

BAHM2023

PROJECT REPORT

HILLCREST SUMMIT APARTMENT
FEBRUARY 28, 2025

PREPARED BY CSW ST2



General Model Information

BAHM2023 Project Name: Hillcrest Summit
Site Name: Hillcrest Summit
Site Address: Hillcrest Ave
City: Antioch
Report Date: 2/28/2025
Gage: Los Medanos
Data Start: 1974/10/01
Data End: 2021/09/30
Timestep: Hourly
Precip Scale: 1.000
Version Date: 2024/06/19

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Pre-Project Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use C D,Grass,Very(>20%)	acre 4.5
Pervious Total	4.5
Impervious Land Use	acre
Impervious Total	0
Basin Total	4.5

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use C D,Grass,Very(>20%)	acre 2
Pervious Total	2
Impervious Land Use Roads,Flat(0-5%) Roof Area	acre 1.5 1
Impervious Total	2.5
Basin Total	4.5

Element Flow Components:

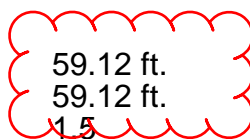
Surface	Interflow	Groundwater
Component Flows To:		
Surface retention 1	Surface retention 1	

Routing Elements
Pre-Project Routing

Mitigated Routing

Bioretention 1

Bottom Length: 59.12 ft.
 Bottom Width: 59.12 ft.
 Material thickness of first layer: 1.5
 Material type for first layer: SMMWW 12 in/hr
 Material thickness of second layer: 1
 Material type for second layer: Sand
 Material thickness of third layer: 0
 Material type for third layer: GRAVEL
 Infiltration On
 Infiltration rate: 2
 Infiltration reduction factor: 0.5
 Total Volume Infiltrated (ac-ft.): 71.079
 Total Volume Through Riser (ac-ft.): 21.185
 Total Volume Through Facility (ac-ft.): 106.336
 Percent Infiltrated: 66.84
 Total Precip Applied to Facility: 2.724
 Total Evap From Facility: 2.689
 Underdrain used
 Underdrain Diameter (feet): 0.5
 Orifice Diameter (in.): 1.98774974880871
 Offset (in.): 6
 Flow Through Underdrain (ac-ft.): 14.072
 Total Outflow (ac-ft.): 106.336
 Percent Through Underdrain: 13.23
 Discharge Structure
 Riser Height: 0.5 ft.
 Riser Diameter: 12 in.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:



**TOTAL REQUIRED
 BIORETENTION AREA
 3,480 SF**

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
70.000	0.0825	0.0000	0.0000	0.0000
70.038	0.0825	0.0014	0.0000	0.0000
70.077	0.0824	0.0028	0.0000	0.0000
70.115	0.0824	0.0042	0.0000	0.0000
70.154	0.0824	0.0056	0.0000	0.0000
70.192	0.0823	0.0071	0.0000	0.0000
70.231	0.0823	0.0085	0.0000	0.0000
70.269	0.0823	0.0099	0.0058	0.0058
70.308	0.0822	0.0113	0.0082	0.0082
70.346	0.0822	0.0127	0.0088	0.0088
70.385	0.0822	0.0141	0.0106	0.0106
70.423	0.0821	0.0156	0.0127	0.0127
70.462	0.0821	0.0170	0.0149	0.0149
70.500	0.0821	0.0184	0.0175	0.0175
70.538	0.0820	0.0198	0.0202	0.0202
70.577	0.0820	0.0212	0.0232	0.0232
70.615	0.0820	0.0227	0.0265	0.0265
70.654	0.0819	0.0241	0.0301	0.0301
70.692	0.0819	0.0255	0.0339	0.0339

