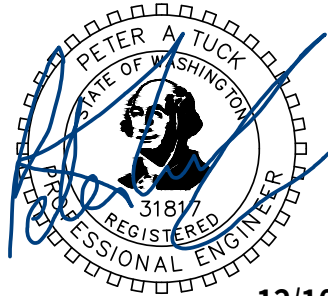


MEMORANDUM

TO: City of Camas

FROM: Peter Tuck P.E.
MacKay Sposito



12/10/2025

RE: Existing and Proposed Stormwater on City of Camas Parcel – Parcel Id # 175721-000.

DATE: December 10, 2025

This memo is to address the following concerns raised by the city in relation to the proposed storm line to be constructed across the City of Camas Parcel with the Lacamas North Shore Development. City staff are concerned that the proposed design will dry up the natural drainage across the parcel and request that a design be completed that preserves the natural drainage.

Currently runoff from the basin area that discharges to the head of the city's drainage, first flows to the central wetland on the Lacamas North Shore Project (LNSP), before being collected and piped to the drainage on the city's parcel. Since the hydrology for the wetland is primarily from groundwater, the current subsurface collection system in the wetland ensures constant flow to the drainage throughout the year.

The existing contributing basin area to the city's drainage is made up of approximately 34 Ac of land not being disturbed by the LNSP and another 55 Ac of development area within the LNSP. The undisturbed area consists of forested area with large basaltic extrusions, some swampy area and the remainder made up of the pastured wetland central to LNSP.

Runoff from the 55 Ac of development area is being collected and routed to the stormwater facility adjacent to the central wetland where it is treated using media cartridges followed by underground detention. Discharge from the detention is currently planned to be piped to the west slope on the City of Camas Parcel where it will be discharged to the existing drainage.

Runoff from the remaining 34 Ac will continue to flow to the central wetland where it will be collected and routed to the head of the drainage on the city's parcel. The current subsurface collection system will be impacted by the development, but a new shallow French drain system will be installed in or adjacent to the wetland in accordance with the wetland mitigation plan, to ensure the base historic flows from groundwater are maintained throughout the year. This

system will also collect surface runoff and route it to the drainage. To increase the amount of water routed to the wetland and therefore the city's drainage, all roof area directly adjacent to the wetland will be routed to it. This flow will be mitigated by oversizing the detention system to ensure the full discharge from the site is in accordance with Washington State Department of Ecology (WSDOE) requirements.

Based on WSDOE requirements, all stormwater facilities are to be sized using the Western Washinton Hydrological Model (WWHM). This model calculates the historic runoff rates from a site and aids in sizing facilities that meet the developed runoff rate that is equal to or lower than the runoff from the site in a fully forested state.

For this project, a model was created that includes both the 55 Ac onsite development area and the undisturbed 34 Ac area. For the model:

- The undisturbed area is unchanged in both the predeveloped and developed conditions
- In the developed state, the undisturbed area was not routed to the detention facility
- Approximately 1.5 Ac of roof area was added to the undisturbed catchment that bypasses detention. (this equates to the roofs runoff being routed directly to the central wetland)
- Resultant discharge flows for the model are for the location of the pipe discharge at the west side of the city parcel not at the head of the drainage.
- Table 1 below shows Peak Historic Flows from the site for the full 89 Ac.
- Table 2 shows Peak Developed Flows from the site for the full 89 Ac.

Since the peak flows shown in the above model are at the pipe discharge rather than at the top of the drainage, a second model was created identical to the first but revised to remove the basin that bypasses the detention. The resultant flows are still at the pipe discharge but do not include the flow across the drainage and are shown below in Table 3.

The flow across the drainage can be calculated as the difference between the two sets of flows or the values shown in Table 3 subtracted from the values in Table 2. These totals are shown in Table 4 below.

Storm Event	Peak Flow (CFS)
2 Year	22.3
10 Year	41.9
25 Year	48.9
100 Year	56.5

Table 1: Historic Runoff from the Entire 89 Ac

Storm Event	Peak Flow (CFS)
2 Year	15.8
10 Year	31.6
25 Year	40.8
100 Year	55.7

Table 2: Developed Discharge from Detention Facility and 34 Ac Undeveloped Area.

Storm Event	Peak Flow (CFS)
2 Year	9.7
10 Year	19.6
25 Year	26.0
100 Year	37.4

Table 3: Developed Discharge from Detention Facility (34 Ac + additional roof areas removed from model)

Storm Event	Peak Flow (CFS)
2 Year	6.1
10 Year	12.0
25 Year	14.8
100 Year	18.3

Table 4: Flow to Head of Drainage after Development (Flows from Table 3 subtracted from Table 2)

As can be seen from the values in Table 4, when the development is completed, post developed flows are still more than adequate to preserve the natural drainage and will ensure that it will not dry up. In addition, since a shallow french drain will be installed in or adjacent to the wetland, the existing low flows from the groundwater will continue to provide moisture in the drainage throughout the year.

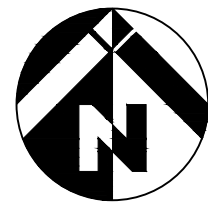
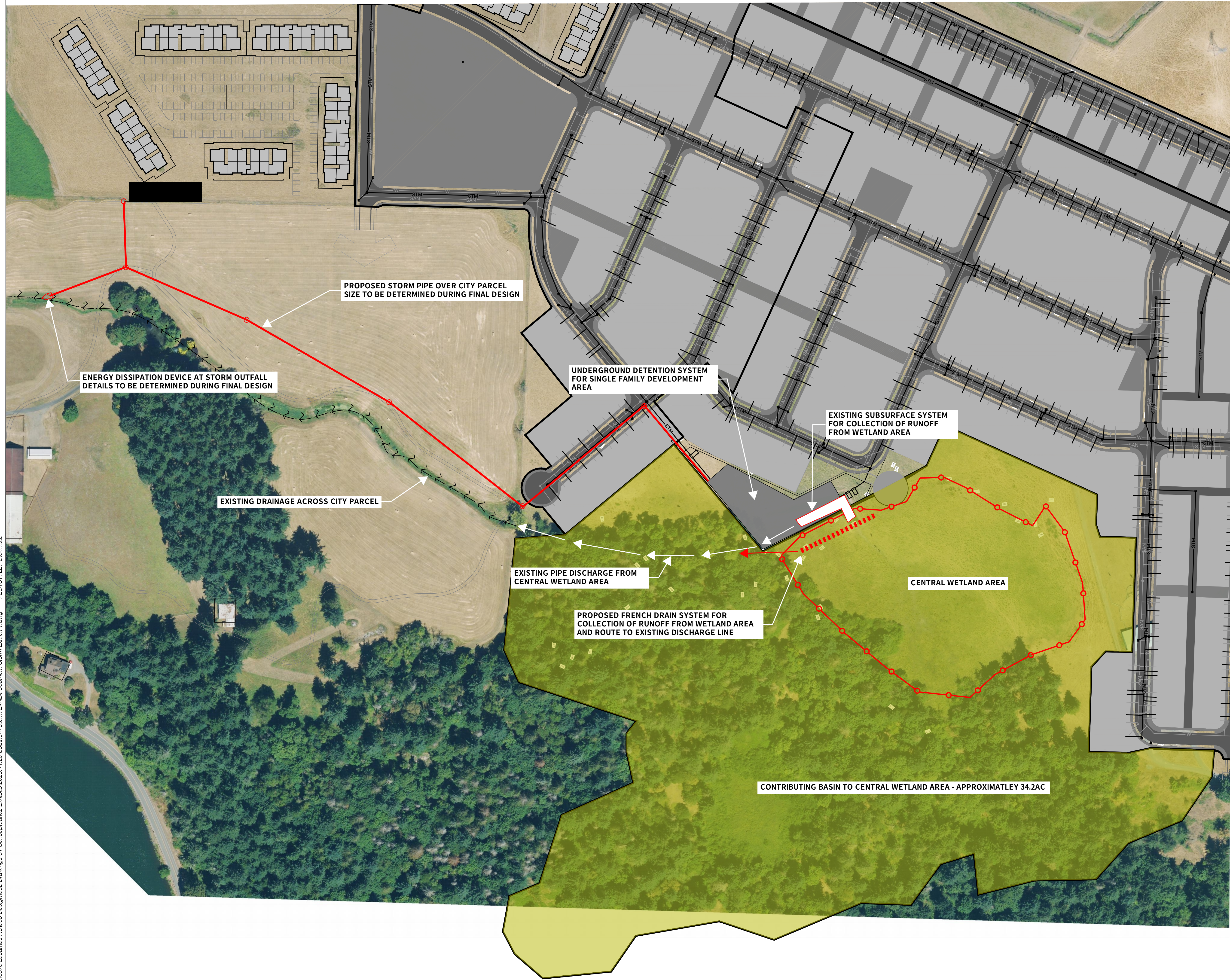
Attached:

