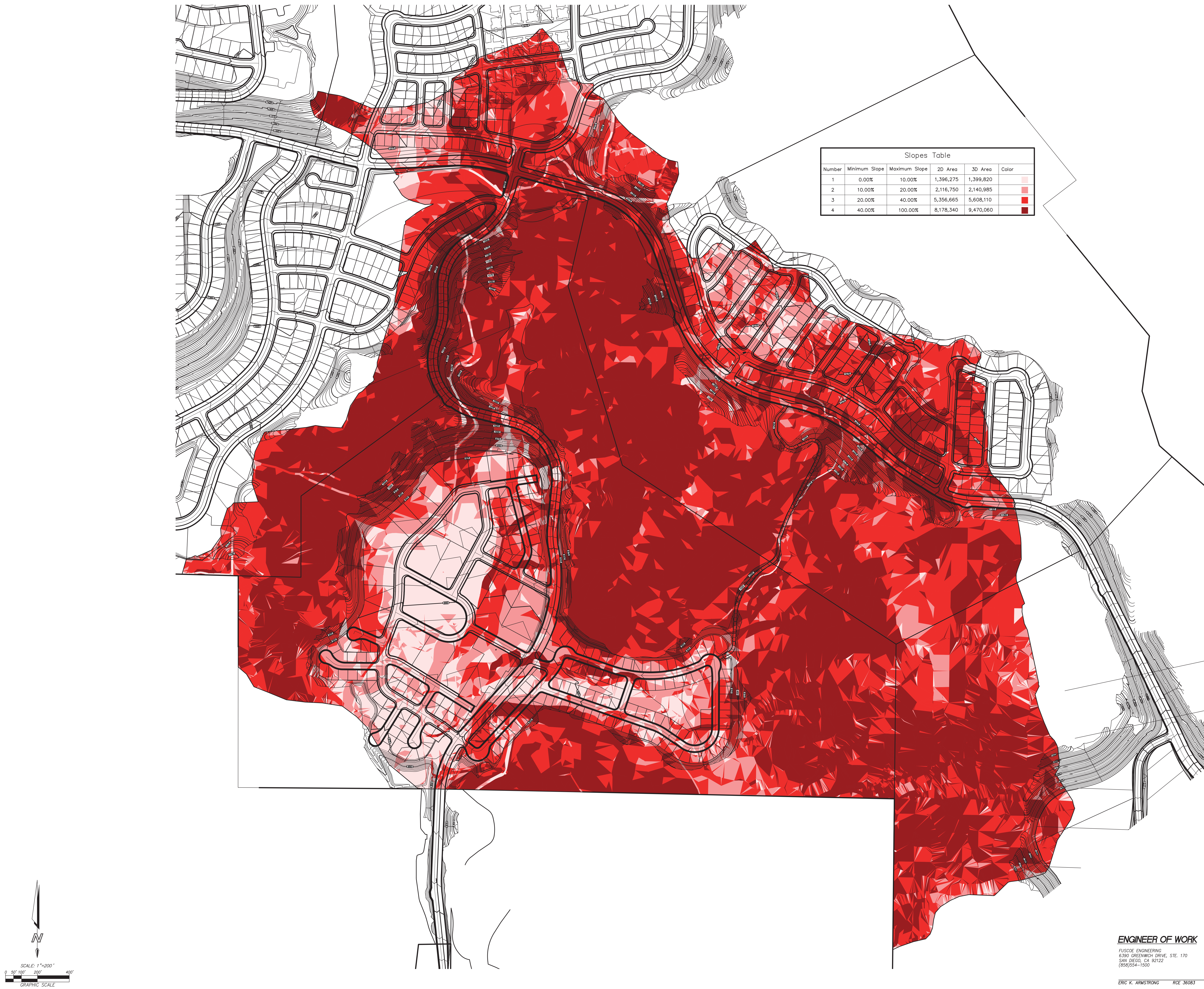
EXISTING BASIN 25A
SLOPE ANALYSIS
NEWLAND SIERRA



Slopes Table

Number	Minimum Slope	Maximum Slope	2D Area	3D Area	Color
1	0.00%	10.00%	1,396,275	1,399,820	
2	10.00%	20.00%	2,116,750	2,140,985	
3	20.00%	40.00%	5,356,665	5,608,110	
4	40.00%	100.00%	8,178,340	9,470,060	