70.731	0.0819	0.0269	0.0381	0.0381
70.769	0.0818	0.0283	0.0425	0.0425
70.808	0.0818	0.0298	0.0472	0.0472
70.846	0.0818	0.0312	0.0523	0.0523
70.885	0.0817	0.0326	0.0577	0.0577
70.923	0.0817	0.0340	0.0634	0.0634
70.962	0.0817	0.0355	0.0694	0.0694
71.000	0.0816	0.0369	0.0758	0.0758
71.038	0.0816	0.0383	0.0809	0.0809
71.077	0.0815	0.0398	0.0809	0.0809
71.115	0.0815	0.0412	0.0809	0.0809
71.154	0.0815	0.0426	0.0809	0.0809
71.192	0.0814	0.0440	0.0809	0.0809
71.231	0.0814	0.0455	0.0809	0.0809
71.269	0.0814	0.0469	0.0809	0.0809
71.308	0.0813	0.0483	0.0809	0.0809
71.346	0.0813	0.0498	0.0809	0.0809
71.385	0.0813	0.0512	0.0809	0.0809
71.423	0.0812	0.0526	0.0809	0.0809
71.462	0.0812	0.0541	0.0809	0.0809
71.500	0.0812	0.0553	0.0809	0.0809
71.538	0.0811	0.0566	0.0809	0.0809
71.577	0.0811	0.0578	0.0809	0.0809
71.615	0.0811	0.0591	0.0809	0.0809
71.654	0.0810	0.0603	0.0809	0.0809
71.692	0.0810	0.0616	0.0809	0.0809
71.731	0.0810	0.0629	0.0809	0.0809
71.769	0.0809	0.0641	0.0809	0.0809
71.808	0.0809	0.0654	0.0809	0.0809
71.846	0.0809	0.0666	0.0809	0.0809
71.885	0.0808	0.0679	0.0809	0.0809
71.923	0.0808	0.0692	0.0809	0.0809
71.962	0.0808	0.0704	0.0809	0.0809
72.000	0.0807	0.0717	0.0809	0.0809
72.038	0.0807	0.0729	0.0809	0.0809
72.077	0.0807	0.0742	0.0809	0.0809
72.115	0.0806	0.0755	0.0809	0.0809
72.154	0.0806	0.0767	0.0809	0.0809
72.192	0.0805	0.0780	0.0809	0.0809
72.231	0.0805	0.0793	0.0809	0.0809
72.269	0.0805	0.0805	0.0809	0.0809
72.308	0.0804	0.0818	0.0809	0.0809
72.346	0.0804	0.0831	0.0809	0.0809
72.385	0.0804	0.0843	0.0809	0.0809
72.423	0.0803	0.0856	0.0809	0.0809
72.462	0.0803	0.0869	0.0809	0.0809
72.500	0.0803	0.0881	0.0809	0.0809
72.500	0.0802	0.0881	0.0809	0.0809

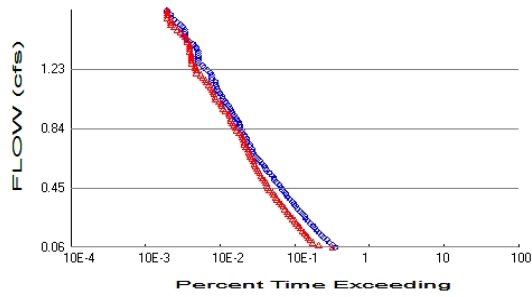
Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infiltr(cfs)
2.5000	0.0825	0.0881	0.0000	0.1738	0.0000
2.5385	0.0825	0.0913	0.0000	0.1738	0.0000
2.5769	0.0825	0.0945	0.0000	0.1738	0.0000
2.6154	0.0826	0.0977	0.0000	0.1738	0.0000
2.6538	0.0826	0.1008	0.0000	0.1738	0.0000
2.6923	0.0826	0.1040	0.0000	0.1738	0.0000
2.7308	0.0827	0.1072	0.0000	0.1738	0.0000

