City of Tacoma Regional Stormwater Facility Plan:
ATTACHMENT 1: FLETT CREEK WATERSHED - ADDENDUM

Aerial Photo of Flett Holding Ponds and Flett Wetlands

Gravel Pit Stormwater Regional Facility and Outlet Structure

June 2022 - Addendum

Prepared by

City of Tacoma
Environmental Services Department
Science and Engineering Division, Environmental Programs Group

Tacoma SURFACEWATER SOLIDWASTE WASTEWATER Tacoma
ENVIRONMENTAL SERVICES DEPARTMENT

I hereby certify that this modeling report was prepared by me and that to my belief was prepared in accordance with the requirements of 18.43 RCW. I hereby certify that I am a licensed professional engineer under the laws of the State of Washington. This report is stamped and signed in accordance with Section 196-23-020(1) of the Washington Administrative Code and Section 18.43.070 of the Revised Code of Washington.

Background:

Ordinance 28371 passed July 26, 2016. This ordinance amended Chapter 12.08 of the Tacoma Municipal Code allowing the City to implement a voluntary payment in-lieu of construction program to allow new development and redevelopment projects to pay a system development charge instead of installing individual onsite stormwater facilities for stormwater treatment and flow control mitigation.

- The City of Tacoma Regional Stormwater Facility Plan describes the program in detail including how capacity credits are calculated and requirements for an annual review.

Ordinance 28372 passed July 26, 2016. This ordinance established a system development charge for the Gravel Pit flow control facility.

- Attachment 1 of the City of Tacoma Regional Stormwater Facility Plan describes the program for the Flett Creek Watershed and describes how program capacity and cost were determined.
- Guidance from the Draft Washington State Department of Ecology's "Stormwater Control Transfer Program – Out of Basin" in conjunction with preliminary project design information was used to calculate capacity available for the program.

The City of Tacoma obtained a new NPDES Phase I Permit effective August 1, 2019. This Permit required the City of Tacoma to update its Stormwater Management Manual to be equivalent to Ecology's 2019 Stormwater Management Manual for Western Washington. Part of the process to update the City of Tacoma Stormwater Management Manual included reviewing and updating as necessary other programs/manuals related to the City of Tacoma SWMM. Because the Washington State Department of Ecology finalized the Sizing Recommendations for Regional Facilities – the calculations for Gravel Pit facility were re-run with new knowledge of final facility design.

Calculations

2016 Calculations

See City of Tacoma Regional Stormwater Facility Plan: Attachment 1: Flett Creek Watershed for complete program information. Table 1 – 2016 Program Assumptions summarizes the final system development charge, how that charge was calculated, and assumptions made in the calculations.

2022 Calculations

The Program calculations were revisited based upon updates to the 2019 Stormwater Management Manual for Western Washington and final project design. A summary of 2022 calculations and outputs is provided in the tables below. The WWHM Reports are included as Attachments to this document for reference.

2016 Compared to 2022 Calculations

The biggest difference between the 2022 calculations and the 2016 calculations is that the 2022 calculations did not assume that the Gravel Pit provides infiltration and the riser height is greater based on survey data.

The 2016 calculations included an infiltration rate of 0.1 inches/hour. This infiltration rate is based upon a Draft 2004 Technical Memorandum which summarized the results of field investigations to characterize subsurface soil conditions at the Gravel Pit and staff knowledge (correspondence with D. Deleon). The report did not specify infiltration or suggest infiltration rates that may be appropriate for facility design and appears to have been conducted to verify the viability of the using the excavated material as gravel base or other viable reuse options. Based upon the available material, it is unclear if infiltration is appropriate in this location and what an appropriate infiltration rate would be for the Gravel Pit.

Survey was completed in 2021 to verify the current outlet structure design. Calculations were updated based upon survey results.

Table 1 - 2016 Program Assumptions

Item #	Item	Value	How Determined/Calculated
1	System Development Charge	$0.97	Capital Cost is Divided by the Net Capacity Credit Available (in square feet)
2	Net Capacity Credit Available (Acres)	68.82	Item 11 minus Item 10 (Totals)
3	Total Impervious Surface Area Available (Acres)	58.5	Item 11 minus Item 10 (Roads/Flat subcategory)
4	Total Lawn/Landscaped Area Available (acres)	10.32	Item 11 minus Item 10 (Lawn/Flat subcategory)
5	Gravel Pit Total Contribution Areas	3138.29 Acres	Basin Map created by AMG using available GIS Layers.
6	Capital Cost	$2,867,804.99	Information Available at Time of development of Fee In-Lieu Program.
7	Existing Outlet Structure	One 4-Foot Square Orifice at 265 Feet. Controlled with Slide Gate Set at 70% Open = Equivalent Circular Orifice diameter of 45.315 Inches. Overflow is Flat Weir, 11 feet Wide at 279 Feet.	Existing Facility Design
8	Excavation Additional Live Storage Area	58 Acre-Feet	Calculated Value Based on 279 to 265 Excavation Elevation.
9	WWHM Outlet Structure Used for Program Design Capacity	Riser: Height: 14 Feet and Diameter 48" Rectangular, Notched: Height: 4 Feet and Width 0.4 Feet 3 Orifices: 3" at 0 Feet, 6" at 5 feet, and 6" at 8.9 feet.	Iteratively running WWHM to obtain a pond design that could provide flow control per the flow control standard.
10	Theoretical Basin That Can Be Controlled by Pond Before Excavation (Acres)	Roads/Flat - 292 Acres C, Lawn/Flat - 51.53 Acres Pond: 17.4 Acres Total - 360.93 Acres	Iteratively running WWHM with the following assumptions to obtain a theoretical basin that could be managed by the pond and provide flow control per flow control standard: Predeveloped: Forested 0.1 Infiltration Rate 85% Impervious Surface Coverage Pond Size: Based on Calculation of Volume for 2:1 Side Slope and Excavation Projections from Project Design (172.7360 Acre-Feet in WWHM)
11	Theoretical Basin That Can Be Controlled by Pond After Excavation (Acres)	Roads/Flat - 350.5 Acres C, Lawn/Flat - 61.853 Acres Pond: 17.4 Acres Total - 429.753 Acres	Iteratively running WWHM with the following assumptions to obtain a theoretical basin that could be managed by the pond and provide flow control per flow control standard: Predeveloped: Forested 0.1 Infiltration Rate

			85% Impervious Surface Coverage Pond Size: Based on Calculation of Volume for 2:1 Side Slope and Excavation Projections from Project Design (216.8311 Acre-Feet in WWHM)
12	Existing Pond Size	384,216 Cubic Yards	Calculated Values Based on Proposed Excavation Depth which assumed a rectangular pond with 2:1 side slopes
13	Proposed Pond Size	477,201 Cubic Yards	Calculated Value Based on 279 to 265 Excavation Elevation.

Table 2 - 2022 Program Modeling Assumptions – No Infiltration Assumed and Assuming 19' Riser

Item #	Item	Value	How Determined/Calculated
1	Gravel Pit Total Contribution Areas (Acres)	3,154.53 - Total 1,641.80 - Impervious 1,512.73 - Pervious	AMG created land use map based upon available GIS information – map developed 08/25/2021.
2	Existing Pond Size	329.0642 acre-feet.	Same pond as other 2022 calculations but used 19' riser which increases the pond size.
3	Excavated Pond Size	387.9373 acre-feet.	Used the same excavation amount as 2016 calculations which is about 58 acre-feet.
4	WWHM Outlet Structure Used for Program Design	Height: 19 Feet Diameter: 96" Orifice: 5" at 0'; 9.25" at 15', 8.5" at 16'	WWHM model run iteratively using autopond feature with varying contributing area contributions until the pond created was close to pre-expansion pond size. The pond created by auto pond was then adjusted to be buildable (Outlet structure height and diameter rounding) and adjust size to be closer to pre-expansion pond size.
5	Theoretical Contributing Area to Facility Before Expansion that Can Meet Flow Control Standard - 85% Impervious – 19' Riser (Acres)	Predeveloped: 400 - C, Forest, Flat Developed: C, Lawn, Flat: 57.741 Roads: 324.94 Pond: 15.06	WWHM model run iteratively using autopond feature with varying contributing area contributions until the pond created was close to pre-expansion pond size. The pond created by auto pond was then adjusted to be buildable (Outlet structure height and diameter rounding) and adjust size to be closer to pre-expansion pond size. This set the pre-expansion pond size and outlet structure size. Once pre-expansion pond size and outlet structure size were determined using autopond, a theoretical contributing basin was created assuming 85% impervious surface coverage that could pass the flow control standard.