ENGINEER OF WORK

FUSCOE ENGINEERING
6390 GREENWICH DRIVE, STE. 170
SAN DIEGO, CA 92122
(858)554-1500

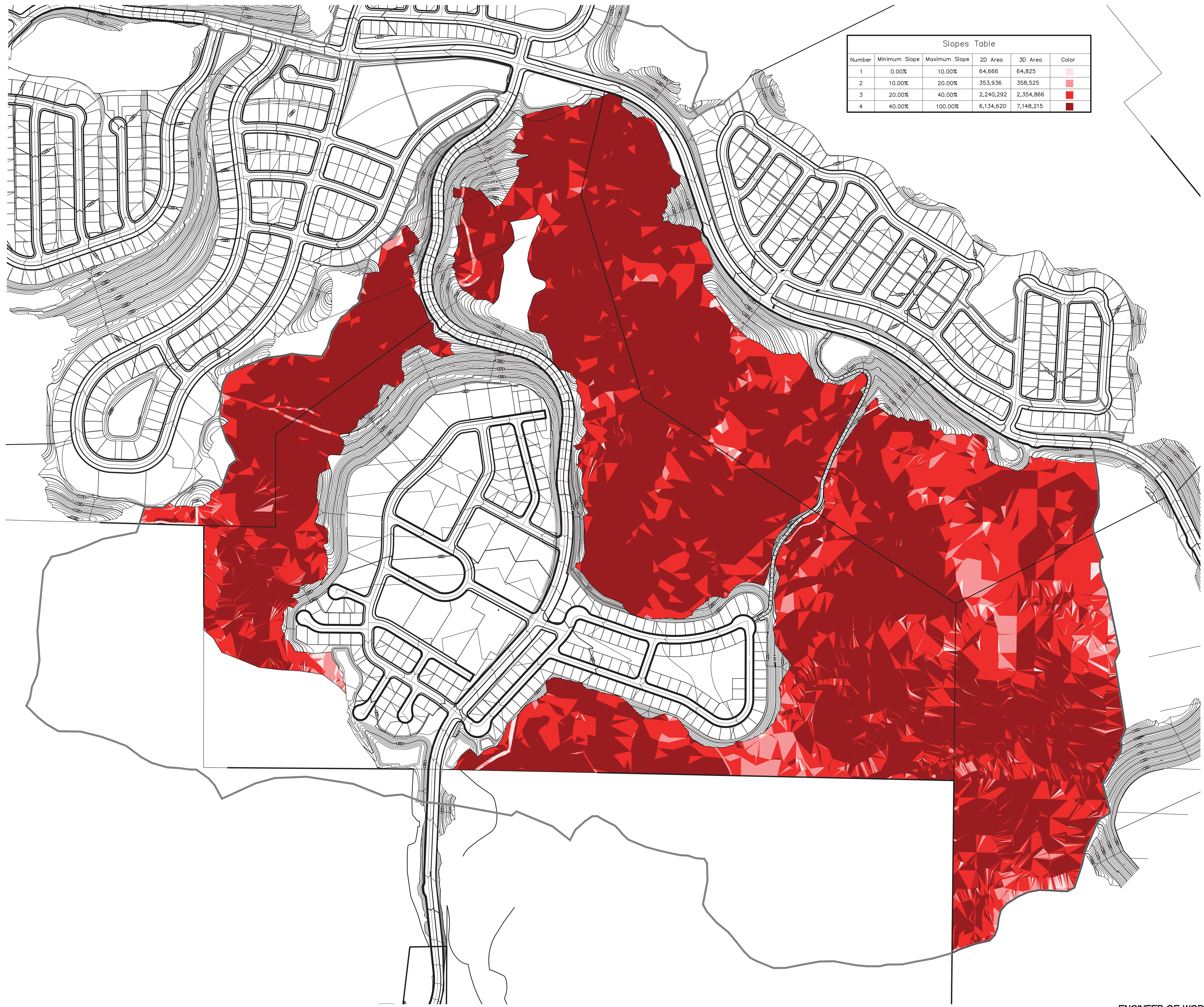
ERIC K. ARMSTRONG RCE 36083 DATE

REGISTERED PROFESSIONAL ENGINEER
ERIC K. ARMSTRONG
No. RCE 36083
EXP. 6-30-18
Civil
STATE OF CALIFORNIA

NO.	DATE	REVISION

FUSCOE
ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ∘ fax 858.597.0335
www.fuscoe.com

POST-DEVELOPMENT NATURAL AREAS
SLOPE ANALYSIS
NEWLAND SIERRA



Slopes Table					
Number	Minimum Slope	Maximum Slope	2D Area	3D Area	Color
1	0.00%	10.00%	64,666	64,825	
2	10.00%	20.00%	353,936	358,525	
3	20.00%	40.00%	2,240,292	2,354,866	
4	40.00%	100.00%	6,134,620	7,148,215	

N

SCALE: 1"=200'

GRAPHIC SCALE

ENGINEER OF WORK

FUSCOE ENGINEERING
6390 GREENWICH DRIVE, STE. 170
SAN DIEGO, CA 92122
(858)554-1500

ERIC K. ARMSTRONG RCE 36083 DATE

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M:\PROJECTS\2660 NEWLAND COMMUNITIES\002-02 NEWLAND SIERRA\ENG\FILES SENT\2016