2.7692	0.0827	0.1104	0.0000	0.1738	0.0000
2.8077	0.0828	0.1136	0.0000	0.1738	0.0000
2.8462	0.0828	0.1167	0.0000	0.1738	0.0000
2.8846	0.0828	0.1199	0.0000	0.1738	0.0000
2.9231	0.0829	0.1231	0.0000	0.1738	0.0000
2.9615	0.0829	0.1263	0.0000	0.1738	0.0000
3.0000	0.0829	0.1295	0.0000	0.1738	0.0000
3.0385	0.0830	0.1327	0.0000	0.1738	0.0000
3.0769	0.0830	0.1359	0.0000	0.1738	0.0000
3.1154	0.0830	0.1391	0.0000	0.1738	0.0000
3.1538	0.0831	0.1423	0.0000	0.1738	0.0000
3.1923	0.0831	0.1454	0.0000	0.1738	0.0000
3.2308	0.0831	0.1486	0.0000	0.1738	0.0000
3.2692	0.0832	0.1518	0.0000	0.1738	0.0000
3.3077	0.0832	0.1550	0.0000	0.1738	0.0000
3.3462	0.0832	0.1582	0.0000	0.1738	0.0000
3.3846	0.0833	0.1614	0.0000	0.1738	0.0000
3.4231	0.0833	0.1646	0.0000	0.1738	0.0000
3.4615	0.0833	0.1679	0.0000	0.1738	0.0000
3.5000	0.0834	0.1711	0.0000	0.1738	0.0000

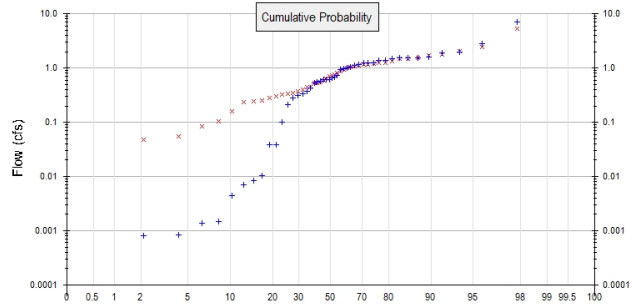
Analysis Results

POC 1



+ Pre-Project

x Mitigated



Pre-Project Landuse Totals for POC #1

Total Pervious Area: 4.5
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 2
Total Impervious Area: 2.5

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #1

Return Period	Flow(cfs)
2 year	0.621292
5 year	1.425109
10 year	1.622057
25 year	2.979895

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.717246
5 year	1.29624
10 year	1.706025
25 year	2.534073

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #1

Year	Pre-Project	Mitigated
1975	0.738	0.870
1976	0.000	0.039
1977	0.001	0.253
1978	1.234	0.638
1979	1.226	1.017
1980	0.940	1.504
1981	0.308	0.351
1982	1.164	1.121
1983	7.090	5.396
1984	0.654	0.528
1985	0.432	0.547
1986	1.551	1.233
1987	0.039	0.244
1988	0.562	0.396

1989	0.008	2.069
1990	0.004	0.450
1991	0.374	0.336
1992	0.039	0.233
1993	0.954	0.585
1994	0.331	0.717
1995	1.956	1.769
1996	0.675	0.524
1997	1.507	1.353
1998	1.871	1.693
1999	0.001	0.278
2000	0.001	0.055
2001	0.007	0.084
2002	0.992	1.170
2003	1.517	1.512
2004	0.604	0.449
2005	0.621	0.811
2006	0.546	0.321
2007	0.010	0.048
2008	1.057	1.081
2009	0.211	0.297
2010	1.360	1.262
2011	1.376	1.178
2012	0.276	0.159
2013	2.801	2.410
2014	0.604	0.765
2015	1.101	0.952
2016	1.235	1.181
2017	1.532	1.034
2018	0.534	0.369
2019	1.572	1.487
2020	0.100	0.102
2021	0.001	0.735

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #1

Rank	Pre-Project	Mitigated
1	7.0899	5.3956
2	2.8012	2.4097
3	1.9559	2.0687
4	1.8708	1.7689
5	1.5723	1.6935
6	1.5505	1.5115
7	1.5321	1.5037
8	1.5172	1.4867
9	1.5067	1.3525
10	1.3762	1.2625
11	1.3600	1.2327
12	1.2349	1.1807
13	1.2343	1.1777
14	1.2258	1.1702
15	1.1635	1.1211
16	1.1007	1.0815
17	1.0569	1.0335
18	0.9918	1.0174
19	0.9541	0.9520
20	0.9398	0.8696
21	0.7375	0.8105