6	Theoretical Contributing Area to Facility After Expansion that Can Meet Flow Control Standard - 85% Impervious – 29’ Riser (Acres)	Predeveloped: 440 - C, Forest, Flat Developed: C, Lawn, Flat: 66 Roads: 356.13 Pond: 17.87	Using the same outlet structure as pond from pre-expansion pond but expanding pond to increase volume to be close to volume increased by excavation. Once the excavated pond with outlet structure were set, a theoretical contributing basin was created assuming 85% impervious surface coverage that could pass the flow control standard. Infiltration was not assumed.
7	Available to Sell - 85% Impervious – 19’ Riser (Acres)	Total: 39.45 Impervious: 31.19 Lawn/Landscaped: 8.26	Item 6 minus Item 5

Table 3 – Summary Table – Program Availability

Item	**2016 Calculations – Assuming 0.1 in/hr Infiltration Rate and a 14’ Riser**	**2022 Calculations – Assuming No Infiltration and a 19’ Riser**
Available to Sell – 85% Impervious (Acres)	Total: 68.82 Impervious: 58.5 Lawn/Landscaped: 10.32	Total: 39.45 Impervious: 31.19 Lawn/Landscaped: 8.26

Appendix A – WWHM Report – Expanded Pond – Theoretical Basin – 85% Impervious – 19’ Riser

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	WWHM - 19' Riser
Site Name:	
Site Address:	
City:	
Report Date:	5/2/2022
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/19
Version:	4.2.18

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
C, Forest, Flat	400
Pervious Total	400
Impervious Land Use	acre
Impervious Total	0
Basin Total	400

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	57.741
Pervious Total	57.741

Impervious Land Use	acre
ROADS FLAT	327.199
POND	15.06
Impervious Total	342.259
Basin Total	400

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	810.00 ft.
Bottom Width:	810.00 ft.
Depth:	20 ft.
Volume at riser head:	330.5236 acre-feet.
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	19 ft.
Riser Diameter:	96 in.
Orifice 1 Diameter:	5.000 in. Elevation:0 ft.
Orifice 2 Diameter:	9.250 in. Elevation:15 ft.
Orifice 3 Diameter:	8.500 in. Elevation:16 ft.
Element Flows To:	
Outlet 1	Outlet 2

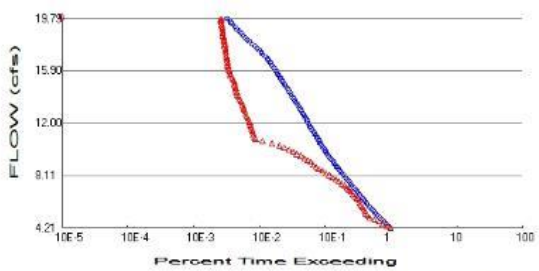
Pond Hydraulic Table

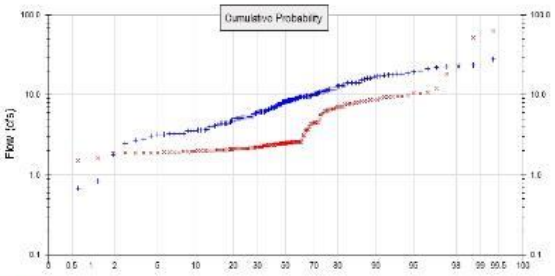
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	15.06	0.000	0.000	0.000
0.2222	15.11	3.352	0.319	0.000
0.4444	15.16	6.716	0.452	0.000
0.6667	15.21	10.09	0.553	0.000
0.8889	15.26	13.47	0.639	0.000
1.1111	15.31	16.87	0.715	0.000
1.3333	15.36	20.28	0.783	0.000
1.5556	15.41	23.70	0.846	0.000
1.7778	15.46	27.13	0.904	0.000
2.0000	15.51	30.57	0.959	0.000
2.2222	15.56	34.02	1.011	0.000
2.4444	15.61	37.48	1.060	0.000
2.6667	15.66	40.96	1.107	0.000
2.8889	15.71	44.45	1.153	0.000
3.1111	15.76	47.94	1.196	0.000
3.3333	15.81	51.45	1.238	0.000
3.5556	15.86	54.97	1.279	0.000
3.7778	15.91	58.50	1.318	0.000
4.0000	15.96	62.05	1.356	0.000
4.2222	16.01	65.60	1.394	0.000
4.4444	16.07	69.17	1.430	0.000
4.6667	16.12	72.74	1.465	0.000
4.8889	16.17	76.33	1.500	0.000
5.1111	16.22	79.93	1.533	0.000
5.3333	16.27	83.54	1.566	0.000
5.5556	16.32	87.16	1.599	0.000
5.7778	16.37	90.80	1.630	0.000
6.0000	16.43	94.44	1.661	0.000
6.2222	16.48	98.10	1.692	0.000
6.4444	16.53	101.7	1.722	0.000
6.6667	16.58	105.4	1.751	0.000
6.8889	16.63	109.1	1.780	0.000
7.1111	16.69	112.8	1.809	0.000

7.3333	16.74	116.5	1.837	0.000
7.5556	16.79	120.2	1.864	0.000
7.7778	16.84	124.0	1.892	0.000
8.0000	16.90	127.7	1.918	0.000
8.2222	16.95	131.5	1.945	0.000
8.4444	17.00	135.3	1.971	0.000
8.6667	17.05	139.1	1.997	0.000
8.8889	17.11	142.8	2.022	0.000
9.1111	17.16	146.7	2.047	0.000
9.3333	17.21	150.5	2.072	0.000
9.5556	17.27	154.3	2.097	0.000
9.7778	17.32	158.2	2.121	0.000
10.000	17.37	162.0	2.145	0.000
10.222	17.42	165.9	2.169	0.000
10.444	17.48	169.8	2.192	0.000
10.667	17.53	173.6	2.215	0.000
10.889	17.59	177.5	2.238	0.000
11.111	17.64	181.5	2.261	0.000
11.333	17.69	185.4	2.283	0.000
11.556	17.75	189.3	2.306	0.000
11.778	17.80	193.3	2.328	0.000
12.000	17.85	197.2	2.350	0.000
12.222	17.91	201.2	2.371	0.000
12.444	17.96	205.2	2.393	0.000
12.667	18.02	209.2	2.414	0.000
12.889	18.07	213.2	2.435	0.000
13.111	18.13	217.2	2.456	0.000
13.333	18.18	221.3	2.477	0.000
13.556	18.23	225.3	2.497	0.000
13.778	18.29	229.4	2.518	0.000
14.000	18.34	233.4	2.538	0.000
14.222	18.40	237.5	2.558	0.000
14.444	18.45	241.6	2.578	0.000
14.667	18.51	245.7	2.598	0.000
14.889	18.56	249.9	2.617	0.000
15.111	18.62	254.0	3.411	0.000
15.333	18.67	258.1	3.997	0.000
15.556	18.73	262.3	4.406	0.000
15.778	18.78	266.5	4.742	0.000
16.000	18.84	270.6	5.035	0.000
16.222	18.89	274.8	6.223	0.000
16.444	18.95	279.0	6.848	0.000
16.667	19.01	283.3	7.368	0.000
16.889	19.06	287.5	7.827	0.000
17.111	19.12	291.7	8.246	0.000
17.333	19.17	296.0	8.635	0.000
17.556	19.23	300.3	8.999	0.000
17.778	19.29	304.5	9.344	0.000
18.000	19.34	308.8	9.672	0.000
18.222	19.40	313.1	9.986	0.000
18.444	19.45	317.4	10.28	0.000
18.667	19.51	321.8	10.57	0.000
18.889	19.57	326.1	10.86	0.000
19.111	19.62	330.5	14.27	0.000
19.333	19.68	334.8	27.71	0.000
19.556	19.74	339.2	46.71	0.000
19.778	19.79	343.6	69.80	0.000
20.000	19.85	348.0	96.08	0.000

20.222	19.91	352.4	124.8	0.000

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 400
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 57.741
Total Impervious Area: 342.259

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	8.429116
5 year	13.113231
10 year	15.658388
25 year	18.248905
50 year	19.788639
100 year	21.054751

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	3.122763
5 year	5.813687
10 year	8.554063
25 year	13.55768
50 year	18.764943
100 year	25.615809

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	6.182	2.341
1903	5.142	2.039
1904	8.410	2.344
1905	4.047	2.491
1906	1.810	1.632
1907	12.936	2.122
1908	9.582	2.381
1909	9.476	2.489
1910	13.064	2.464
1911	8.507	2.212