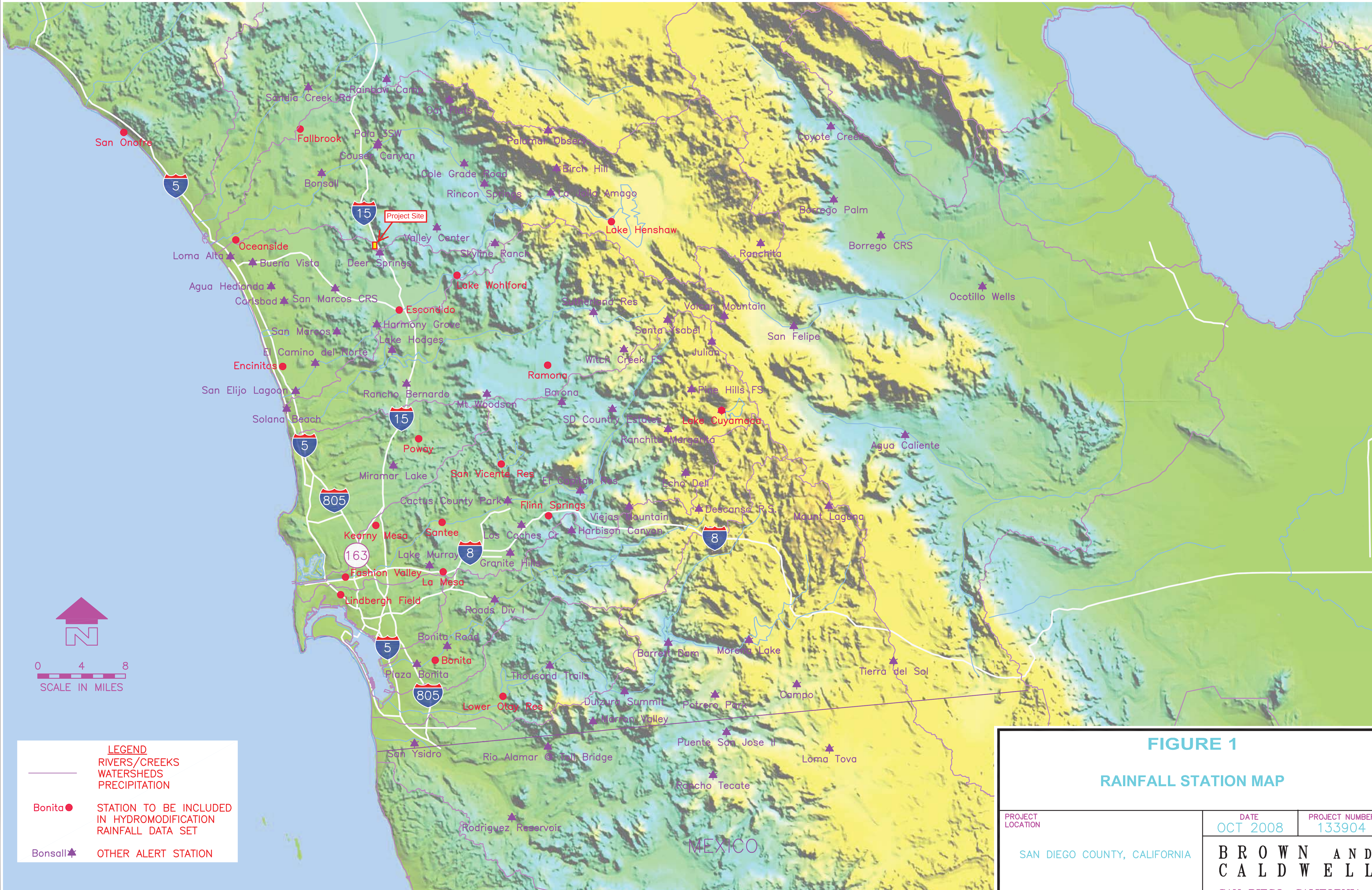


FIGURE 1

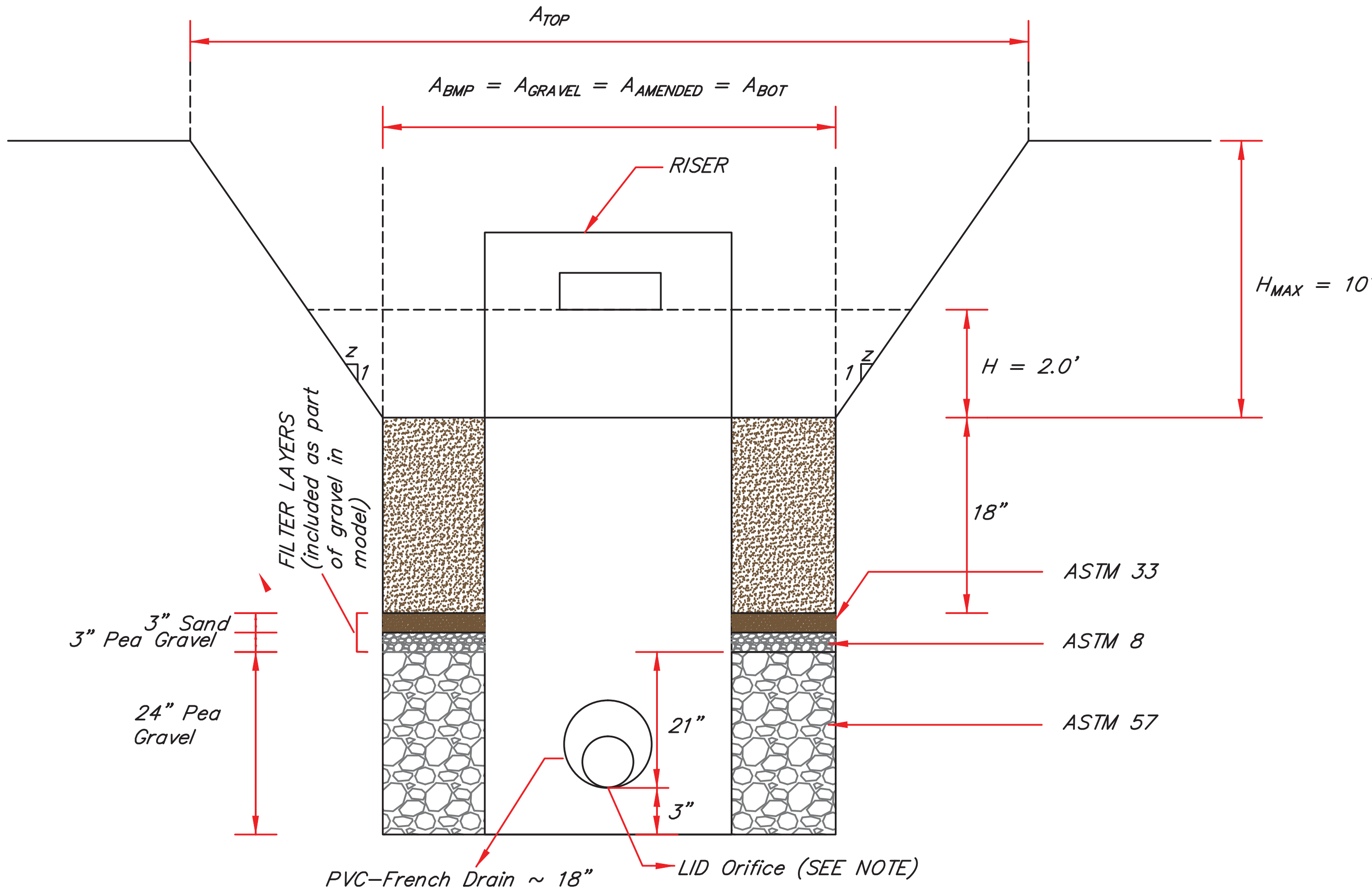
RAINFALL STATION MAP

PROJECT LOCATION	DATE	PROJECT NUMBER
SAN DIEGO COUNTY, CALIFORNIA	OCT 2008	133904

BROWN AND CALDWELL
SAN DIEGO, CALIFORNIA

BASIN M1MR1K1 DETAIL

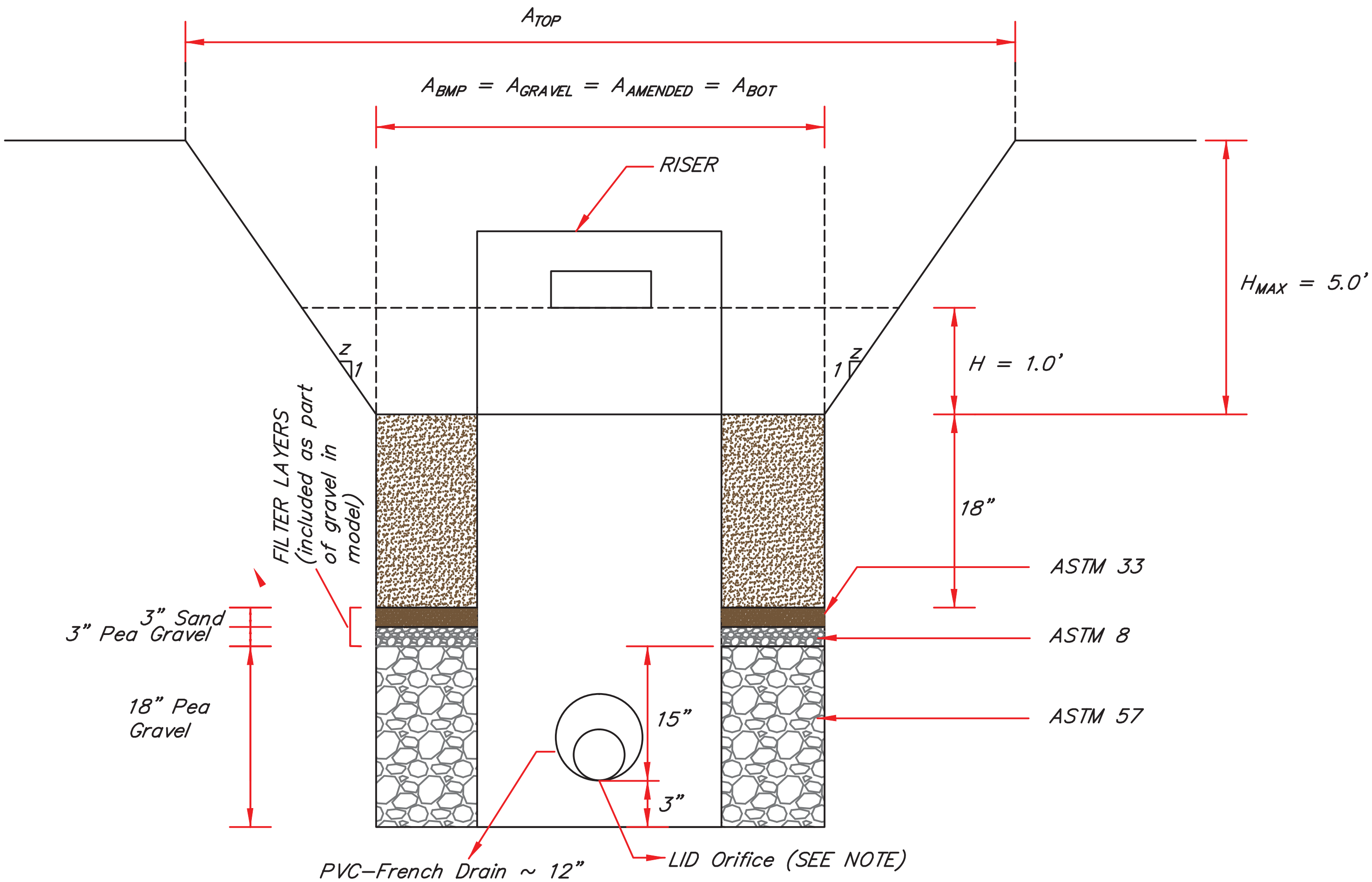
(NOT TO SCALE)