22	0.6749	0.7650
23	0.6542	0.7346
24	0.6213	0.7172
25	0.6044	0.6375
26	0.6042	0.5853
27	0.5623	0.5469
28	0.5461	0.5276
29	0.5344	0.5240
30	0.4321	0.4495
31	0.3745	0.4490
32	0.3306	0.3960
33	0.3081	0.3692
34	0.2759	0.3506
35	0.2106	0.3362
36	0.0998	0.3206
37	0.0391	0.2966
38	0.0386	0.2782
39	0.0103	0.2525
40	0.0084	0.2436
41	0.0070	0.2333
42	0.0045	0.1589
43	0.0015	0.1022
44	0.0014	0.0844
45	0.0008	0.0545
46	0.0008	0.0483
47	0.0001	0.0387

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0621	1441	1322	91	Pass
0.0779	1328	862	64	Pass
0.0936	1200	714	59	Pass
0.1094	1107	663	59	Pass
0.1252	1015	621	61	Pass
0.1409	936	595	63	Pass
0.1567	870	557	64	Pass
0.1724	812	521	64	Pass
0.1882	765	490	64	Pass
0.2039	723	461	63	Pass
0.2197	671	433	64	Pass
0.2355	627	410	65	Pass
0.2512	585	385	65	Pass
0.2670	557	358	64	Pass
0.2827	522	337	64	Pass
0.2985	485	324	66	Pass
0.3142	448	305	68	Pass
0.3300	426	288	67	Pass
0.3458	404	272	67	Pass
0.3615	379	254	67	Pass
0.3773	353	239	67	Pass
0.3930	332	230	69	Pass
0.4088	315	217	68	Pass
0.4245	299	206	68	Pass
0.4403	278	189	67	Pass
0.4561	268	180	67	Pass
0.4718	257	174	67	Pass
0.4876	237	170	71	Pass
0.5033	219	163	74	Pass
0.5191	215	151	70	Pass
0.5348	203	145	71	Pass
0.5506	188	139	73	Pass
0.5663	174	133	76	Pass
0.5821	167	128	76	Pass
0.5979	161	121	75	Pass
0.6136	149	118	79	Pass
0.6294	140	116	82	Pass
0.6451	131	110	83	Pass
0.6609	122	105	86	Pass
0.6766	116	104	89	Pass
0.6924	112	99	88	Pass
0.7082	109	97	88	Pass
0.7239	104	90	86	Pass
0.7397	103	86	83	Pass
0.7554	97	86	88	Pass
0.7712	94	84	89	Pass
0.7869	90	82	91	Pass
0.8027	86	80	93	Pass
0.8185	81	74	91	Pass
0.8342	80	68	85	Pass
0.8500	75	66	88	Pass
0.8657	75	63	84	Pass
0.8815	74	60	81	Pass

0.8972	70	58	82	Pass
0.9130	68	57	83	Pass
0.9288	63	55	87	Pass
0.9445	60	54	90	Pass
0.9603	58	48	82	Pass
0.9760	56	45	80	Pass
0.9918	53	43	81	Pass
1.0075	50	42	84	Pass
1.0233	48	40	83	Pass
1.0391	45	36	80	Pass
1.0548	44	35	79	Pass
1.0706	41	34	82	Pass
1.0863	39	33	84	Pass
1.1021	38	32	84	Pass
1.1178	37	31	83	Pass
1.1336	36	29	80	Pass
1.1494	36	27	75	Pass
1.1651	32	26	81	Pass
1.1809	32	24	75	Pass
1.1966	32	23	71	Pass
1.2124	31	20	64	Pass
1.2281	28	20	71	Pass
1.2439	25	19	76	Pass
1.2596	24	19	79	Pass
1.2754	21	17	80	Pass
1.2912	21	17	80	Pass
1.3069	21	17	80	Pass
1.3227	21	17	80	Pass
1.3384	21	17	80	Pass
1.3542	21	16	76	Pass
1.3699	20	16	80	Pass
1.3857	19	16	84	Pass
1.4015	18	16	88	Pass
1.4172	16	15	93	Pass
1.4330	15	15	100	Pass
1.4487	14	14	100	Pass
1.4645	14	13	92	Pass
1.4802	14	12	85	Pass
1.4960	14	11	78	Pass
1.5118	13	10	76	Pass
1.5275	12	9	75	Pass
1.5433	11	9	81	Pass
1.5590	10	9	90	Pass
1.5748	9	8	88	Pass
1.5905	9	8	88	Pass
1.6063	8	8	100	Pass
1.6221	8	8	100	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