Southern Storm Basin Exhibit

WWHM Model for 89 Ac Development and Adjacent Area – Results

Original WWHM Model with 34 Ac + additional roof areas removed - Results

FILE: W:\8973 Lacamas NS\500 Design\502 Drawings\01 Conceptual\02 Exhibits\2025.11.25 Southern Storm Exhibit\Southern Storm Exhibit 1.dwg PLOTSTYLE: Storm.sbt



0 100 200
SCALE: 1" = 100'

12/8/2025

LACAMAS NORTH SHORE
CITY OF CAMAS
SOUTHERN STORM EXHIBIT

REVISIONS:

JOB NO.: 8973
DATE: 12/8/2025
DESIGNED BY: KEH
DRAWN BY: KEH
CHECKED BY: TAW

CONCEPTUAL

EX3.1

WWHM2012
PROJECT REPORT

General Model Information

WWHM2012 Project Name: South Basin Revised w roof to wetland

Site Name: Lacamas NS

Site Address:

City:

Report Date: 12/9/2025

Gage: Lacamas

Data Start: 1948/10/01

Data End: 2008/09/30

Timestep: 15 Minute

Precip Scale: 1.300

Version Date: 2025/05/13

Version: 4.3.2

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Flat	54.83
Pervious Total	54.83
Impervious Land Use	acre
Impervious Total	0
Basin Total	54.83

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Flat	34.23
Pervious Total	34.23
Impervious Land Use	acre
Impervious Total	0
Basin Total	34.23

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Lawn, Flat	21.03
Pervious Total	21.03
Impervious Land Use	acre
ROADS FLAT	6.05
ROOF TOPS FLAT	4.13
SIDEWALKS FLAT	2.23
Impervious Total	12.41
Basin Total	33.44

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Lawn, Flat	11.26
Pervious Total	11.26
Impervious Land Use	acre
ROADS FLAT	3.73
ROOF TOPS FLAT	3.42
SIDEWALKS FLAT	1.43
Impervious Total	8.58
Basin Total	19.84

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 3

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Flat	34.23
Pervious Total	34.23
Impervious Land Use	acre
ROOF TOPS FLAT	1.54
Impervious Total	1.54
Basin Total	35.77

Element Flow Components:		
Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 170.00 ft.
Bottom Width: 170.00 ft.
Depth: 5 ft.
Volume at riser head: 2.6907 acre-feet.
Side slope 1: 0 To 1
Side slope 2: 0 To 1
Side slope 3: 0 To 1
Side slope 4: 0 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 54 in.
Notch Type: Rectangular
Notch Width: 1.750 ft.
Notch Height: 1.250 ft.
Orifice 1 Diameter: 11.000 in Elevation: 0 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

Pond Hydraulic Table

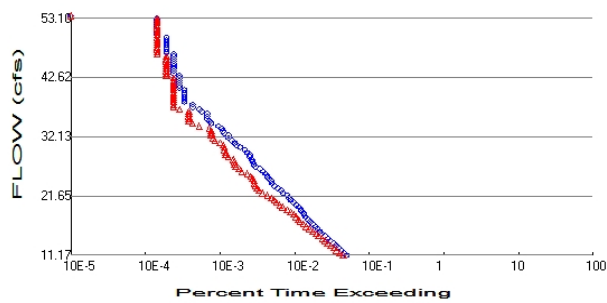
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.663	0.000	0.000	0.000
0.0556	0.663	0.036	0.773	0.000
0.1111	0.663	0.073	1.094	0.000
0.1667	0.663	0.110	1.340	0.000
0.2222	0.663	0.147	1.547	0.000
0.2778	0.663	0.184	1.730	0.000
0.3333	0.663	0.221	1.895	0.000
0.3889	0.663	0.258	2.047	0.000
0.4444	0.663	0.294	2.189	0.000
0.5000	0.663	0.331	2.321	0.000
0.5556	0.663	0.368	2.447	0.000
0.6111	0.663	0.405	2.566	0.000
0.6667	0.663	0.442	2.681	0.000
0.7222	0.663	0.479	2.790	0.000
0.7778	0.663	0.516	2.895	0.000
0.8333	0.663	0.552	2.997	0.000
0.8889	0.663	0.589	3.095	0.000
0.9444	0.663	0.626	3.191	0.000
1.0000	0.663	0.663	3.283	0.000
1.0556	0.663	0.700	3.373	0.000
1.1111	0.663	0.737	3.461	0.000
1.1667	0.663	0.774	3.546	0.000
1.2222	0.663	0.810	3.630	0.000
1.2778	0.663	0.847	3.711	0.000
1.3333	0.663	0.884	3.791	0.000
1.3889	0.663	0.921	3.869	0.000
1.4444	0.663	0.958	3.946	0.000
1.5000	0.663	0.995	4.021	0.000
1.5556	0.663	1.032	4.095	0.000
1.6111	0.663	1.068	4.167	0.000
1.6667	0.663	1.105	4.239	0.000