1912	28.058	8.998
1913	13.445	10.668
1914	3.285	1.938
1915	5.417	4.604
1916	8.414	2.598
1917	2.807	1.992
1918	9.006	9.744
1919	6.658	2.187
1920	8.572	2.486
1921	9.588	6.739
1922	9.616	2.394
1923	7.729	6.504
1924	3.532	2.209
1925	4.383	2.019
1926	8.163	2.584
1927	5.295	2.232
1928	6.533	2.599
1929	13.388	8.363
1930	8.604	2.549
1931	7.958	3.602
1932	6.231	2.523
1933	6.010	2.559
1934	17.649	18.339
1935	8.194	3.669
1936	7.122	6.263
1937	11.370	2.549
1938	6.929	2.602
1939	0.433	1.512
1940	7.679	2.515
1941	3.657	1.902
1942	11.566	8.392
1943	5.950	2.451
1944	10.901	6.972
1945	9.636	2.594
1946	5.211	2.095
1947	3.291	2.035
1948	18.133	2.377
1949	15.537	2.609
1950	4.403	1.990
1951	5.417	2.229
1952	23.644	5.637
1953	21.328	8.062
1954	7.696	2.425
1955	6.291	2.012
1956	3.084	1.938
1957	10.923	4.020
1958	22.817	51.520
1959	14.106	10.559
1960	3.753	1.993
1961	14.181	8.660
1962	7.615	2.562
1963	3.649	1.955
1964	4.015	2.141
1965	15.872	9.748
1966	4.450	1.866
1967	6.817	2.147
1968	6.956	2.539
1969	6.943	2.326

1970	10.872	2.322
1971	17.117	6.942
1972	11.098	4.376
1973	14.145	6.604
1974	7.657	2.473
1975	17.965	9.934
1976	9.513	4.483
1977	3.202	1.985
1978	15.996	10.598
1979	4.387	2.179
1980	9.058	4.334
1981	8.672	2.600
1982	3.544	2.071
1983	14.186	4.611
1984	5.779	2.031
1985	9.405	2.064
1986	8.435	2.497
1987	16.091	7.073
1988	10.203	3.542
1989	9.173	2.226
1990	10.382	2.375
1991	8.128	7.190
1992	11.625	9.373
1993	11.270	4.534
1994	16.903	3.162
1995	3.243	2.127
1996	18.524	22.481
1997	7.106	2.351
1998	8.454	2.390
1999	0.681	1.950
2000	6.431	2.516
2001	3.291	1.859
2002	11.752	2.429
2003	10.232	2.428
2004	9.411	2.768
2005	17.329	5.902
2006	5.241	2.240
2007	5.257	2.439
2008	8.952	2.419
2009	6.144	2.379
2010	5.229	2.431
2011	4.224	2.053
2012	6.129	2.345
2013	4.785	1.891
2014	3.565	1.949
2015	6.829	2.135
2016	2.718	1.869
2017	12.990	2.546
2018	23.620	63.452
2019	22.031	12.289
2020	7.187	2.156
2021	11.697	7.775
2022	4.842	2.189
2023	9.838	7.684
2024	18.498	2.443
2025	8.685	2.519
2026	14.179	8.082
2027	5.095	2.188

2028	4.415	1.842
2029	9.610	7.584
2030	17.825	6.310
2031	5.890	2.249
2032	3.207	1.892
2033	5.157	2.040
2034	5.074	2.372
2035	20.108	5.638
2036	10.442	2.557
2037	2.496	1.941
2038	8.328	7.200
2039	0.836	1.441
2040	4.629	2.119
2041	6.240	2.082
2042	19.561	4.963
2043	9.447	8.702
2044	12.746	8.623
2045	8.679	7.741
2046	10.167	8.533
2047	7.485	4.450
2048	9.687	2.135
2049	8.659	2.574
2050	6.215	2.148
2051	9.026	6.669
2052	5.191	3.083
2053	9.288	9.567
2054	11.805	6.439
2055	3.658	1.905
2056	4.103	2.129
2057	6.378	3.748
2058	8.075	8.050
2059	14.261	9.544

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	28.0580	63.4522
2	23.6443	51.5203
3	23.6196	22.4808
4	22.8165	18.3390
5	22.0309	12.2892
6	21.3281	10.6677
7	20.1082	10.5978
8	19.5614	10.5588
9	18.5241	9.9341
10	18.4978	9.7477
11	18.1329	9.7437
12	17.9645	9.5668
13	17.8247	9.5436
14	17.6490	9.3728
15	17.3288	8.9983
16	17.1168	8.7020
17	16.9031	8.6599
18	16.0906	8.6229
19	15.9955	8.5330
20	15.8717	8.3917
21	15.5366	8.3630
22	14.2613	8.0818

23	14.1855	8.0625
24	14.1814	8.0498
25	14.1791	7.7749
26	14.1450	7.7406
27	14.1056	7.6845
28	13.4450	7.5838
29	13.3879	7.2005
30	13.0641	7.1897
31	12.9897	7.0734
32	12.9360	6.9719
33	12.7460	6.9423
34	11.8050	6.7394
35	11.7517	6.6688
36	11.6973	6.6041
37	11.6253	6.5040
38	11.5663	6.4386
39	11.3698	6.3096
40	11.2702	6.2633
41	11.0982	5.9019
42	10.9231	5.6375
43	10.9008	5.6368
44	10.8716	4.9630
45	10.4420	4.6113
46	10.3820	4.6043
47	10.2317	4.5335
48	10.2027	4.4829
49	10.1667	4.4496
50	9.8379	4.3760
51	9.6867	4.3337
52	9.6357	4.0196
53	9.6158	3.7482
54	9.6097	3.6691
55	9.5877	3.6018
56	9.5815	3.5425
57	9.5128	3.1618
58	9.4763	3.0828
59	9.4467	2.7676
60	9.4112	2.6087
61	9.4048	2.6019
62	9.2876	2.5995
63	9.1729	2.5991
64	9.0575	2.5977
65	9.0263	2.5936
66	9.0057	2.5838
67	8.9519	2.5737
68	8.6849	2.5618
69	8.6789	2.5590
70	8.6722	2.5567
71	8.6594	2.5495
72	8.6038	2.5488
73	8.5722	2.5463
74	8.5068	2.5392
75	8.4538	2.5227
76	8.4354	2.5190
77	8.4144	2.5165
78	8.4098	2.5150
79	8.3276	2.4972
80	8.1940	2.4914

81	8.1634	2.4891
82	8.1284	2.4856
83	8.0754	2.4734
84	7.9585	2.4642
85	7.7292	2.4506
86	7.6964	2.4429
87	7.6786	2.4386
88	7.6570	2.4312
89	7.6153	2.4294
90	7.4847	2.4278
91	7.1866	2.4250
92	7.1216	2.4186
93	7.1058	2.3935
94	6.9563	2.3903
95	6.9425	2.3806
96	6.9292	2.3793
97	6.8292	2.3771
98	6.8171	2.3754
99	6.6580	2.3723
100	6.5335	2.3515
101	6.4309	2.3445
102	6.3776	2.3437
103	6.2906	2.3410
104	6.2405	2.3258
105	6.2309	2.3221
106	6.2152	2.2488
107	6.1815	2.2402
108	6.1439	2.2316
109	6.1288	2.2294
110	6.0100	2.2260
111	5.9503	2.2118
112	5.8900	2.2090
113	5.7792	2.1889
114	5.4174	2.1881
115	5.4171	2.1868
116	5.2948	2.1794
117	5.2567	2.1560
118	5.2407	2.1476
119	5.2293	2.1467
120	5.2107	2.1407
121	5.1912	2.1349
122	5.1565	2.1346
123	5.1417	2.1287
124	5.0953	2.1270
125	5.0736	2.1218
126	4.8419	2.1185
127	4.7850	2.0954
128	4.6285	2.0818
129	4.4504	2.0714
130	4.4154	2.0636
131	4.4031	2.0532
132	4.3871	2.0401
133	4.3829	2.0393
134	4.2243	2.0354
135	4.1029	2.0310
136	4.0473	2.0194
137	4.0153	2.0116
138	3.7527	1.9927

139	3.6584	1.9915
140	3.6573	1.9901
141	3.6495	1.9854
142	3.5646	1.9554
143	3.5440	1.9500
144	3.5317	1.9487
145	3.2914	1.9408
146	3.2910	1.9384
147	3.2850	1.9378
148	3.2434	1.9049
149	3.2067	1.9022
150	3.2024	1.8922
151	3.0840	1.8907
152	2.8068	1.8694
153	2.7175	1.8658
154	2.4959	1.8588
155	1.8104	1.8421
156	0.8358	1.6319
157	0.6806	1.5120
158	0.4334	1.4410