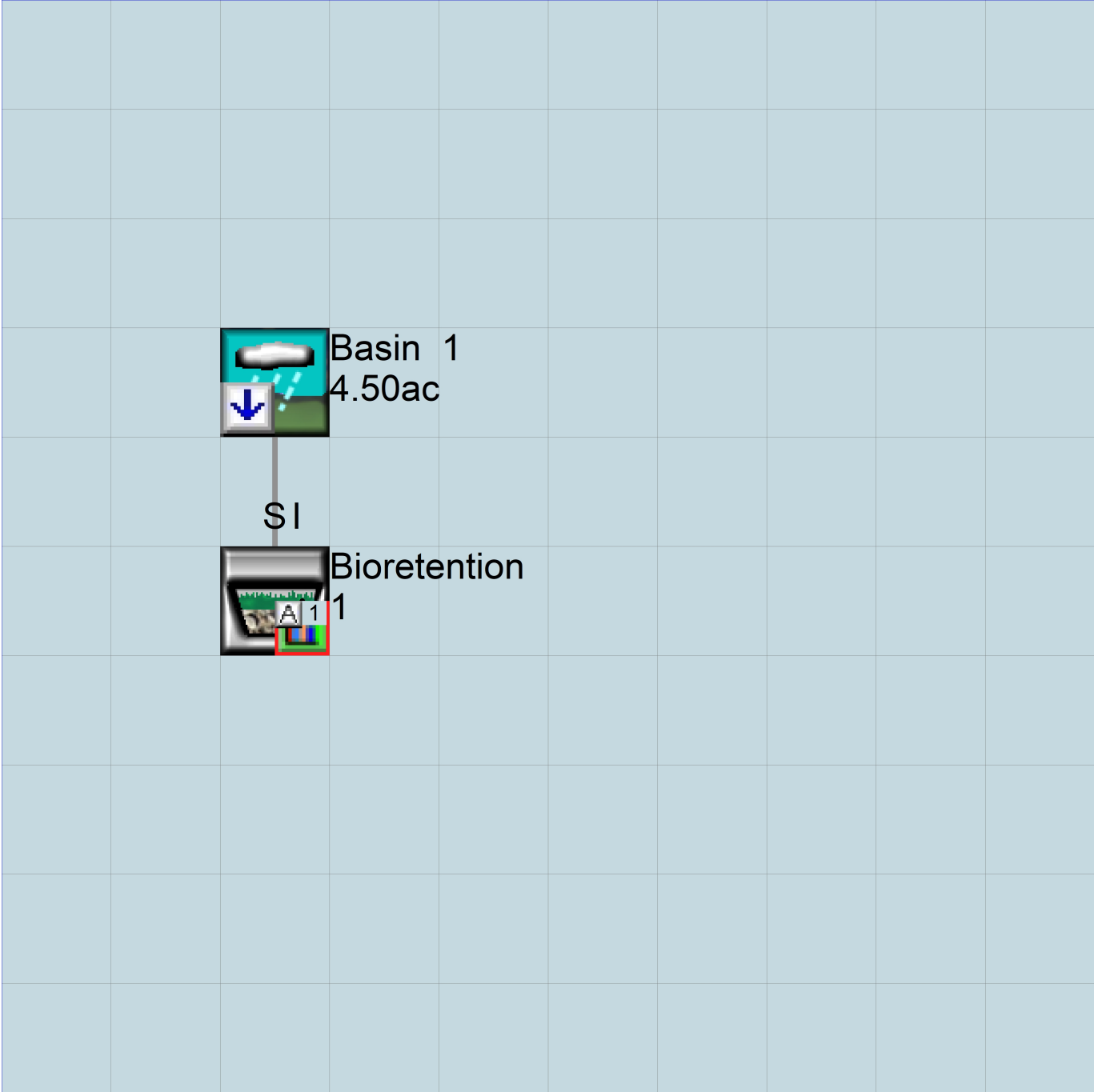
No IMPLND changes have been made.

Appendix
Pre-Project Schematic



Basin 1
4.50ac

Mitigated Schematic



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