Note: $A_{BOT} = 94{,}224\ ft^2$
$A_{TOP} = 154{,}700\ ft^2$
LID Diameter: 2–12 inch orifices to be used.
Square Riser: 5' by 5' internal perimeter.

BASIN V11VR2 DETAIL

(NOT TO SCALE)



Note: A_{BOT} = 20,200 ft^2

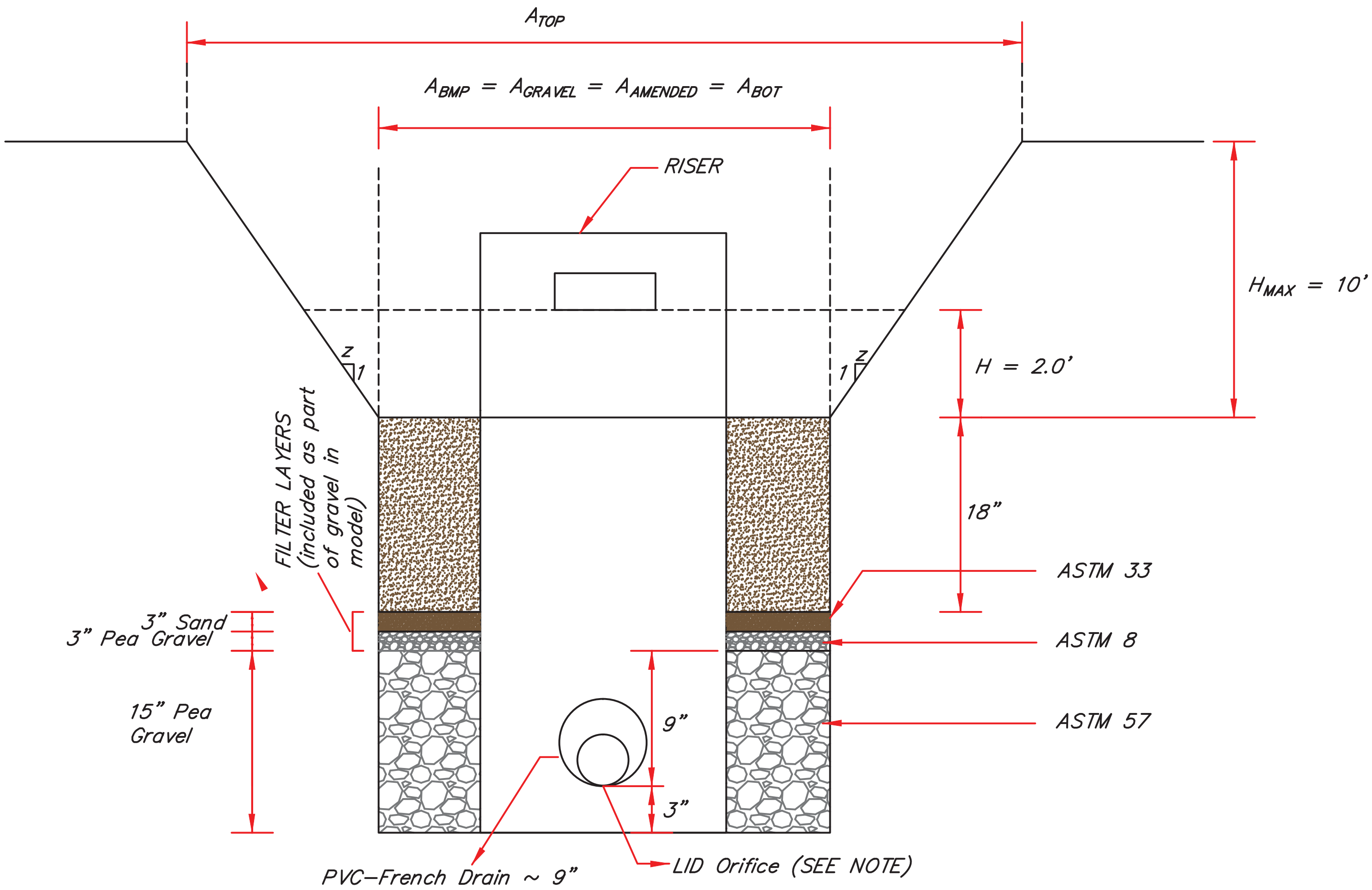
A_{TOP} = 26,225 ft^2

LID Diameter: 2–6 inch orifices to be used.