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
4.2146	54298	54215	99	Pass
4.3719	50171	48476	96	Pass
4.5292	46564	42254	90	Pass
4.6865	43312	36598	84	Pass
4.8438	40271	31301	77	Pass
5.0011	37451	26182	69	Pass
5.1584	34913	24332	69	Pass
5.3158	32570	23335	71	Pass
5.4731	30315	22354	73	Pass
5.6304	28265	21418	75	Pass
5.7877	26432	20587	77	Pass
5.9450	24786	19728	79	Pass
6.1023	23285	18975	81	Pass
6.2596	21928	18088	82	Pass
6.4170	20637	16786	81	Pass
6.5743	19412	15612	80	Pass
6.7316	18282	14593	79	Pass
6.8889	17219	13623	79	Pass
7.0462	16149	12659	78	Pass
7.2035	15141	11839	78	Pass
7.3608	14271	11047	77	Pass
7.5182	13446	9955	74	Pass
7.6755	12659	8975	70	Pass
7.8328	11939	8127	68	Pass
7.9901	11235	7202	64	Pass
8.1474	10559	6438	60	Pass
8.3047	9972	5756	57	Pass
8.4620	9374	5028	53	Pass
8.6193	8842	4473	50	Pass
8.7767	8332	4051	48	Pass
8.9340	7856	3671	46	Pass
9.0913	7457	3342	44	Pass
9.2486	7030	3009	42	Pass
9.4059	6615	2677	40	Pass
9.5632	6271	2380	37	Pass
9.7205	5978	2086	34	Pass
9.8779	5701	1834	32	Pass
10.0352	5447	1578	28	Pass
10.1925	5199	1327	25	Pass
10.3498	4958	1135	22	Pass
10.5071	4709	868	18	Pass
10.6644	4515	621	13	Pass
10.8217	4338	488	11	Pass
10.9791	4163	464	11	Pass
11.1364	3962	453	11	Pass
11.2937	3770	445	11	Pass
11.4510	3577	435	12	Pass
11.6083	3421	427	12	Pass
11.7656	3268	415	12	Pass
11.9229	3135	407	12	Pass
12.0803	3026	397	13	Pass
12.2376	2934	386	13	Pass
12.3949	2815	375	13	Pass

12.5522	2682	363	13	Pass
12.7095	2560	350	13	Pass
12.8668	2454	337	13	Pass
13.0241	2362	327	13	Pass
13.1815	2256	320	14	Pass
13.3388	2148	311	14	Pass
13.4961	2042	303	14	Pass
13.6534	1952	295	15	Pass
13.8107	1860	280	15	Pass
13.9680	1783	268	15	Pass
14.1253	1694	259	15	Pass
14.2827	1619	253	15	Pass
14.4400	1564	246	15	Pass
14.5973	1485	244	16	Pass
14.7546	1408	240	17	Pass
14.9119	1339	236	17	Pass
15.0692	1275	233	18	Pass
15.2265	1219	225	18	Pass
15.3838	1163	215	18	Pass
15.5412	1103	207	18	Pass
15.6985	1057	203	19	Pass
15.8558	1007	197	19	Pass
16.0131	964	193	20	Pass
16.1704	919	187	20	Pass
16.3277	873	185	21	Pass
16.4850	815	184	22	Pass
16.6424	774	181	23	Pass
16.7997	738	179	24	Pass
16.9570	695	178	25	Pass
17.1143	637	176	27	Pass
17.2716	601	174	28	Pass
17.4289	558	172	30	Pass
17.5862	517	171	33	Pass
17.7436	478	168	35	Pass
17.9009	433	167	38	Pass
18.0582	395	163	41	Pass
18.2155	363	162	44	Pass
18.3728	339	159	46	Pass
18.5301	310	157	50	Pass
18.6874	297	154	51	Pass
18.8448	273	154	56	Pass
19.0021	252	153	60	Pass
19.1594	237	153	64	Pass
19.3167	224	150	66	Pass
19.4740	206	148	71	Pass
19.6313	194	146	75	Pass
19.7886	180	145	80	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	134275.69			☐	0.00			
Total Volume Infiltrated		134275.69	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

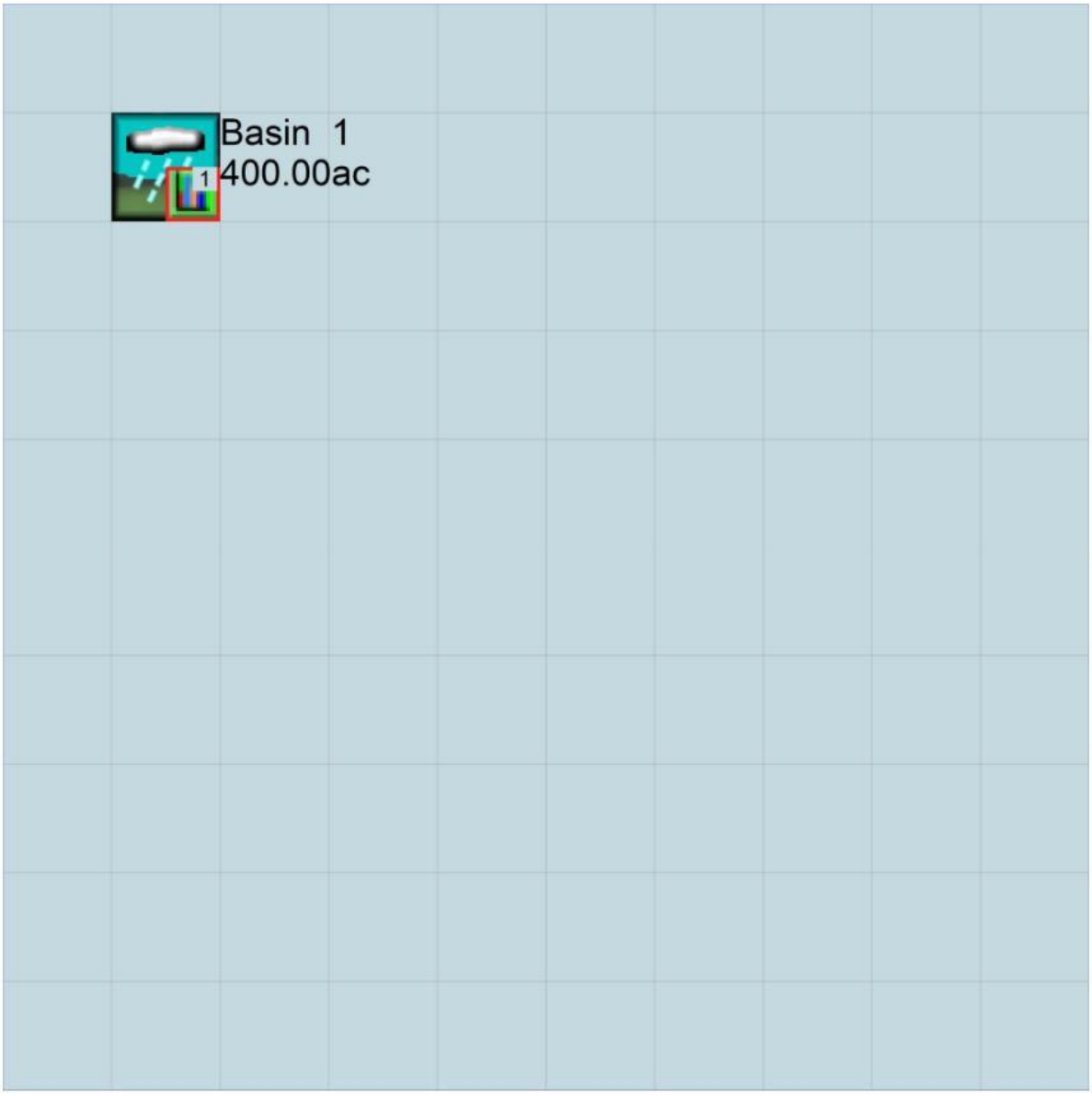
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 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   WWHM - 19' Riser.wdm
MESSU       25   PreWWHM - 19' Riser.MES
            27   PreWWHM - 19' Riser.L61
            28   PreWWHM - 19' Riser.L62
            30   POCWWHM - 19' Riser1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                    MAX                   1    2   30    9
  END DISPLY-INFO1
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           ***
   10     C, Forest, 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 ***
   10         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  *********
   10         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 ***
   10         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
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
  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
   10              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           ***
  END GEN-INFO
  *** Section IWATER***

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

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

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                        400     COPY   501     12
PERLND  10                        400     COPY   501     13

******Routing******
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  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  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      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 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   WWHM - 19' Riser.wdm
MESSU       25   MitWWHM - 19' Riser.MES
            27   MitWWHM - 19' Riser.L61
            28   MitWWHM - 19' Riser.L62
            30   POCWWHM - 19' Riser1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      16
      IMPLND       1
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
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           ***
   16     C, 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 ***
   16         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  *********
   16         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 ***
   16         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
   16              0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      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
   16              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
   14      POND                   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
   14         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    0    1    9
   14         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
   14         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
   14            400       0.01        0.1        0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                      57.741     RCHRES   1      2
PERLND  16                      57.741     RCHRES   1      3
IMPLND   1                     327.199     RCHRES   1      5
IMPLND  14                       15.06     RCHRES   1      5