1.7222	0.663	1.142	4.309	0.000
1.7778	0.663	1.179	4.378	0.000
1.8333	0.663	1.216	4.446	0.000
1.8889	0.663	1.253	4.512	0.000
1.9444	0.663	1.290	4.578	0.000
2.0000	0.663	1.326	4.643	0.000
2.0556	0.663	1.363	4.707	0.000
2.1111	0.663	1.400	4.770	0.000
2.1667	0.663	1.437	4.833	0.000
2.2222	0.663	1.474	4.894	0.000
2.2778	0.663	1.511	4.955	0.000
2.3333	0.663	1.548	5.015	0.000
2.3889	0.663	1.584	5.075	0.000
2.4444	0.663	1.621	5.133	0.000
2.5000	0.663	1.658	5.191	0.000
2.5556	0.663	1.695	5.249	0.000
2.6111	0.663	1.732	5.305	0.000
2.6667	0.663	1.769	5.362	0.000
2.7222	0.663	1.806	5.417	0.000
2.7778	0.663	1.842	5.499	0.000
2.8333	0.663	1.879	5.667	0.000
2.8889	0.663	1.916	5.882	0.000
2.9444	0.663	1.953	6.134	0.000
3.0000	0.663	1.990	6.415	0.000
3.0556	0.663	2.027	6.724	0.000
3.1111	0.663	2.064	7.056	0.000
3.1667	0.663	2.100	7.410	0.000
3.2222	0.663	2.137	7.785	0.000
3.2778	0.663	2.174	8.179	0.000
3.3333	0.663	2.211	8.591	0.000
3.3889	0.663	2.248	9.020	0.000
3.4444	0.663	2.285	9.466	0.000
3.5000	0.663	2.322	9.928	0.000
3.5556	0.663	2.358	10.40	0.000
3.6111	0.663	2.395	10.89	0.000
3.6667	0.663	2.432	11.40	0.000
3.7222	0.663	2.469	11.92	0.000
3.7778	0.663	2.506	12.45	0.000
3.8333	0.663	2.543	13.00	0.000
3.8889	0.663	2.580	13.55	0.000
3.9444	0.663	2.617	14.12	0.000
4.0000	0.663	2.653	14.71	0.000
4.0556	0.663	2.690	15.38	0.000
4.1111	0.663	2.727	16.57	0.000
4.1667	0.663	2.764	18.09	0.000
4.2222	0.663	2.801	19.88	0.000
4.2778	0.663	2.838	21.91	0.000
4.3333	0.663	2.875	24.14	0.000
4.3889	0.663	2.911	26.55	0.000
4.4444	0.663	2.948	29.13	0.000
4.5000	0.663	2.985	31.85	0.000
4.5556	0.663	3.022	34.71	0.000
4.6111	0.663	3.059	37.68	0.000
4.6667	0.663	3.096	40.75	0.000
4.7222	0.663	3.133	43.91	0.000
4.7778	0.663	3.169	47.13	0.000
4.8333	0.663	3.206	50.41	0.000
4.8889	0.663	3.243	53.73	0.000

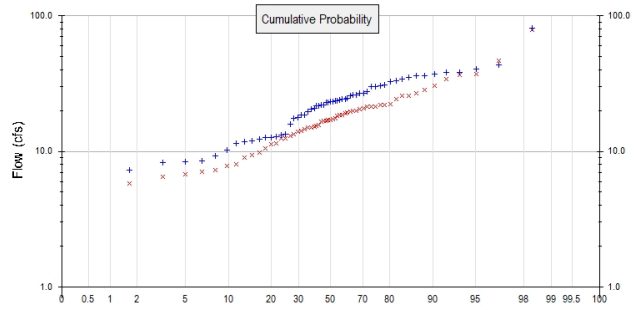
4.9444	0.663	3.280	57.07	0.000
5.0000	0.663	3.317	60.42	0.000
5.0556	0.663	3.354	63.75	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #1

Total Pervious Area: 89.06
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 66.52
Total Impervious Area: 22.53

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	22.344109
5 year	34.979818
10 year	41.874478
25 year	48.90844
50 year	53.096113
100 year	56.543096

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	16.283888
5 year	25.41149
10 year	32.066895
25 year	41.095244
50 year	48.237759
100 year	55.717006

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	17.448	16.894
1950	22.877	16.886
1951	30.220	16.467
1952	17.715	18.511
1953	23.899	15.456
1954	33.306	19.313
1955	18.543	12.421
1956	36.364	36.931
1957	27.656	18.249
1958	20.516	25.831

1959	11.927	8.040
1960	11.780	9.004
1961	32.747	20.826
1962	21.974	14.986
1963	24.417	15.587
1964	23.303	15.006
1965	20.892	19.054
1966	26.700	16.995
1967	23.265	14.263
1968	30.419	19.631
1969	24.787	19.928
1970	81.020	79.014
1971	12.814	10.450
1972	21.788	14.574
1973	21.699	21.334
1974	34.171	36.730
1975	18.621	13.086
1976	26.765	21.411
1977	0.729	4.123
1978	38.152	30.393
1979	25.823	21.342
1980	15.792	11.385
1981	36.269	26.764
1982	24.410	22.271
1983	40.608	25.666
1984	13.249	9.840
1985	10.213	11.322
1986	12.615	9.338
1987	22.014	17.432
1988	8.500	6.473
1989	9.236	7.058
1990	8.378	7.229
1991	23.763	13.875
1992	26.142	15.210
1993	30.729	28.242
1994	23.493	21.973
1995	19.493	22.131
1996	37.280	46.361
1997	43.174	34.015
1998	34.903	18.558
1999	26.084	20.591
2000	12.631	7.771
2001	7.279	5.752
2002	38.095	20.010
2003	29.949	24.358
2004	8.219	6.810
2005	12.286	12.527
2006	22.984	17.288
2007	11.378	16.991
2008	13.352	13.475

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	81.0204	79.0136
2	43.1735	46.3608
3	40.6079	36.9313
4	38.1521	36.7296

5	38.0949	34.0149
6	37.2802	30.3928
7	36.3635	28.2415
8	36.2693	26.7642
9	34.9032	25.8306
10	34.1706	25.6655
11	33.3057	24.3581
12	32.7471	22.2709
13	30.7287	22.1307
14	30.4193	21.9734
15	30.2198	21.4107
16	29.9486	21.3424
17	27.6561	21.3335
18	26.7653	20.8259
19	26.7001	20.5905
20	26.1422	20.0098
21	26.0842	19.9277
22	25.8228	19.6306
23	24.7866	19.3128
24	24.4166	19.0537
25	24.4099	18.5578
26	23.8989	18.5107
27	23.7633	18.2493
28	23.4933	17.4320
29	23.3027	17.2878
30	23.2653	16.9948
31	22.9836	16.9909
32	22.8768	16.8938
33	22.0144	16.8862
34	21.9736	16.4672
35	21.7883	15.5873
36	21.6993	15.4562
37	20.8921	15.2095
38	20.5158	15.0057
39	19.4933	14.9857
40	18.6209	14.5740
41	18.5433	14.2627
42	17.7147	13.8754
43	17.4476	13.4753
44	15.7916	13.0862
45	13.3524	12.5274
46	13.2489	12.4205
47	12.8138	11.3851
48	12.6306	11.3216
49	12.6152	10.4495
50	12.2862	9.8402
51	11.9265	9.3383
52	11.7803	9.0037
53	11.3782	8.0405
54	10.2127	7.7707
55	9.2359	7.2294
56	8.5003	7.0581
57	8.3785	6.8098
58	8.2195	6.4732
59	7.2790	5.7524
60	0.7288	4.1234

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
11.1721	1041	937	90	Pass
11.5955	960	839	87	Pass
12.0190	894	761	85	Pass
12.4425	811	702	86	Pass
12.8660	746	634	84	Pass
13.2894	694	582	83	Pass
13.7129	631	535	84	Pass
14.1364	583	495	84	Pass
14.5599	536	440	82	Pass
14.9833	484	406	83	Pass
15.4068	456	367	80	Pass
15.8303	425	332	78	Pass
16.2538	402	301	74	Pass
16.6772	367	274	74	Pass
17.1007	336	246	73	Pass
17.5242	314	236	75	Pass
17.9477	298	220	73	Pass
18.3711	280	204	72	Pass
18.7946	265	186	70	Pass
19.2181	253	168	66	Pass
19.6416	238	145	60	Pass
20.0650	221	132	59	Pass
20.4885	201	120	59	Pass
20.9120	186	112	60	Pass
21.3355	175	102	58	Pass
21.7589	168	91	54	Pass
22.1824	145	77	53	Pass
22.6059	139	70	50	Pass
23.0294	126	66	52	Pass
23.4528	113	62	54	Pass
23.8763	104	60	57	Pass
24.2998	101	60	59	Pass
24.7233	95	57	60	Pass
25.1467	90	54	60	Pass
25.5702	85	49	57	Pass
25.9937	80	41	51	Pass
26.4172	71	38	53	Pass
26.8406	62	34	54	Pass
27.2641	59	33	55	Pass
27.6876	57	33	57	Pass
28.1111	56	32	57	Pass
28.5345	53	27	50	Pass
28.9580	52	25	48	Pass
29.3815	48	25	52	Pass
29.8050	45	24	53	Pass
30.2284	39	24	61	Pass
30.6519	35	23	65	Pass
31.0754	33	21	63	Pass
31.4989	30	18	60	Pass
31.9223	27	17	62	Pass
32.3458	27	16	59	Pass
32.7693	24	16	66	Pass
33.1928	23	16	69	Pass