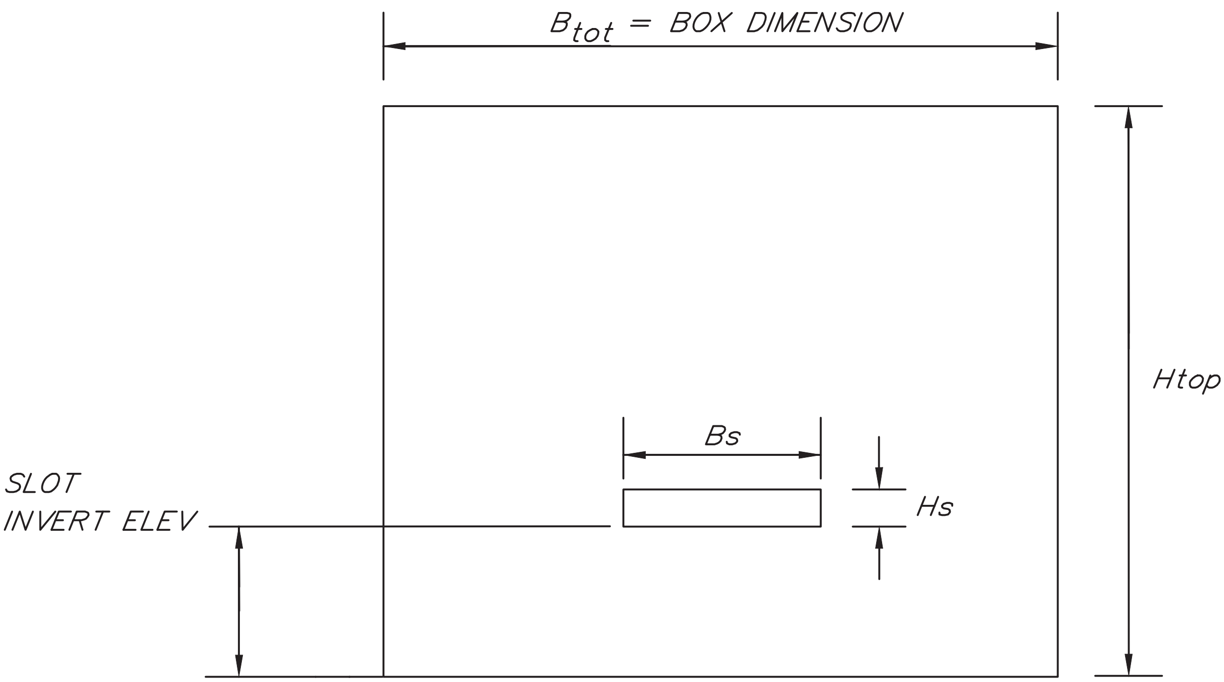
Square Riser: 3' by 3' internal perimeter.

BASIN V14 DETAIL

(NOT TO SCALE)



Note: A_{BOT} = 7,862 ft^2
A_{TOP} = 18,535 ft^2
LID Diameter: 1–6 inch orifices to be used.
Square Riser: 2' by 2' internal perimeter.



BIO-FILTRATION OUTLET STRUCTURE DETAIL - SECTION (TYP)

NOT TO SCALE

BASIN	SLOT			SPILLWAY	
	Bs (ft)	Hs (in)	ELEV (ft)	Btot (ft)	Htop (ft)
M1MR1K1	6.0	6.0	2.00	20.0	8.00
V11VR2	3.5	4.0	1.00	12.0	3.50
V14	1.3	3.0	2.00	8.0	8.00

NOTE: Btot IS THE INTERNAL PERIMETER OF RISER STRUCTURE.
FOR BASIN M1MR1K1 THE INTERNAL DIMENSIONS OF THE RISER STRUCTURE ARE 5' BY 5'.
FOR BASIN V11VR2 THE INTERNAL DIMENSIONS OF THE RISER STRUCTURE ARE 3' BY 3'.
FOR BASIN V14 THE INTERNAL DIMENSIONS OF THE RISER STRUCTURE ARE 2' BY 2'.

ATTACHMENT 6

SWMM Input Data in Input Format (Existing & Proposed Models)

PRE_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           05/24/1951
START_TIME           00:00:00
REPORT_START_DATE    05/24/1951
REPORT_START_TIME    00:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.06   0.08   0.11   0.16   0.18   0.21   0.21   0.20   0.16   0.12   0.08   0.06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LAKE_WHOL        INTENSITY 1:00   1.0    TIMESERIES LAKE_WHOL

[SUBCATCHMENTS]
;;                                                Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
DMA-C            LAKE_WHOL        POC-25A          16.074   0        437      10       0
DMA-B            LAKE_WHOL        POC-25A          21.882   0        510      20       0
DMA-D            LAKE_WHOL        POC-25A          353.414  0        4847     40       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-C            0.012      0.05       0.02       0.1        25         OUTLET
DMA-B            0.012      0.05       0.05       0.1        25         OUTLET
DMA-D            0.012      0.05       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA-C            6          0.1        0.32
DMA-B            3          0.2        0.31
DMA-D            9          0.025      0.33

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
POC-25A          0          FREE                        NO

[TIMESERIES]
```

```
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LAKE_WHOL        FILE "L-Wohlf.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 1287.606 2381.886 6519.597 7077.860
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-25A          3762.923           2844.115

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-C            4425.929           6092.899
DMA-B            2273.231           6063.052
DMA-D            6281.780           6069.915

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LAKE_WHOL        1525.424           6864.407
```

POST_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           05/24/1951
START_TIME           00:00:00
REPORT_START_DATE    05/24/1951
REPORT_START_TIME    00:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.06   0.08   0.11   0.16   0.18   0.21   0.21   0.20   0.16   0.12   0.08   0.06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LAKE_WHOL        INTENSITY 1:00   1.0    TIMESERIES LAKE_WHOL

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
H1-D-S           LAKE_WHOL        H1               1.523    67.08    439      1.5      0
H2-D-S           LAKE_WHOL        H2               0.429    67.27    103      1.4      0
H4-D-S           LAKE_WHOL        H4               0.665    67.13    115      1.2      0
H5-D-S           LAKE_WHOL        H5               0.637    67.37    113      1.3      0
H6-D-S           LAKE_WHOL        H6               0.615    67.09    111      1.4      0
H7-D-S           LAKE_WHOL        H7               0.541    67.11    114      1.4      0
H8-D-S           LAKE_WHOL        H8HR1            18.138   65.00    707      1.5      0
HR1-D-S          LAKE_WHOL        H8HR1            4.173    90.00    212      1.2      0
H9-D-S           LAKE_WHOL        H9HR2            2.551    65.00    235      1.2      0
HR2-D-S          LAKE_WHOL        H9HR2            1.737    90.00    90       1.3      0
M1-D-S           LAKE_WHOL        M1MR1K1          39.309   65.00    1093     1.4      0
K1-D-S           LAKE_WHOL        M1MR1K1          4.398    74.77    717      1.5      0
MR1-D-S          LAKE_WHOL        M1MR1K1          4.706    90.00    40       1.5      0
V1-D-S           LAKE_WHOL        V1               3.328    78.03    213      1.2      0
V2-B-S           LAKE_WHOL        V2               1.872    75.00    211      1.3      0
V2-C-S           LAKE_WHOL        V2               0.100    75.00    17       1.2      0
V2-D-S           LAKE_WHOL        V2               1.354    82.43    514      1.4      0
V3-B-S           LAKE_WHOL        V3               0.172    75.00    114      1.5      0
V3-D-S           LAKE_WHOL        V3               0.911    78.63    170      1.3      0
V4-C-S           LAKE_WHOL        V4               0.398    75.00    280      1.3      0
V4-D-S           LAKE_WHOL        V4               1.268    75.00    202      1.2      0
V5-C-S           LAKE_WHOL        V5               2.572    78.03    226      1.5      0
V6-C-S           LAKE_WHOL        V6               1.053    78.04    95       1.3      0
V7-B-S           LAKE_WHOL        V7               1.977    75.00    168      1.3      0
V7-C-S           LAKE_WHOL        V7               0.025    75.00    64       1.2      0
V7-D-S           LAKE_WHOL        V7               0.725    86.40    191      1.4      0
V8-C-S           LAKE_WHOL        V8               2.418    51.47    250      1.5      0
V8-D-S           LAKE_WHOL        V8               0.092    50.00    122      1.4      0
V9-B-S           LAKE_WHOL        V9               0.329    75.00    287      1.2      0
V9-C-S           LAKE_WHOL        V9               2.276    78.67    309      1.4      0
V9-D-S           LAKE_WHOL        V9               0.141    75.00    198      1.5      0
```