******Routing******
PERLND  16                      57.741     COPY     1     12
IMPLND   1                     327.199     COPY     1     15
IMPLND  14                       15.06     COPY     1     15
PERLND  16                      57.741     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  Engl 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      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      0.15        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  15.06198  0.000000  0.000000
  0.222222  15.11161  3.352622  0.319810
  0.444444  15.16132  6.716281  0.452280
  0.666667  15.21111  10.09100  0.553928
  0.888889  15.26098  13.47678  0.639621
  1.111111  15.31094  16.87366  0.715118
  1.333333  15.36097  20.28165  0.783372
  1.555556  15.41109  23.70077  0.846139
  1.777778  15.46129  27.13104  0.904560
  2.000000  15.51157  30.57247  0.959431
  2.222222  15.56193  34.02508  1.011329
  2.444444  15.61238  37.48889  1.060691
  2.666667  15.66290  40.96392  1.107855
  2.888889  15.71351  44.45019  1.153093
  3.111111  15.76420  47.94771  1.196621
  3.333333  15.81497  51.45651  1.238620
  3.555556  15.86582  54.97659  1.279241
  3.777778  15.91675  58.50799  1.318612
  4.000000  15.96777  62.05072  1.356840
  4.222222  16.01887  65.60479  1.394021
  4.444444  16.07004  69.17022  1.430235
  4.666667  16.12130  72.74704  1.465555
  4.888889  16.17265  76.33525  1.500043
  5.111111  16.22407  79.93489  1.533756
  5.333333  16.27557  83.54596  1.566744
  5.555556  16.32716  87.16849  1.599052
  5.777778  16.37883  90.80249  1.630719
  6.000000  16.43058  94.44797  1.661783
  6.222222  16.48241  98.10497  1.692277
  6.444444  16.53432  101.7735  1.722231
  6.666667  16.58632  105.4536  1.751673
  6.888889  16.63839  109.1452  1.780629
  7.111111  16.69055  112.8484  1.809120
  7.333333  16.74279  116.5632  1.837170
  7.555556  16.79511  120.2897  1.864799
  7.777778  16.84752  124.0277  1.892023
  8.000000  16.90000  127.7775  1.918862
  8.222222  16.95257  131.5389  1.945330
  8.444444  17.00521  135.3119  1.971443
  8.666667  17.05794  139.0967  1.997215
  8.888889  17.11075  142.8933  2.022658
  9.111111  17.16365  146.7015  2.047785
```

```
  9.333333  17.21662  150.5216  2.072608
  9.555556  17.26968  154.3534  2.097137
  9.777778  17.32281  158.1970  2.121382
  10.00000  17.37603  162.0524  2.145353
  10.22222  17.42933  165.9197  2.169059
  10.44444  17.48272  169.7988  2.192509
  10.66667  17.53618  173.6898  2.215711
  10.88889  17.58973  177.5927  2.238672
  11.11111  17.64335  181.5074  2.261400
  11.33333  17.69706  185.4342  2.283903
  11.55556  17.75085  189.3728  2.306185
  11.77778  17.80472  193.3234  2.328254
  12.00000  17.85868  197.2860  2.350116
  12.22222  17.91271  201.2606  2.371777
  12.44444  17.96683  205.2472  2.393241
  12.66667  18.02103  209.2459  2.414515
  12.88889  18.07531  213.2566  2.435603
  13.11111  18.12967  217.2794  2.456510
  13.33333  18.18411  221.3142  2.477240
  13.55556  18.23864  225.3612  2.497798
  13.77778  18.29325  229.4203  2.518189
  14.00000  18.34793  233.4916  2.538416
  14.22222  18.40270  237.5750  2.558483
  14.44444  18.45756  241.6705  2.578393
  14.66667  18.51249  245.7783  2.598151
  14.88889  18.56750  249.8983  2.617760
  15.11111  18.62260  254.0306  3.411188
  15.33333  18.67778  258.1750  3.997090
  15.55556  18.73304  262.3318  4.406362
  15.77778  18.78838  266.5008  4.742487
  16.00000  18.84380  270.6822  5.035573
  16.22222  18.89931  274.8759  6.223662
  16.44444  18.95489  279.0819  6.848770
  16.66667  19.01056  283.3003  7.368041
  16.88889  19.06631  287.5311  7.827682
  17.11111  19.12214  291.7742  8.246646
  17.33333  19.17805  296.0298  8.635184
  17.55556  19.23405  300.2978  8.999679
  17.77778  19.29012  304.5783  9.344471
  18.00000  19.34628  308.8712  9.672685
  18.22222  19.40252  313.1766  9.986672
  18.44444  19.45884  317.4945  10.28826
  18.66667  19.51524  321.8250  10.57890
  18.88889  19.57173  326.1680  10.85978
  19.11111  19.62829  330.5236  14.27664
  19.33333  19.68494  334.8917  27.71800
  19.55556  19.74167  339.2724  46.71642
  19.77778  19.79848  343.6658  69.80399
  20.00000  19.85537  348.0718  96.08547
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              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>              <Name> # #***
  MASS-LINK         2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     2

  MASS-LINK         3
PERLND     PWATER IFWO       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 IFWO       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

Disclaimer

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Local (360)943-0304

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Appendix B – WWHM Report – Pre-Expanded Pond – Theoretical Basin – 85% Impervious – 19’ Riser

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	WWHM - 19' Riser
Site Name:	
Site Address:	
City:	
Report Date:	6/8/2022
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/19
Version:	4.2.18

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
C, Forest, Flat	440
Pervious Total	440
Impervious Land Use	acre
Impervious Total	0
Basin Total	440

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	66
Pervious Total	66

Impervious Land Use	acre
ROADS FLAT	356.13
POND	17.87
Impervious Total	374
Basin Total	440

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	870.00 ft.
Bottom Width:	895.00 ft.
Depth:	20 ft.
Volume at riser head:	387.9373 acre-feet.
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	19 ft.
Riser Diameter:	96 in.
Orifice 1 Diameter:	5.000 in. Elevation:0 ft.
Orifice 2 Diameter:	9.250 in. Elevation:15 ft.
Orifice 3 Diameter:	8.500 in. Elevation:16 ft.
Element Flows To:	
Outlet 1	Outlet 2

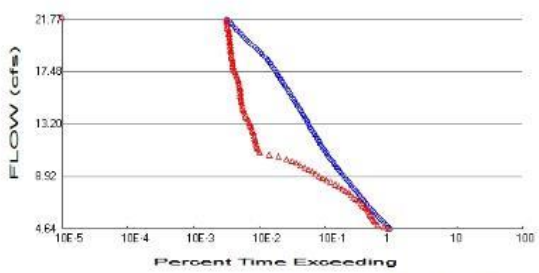
Pond Hydraulic Table

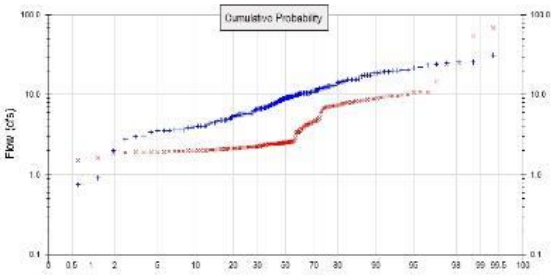
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	17.87	0.000	0.000	0.000
0.2222	17.92	3.978	0.319	0.000
0.4444	17.98	7.968	0.452	0.000
0.6667	18.03	11.97	0.553	0.000
0.8889	18.09	15.98	0.639	0.000
1.1111	18.14	20.01	0.715	0.000
1.3333	18.20	24.05	0.783	0.000
1.5556	18.25	28.10	0.846	0.000
1.7778	18.31	32.16	0.904	0.000
2.0000	18.36	36.23	0.959	0.000
2.2222	18.42	40.32	1.011	0.000
2.4444	18.47	44.42	1.060	0.000
2.6667	18.53	48.53	1.107	0.000
2.8889	18.58	52.66	1.153	0.000
3.1111	18.64	56.79	1.196	0.000
3.3333	18.69	60.94	1.238	0.000
3.5556	18.75	65.10	1.279	0.000
3.7778	18.80	69.27	1.318	0.000
4.0000	18.86	73.46	1.356	0.000
4.2222	18.91	77.66	1.394	0.000
4.4444	18.97	81.87	1.430	0.000
4.6667	19.02	86.09	1.465	0.000
4.8889	19.08	90.32	1.500	0.000
5.1111	19.14	94.57	1.533	0.000
5.3333	19.19	98.83	1.566	0.000
5.5556	19.25	103.1	1.599	0.000
5.7778	19.30	107.3	1.630	0.000
6.0000	19.36	111.6	1.661	0.000
6.2222	19.42	116.0	1.692	0.000
6.4444	19.47	120.3	1.722	0.000
6.6667	19.53	124.6	1.751	0.000
6.8889	19.58	129.0	1.780	0.000
7.1111	19.64	133.3	1.809	0.000

