

WWHM2012
PROJECT REPORT

General Model Information

Project Name: QCF Phase III - Tributary 316A Sizing
Site Name: Queen City Farms
Site Address: 17825 Cedar Grove Rd SE
City: Maple Valley
Report Date: 8/23/2019
Gage: Seatac
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 1.167
Version Date: 2018/10/10
Version: 4.2.16

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

Maple Hill sub-basin (north area only)

Bypass: No

GroundWater: No

Pervious Land Use acre
A B, Forest, Mod 128

Pervious Total 128

Impervious Land Use acre
ROADS FLAT 38

Impervious Total 38

Basin Total 166

Element Flows To:
Surface

Interflow

Groundwater

Mitigated Land Use

Maple Hills sub-basin (north area only)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Mod	128
Pervious Total	128
Impervious Land Use	acre
ROADS FLAT	38
Impervious Total	38
Basin Total	166

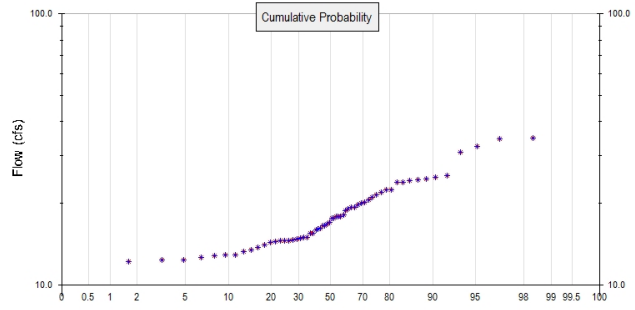
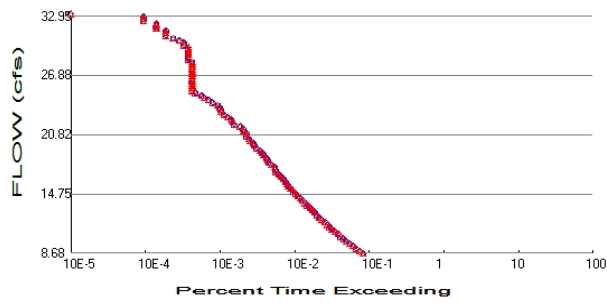
Element Flows To:		
Surface	Interflow	Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 128
Total Impervious Area: 38

Mitigated Landuse Totals for POC #1

Total Pervious Area: 128
Total Impervious Area: 38

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	17.36959
5 year	22.044684
10 year	25.2983
25 year	29.599134
50 year	32.946245
100 year	36.420295

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	17.36959
5 year	22.044684
10 year	25.2983
25 year	29.599134
50 year	32.946245
100 year	36.420295

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	22.417	22.417
1950	24.201	24.201
1951	14.502	14.502
1952	12.220	12.220
1953	13.488	13.488
1954	14.049	14.049
1955	16.184	16.184
1956	15.482	15.482
1957	17.593	17.593
1958	14.383	14.383

1959	14.944	14.944
1960	14.460	14.460
1961	14.996	14.996
1962	13.255	13.255
1963	14.831	14.831
1964	14.634	14.634
1965	18.118	18.118
1966	12.071	12.071
1967	21.015	21.015
1968	24.451	24.451
1969	16.534	16.534
1970	16.118	16.118
1971	19.266	19.266
1972	19.966	19.966
1973	12.378	12.378
1974	17.818	17.818
1975	20.109	20.109
1976	13.709	13.709
1977	14.806	14.806
1978	18.824	18.824
1979	25.006	25.006
1980	21.946	21.946
1981	17.871	17.871
1982	25.249	25.249
1983	20.638	20.638
1984	12.902	12.902
1985	17.827	17.827
1986	15.561	15.561
1987	23.976	23.976
1988	14.535	14.535
1989	19.734	19.734
1990	30.835	30.835
1991	24.563	24.563
1992	12.820	12.820
1993	12.401	12.401
1994	12.620	12.620
1995	15.945	15.945
1996	19.290	19.290
1997	16.515	16.515
1998	16.788	16.788
1999	34.498	34.498
2000	16.968	16.968
2001	19.111	19.111
2002	21.530	21.530
2003	17.562	17.562
2004	32.343	32.343
2005	14.530	14.530
2006	12.934	12.934
2007	34.741	34.741
2008	23.923	23.923
2009	22.429	22.429

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	34.7413	34.7413
2	34.4978	34.4978
3	32.3426	32.3426