33.6162	22	15	68	Pass
34.0397	20	11	55	Pass
34.4632	16	9	56	Pass
34.8867	15	8	53	Pass
35.3101	14	8	57	Pass
35.7336	14	8	57	Pass
36.1571	14	8	57	Pass
36.5806	12	8	66	Pass
37.0041	11	6	54	Pass
37.4275	9	5	55	Pass
37.8510	9	5	55	Pass
38.2745	7	5	71	Pass
38.6980	7	5	71	Pass
39.1214	7	5	71	Pass
39.5449	7	5	71	Pass
39.9684	7	5	71	Pass
40.3919	7	5	71	Pass
40.8153	6	5	83	Pass
41.2388	6	5	83	Pass
41.6623	6	5	83	Pass
42.0858	6	5	83	Pass
42.5092	6	5	83	Pass
42.9327	6	4	66	Pass
43.3562	5	4	80	Pass
43.7797	5	4	80	Pass
44.2031	5	4	80	Pass
44.6266	5	4	80	Pass
45.0501	5	4	80	Pass
45.4736	5	4	80	Pass
45.8970	5	4	80	Pass
46.3205	5	4	80	Pass
46.7440	5	3	60	Pass
47.1675	4	3	75	Pass
47.5909	4	3	75	Pass
48.0144	4	3	75	Pass
48.4379	4	3	75	Pass
48.8614	4	3	75	Pass
49.2848	4	3	75	Pass
49.7083	4	3	75	Pass
50.1318	3	3	100	Pass
50.5553	3	3	100	Pass
50.9787	3	3	100	Pass
51.4022	3	3	100	Pass
51.8257	3	3	100	Pass
52.2492	3	3	100	Pass
52.6726	3	3	100	Pass
53.0961	3	3	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 2.3746 acre-feet

On-line facility target flow: 3.2304 cfs.

Adjusted for 15 min: 3.2304 cfs.

Off-line facility target flow: 1.7176 cfs.

Adjusted for 15 min: 1.7176 cfs.

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

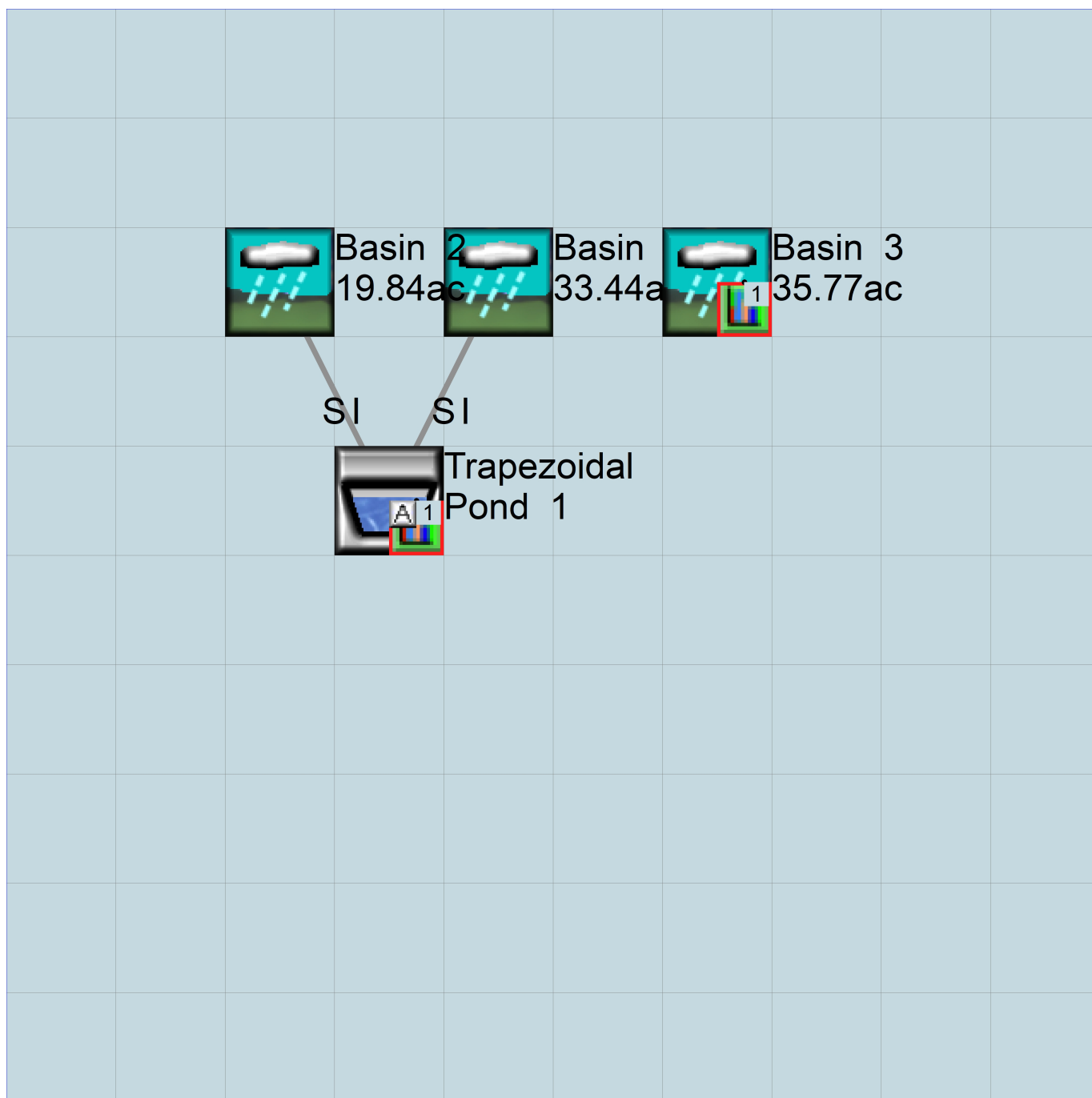
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped HSPF Message File

Disclaimer

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Local (360)943-0304

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WWHM2012
PROJECT REPORT

General Model Information

WWHM2012 Project Name: Sth Basin Rev w roof to wetland w 34 Ac removed

Site Name: Lacamas NS

Site Address:

City:

Report Date: 12/9/2025

Gage: Lacamas

Data Start: 1948/10/01

Data End: 2008/09/30

Timestep: 15 Minute

Precip Scale: 1.300

Version Date: 2025/05/13

Version: 4.3.2

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Flat	54.83
Pervious Total	54.83
Impervious Land Use	acre
Impervious Total	0
Basin Total	54.83

Element Flow Component:		
Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Flat	34.23
Pervious Total	34.23
Impervious Land Use	acre
Impervious Total	0
Basin Total	34.23

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Lawn, Flat	21.03
Pervious Total	21.03
Impervious Land Use	acre
ROADS FLAT	6.05
ROOF TOPS FLAT	4.13
SIDEWALKS FLAT	2.23
Impervious Total	12.41
Basin Total	33.44