7.3333	19.70	137.7	1.837	0.000
7.5556	19.75	142.1	1.864	0.000
7.7778	19.81	146.5	1.892	0.000
8.0000	19.87	150.9	1.918	0.000
8.2222	19.93	155.3	1.945	0.000
8.4444	19.98	159.7	1.971	0.000
8.6667	20.04	164.2	1.997	0.000
8.8889	20.10	168.6	2.022	0.000
9.1111	20.15	173.1	2.047	0.000
9.3333	20.21	177.6	2.072	0.000
9.5556	20.27	182.1	2.097	0.000
9.7778	20.33	186.6	2.121	0.000
10.000	20.38	191.1	2.145	0.000
10.222	20.44	195.7	2.169	0.000
10.444	20.50	200.2	2.192	0.000
10.667	20.56	204.8	2.215	0.000
10.889	20.62	209.4	2.238	0.000
11.111	20.67	214.0	2.261	0.000
11.333	20.73	218.6	2.283	0.000
11.556	20.79	223.2	2.306	0.000
11.778	20.85	227.8	2.328	0.000
12.000	20.91	232.4	2.350	0.000
12.222	20.97	237.1	2.371	0.000
12.444	21.02	241.8	2.393	0.000
12.667	21.08	246.4	2.414	0.000
12.889	21.14	251.1	2.435	0.000
13.111	21.20	255.8	2.456	0.000
13.333	21.26	260.6	2.477	0.000
13.556	21.32	265.3	2.497	0.000
13.778	21.38	270.0	2.518	0.000
14.000	21.44	274.8	2.538	0.000
14.222	21.50	279.6	2.558	0.000
14.444	21.55	284.3	2.578	0.000
14.667	21.61	289.1	2.598	0.000
14.889	21.67	294.0	2.617	0.000
15.111	21.73	298.8	3.411	0.000
15.333	21.79	303.6	3.997	0.000
15.556	21.85	308.5	4.406	0.000
15.778	21.91	313.3	4.742	0.000
16.000	21.97	318.2	5.035	0.000
16.222	22.03	323.1	6.223	0.000
16.444	22.09	328.0	6.848	0.000
16.667	22.15	332.9	7.368	0.000
16.889	22.21	337.8	7.827	0.000
17.111	22.27	342.8	8.246	0.000
17.333	22.33	347.8	8.635	0.000
17.556	22.39	352.7	8.999	0.000
17.778	22.45	357.7	9.344	0.000
18.000	22.51	362.7	9.672	0.000
18.222	22.58	367.7	9.986	0.000
18.444	22.64	372.7	10.28	0.000
18.667	22.70	377.8	10.57	0.000
18.889	22.76	382.8	10.86	0.000
19.111	22.82	387.9	14.27	0.000
19.333	22.88	393.0	27.71	0.000
19.556	22.94	398.1	46.71	0.000
19.778	23.00	403.2	69.80	0.000
20.000	23.06	408.3	96.08	0.000

20.222	23.13	413.4	124.8	0.000

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 440
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 66
Total Impervious Area: 374

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	9.272029
5 year	14.424557
10 year	17.224231
25 year	20.0738
50 year	21.767508
100 year	23.160231

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	3.263326
5 year	6.163982
10 year	9.151445
25 year	14.660962
50 year	20.446224
100 year	28.114016

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	6.800	2.405
1903	5.656	2.082
1904	9.251	2.351
1905	4.452	2.478
1906	1.991	1.619
1907	14.230	2.162
1908	10.540	2.436
1909	10.424	2.482
1910	14.371	2.495
1911	9.358	2.247

1912	30.864	9.258
1913	14.790	10.749
1914	3.613	1.982
1915	5.959	4.569
1916	9.256	4.188
1917	3.087	1.994
1918	9.906	9.944
1919	7.324	2.211
1920	9.429	2.530
1921	10.547	7.094
1922	10.577	2.444
1923	8.502	6.966
1924	3.885	2.222
1925	4.821	2.051
1926	8.980	3.434
1927	5.824	2.281
1928	7.187	2.608
1929	14.727	8.487
1930	9.464	2.613
1931	8.754	4.207
1932	6.854	2.524
1933	6.611	3.413
1934	19.414	24.130
1935	9.013	3.413
1936	7.834	6.815
1937	12.507	2.612
1938	7.622	3.788
1939	0.477	1.503
1940	8.446	2.510
1941	4.023	1.949
1942	12.723	8.367
1943	6.545	2.453
1944	11.991	7.839
1945	10.599	4.235
1946	5.732	2.130
1947	3.621	2.071
1948	19.946	2.441
1949	17.090	2.604
1950	4.843	1.962
1951	5.959	2.296
1952	26.009	6.188
1953	23.461	8.688
1954	8.466	2.441
1955	6.920	2.029
1956	3.392	1.960
1957	12.015	3.930
1958	25.098	54.844
1959	15.516	10.656
1960	4.128	2.051
1961	15.600	8.796
1962	8.377	2.562
1963	4.014	1.999
1964	4.417	2.175
1965	17.459	10.030
1966	4.895	1.928
1967	7.499	2.205
1968	7.652	2.606
1969	7.637	2.330

1970	11.959	2.347
1971	18.829	7.472
1972	12.208	4.609
1973	15.560	7.217
1974	8.423	2.545
1975	19.761	9.691
1976	10.464	5.110
1977	3.523	2.011
1978	17.595	10.816
1979	4.826	2.199
1980	9.963	4.750
1981	9.539	3.554
1982	3.898	2.129
1983	15.604	4.872
1984	6.357	2.022
1985	10.345	2.068
1986	9.279	2.509
1987	17.700	7.690
1988	11.223	3.456
1989	10.090	2.267
1990	11.420	2.413
1991	8.941	7.572
1992	12.788	9.722
1993	12.397	5.759
1994	18.593	3.849
1995	3.568	2.157
1996	20.377	24.970
1997	7.816	2.415
1998	9.299	2.450
1999	0.749	1.916
2000	7.074	2.504
2001	3.620	1.903
2002	12.927	2.451
2003	11.255	2.422
2004	10.352	3.733
2005	19.062	6.779
2006	5.765	2.318
2007	5.782	2.428
2008	9.847	2.457
2009	6.758	2.415
2010	5.752	2.448
2011	4.647	2.123
2012	6.742	2.377
2013	5.263	1.945
2014	3.921	2.006
2015	7.512	2.162
2016	2.989	1.867
2017	14.289	3.263
2018	25.982	68.289
2019	24.234	14.562
2020	7.905	2.226
2021	12.867	8.039
2022	5.326	2.221
2023	10.822	8.021
2024	20.348	2.466
2025	9.553	2.537
2026	15.597	8.426
2027	5.605	2.239

2028	4.857	1.874
2029	10.571	7.763
2030	19.607	7.306
2031	6.479	2.304
2032	3.527	1.926
2033	5.672	2.105
2034	5.581	2.394
2035	22.119	4.682
2036	11.486	2.877
2037	2.745	1.993
2038	9.160	7.384
2039	0.919	1.421
2040	5.091	2.132
2041	6.865	2.106
2042	21.518	4.413
2043	10.391	8.855
2044	14.021	9.089
2045	9.547	8.373
2046	11.183	7.976
2047	8.233	4.416
2048	10.655	2.140
2049	9.525	2.584
2050	6.837	2.121
2051	9.929	7.152
2052	5.710	4.460
2053	10.216	9.365
2054	12.986	6.961
2055	4.024	1.922
2056	4.513	2.144
2057	7.015	4.142
2058	8.883	8.240
2059	15.687	9.720

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	30.8638	68.2888
2	26.0087	54.8440
3	25.9816	24.9695
4	25.0981	24.1301
5	24.2340	14.5623
6	23.4609	10.8155
7	22.1190	10.7490
8	21.5176	10.6557
9	20.3765	10.0297
10	20.3476	9.9441
11	19.9462	9.7219
12	19.7610	9.7199
13	19.6072	9.6913
14	19.4140	9.3651
15	19.0616	9.2582
16	18.8285	9.0891
17	18.5934	8.8546
18	17.6997	8.7959
19	17.5950	8.6878
20	17.4589	8.4865
21	17.0903	8.4263
22	15.6874	8.3733