POST_DEV

```
V10-C-S          LAKE_WHOL        V10              0.717     75.00    96       1.2      0
V10-D-S          LAKE_WHOL        V10              8.862     78.20    277      1.4      0
V11-B-S          LAKE_WHOL        V11VR2           3.321     75.00    190      1.5      0
V11-C-S          LAKE_WHOL        V11VR2           6.342     80.48    392      1.3      0
V11-D-S          LAKE_WHOL        V11VR2           0.128     75.00    103      1.4      0
VR2-B-S          LAKE_WHOL        V11VR2           1.569     90.00    80       1.2      0
VR2-C-S          LAKE_WHOL        V11VR2           0.033     90.00    17       1.5      0
V12-B-S          LAKE_WHOL        V12VR1           0.190     92.89    38       1.4      0
VR1-B-S          LAKE_WHOL        V12VR1           0.860     90.00    90       1.3      0
VR1-C-S          LAKE_WHOL        V12VR1           0.141     90.00    114      1.4      0
VR1-D-S          LAKE_WHOL        V12VR1           2.273     90.00    70       1.5      0
V13-B-S          LAKE_WHOL        V13              1.887     75.00    113      1.5      0
V13-D-S          LAKE_WHOL        V13              1.601     78.17    156      1.5      0
V14-B-S          LAKE_WHOL        V14              2.459     80.51    230      1.3      0
V14-D-S          LAKE_WHOL        V14              2.511     75.00    209      1.3      0
V15-B-S          LAKE_WHOL        V15              3.984     80.42    274      1.2      0
V15-D-S          LAKE_WHOL        V15              3.314     75.00    222      1.5      0
V16-B-S          LAKE_WHOL        V16              2.114     51.79    191      1.3      0
V16-D-S          LAKE_WHOL        V16              0.553     50.00    132      1.2      0
H1               LAKE_WHOL        POC-25           0.04867   0        10       1.4      0
H2               LAKE_WHOL        POC-25           0.01504   0        10       1.2      0
H4               LAKE_WHOL        POC-25           0.02181   0        10       1.4      0
H5               LAKE_WHOL        POC-25           0.02319   0        10       1.3      0
H6               LAKE_WHOL        POC-25           0.01974   0        10       1.2      0
H7               LAKE_WHOL        POC-25           0.01756   0        10       1.3      0
H8HR1            LAKE_WHOL        POC-25           0.74529   0        10       1.4      0
H9HR2            LAKE_WHOL        POC-25           0.17057   0        10       1.5      0
M1MR1K1          LAKE_WHOL        D-K1             2.26974   0        10       1.2      0
V1               LAKE_WHOL        POC-25           0.13464   0        10       1.3      0
V2               LAKE_WHOL        POC-25           0.13407   0        10       1.4      0
V3               LAKE_WHOL        POC-25           0.04408   0        10       1.5      0
V4               LAKE_WHOL        POC-25           0.06474   0        10       1.5      0
V5               LAKE_WHOL        POC-25           0.10376   0        10       1.4      0
V6               LAKE_WHOL        POC-25           0.04258   0        10       1.3      0
V7               LAKE_WHOL        POC-25           0.11019   0        10       1.2      0
V8               LAKE_WHOL        POC-25           0.07117   0        10       1.5      0
V9               LAKE_WHOL        POC-25           0.11134   0        10       1.3      0
V10              LAKE_WHOL        POC-25           0.37821   0        10       1.2      0
V11VR2           LAKE_WHOL        D11R2            0.463728  0        10       1.5      0
V12VR1           LAKE_WHOL        POC-25           0.16311   0        10       1.3      0
V13              LAKE_WHOL        POC-25           0.06761   0        10       1.2      0
V14              LAKE_WHOL        D14              0.180487  0        10       1.4      0
V15              LAKE_WHOL        POC-25           0.28788   0        10       1.5      0
V16              LAKE_WHOL        POC-25           0.07576   0        10       1.4      0
OFF-1-B          LAKE_WHOL        POC-25           0.442     0        10.3     15       0
OFF-1-D          LAKE_WHOL        POC-25           245.952   0        3373     40       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
H1-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H2-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H4-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H5-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H6-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H7-D-S           0.012      0.05       0.05       0.10       25         OUTLET
H8-D-S           0.012      0.05       0.05       0.10       25         OUTLET
HR1-D-S          0.012      0.05       0.05       0.10       25         OUTLET
H9-D-S           0.012      0.05       0.05       0.10       25         OUTLET
HR2-D-S          0.012      0.05       0.05       0.10       25         OUTLET
M1-D-S           0.012      0.05       0.05       0.10       25         OUTLET
K1-D-S           0.012      0.05       0.05       0.10       25         OUTLET
MR1-D-S          0.012      0.05       0.05       0.10       25         OUTLET
V1-D-S           0.012      0.05       0.05       0.10       25         OUTLET
V2-B-S           0.012      0.05       0.05       0.10       25         OUTLET
V2-C-S           0.012      0.05       0.05       0.10       25         OUTLET
V2-D-S           0.012      0.05       0.05       0.10       25         OUTLET
V3-B-S           0.012      0.05       0.05       0.10       25         OUTLET
V3-D-S           0.012      0.05       0.05       0.10       25         OUTLET
V4-C-S           0.012      0.05       0.05       0.10       25         OUTLET
V4-D-S           0.012      0.05       0.05       0.10       25         OUTLET
V5-C-S           0.012      0.05       0.05       0.10       25         OUTLET
V6-C-S           0.012      0.05       0.05       0.10       25         OUTLET
V7-B-S           0.012      0.05       0.05       0.10       25         OUTLET
V7-C-S           0.012      0.05       0.05       0.10       25         OUTLET
V7-D-S           0.012      0.05       0.05       0.10       25         OUTLET
V8-C-S           0.012      0.05       0.05       0.10       25         OUTLET
```

```
V8-D-S          0.012      0.05       0.05       0.10       25         OUTLET
V9-B-S          0.012      0.05       0.05       0.10       25         OUTLET
V9-C-S          0.012      0.05       0.05       0.10       25         OUTLET
V9-D-S          0.012      0.05       0.05       0.10       25         OUTLET
V10-C-S         0.012      0.05       0.05       0.10       25         OUTLET
V10-D-S         0.012      0.05       0.05       0.10       25         OUTLET
V11-B-S         0.012      0.05       0.05       0.10       25         OUTLET
V11-C-S         0.012      0.05       0.05       0.10       25         OUTLET
V11-D-S         0.012      0.05       0.05       0.10       25         OUTLET
VR2-B-S         0.012      0.05       0.05       0.10       25         OUTLET
VR2-C-S         0.012      0.05       0.05       0.10       25         OUTLET
V12-B-S         0.012      0.05       0.05       0.10       25         OUTLET
VR1-B-S         0.012      0.05       0.05       0.10       25         OUTLET
VR1-C-S         0.012      0.05       0.05       0.10       25         OUTLET