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Lawn, Flat	11.26
Pervious Total	11.26
Impervious Land Use	acre
ROADS FLAT	3.73
ROOF TOPS FLAT	3.42
SIDEWALKS FLAT	1.43
Impervious Total	8.58
Basin Total	19.84

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 170.00 ft.
Bottom Width: 170.00 ft.
Depth: 5 ft.
Volume at riser head: 2.6907 acre-feet.
Side slope 1: 0 To 1
Side slope 2: 0 To 1
Side slope 3: 0 To 1
Side slope 4: 0 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 54 in.
Notch Type: Rectangular
Notch Width: 1.750 ft.
Notch Height: 1.250 ft.
Orifice 1 Diameter: 11.000 in Elevation: 0 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

Pond Hydraulic Table

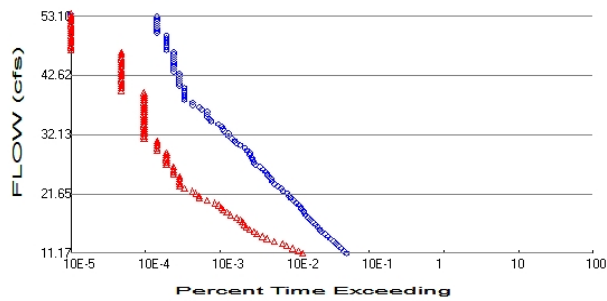
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.663	0.000	0.000	0.000
0.0556	0.663	0.036	0.773	0.000
0.1111	0.663	0.073	1.094	0.000
0.1667	0.663	0.110	1.340	0.000
0.2222	0.663	0.147	1.547	0.000
0.2778	0.663	0.184	1.730	0.000
0.3333	0.663	0.221	1.895	0.000
0.3889	0.663	0.258	2.047	0.000
0.4444	0.663	0.294	2.189	0.000
0.5000	0.663	0.331	2.321	0.000
0.5556	0.663	0.368	2.447	0.000
0.6111	0.663	0.405	2.566	0.000
0.6667	0.663	0.442	2.681	0.000
0.7222	0.663	0.479	2.790	0.000
0.7778	0.663	0.516	2.895	0.000
0.8333	0.663	0.552	2.997	0.000
0.8889	0.663	0.589	3.095	0.000
0.9444	0.663	0.626	3.191	0.000
1.0000	0.663	0.663	3.283	0.000
1.0556	0.663	0.700	3.373	0.000
1.1111	0.663	0.737	3.461	0.000
1.1667	0.663	0.774	3.546	0.000
1.2222	0.663	0.810	3.630	0.000
1.2778	0.663	0.847	3.711	0.000
1.3333	0.663	0.884	3.791	0.000
1.3889	0.663	0.921	3.869	0.000
1.4444	0.663	0.958	3.946	0.000
1.5000	0.663	0.995	4.021	0.000
1.5556	0.663	1.032	4.095	0.000
1.6111	0.663	1.068	4.167	0.000
1.6667	0.663	1.105	4.239	0.000

1.7222	0.663	1.142	4.309	0.000
1.7778	0.663	1.179	4.378	0.000
1.8333	0.663	1.216	4.446	0.000
1.8889	0.663	1.253	4.512	0.000
1.9444	0.663	1.290	4.578	0.000
2.0000	0.663	1.326	4.643	0.000
2.0556	0.663	1.363	4.707	0.000
2.1111	0.663	1.400	4.770	0.000
2.1667	0.663	1.437	4.833	0.000
2.2222	0.663	1.474	4.894	0.000
2.2778	0.663	1.511	4.955	0.000
2.3333	0.663	1.548	5.015	0.000
2.3889	0.663	1.584	5.075	0.000
2.4444	0.663	1.621	5.133	0.000
2.5000	0.663	1.658	5.191	0.000
2.5556	0.663	1.695	5.249	0.000
2.6111	0.663	1.732	5.305	0.000
2.6667	0.663	1.769	5.362	0.000
2.7222	0.663	1.806	5.417	0.000
2.7778	0.663	1.842	5.499	0.000
2.8333	0.663	1.879	5.667	0.000
2.8889	0.663	1.916	5.882	0.000
2.9444	0.663	1.953	6.134	0.000
3.0000	0.663	1.990	6.415	0.000
3.0556	0.663	2.027	6.724	0.000
3.1111	0.663	2.064	7.056	0.000
3.1667	0.663	2.100	7.410	0.000
3.2222	0.663	2.137	7.785	0.000
3.2778	0.663	2.174	8.179	0.000
3.3333	0.663	2.211	8.591	0.000
3.3889	0.663	2.248	9.020	0.000
3.4444	0.663	2.285	9.466	0.000
3.5000	0.663	2.322	9.928	0.000
3.5556	0.663	2.358	10.40	0.000
3.6111	0.663	2.395	10.89	0.000
3.6667	0.663	2.432	11.40	0.000
3.7222	0.663	2.469	11.92	0.000
3.7778	0.663	2.506	12.45	0.000
3.8333	0.663	2.543	13.00	0.000
3.8889	0.663	2.580	13.55	0.000
3.9444	0.663	2.617	14.12	0.000
4.0000	0.663	2.653	14.71	0.000
4.0556	0.663	2.690	15.38	0.000
4.1111	0.663	2.727	16.57	0.000
4.1667	0.663	2.764	18.09	0.000
4.2222	0.663	2.801	19.88	0.000
4.2778	0.663	2.838	21.91	0.000
4.3333	0.663	2.875	24.14	0.000
4.3889	0.663	2.911	26.55	0.000
4.4444	0.663	2.948	29.13	0.000
4.5000	0.663	2.985	31.85	0.000
4.5556	0.663	3.022	34.71	0.000
4.6111	0.663	3.059	37.68	0.000
4.6667	0.663	3.096	40.75	0.000
4.7222	0.663	3.133	43.91	0.000
4.7778	0.663	3.169	47.13	0.000
4.8333	0.663	3.206	50.41	0.000
4.8889	0.663	3.243	53.73	0.000

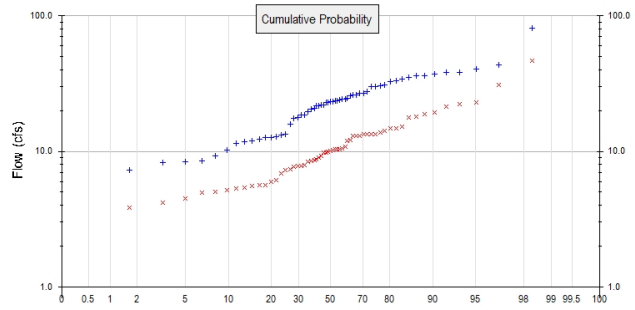
4.9444	0.663	3.280	57.07	0.000
5.0000	0.663	3.317	60.42	0.000
5.0556	0.663	3.354	63.75	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #1

Total Pervious Area: 89.06
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 32.29
Total Impervious Area: 20.99

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	22.344109
5 year	34.979818
10 year	41.874478
25 year	48.90844
50 year	53.096113
100 year	56.543096

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	9.667273
5 year	15.246935
10 year	19.640866
25 year	26.031016
50 year	31.428534
100 year	37.396735

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	17.448	10.326
1950	22.877	9.750
1951	30.220	8.745
1952	17.715	12.999
1953	23.899	7.417
1954	33.306	9.307
1955	18.543	6.883
1956	36.364	22.233
1957	27.656	10.561
1958	20.516	19.256

