00:00:00	2050-01-01 12:38:00

NW-3-A Overflow	0.000	17.347	48534.7	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-B Overflow	0.000	21.244	81157.5	2050-01-01 00:00:00	2050-01-01 12:46:00

Pumps - Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum	Pump starts	Dry stops (1)	Speed	Operation total
	[cfs]	[cfs]	[ft3]			[Count]	[Count]		[Hr:Min:Sec]
NW PUMP	0.000	44.595	1175279.8	2050-01-01 00:00:00	2050-01-01 11:08:00	6	0	Constant	7:19:20

(1) : Pump stops due to dry pump well.

Links - Result summary

LinkID	From Node	To Node	Qf	Hmax	Qmax	Hmax/D	Qmax/Qf	Flow - Accumulated	Time - Hmax	Time - Qmax
			[cfs]	[ft]	[cfs]			[ft3]		
NW-1-1+V (1)	NW-1-1	NW VAULT	50.225	1.94	37.495	1.969	0.747	360803.4	2050-01-01 13:44:00	2050-01-01 12:46:00
NW-1-1+V (2)	NW-1-1	NW VAULT	50.225	1.94	37.495	1.969	0.747	360803.4	2050-01-01 13:44:00	2050-01-01 12:46:00
NW-1-2+1 (1)	NW-1-2	NW-1-1	50.002	2.14	37.510	1.846	0.750	368740.9	2050-01-01 13:26:00	2050-01-01 12:46:00
NW-1-2+1 (2)	NW-1-2	NW-1-1	50.002	2.14	37.510	1.846	0.750	368740.9	2050-01-01 13:26:00	2050-01-01 12:46:00
NW-1-3+2	NW-1-3	NW-1-2	50.071	2.27	27.862	1.680	0.556	414200.8	2050-01-01 13:10:00	2050-01-01 12:40:00
NW-1-4+3	NW-1-4	NW-1-3	50.082	2.36	12.377	1.626	0.247	222614.1	2050-01-01 13:06:00	2050-01-01 12:50:00
NW-1-5+4	NW-1-5	NW-1-4	23.395	2.44	12.382	2.045	0.529	225801.6	2050-01-01 13:08:00	2050-01-01 12:50:00
NW-1-A+2	NW-1-A Bioret	NW-1-2	0.692	2.27	0.851	14.001	1.230	30178.8	2050-01-01 13:08:00	2050-01-01 20:30:00
NW-1-B+3	NW-1-B Bioret	NW-1-3	2.391	2.36	2.883	8.671	1.206	120081.3	2050-01-01 13:06:00	2050-01-01 17:24:00
NW-1-C+5	NW-1-C	NW-1-5	2.664	2.53	3.535	7.372	1.327	145586.0	2050-01-01	2050-01-01