4	30.8345	30.8345
5	25.2486	25.2486
6	25.0060	25.0060
7	24.5630	24.5630
8	24.4508	24.4508
9	24.2009	24.2009
10	23.9764	23.9764
11	23.9227	23.9227
12	22.4292	22.4292
13	22.4174	22.4174
14	21.9461	21.9461
15	21.5295	21.5295
16	21.0153	21.0153
17	20.6376	20.6376
18	20.1092	20.1092
19	19.9657	19.9657
20	19.7336	19.7336
21	19.2895	19.2895
22	19.2657	19.2657
23	19.1108	19.1108
24	18.8242	18.8242
25	18.1184	18.1184
26	17.8708	17.8708
27	17.8272	17.8272
28	17.8184	17.8184
29	17.5930	17.5930
30	17.5621	17.5621
31	16.9679	16.9679
32	16.7875	16.7875
33	16.5341	16.5341
34	16.5154	16.5154
35	16.1842	16.1842
36	16.1175	16.1175
37	15.9447	15.9447
38	15.5609	15.5609
39	15.4818	15.4818
40	14.9959	14.9959
41	14.9437	14.9437
42	14.8311	14.8311
43	14.8058	14.8058
44	14.6341	14.6341
45	14.5346	14.5346
46	14.5300	14.5300
47	14.5022	14.5022
48	14.4602	14.4602
49	14.3828	14.3828
50	14.0492	14.0492
51	13.7093	13.7093
52	13.4880	13.4880
53	13.2546	13.2546
54	12.9339	12.9339
55	12.9016	12.9016
56	12.8200	12.8200
57	12.6200	12.6200
58	12.4006	12.4006
59	12.3776	12.3776
60	12.2201	12.2201
61	12.0712	12.0712

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
8.6848	1751	1751	100	Pass
8.9299	1576	1576	100	Pass
9.1749	1412	1412	100	Pass
9.4200	1287	1287	100	Pass
9.6651	1166	1166	100	Pass
9.9101	1052	1052	100	Pass
10.1552	964	964	100	Pass
10.4003	881	881	100	Pass
10.6453	813	813	100	Pass
10.8904	742	742	100	Pass
11.1354	675	675	100	Pass
11.3805	629	629	100	Pass
11.6256	589	589	100	Pass
11.8706	540	540	100	Pass
12.1157	491	491	100	Pass
12.3608	452	452	100	Pass
12.6058	422	422	100	Pass
12.8509	392	392	100	Pass
13.0960	366	366	100	Pass
13.3410	341	341	100	Pass
13.5861	315	315	100	Pass
13.8312	296	296	100	Pass
14.0762	268	268	100	Pass
14.3213	254	254	100	Pass
14.5664	235	235	100	Pass
14.8114	220	220	100	Pass
15.0565	204	204	100	Pass
15.3016	189	189	100	Pass
15.5466	176	176	100	Pass
15.7917	168	168	100	Pass
16.0367	161	161	100	Pass
16.2818	149	149	100	Pass
16.5269	139	139	100	Pass
16.7719	130	130	100	Pass
17.0170	120	120	100	Pass
17.2621	118	118	100	Pass
17.5071	115	115	100	Pass
17.7522	104	104	100	Pass
17.9973	95	95	100	Pass
18.2423	92	92	100	Pass
18.4874	89	89	100	Pass
18.7325	82	82	100	Pass
18.9775	78	78	100	Pass
19.2226	73	73	100	Pass
19.4677	65	65	100	Pass
19.7127	61	61	100	Pass
19.9578	59	59	100	Pass
20.2029	54	54	100	Pass
20.4479	52	52	100	Pass
20.6930	48	48	100	Pass
20.9381	48	48	100	Pass
21.1831	44	44	100	Pass
21.4282	43	43	100	Pass