1959	11.927	4.511
1960	11.780	6.099
1961	32.747	13.017
1962	21.974	8.569
1963	24.417	7.938
1964	23.303	8.461
1965	20.892	12.113
1966	26.700	10.336
1967	23.265	8.330
1968	30.419	9.865
1969	24.787	18.822
1970	81.020	46.940
1971	12.814	5.299
1972	21.788	7.851
1973	21.699	13.374
1974	34.171	22.882
1975	18.621	7.252
1976	26.765	11.961
1977	0.729	3.861
1978	38.152	18.115
1979	25.823	14.859
1980	15.792	5.433
1981	36.269	15.196
1982	24.410	13.464
1983	40.608	14.240
1984	13.249	5.947
1985	10.213	10.085
1986	12.615	5.607
1987	22.014	10.319
1988	8.500	4.925
1989	9.236	5.657
1990	8.378	5.154
1991	23.763	7.661
1992	26.142	5.575
1993	30.729	17.788
1994	23.493	13.349
1995	19.493	14.729
1996	37.280	31.090
1997	43.174	21.454
1998	34.903	10.279
1999	26.084	12.988
2000	12.631	4.200
2001	7.279	3.833
2002	38.095	9.894
2003	29.949	13.405
2004	8.219	5.020
2005	12.286	7.817
2006	22.984	9.046
2007	11.378	13.717
2008	13.352	10.859

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	81.0204	46.9396
2	43.1735	31.0901
3	40.6079	22.8820
4	38.1521	22.2332

5	38.0949	21.4544
6	37.2802	19.2562
7	36.3635	18.8224
8	36.2693	18.1154
9	34.9032	17.7882
10	34.1706	15.1961
11	33.3057	14.8587
12	32.7471	14.7289
13	30.7287	14.2396
14	30.4193	13.7169
15	30.2198	13.4639
16	29.9486	13.4054
17	27.6561	13.3740
18	26.7653	13.3490
19	26.7001	13.0167
20	26.1422	12.9988
21	26.0842	12.9875
22	25.8228	12.1128
23	24.7866	11.9606
24	24.4166	10.8590
25	24.4099	10.5607
26	23.8989	10.3357
27	23.7633	10.3259
28	23.4933	10.3193
29	23.3027	10.2792
30	23.2653	10.0847
31	22.9836	9.8944
32	22.8768	9.8648
33	22.0144	9.7502
34	21.9736	9.3071
35	21.7883	9.0464
36	21.6993	8.7448
37	20.8921	8.5690
38	20.5158	8.4613
39	19.4933	8.3304
40	18.6209	7.9376
41	18.5433	7.8514
42	17.7147	7.8170
43	17.4476	7.6608
44	15.7916	7.4175
45	13.3524	7.2520
46	13.2489	6.8834
47	12.8138	6.0993
48	12.6306	5.9473
49	12.6152	5.6571
50	12.2862	5.6075
51	11.9265	5.5752
52	11.7803	5.4329
53	11.3782	5.2993
54	10.2127	5.1538
55	9.2359	5.0198
56	8.5003	4.9248
57	8.3785	4.5114
58	8.2195	4.1999
59	7.2790	3.8607
60	0.7288	3.8325

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
11.1721	1041	267	25	Pass
11.5955	960	237	24	Pass
12.0190	894	198	22	Pass
12.4425	811	164	20	Pass
12.8660	746	144	19	Pass
13.2894	694	112	16	Pass
13.7129	631	90	14	Pass
14.1364	583	78	13	Pass
14.5599	536	65	12	Pass
14.9833	484	60	12	Pass
15.4068	456	52	11	Pass
15.8303	425	47	11	Pass
16.2538	402	44	10	Pass
16.6772	367	42	11	Pass
17.1007	336	39	11	Pass
17.5242	314	35	11	Pass
17.9477	298	29	9	Pass
18.3711	280	26	9	Pass
18.7946	265	23	8	Pass
19.2181	253	22	8	Pass
19.6416	238	20	8	Pass
20.0650	221	18	8	Pass
20.4885	201	14	6	Pass
20.9120	186	11	5	Pass
21.3355	175	11	6	Pass
21.7589	168	10	5	Pass
22.1824	145	9	6	Pass
22.6059	139	7	5	Pass
23.0294	126	6	4	Pass
23.4528	113	6	5	Pass
23.8763	104	6	5	Pass
24.2998	101	6	5	Pass
24.7233	95	6	6	Pass
25.1467	90	5	5	Pass
25.5702	85	5	5	Pass
25.9937	80	5	6	Pass
26.4172	71	5	7	Pass
26.8406	62	4	6	Pass
27.2641	59	4	6	Pass
27.6876	57	4	7	Pass
28.1111	56	4	7	Pass
28.5345	53	4	7	Pass
28.9580	52	4	7	Pass
29.3815	48	3	6	Pass
29.8050	45	3	6	Pass
30.2284	39	3	7	Pass
30.6519	35	3	8	Pass
31.0754	33	3	9	Pass
31.4989	30	2	6	Pass
31.9223	27	2	7	Pass
32.3458	27	2	7	Pass
32.7693	24	2	8	Pass
33.1928	23	2	8	Pass

33.6162	22	2	9	Pass
34.0397	20	2	10	Pass
34.4632	16	2	12	Pass
34.8867	15	2	13	Pass
35.3101	14	2	14	Pass
35.7336	14	2	14	Pass
36.1571	14	2	14	Pass
36.5806	12	2	16	Pass
37.0041	11	2	18	Pass
37.4275	9	2	22	Pass
37.8510	9	2	22	Pass
38.2745	7	2	28	Pass
38.6980	7	2	28	Pass
39.1214	7	2	28	Pass
39.5449	7	2	28	Pass
39.9684	7	1	14	Pass
40.3919	7	1	14	Pass
40.8153	6	1	16	Pass
41.2388	6	1	16	Pass
41.6623	6	1	16	Pass
42.0858	6	1	16	Pass
42.5092	6	1	16	Pass
42.9327	6	1	16	Pass
43.3562	5	1	20	Pass
43.7797	5	1	20	Pass
44.2031	5	1	20	Pass
44.6266	5	1	20	Pass
45.0501	5	1	20	Pass
45.4736	5	1	20	Pass
45.8970	5	1	20	Pass
46.3205	5	1	20	Pass
46.7440	5	1	20	Pass
47.1675	4	0	0	Pass
47.5909	4	0	0	Pass
48.0144	4	0	0	Pass
48.4379	4	0	0	Pass
48.8614	4	0	0	Pass
49.2848	4	0	0	Pass
49.7083	4	0	0	Pass
50.1318	3	0	0	Pass
50.5553	3	0	0	Pass
50.9787	3	0	0	Pass
51.4022	3	0	0	Pass
51.8257	3	0	0	Pass
52.2492	3	0	0	Pass
52.6726	3	0	0	Pass
53.0961	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 2.3746 acre-feet

On-line facility target flow: 3.2304 cfs.

Adjusted for 15 min: 3.2304 cfs.

Off-line facility target flow: 1.7176 cfs.

Adjusted for 15 min: 1.7176 cfs.