	Bioret								13:08:00	17:26:00
NW-2-1+V (1)	NW-2-1	NW VAULT	50.210	1.88	40.915	1.969	0.815	235563.2	2050-01-01 13:50:00	2050-01-01 12:36:00
NW-2-1+V (2)	NW-2-1	NW VAULT	50.210	1.88	40.915	1.969	0.815	235563.2	2050-01-01 13:50:00	2050-01-01 12:36:00
NW-2-2+1 (1)	NW-2-2	NW-2-1	50.144	1.89	23.947	1.782	0.478	120056.8	2050-01-01 13:50:00	2050-01-01 12:34:00
NW-2-2+1 (2)	NW-2-2	NW-2-1	50.144	1.89	23.947	1.782	0.478	120056.8	2050-01-01 13:50:00	2050-01-01 12:34:00
NW-2-3+2	NW-2-3	NW-2-2	23.343	1.89	19.181	2.193	0.822	99950.3	2050-01-01 13:50:00	2050-01-01 12:40:00
NW-2-A+2	NW-2-A Bioret	NW-2-2	0.992	2.06	1.143	13.705	1.153	44294.6	2050-01-01 12:36:00	2050-01-01 18:50:00
NW-2-B+3	NW-2-B Bioret	NW-2-3	0.388	2.14	0.506	17.766	1.305	19349.8	2050-01-01 12:36:00	2050-01-01 18:50:00
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	49.834	1.89	17.530	1.782	0.352	126613.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	49.834	1.89	17.530	1.782	0.352	126613.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-2+1	NW-3-2	NW-3-1	50.397	1.89	35.136	1.662	0.697	263038.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-3+2	NW-3-3	NW-3-2	23.147	2.17	21.411	2.087	0.925	163342.8	2050-01-01 12:40:00	2050-01-01 12:46:00
NW-3-A+2	NW-3-A Bioret	NW-3-2	1.091	2.92	1.240	13.041	1.137	55235.7	2050-01-01 12:36:00	2050-01-01 17:24:00
NW-3-B+3	NW-3-B Bioret	NW-3-3	1.948	2.36	2.074	10.280	1.065	84509.7	2050-01-01 12:42:00	2050-01-01 17:26:00
NW-B-V	NW BASIN	NW VAULT	158.570	1.88	27.397	1.094	0.173	156262.7	2050-01-01 13:52:00	2050-01-01 16:08:00
NW-O-2+OUT	NW-O-2	NW-OUTFALL	261.394	6.31	-0.327	2.302	-0.001	-0.3	2050-01-01 00:00:00	2050-01-01 00:18:00
NW-O-V+2 (1)	NW VAULT	NW-O-2	111.465	1.88	0.112	1.700	0.001	929.7	2050-01-01 14:06:00	2050-01-01 07:18:00
NW-O-V+2 (2)	NW VAULT	NW-O-2	111.465	1.88	0.112	1.700	0.001	929.7	2050-01-01 14:06:00	2050-01-01 07:18:00

Links - Data

LinkID	From Node	To Node	Up - Invert Level	Down - Invert Level	Length	Dimension (Max Height)	Slope	Qf

			[ft]	[ft]	[ft]	[ft]	[‰]	[]
NW-1-1+V (1)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-1+V (2)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-2+1 (1)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-2+1 (2)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-3+2	NW-1-3	NW-1-2	-4.16	-4.50	341.00	4.00	0.997	50.071
NW-1-4+3	NW-1-4	NW-1-3	-3.76	-4.16	401.00	4.00	0.998	50.082
NW-1-5+4	NW-1-5	NW-1-4	-3.45	-3.76	307.00	3.00	1.010	23.395
NW-1-A+2	NW-1-A Bioret	NW-1-2	-1.50	-4.50	193.00	0.48	15.544	0.692
NW-1-B+3	NW-1-B Bioret	NW-1-3	-1.50	-4.16	155.00	0.75	17.161	2.391
NW-1-C+5	NW-1-C Bioret	NW-1-5	-1.50	-3.45	138.00	0.81	14.130	2.664
NW-2-1+V (1)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-1+V (2)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-2+1 (1)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-2+1 (2)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-3+2	NW-2-3	NW-2-2	-4.31	-4.69	378.00	3.00	1.005	23.343
NW-2-A+2	NW-2-A Bioret	NW-2-2	-1.50	-4.69	100.00	0.48	31.900	0.992
NW-2-B+3	NW-2-B Bioret	NW-2-3	-1.50	-4.13	100.00	0.35	26.300	0.388
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-2+1	NW-3-2	NW-3-1	-4.36	-4.76	396.00	4.00	1.010	50.397
NW-3-3+2	NW-3-3	NW-3-2	-3.93	-4.36	435.00	3.00	0.989	23.147
NW-3-A+2	NW-3-A Bioret	NW-3-2	-0.50	-4.36	100.00	0.48	38.600	1.091
NW-3-B+3	NW-3-B Bioret	NW-3-3	-0.50	-3.93	100.00	0.61	34.300	1.948
NW-B-V	NW BASIN	NW VAULT	-2.00	-2.50	50.00	4.00	10.000	158.570
NW-O-2+OUT	NW-O-2	NW-OUTFALL	-4.92	-5.20	55.00	5.00	5.091	261.394
NW-O-V+2 (1)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465
NW-O-V+2 (2)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465