23	15.6040	8.3674
24	15.5995	8.2401
25	15.5971	8.0387
26	15.5596	8.0205
27	15.5161	7.9758
28	14.7895	7.8394
29	14.7267	7.7634
30	14.3705	7.6903
31	14.2887	7.5720
32	14.2296	7.4716
33	14.0206	7.3836
34	12.9855	7.3057
35	12.9269	7.2175
36	12.8671	7.1519
37	12.7878	7.0938
38	12.7229	6.9662
39	12.5067	6.9614
40	12.3972	6.8151
41	12.2080	6.7789
42	12.0154	6.1880
43	11.9909	5.7589
44	11.9588	5.1095
45	11.4862	4.8715
46	11.4202	4.7503
47	11.2548	4.6821
48	11.2230	4.6094
49	11.1833	4.5686
50	10.8217	4.4603
51	10.6554	4.4162
52	10.5993	4.4134
53	10.5773	4.2348
54	10.5707	4.2073
55	10.5465	4.1879
56	10.5397	4.1421
57	10.4641	3.9304
58	10.4239	3.8489
59	10.3914	3.7879
60	10.3523	3.7331
61	10.3452	3.5543
62	10.2164	3.4558
63	10.0901	3.4336
64	9.9633	3.4133
65	9.9290	3.4127
66	9.9063	3.2633
67	9.8471	2.8775
68	9.5534	2.6133
69	9.5468	2.6123
70	9.5395	2.6081
71	9.5254	2.6059
72	9.4641	2.6038
73	9.4295	2.5837
74	9.3575	2.5617
75	9.2992	2.5450
76	9.2790	2.5374
77	9.2558	2.5299
78	9.2508	2.5243
79	9.1604	2.5096
80	9.0133	2.5090

81	8.9797	2.5042
82	8.9413	2.4952
83	8.8829	2.4825
84	8.7543	2.4779
85	8.5021	2.4663
86	8.4660	2.4570
87	8.4465	2.4528
88	8.4227	2.4509
89	8.3768	2.4497
90	8.2332	2.4480
91	7.9053	2.4435
92	7.8338	2.4412
93	7.8164	2.4406
94	7.6519	2.4364
95	7.6368	2.4283
96	7.6221	2.4219
97	7.5121	2.4154
98	7.4988	2.4146
99	7.3238	2.4128
100	7.1868	2.4045
101	7.0740	2.3944
102	7.0153	2.3775
103	6.9196	2.3511
104	6.8645	2.3468
105	6.8540	2.3295
106	6.8367	2.3184
107	6.7997	2.3042
108	6.7583	2.2960
109	6.7417	2.2811
110	6.6110	2.2672
111	6.5453	2.2471
112	6.4790	2.2392
113	6.3571	2.2264
114	5.9592	2.2215
115	5.9588	2.2212
116	5.8243	2.2111
117	5.7824	2.2047
118	5.7648	2.1995
119	5.7522	2.1745
120	5.7318	2.1624
121	5.7104	2.1616
122	5.6722	2.1567
123	5.6559	2.1441
124	5.6048	2.1398
125	5.5809	2.1318
126	5.3261	2.1303
127	5.2635	2.1289
128	5.0914	2.1232
129	4.8954	2.1207
130	4.8569	2.1056
131	4.8434	2.1054
132	4.8258	2.0820
133	4.8212	2.0713
134	4.6468	2.0676
135	4.5132	2.0508
136	4.4520	2.0508
137	4.4168	2.0292
138	4.1280	2.0224

139	4.0242	2.0107
140	4.0230	2.0063
141	4.0144	1.9987
142	3.9211	1.9944
143	3.8984	1.9925
144	3.8849	1.9817
145	3.6205	1.9622
146	3.6201	1.9598
147	3.6135	1.9490
148	3.5678	1.9448
149	3.5273	1.9281
150	3.5227	1.9260
151	3.3924	1.9219
152	3.0875	1.9164
153	2.9893	1.9033
154	2.7455	1.8736
155	1.9915	1.8674
156	0.9194	1.6191
157	0.7487	1.5026
158	0.4767	1.4212

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
4.6360	54276	50935	93	Pass
4.8091	50160	42941	85	Pass
4.9821	46564	35074	75	Pass
5.1552	43312	31966	73	Pass
5.3282	40260	30376	75	Pass
5.5012	37451	28980	77	Pass
5.6743	34908	27673	79	Pass
5.8473	32559	26493	81	Pass
6.0204	30321	25335	83	Pass
6.1934	28265	24249	85	Pass
6.3665	26432	22642	85	Pass
6.5395	24786	21008	84	Pass
6.7126	23285	19462	83	Pass
6.8856	21928	17845	81	Pass
7.0586	20637	16260	78	Pass
7.2317	19418	14786	76	Pass
7.4047	18282	13557	74	Pass
7.5778	17219	12443	72	Pass
7.7508	16155	11174	69	Pass
7.9239	15141	10039	66	Pass
8.0969	14271	8980	62	Pass
8.2700	13451	7917	58	Pass
8.4430	12659	6764	53	Pass
8.6161	11933	5823	48	Pass
8.7891	11235	5082	45	Pass
8.9621	10559	4497	42	Pass
9.1352	9967	4003	40	Pass
9.3082	9374	3520	37	Pass
9.4813	8842	3118	35	Pass
9.6543	8332	2705	32	Pass
9.8274	7856	2332	29	Pass
10.0004	7457	2040	27	Pass
10.1735	7036	1745	24	Pass
10.3465	6626	1448	21	Pass
10.5196	6282	1091	17	Pass
10.6926	5978	791	13	Pass
10.8656	5712	564	9	Pass
11.0387	5450	545	10	Pass
11.2117	5198	526	10	Pass
11.3848	4950	512	10	Pass
11.5578	4709	500	10	Pass
11.7309	4511	489	10	Pass
11.9039	4339	481	11	Pass
12.0770	4160	472	11	Pass
12.2500	3956	463	11	Pass
12.4231	3770	452	11	Pass
12.5961	3586	442	12	Pass
12.7691	3421	430	12	Pass
12.9422	3265	421	12	Pass
13.1152	3135	411	13	Pass
13.2883	3029	399	13	Pass
13.4613	2927	387	13	Pass
13.6344	2815	369	13	Pass

13.8074	2685	347	12	Pass
13.9805	2555	338	13	Pass
14.1535	2454	329	13	Pass
14.3266	2363	318	13	Pass
14.4996	2259	311	13	Pass
14.6726	2142	305	14	Pass
14.8457	2041	303	14	Pass
15.0187	1953	298	15	Pass
15.1918	1860	295	15	Pass
15.3648	1779	294	16	Pass
15.5379	1695	289	17	Pass
15.7109	1619	287	17	Pass
15.8840	1561	284	18	Pass
16.0570	1485	283	19	Pass
16.2301	1407	280	19	Pass
16.4031	1340	274	20	Pass
16.5761	1275	272	21	Pass
16.7492	1219	268	21	Pass
16.9222	1163	264	22	Pass
17.0953	1104	255	23	Pass
17.2683	1057	250	23	Pass
17.4414	1006	238	23	Pass
17.6144	964	228	23	Pass
17.7875	920	224	24	Pass
17.9605	872	221	25	Pass
18.1336	815	218	26	Pass
18.3066	776	217	27	Pass
18.4796	738	215	29	Pass
18.6527	694	212	30	Pass
18.8257	637	209	32	Pass
18.9988	602	209	34	Pass
19.1718	553	207	37	Pass
19.3449	517	204	39	Pass
19.5179	478	202	42	Pass
19.6910	433	202	46	Pass
19.8640	394	199	50	Pass
20.0371	363	197	54	Pass
20.2101	339	195	57	Pass
20.3831	310	194	62	Pass
20.5562	297	192	64	Pass
20.7292	273	192	70	Pass
20.9023	252	190	75	Pass
21.0753	237	186	78	Pass
21.2484	224	182	81	Pass
21.4214	206	180	87	Pass
21.5945	195	178	91	Pass
21.7675	180	176	97	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	141133.54			☐	0.00			
Total Volume Infiltrated		141133.54	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