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

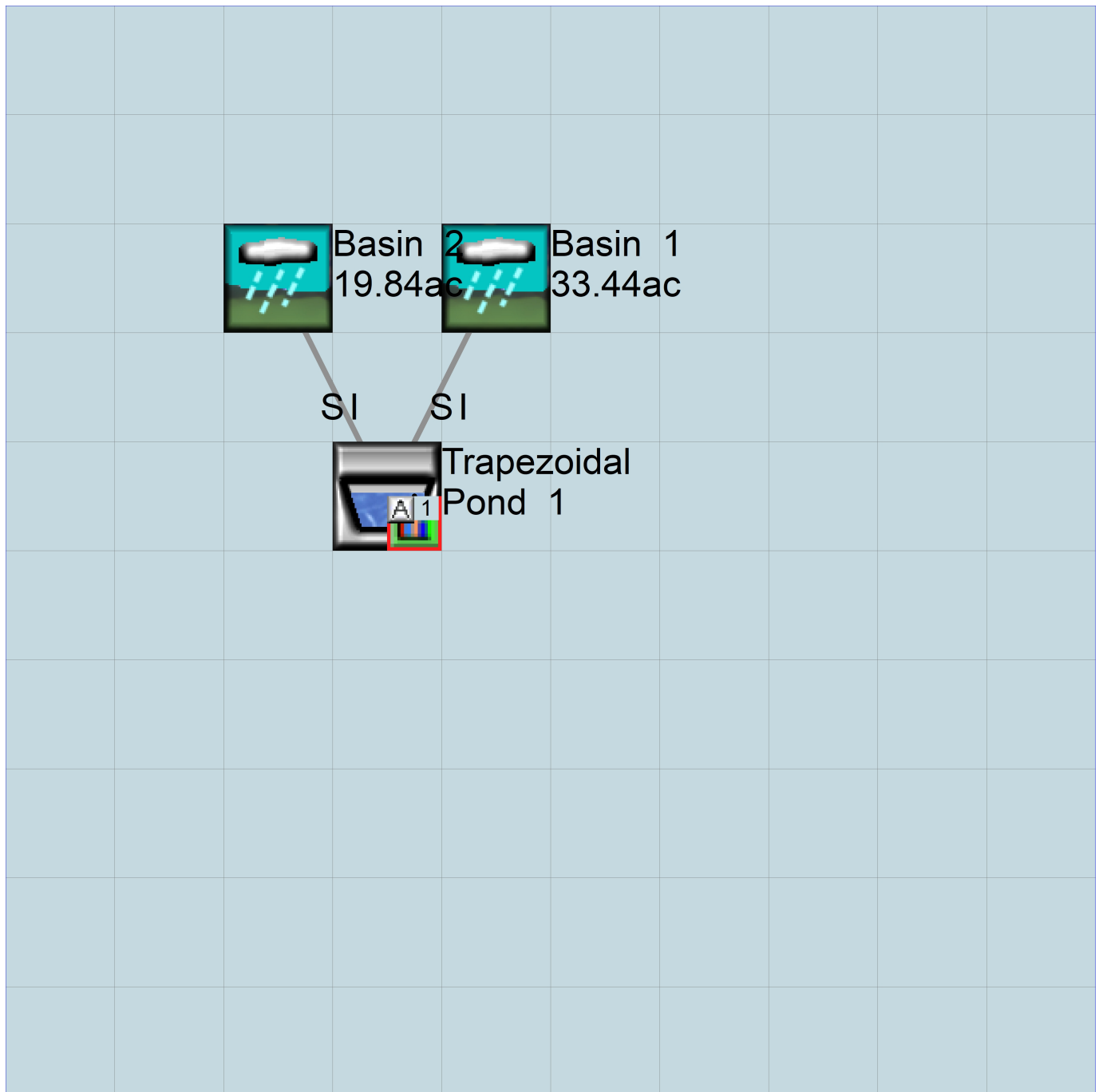
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Mitigated UCI File

RUN

GLOBAL

WWM4 model simulation
START 1948 10 01 END 2008 09 30
RUN INTERP OUTPUT LEVEL 3 0
RESUME 0 RUN 1 UNIT SYSTEM 1
END GLOBAL

FILES

```
<File> <Un#> <-----File Name----->***  
<-ID-> ***  
WDM 26 Sth Basin Rev w roof to wetland w 34 Ac removed.wdm  
MESSU 25 MitSth Basin Rev w roof to wetland w 34 Ac removed.MES  
27 MitSth Basin Rev w roof to wetland w 34 Ac removed.L61  
28 MitSth Basin Rev w roof to wetland w 34 Ac removed.L62  
30 POCStH Basin Rev w roof to wetland w 34 Ac removed1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

PERLND 34
IMPLND 1
IMPLND 4
IMPLND 8
RCHRES 1
COPY 1
COPY 501
DISPLY 1

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND  
1 Trapezoidal Pond 1 MAX 1 2 30 9
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***  
1 1 1  
501 1 1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
# # OPCD ***
```

END OPCODE

PARM

```
# # K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***  
# - # User t-series Engl Metr ***  
in out  
34 SG4, Lawn, Flat 1 1 1 1 27 0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****  
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***  
34 0 0 1 0 0 0 0 0 0 0 0 0
```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
34      0      0      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
34      0      0      0      0      0      0      0      0      0      0      0
END PWAT-PARM1

```

```

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
34      0      6      0.02      400      0.05      0      0.96
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
34      0      0      3      2      0      0      0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
34      0.1      0.2      0.25      2      0.4      0.25
END PWAT-PARM4

```

```

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
34      0      0      0      0      2.5      1      0
END PWAT-STATE1

```

END PERLND

IMPLND

```

GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out
1 ROADS/FLAT 1 1 1 27 0
4 ROOF TOPS/FLAT 1 1 1 27 0
8 SIDEWALKS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
1      0      0      1      0      0      0
4      0      0      1      0      0      0
8      0      0      1      0      0      0
END ACTIVITY

```

```

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
1      0      0      4      0      0      4      1      9
4      0      0      4      0      0      0      1      9
8      0      0      4      0      0      0      1      9
END PRINT-INFO

```

```

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
1      0      0      0      0      0
4      0      0      0      0      0
8      0      0      0      0      0

```



```

END IWAT-PARM1

IWAT-PARM2
<PLS >      IWATER input info: Part 2      ***
# - # ***   LSUR      SLSUR      NSUR      RETSC
1          400      0.01      0.1      0.1
4          400      0.01      0.1      0.1
8          400      0.01      0.1      0.1
END IWAT-PARM2

IWAT-PARM3
<PLS >      IWATER input info: Part 3      ***
# - # ***   PETMAX    PETMIN
1          0          0
4          0          0
8          0          0
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # ***   RETS      SURS
1          0          0
4          0          0
8          0          0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->
<Name> #
Basin 1***
PERLND 34          21.03      RCHRES 1      2
PERLND 34          21.03      RCHRES 1      3
IMPLND 1           6.05      RCHRES 1      5
IMPLND 4           4.13      RCHRES 1      5
IMPLND 8           2.23      RCHRES 1      5
Basin 2***
PERLND 34          11.26      RCHRES 1      2
PERLND 34          11.26      RCHRES 1      3
IMPLND 1           3.73      RCHRES 1      5
IMPLND 4           3.42      RCHRES 1      5
IMPLND 8           1.43      RCHRES 1      5

*****Routing*****
PERLND 34          21.03      COPY 1      12
IMPLND 1           6.05      COPY 1      15
IMPLND 4           4.13      COPY 1      15
IMPLND 8           2.23      COPY 1      15
PERLND 34          21.03      COPY 1      13
PERLND 34          11.26      COPY 1      12
IMPLND 1           3.73      COPY 1      15
IMPLND 4           3.42      COPY 1      15
IMPLND 8           1.43      COPY 1      15
PERLND 34          11.26      COPY 1      13
RCHRES 1           1          COPY 501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><-Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 48.4 DISPLY 1 INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><-Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