21.6732	40	40	100	Pass
21.9183	33	33	100	Pass
22.1634	31	31	100	Pass
22.4084	30	30	100	Pass
22.6535	27	27	100	Pass
22.8986	24	24	100	Pass
23.1436	22	22	100	Pass
23.3887	22	22	100	Pass
23.6338	21	21	100	Pass
23.8788	20	20	100	Pass
24.1239	17	17	100	Pass
24.3690	15	15	100	Pass
24.6140	13	13	100	Pass
24.8591	12	12	100	Pass
25.1042	10	10	100	Pass
25.3492	9	9	100	Pass
25.5943	9	9	100	Pass
25.8394	9	9	100	Pass
26.0844	9	9	100	Pass
26.3295	9	9	100	Pass
26.5746	9	9	100	Pass
26.8196	9	9	100	Pass
27.0647	9	9	100	Pass
27.3097	9	9	100	Pass
27.5548	9	9	100	Pass
27.7999	9	9	100	Pass
28.0449	9	9	100	Pass
28.2900	9	9	100	Pass
28.5351	8	8	100	Pass
28.7801	8	8	100	Pass
29.0252	8	8	100	Pass
29.2703	8	8	100	Pass
29.5153	8	8	100	Pass
29.7604	8	8	100	Pass
30.0055	7	7	100	Pass
30.2505	7	7	100	Pass
30.4956	6	6	100	Pass
30.7407	5	5	100	Pass
30.9857	4	4	100	Pass
31.2308	4	4	100	Pass
31.4759	4	4	100	Pass
31.7209	3	3	100	Pass
31.9660	3	3	100	Pass
32.2110	3	3	100	Pass
32.4561	2	2	100	Pass
32.7012	2	2	100	Pass
32.9462	2	2	100	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
Total Volume Infiltrated		0.00	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



Maple Hill
sub-basin
(north area
only)
166.00ac

Mitigated Schematic



Maple Hills
sub-basin
(north area
only)
166.00ac

Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1948 10 01      END      2009 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      QCF Phase III - Tributary 316A Sizing.wdm
MESSU    25      PreQCF Phase III - Tributary 316A Sizing.MES
          27      PreQCF Phase III - Tributary 316A Sizing.L61
          28      PreQCF Phase III - Tributary 316A Sizing.L62
          30      POCQCF Phase III - Tributary 316A Sizing1.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND        2
  IMPLND        1
  COPY          501
  DISPLY        1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Maple Hill sub-basin (nor  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          ***
```

```
2      A/B, Forest, Mod          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 ***
2      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 *****
2      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 ***
2 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
2 0 5 2 400 0.1 0.3 0.996
END PWAT-PARM2

```

```

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

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
2 0.2 0.5 0.35 0 0.7 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
2 0 0 0 0 3 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
END GEN-INFO
*** Section IWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
1 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
END PRINT-INFO

```

```

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
1 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
END IWAT-PARM2

```

```

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

```


END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#	***
WDM	2	PREC	ENGL	1.167		PERLND	1 999	EXTNL	PREC
WDM	2	PREC	ENGL	1.167		IMPLND	1 999	EXTNL	PREC
WDM	1	EVAP	ENGL	0.76		PERLND	1 999	EXTNL	PETINP
WDM	1	EVAP	ENGL	0.76		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						
MASS-LINK			15						
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN		
END MASS-LINK			15						

END MASS-LINK

END RUN

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1948 10 01      END      2009 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    QCF Phase III - Tributary 316A Sizing.wdm
MESSU    25    MitQCF Phase III - Tributary 316A Sizing.MES
          27    MitQCF Phase III - Tributary 316A Sizing.L61
          28    MitQCF Phase III - Tributary 316A Sizing.L62
          30    POCQCF Phase III - Tributary 316A Sizing1.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND        2
  IMPLND        1
  COPY          501
  DISPLY        1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   1   Maple Hills sub-basin (no MAX          1   2   30   9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

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

```
2   A/B, Forest, Mod          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 ***
2   0   0   1   0   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 *****
2   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 ***
2 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
2 0 5 2 400 0.1 0.3 0.996

END PWAT-PARM2

PWAT-PARM3

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

END PWAT-PARM3

PWAT-PARM4

<PLS > PWATER input info: Part 4 ***
- # CEPSC UZSN NSUR INTFW IRC LZETP ***
2 0.2 0.5 0.35 0 0.7 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
2 0 0 0 0 3 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

END GEN-INFO

*** Section IWATER***

ACTIVITY

<PLS > ***** Active Sections *****
- # ATMP SNOW IWAT SLD IWG IQAL ***
1 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

END PRINT-INFO

IWAT-PARM1

<PLS > IWATER variable monthly parameter value flags ***
- # CSNO RTOP VRS VNN RTLI ***
1 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

END IWAT-PARM2

IWAT-PARM3

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

END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#	***
WDM	2	PREC	ENGL	1.167		PERLND	1 999	EXTNL	PREC
WDM	2	PREC	ENGL	1.167		IMPLND	1 999	EXTNL	PREC
WDM	1	EVAP	ENGL	0.76		PERLND	1 999	EXTNL	PETINP
WDM	1	EVAP	ENGL	0.76		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	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		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					

END MASS-LINK

END RUN

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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