VR1-D-S         0.012      0.05       0.05       0.10       25         OUTLET
V13-B-S         0.012      0.05       0.05       0.10       25         OUTLET
V13-D-S         0.012      0.05       0.05       0.10       25         OUTLET
V14-B-S         0.012      0.05       0.05       0.10       25         OUTLET
V14-D-S         0.012      0.05       0.05       0.10       25         OUTLET
V15-B-S         0.012      0.05       0.05       0.10       25         OUTLET
V15-D-S         0.012      0.05       0.05       0.10       25         OUTLET
V16-B-S         0.012      0.05       0.05       0.10       25         OUTLET
V16-D-S         0.012      0.05       0.05       0.10       25         OUTLET
H1              0.012      0.05       0.05       0.10       25         OUTLET
H2              0.012      0.05       0.05       0.10       25         OUTLET
H4              0.012      0.05       0.05       0.10       25         OUTLET
H5              0.012      0.05       0.05       0.10       25         OUTLET
H6              0.012      0.05       0.05       0.10       25         OUTLET
H7              0.012      0.05       0.05       0.10       25         OUTLET
H8HR1           0.012      0.05       0.05       0.10       25         OUTLET
H9HR2           0.012      0.05       0.05       0.10       25         OUTLET
M1MR1K1         0.012      0.05       0.05       0.10       25         OUTLET
V1              0.012      0.05       0.05       0.10       25         OUTLET
V2              0.012      0.05       0.05       0.10       25         OUTLET
V3              0.012      0.05       0.05       0.10       25         OUTLET
V4              0.012      0.05       0.05       0.10       25         OUTLET
V5              0.012      0.05       0.05       0.10       25         OUTLET
V6              0.012      0.05       0.05       0.10       25         OUTLET
V7              0.012      0.05       0.05       0.10       25         OUTLET
V8              0.012      0.05       0.05       0.10       25         OUTLET
V9              0.012      0.05       0.05       0.10       25         OUTLET
V10             0.012      0.05       0.05       0.10       25         OUTLET
V11VR2          0.012      0.05       0.05       0.10       25         OUTLET
V12VR1          0.012      0.05       0.05       0.10       25         OUTLET
V13             0.012      0.05       0.05       0.10       25         OUTLET
V14             0.012      0.05       0.05       0.10       25         OUTLET
V15             0.012      0.05       0.05       0.10       25         OUTLET
V16             0.012      0.05       0.05       0.10       25         OUTLET
OFF-1-B         0.012      0.05       0.05       0.10       25         OUTLET
OFF-1-D         0.012      0.05       0.05       0.10       25         OUTLET

[INFILTRATION]
;;Subcatchment  Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
H1-D-S          9.0        0.01875    0.33
H2-D-S          9.0        0.01875    0.33
H4-D-S          9.0        0.01875    0.33
H5-D-S          9.0        0.01875    0.33
H6-D-S          9.0        0.01875    0.33
H7-D-S          9.0        0.01875    0.33
H8-D-S          9.0        0.01875    0.33
HR1-D-S         9.0        0.01875    0.33
H9-D-S          9.0        0.01875    0.33
HR2-D-S         9.0        0.01875    0.33
M1-D-S          9.0        0.01875    0.33
K1-D-S          9.0        0.01875    0.33
MR1-D-S         9.0        0.01875    0.33
V1-D-S          9.0        0.01875    0.33
V2-B-S          3.0        0.15       0.31
V2-C-S          6.0        0.075      0.32
V2-D-S          9.0        0.01875    0.33
V3-B-S          3.0        0.15       0.31
V3-D-S          9.0        0.01875    0.33
V4-C-S          6.0        0.075      0.32
V4-D-S          9.0        0.01875    0.33
V5-C-S          6.0        0.075      0.32
V6-C-S          6.0        0.075      0.32
```

```
V7-B-S           3.0        0.15       0.31
V7-C-S           6.0        0.075      0.32
V7-D-S           9.0        0.01875    0.33
V8-C-S           6.0        0.075      0.32
V8-D-S           9.0        0.01875    0.33
V9-B-S           3.0        0.15       0.31
V9-C-S           6.0        0.075      0.32
V9-D-S           9.0        0.01875    0.33
V10-C-S          6.0        0.075      0.32
V10-D-S          9.0        0.01875    0.33
V11-B-S          3.0        0.15       0.31
V11-C-S          6.0        0.075      0.32
V11-D-S          9.0        0.01875    0.33
VR2-B-S          3.0        0.15       0.31
VR2-C-S          6.0        0.075      0.32
V12-B-S          3.0        0.15       0.31
VR1-B-S          3.0        0.15       0.31
VR1-C-S          6.0        0.075      0.32
VR1-D-S          9.0        0.01875    0.33
V13-B-S          3.0        0.15       0.31
V13-D-S          9.0        0.01875    0.33
V14-B-S          3.0        0.15       0.31
V14-D-S          9.0        0.01875    0.33
V15-B-S          3.0        0.15       0.31
V15-D-S          9.0        0.01875    0.33
V16-B-S          3.0        0.15       0.31
V16-D-S          9.0        0.01875    0.33
H1               9.0        0.01875    0.33
H2               9.0        0.01875    0.33
H4               9.0        0.01875    0.33
H5               9.0        0.01875    0.33
H6               9.0        0.01875    0.33
H7               9.0        0.01875    0.33
H8HR1            9.0        0.01875    0.33
H9HR2            9.0        0.01875    0.33
M1MR1K1          9.0        0.01875    0.33
V1               9.0        0.01875    0.33
V2               9.0        0.01875    0.33
V3               9.0        0.01875    0.33
V4               6.0        0.075      0.32
V5               3.0        0.15       0.31
V6               6.0        0.075      0.32
V7               9.0        0.01875    0.33
V8               6.0        0.075      0.32
V9               6.0        0.075      0.32
V10              6.0        0.075      0.32
V11VR2           6.0        0.075      0.32
V12VR1           3.0        0.15       0.31
V13              9.0        0.01875    0.33
V14              3.0        0.15       0.31
V15              3.0        0.15       0.31
V16              3.0        0.15       0.31
OFF-1-B          3.0        0.20       0.31
OFF-1-D          9.0        0.025      0.33


[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
H1               BC
H1               SURFACE    6.83       0.05       0          0          5
H1               SOIL       18         0.4        0.2        0.1        5          5          1.5
H1               STORAGE    18         0.67       0          0
H1               DRAIN      1.4135     0.5        3          6

H2               BC
H2               SURFACE    6.73       0.05       0.1        1.0        5
H2               SOIL       18         0.4        0.2        0.1        5          5          1.5
H2               STORAGE    18         0.67       0          0
H2               DRAIN      1.1438     0.5        3          6

H4               BC
H4               SURFACE    6.76       0.05       0          0          5
H4               SOIL       18         0.4        0.2        0.1        5          5          1.5
H4               STORAGE    18         0.67       0          0
H4               DRAIN      1.4019     0.5        3          6
```