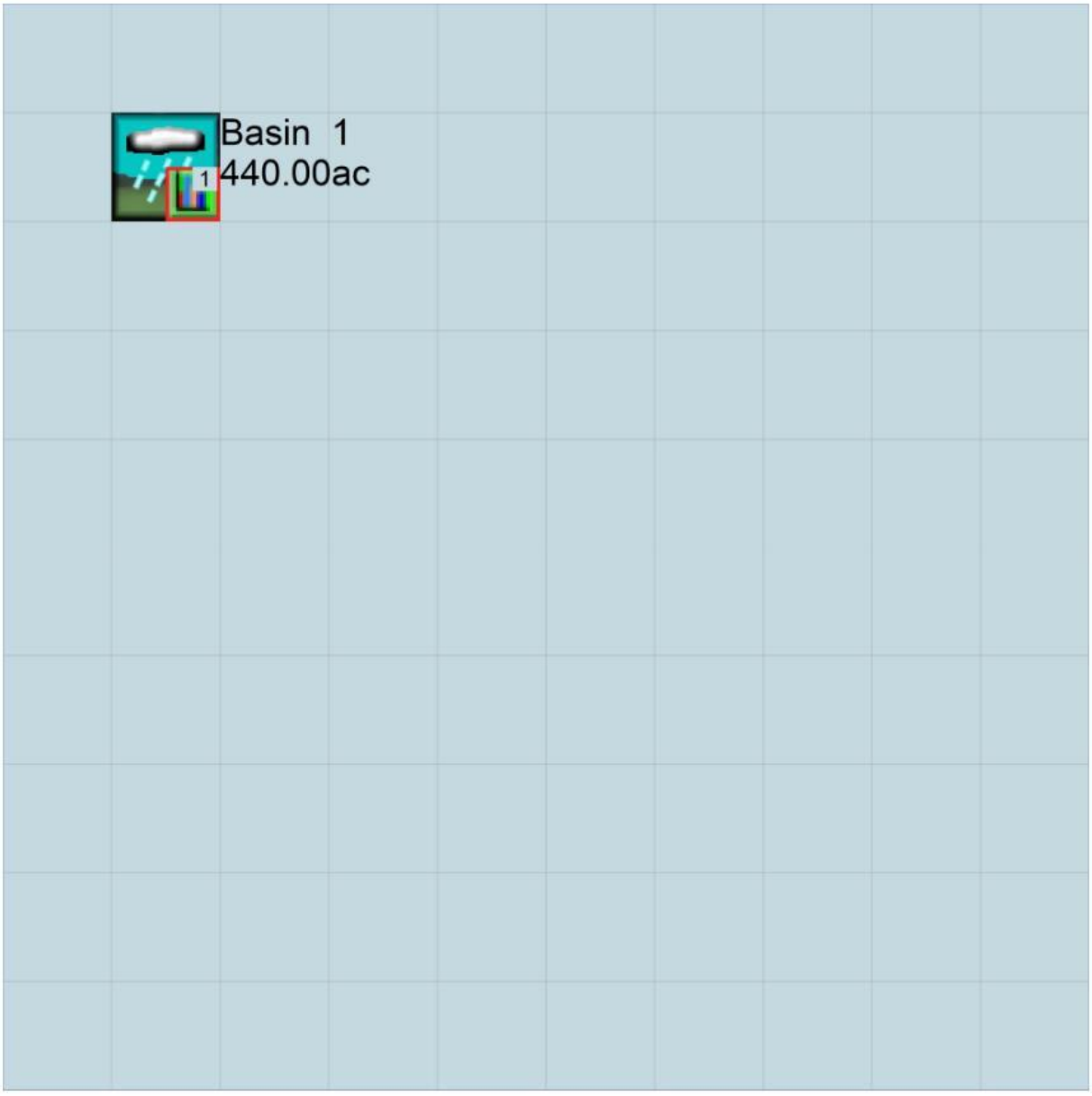
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 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   WWHM - 19' Riser.wdm
MESSU       25   PreWWHM - 19' Riser.MES
            27   PreWWHM - 19' Riser.L61
            28   PreWWHM - 19' Riser.L62
            30   POCWWHM - 19' Riser1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                    MAX                   1    2   30    9
  END DISPLY-INFO1
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           ***
   10     C, Forest, 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 ***
   10         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  *********
   10         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 ***
   10         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
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC      LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
  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
   10              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           ***
  END GEN-INFO
  *** Section IWATER***

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

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

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                        440     COPY   501     12
PERLND  10                        440     COPY   501     13

******Routing******
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  Engl Metr LKFG           ***
                                       in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  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      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 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   WWHM - 19' Riser.wdm
MESSU       25   MitWWHM - 19' Riser.MES
            27   MitWWHM - 19' Riser.L61
            28   MitWWHM - 19' Riser.L62
            30   POCWWHM - 19' Riser1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      16
      IMPLND       1
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
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           ***
   16     C, 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 ***
   16         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  *********
   16         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 ***
   16         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
   16              0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      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
   16              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
   14      POND                   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
   14         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    0    1    9
   14         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
   14         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
   14            400       0.01        0.1        0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                         66     RCHRES   1      2
PERLND  16                         66     RCHRES   1      3
IMPLND   1                     356.13     RCHRES   1      5
IMPLND  14                      17.87     RCHRES   1      5

******Routing******
PERLND  16                         66     COPY     1     12
IMPLND   1                     356.13     COPY     1     15
IMPLND  14                      17.87     COPY     1     15
PERLND  16                         66     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  Engl 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      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      0.16        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  17.87534  0.000000  0.000000
  0.222222  17.92941  3.978306  0.319810
  0.444444  17.98356  7.968636  0.452280
  0.666667  18.03779  11.97101  0.553928
  0.888889  18.09210  15.98544  0.639621
  1.111111  18.14649  20.01195  0.715118
  1.333333  18.20096  24.05055  0.783372
  1.555556  18.25552  28.10128  0.846139
  1.777778  18.31016  32.16413  0.904560
  2.000000  18.36488  36.23913  0.959431
  2.222222  18.41968  40.32630  1.011329
  2.444444  18.47456  44.42566  1.060691
  2.666667  18.52952  48.53723  1.107855
  2.888889  18.58457  52.66102  1.153093
  3.111111  18.63969  56.79705  1.196621
  3.333333  18.69490  60.94533  1.238620
  3.555556  18.75019  65.10590  1.279241
  3.777778  18.80557  69.27876  1.318612
  4.000000  18.86102  73.46394  1.356840
  4.222222  18.91655  77.66145  1.394021
  4.444444  18.97217  81.87131  1.430235
  4.666667  19.02787  86.09353  1.465555
  4.888889  19.08365  90.32815  1.500043
  5.111111  19.13951  94.57516  1.533756
  5.333333  19.19545  98.83460  1.566744
  5.555556  19.25148  103.1065  1.599052
  5.777778  19.30759  107.3908  1.630719
  6.000000  19.36377  111.6876  1.661783
  6.222222  19.42004  115.9970  1.692277
  6.444444  19.47640  120.3188  1.722231
  6.666667  19.53283  124.6531  1.751673
  6.888889  19.58934  129.0000  1.780629
  7.111111  19.64594  133.3595  1.809120
  7.333333  19.70262  137.7316  1.837170
  7.555556  19.75938  142.1163  1.864799
  7.777778  19.81622  146.5135  1.892023
  8.000000  19.87314  150.9235  1.918862
  8.222222  19.93014  155.3461  1.945330
  8.444444  19.98723  159.7813  1.971443
  8.666667  20.04440  164.2293  1.997215
  8.888889  20.10165  168.6900  2.022658
  9.111111  20.15898  173.1634  2.047785
```

```
  9.333333  20.21639  177.6495  2.072608
  9.555556  20.27389  182.1484  2.097137
  9.777778  20.33146  186.6601  2.121382
  10.00000  20.38912  191.1846  2.145353
  10.22222  20.44686  195.7220  2.169059
  10.44444  20.50468  200.2721  2.192509
  10.66667  20.56258  204.8352  2.215711
  10.88889  20.62056  209.4111  2.238672
  11.11111  20.67863  213.9999  2.261400
  11.33333  20.73678  218.6016  2.283903
  11.55556  20.79501  223.2162  2.306185
  11.77778  20.85332  227.8438  2.328254
  12.00000  20.91171  232.4844  2.350116
  12.22222  20.97018  237.1379  2.371777
  12.44444  21.02874  241.8045  2.393241
  12.66667  21.08737  246.4840  2.414515
  12.88889  21.14609  251.1766  2.435603
  13.11111  21.20489  255.8823  2.456510
  13.33333  21.26377  260.6010  2.477240
  13.55556  21.32274  265.3329  2.497798
  13.77778  21.38178  270.0778  2.518189
  14.00000  21.44091  274.8359  2.538416
  14.22222  21.50012  279.6071  2.558483
  14.44444  21.55941  284.3915  2.578393
  14.66667  21.61878  289.1891  2.598151
  14.88889  21.67823  293.9999  2.617760
  15.11111  21.73777  298.8239  3.411188
  15.33333  21.79738  303.6611  3.997090
  15.55556  21.85708  308.5116  4.406362
  15.77778  21.91686  313.3754  4.742487
  16.00000  21.97672  318.2525  5.035573
  16.22222  22.03666  323.1428  6.223662
  16.44444  22.09669  328.0465  6.848770
  16.66667  22.15680  332.9636  7.368041
  16.88889  22.21698  337.8940  7.827682
  17.11111  22.27725  342.8378  8.246646
  17.33333  22.33760  347.7950  8.635184
  17.55556  22.39804  352.7656  8.999679
  17.77778  22.45855  357.7497  9.344471
  18.00000  22.51915  362.7472  9.672685
  18.22222  22.57982  367.7582  9.986672
  18.44444  22.64058  372.7827  10.28826
  18.66667  22.70142  377.8207  10.57890
  18.88889  22.76235  382.8722  10.85978
  19.11111  22.82335  387.9373  14.27664
  19.33333  22.88444  393.0160  27.71800
  19.55556  22.94560  398.1082  46.71642
  19.77778  23.00685  403.2140  69.80399
  20.00000  23.06818  408.3335  96.08547
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              RCHRES   1     EXTNL  POTEV

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>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       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 IFWO       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

Disclaimer

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