RCHRES

```

```

GEN-INFO
RCHRES      Name      Nexits    Unit Systems    Printer      ***
# - #<-----><----> User T-series  Engr Metr LKFG  ***
                        in out
1      Trapezoidal Pond-007    1    1    1    1    28    0    1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1      1      0      0      0      0      0      0      0      0      0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL  PYR
# - # HYDR ADCA CONS HEAT  SED  GQL  OXRX  NUTR  PLNK  PHCB  PIVL  PYR  *****
1      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

HYDR-PARM1
RCHRES      Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each  FUNCT for each
      FG FG FG FG possible exit *** possible exit
      * * * * *
1      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><----->
1      1      0.03      0.0      0.0      0.5      0.0
END HYDR-PARM2

HYDR-INIT
RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><-----> <-----><-----><-----> *** <-----><-----><-----><----->
1      0      4.0 0.0 0.0 0.0 0.0      0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
FTABLE      1
91      4
      Depth      Area      Volume      Outflow1 Velocity      Travel Time***
      (ft)      (acres) (acre-ft) (cfs) (ft/sec) (Minutes)***
0.000000 0.663453 0.000000 0.000000
0.055556 0.663453 0.036858 0.773941
0.111111 0.663453 0.073717 1.094518
0.166667 0.663453 0.110575 1.340505
0.222222 0.663453 0.147434 1.547882
0.277778 0.663453 0.184292 1.730585
0.333333 0.663453 0.221151 1.895760
0.388889 0.663453 0.258009 2.047655
0.444444 0.663453 0.294868 2.189036
0.500000 0.663453 0.331726 2.321823
0.555556 0.663453 0.368585 2.447416
0.611111 0.663453 0.405443 2.566872
0.666667 0.663453 0.442302 2.681010
0.722222 0.663453 0.479160 2.790484
0.777778 0.663453 0.516019 2.895822
0.833333 0.663453 0.552877 2.997461
0.888889 0.663453 0.589736 3.095764
0.944444 0.663453 0.626594 3.191040
1.000000 0.663453 0.663453 3.283553
1.055556 0.663453 0.700311 3.373531
1.111111 0.663453 0.737170 3.461169

```

1.166667	0.663453	0.774028	3.546643
1.222222	0.663453	0.810887	3.630105
1.277778	0.663453	0.847745	3.711691
1.333333	0.663453	0.884604	3.791521
1.388889	0.663453	0.921462	3.869705
1.444444	0.663453	0.958321	3.946340
1.500000	0.663453	0.995179	4.021515
1.555556	0.663453	1.032038	4.095311
1.611111	0.663453	1.068896	4.167800
1.666667	0.663453	1.105755	4.239049
1.722222	0.663453	1.142613	4.309121
1.777778	0.663453	1.179471	4.378071
1.833333	0.663453	1.216330	4.445952
1.888889	0.663453	1.253188	4.512813
1.944444	0.663453	1.290047	4.578697
2.000000	0.663453	1.326905	4.643646
2.055556	0.663453	1.363764	4.707699
2.111111	0.663453	1.400622	4.770893
2.166667	0.663453	1.437481	4.833260
2.222222	0.663453	1.474339	4.894833
2.277778	0.663453	1.511198	4.955640
2.333333	0.663453	1.548056	5.015711
2.388889	0.663453	1.584915	5.075070
2.444444	0.663453	1.621773	5.133744
2.500000	0.663453	1.658632	5.191754
2.555556	0.663453	1.695490	5.249123
2.611111	0.663453	1.732349	5.305872
2.666667	0.663453	1.769207	5.362020
2.722222	0.663453	1.806066	5.417587
2.777778	0.663453	1.842924	5.499568
2.833333	0.663453	1.879783	5.667232
2.888889	0.663453	1.916641	5.882604
2.944444	0.663453	1.953500	6.134037
3.000000	0.663453	1.990358	6.415719
3.055556	0.663453	2.027217	6.723977
3.111111	0.663453	2.064075	7.056216
3.166667	0.663453	2.100934	7.410474
3.222222	0.663453	2.137792	7.785204
3.277778	0.663453	2.174651	8.179143
3.333333	0.663453	2.211509	8.591237
3.388889	0.663453	2.248368	9.020586
3.444444	0.663453	2.285226	9.466413
3.500000	0.663453	2.322084	9.928038
3.555556	0.663453	2.358943	10.40486
3.611111	0.663453	2.395801	10.89633
3.666667	0.663453	2.432660	11.40198
3.722222	0.663453	2.469518	11.92136
3.777778	0.663453	2.506377	12.45407
3.833333	0.663453	2.543235	12.99975
3.888889	0.663453	2.580094	13.55804
3.944444	0.663453	2.616952	14.12865
4.000000	0.663453	2.653811	14.71129
4.055556	0.663453	2.690669	15.38219
4.111111	0.663453	2.727528	16.56997
4.166667	0.663453	2.764386	18.09334
4.222222	0.663453	2.801245	19.88708
4.277778	0.663453	2.838103	21.91256
4.333333	0.663453	2.874962	24.14242
4.388889	0.663453	2.911820	26.55499
4.444444	0.663453	2.948679	29.13175
4.500000	0.663453	2.985537	31.85585
4.555556	0.663453	3.022396	34.71140
4.611111	0.663453	3.059254	37.68288
4.666667	0.663453	3.096113	40.75491
4.722222	0.663453	3.132971	43.91205
4.777778	0.663453	3.169830	47.13866
4.833333	0.663453	3.206688	50.41891
4.888889	0.663453	3.243547	53.73678
4.944444	0.663453	3.280405	57.07606
5.000000	0.663453	3.317264	60.42046

END FTABLE 1
END FTABLES

EXT SOURCES

<-Volume->	<Member>	Ssys	Sgap	<-Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***		
<Name>	#	<Name>	#	tem	strg	<-factor-->	strg	<Name>	#	#	***	
WDM	2	PREC	ENGL	1.3				PERLND	1	999	EXTNL	PREC
WDM	2	PREC	ENGL	1.3				IMPLND	1	999	EXTNL	PREC
WDM	1	EVAP	ENGL	0.8				PERLND	1	999	EXTNL	PETINP
WDM	1	EVAP	ENGL	0.8				IMPLND	1	999	EXTNL	PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<-Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***			
<Name>	#	<Name>	#	#	<-factor-->	strg	<Name>	#	<Name>	tem	strg	strg	***
RCHRES	1	HYDR	RO	1	1	1	WDM	1000	FLOW	ENGL		REPL	
RCHRES	1	HYDR	STAGE	1	1	1	WDM	1001	STAG	ENGL		REPL	
COPY	1	OUTPUT	MEAN	1	1	48.4	WDM	701	FLOW	ENGL		REPL	
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	801	FLOW	ENGL		REPL	

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<-Mult-->	<Target>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	<-factor-->	<Name>	#	#	***
MASS-LINK		2						
PERLND	PWATER	SURO		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK		2						
MASS-LINK		3						
PERLND	PWATER	IFW0		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK		3						
MASS-LINK		5						
IMPLND	IWATER	SURO		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK		5						
MASS-LINK		12						
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN	
END MASS-LINK		12						
MASS-LINK		13						
PERLND	PWATER	IFW0		0.083333	COPY	INPUT	MEAN	
END MASS-LINK		13						
MASS-LINK		15						
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN	
END MASS-LINK		15						
MASS-LINK		16						
RCHRES	ROFLOW				COPY	INPUT	MEAN	
END MASS-LINK		16						

END MASS-LINK

END RUN

Predeveloped HSPF Message File

Mitigated HSPF Message File

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