POST_DEV

H5	BC							
H5	SURFACE	6.62	0.05	0	0	5		
H5	SOIL	18	0.4	0.2	0.1	5	5	1.5
H5	STORAGE	18	0.67	0	0			
H5	DRAIN	1.3187	0.5	3	6			
H6	BC							
H6	SURFACE	6.68	0.05	0	0	5		
H6	SOIL	18	0.4	0.2	0.1	5	5	1.5
H6	STORAGE	18	0.67	0	0			
H6	DRAIN	1.1857	0.5	3	6			
H7	BC							
H7	SURFACE	6.78	0.05	0	0	5		
H7	SOIL	18	0.4	0.2	0.1	5	5	1.5
H7	STORAGE	18	0.67	0	0			
H7	DRAIN	1.3329	0.5	3	6			
H8HR1	BC							
H8HR1	SURFACE	6.10	0.05	0	0	5		
H8HR1	SOIL	18	0.4	0.2	0.1	5	5	1.5
H8HR1	STORAGE	27	0.67	0	0			
H8HR1	DRAIN	1.3128	0.5	3	6			
H9HR2	BC							
H9HR2	SURFACE	6.23	0.05	0	0	5		
H9HR2	SOIL	18	0.4	0.2	0.1	5	5	1.5
H9HR2	STORAGE	18	0.75	0	0			
H9HR2	DRAIN	1.6133	0.5	3	6			
M1MR1K1	BC							
M1MR1K1	SURFACE	25.64	0.05	0	0	5		
M1MR1K1	SOIL	18	0.4	0.2	0.1	5	5	1.5
M1MR1K1	STORAGE	30	0.67	0	0			
M1MR1K1	DRAIN	1.01771	0.5	3	6			
V1	BC							
V1	SURFACE	6.34	0.05	0	0	5		
V1	SOIL	18	0.4	0.2	0.1	5	5	1.5
V1	STORAGE	18	0.75	0	0			
V1	DRAIN	1.0219	0.5	3	6			
V2	BC							
V2	SURFACE	6.29	0.05	0	0	5		
V2	SOIL	18	0.4	0.2	0.1	5	5	1.5
V2	STORAGE	18	0.67	0	0			
V2	DRAIN	1.02625	0.5	3	6			
V3	BC							
V3	SURFACE	6.63	0.05	0	0	5		
V3	SOIL	18	0.4	0.2	0.1	5	5	1.5
V3	STORAGE	18	0.67	0	0			
V3	DRAIN	1.0839	0.5	3	6			
V4	BC							
V4	SURFACE	6.47	0.05	0	0	5		
V4	SOIL	18	0.4	0.2	0.1	5	5	1.5
V4	STORAGE	18	0.75	0	0			
V4	DRAIN	1.4464	0.5	3	6			
V5	BC							
V5	SURFACE	6.44	0.05	0	0	5		
V5	SOIL	18	0.4	0.2	0.1	5	5	1.5
V5	STORAGE	18	0.67	0	0			
V5	DRAIN	1.32595	0.5	3	6			
V6	BC							
V6	SURFACE	6.59	0.05	0	0	5		
V6	SOIL	18	0.4	0.2	0.1	5	5	1.5
V6	STORAGE	18	0.67	0	0			
V6	DRAIN	1.1218	0.5	3	6			
V7	BC							
V7	SURFACE	6.48	0.05	0	0	5		
V7	SOIL	18	0.4	0.2	0.1	5	5	1.5
V7	STORAGE	18	0.67	0	0			
V7	DRAIN	1.2486	0.5	3	6			

POST_DEV

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V8               BC
V8               SURFACE    6.44       0.05       0          0          5
V8               SOIL       18         0.4        0.2        0.1        5          5          1.5
V8               STORAGE    18         0.67       0          0
V8               DRAIN      1.3157     0.5        3          6

V9               BC
V9               SURFACE    6.28       0.05       0          0          5
V9               SOIL       18         0.4        0.2        0.1        5          5          1.5
V9               STORAGE    18         0.67       0          0
V9               DRAIN      1.2357     0.5        3          6

V10              BC
V10              SURFACE    6.18       0.05       0          0          5
V10              SOIL       18         0.4        0.2        0.1        5          5          1.5
V10              STORAGE    18         0.67       0          0
V10              DRAIN      1.4551     0.5        3          6

V11VR2           BC
V11VR2           SURFACE    12.36      0.05       0          0          5
V11VR2           SOIL       18         0.4        0.2        0.1        5          5          1.5
V11VR2           STORAGE    24         0.67       0          0
V11VR2           DRAIN      1.186791   0.5        3          6

V12VR1           BC
V12VR1           SURFACE    6.48       0.05       0          0          5
V12VR1           SOIL       18         0.4        0.2        0.1        5          5          1.5
V12VR1           STORAGE    18         0.67       0          0
V12VR1           DRAIN      1.6871     0.5        3          6

V13              BC
V13              SURFACE    6.33       0.05       0          0          5
V13              SOIL       18         0.4        0.2        0.1        5          5          1.5
V13              STORAGE    18         0.67       0          0
V13              DRAIN      1.3850     0.5        3          6

V14              BC
V14              SURFACE    27.01      0.05       0          0          5
V14              SOIL       18         0.4        0.2        0.1        5          5          1.5
V14              STORAGE    18         0.67       0          0
V14              DRAIN      1.5246     0.5        3          6

V15              BC
V15              SURFACE    6.32       0.05       0          0          5
V15              SOIL       18         0.4        0.2        0.1        5          5          1.5
V15              STORAGE    18         0.67       0          0
V15              DRAIN      0.9559     0.5        3          6

V16              BC
V16              SURFACE    6.33       0.05       0          0          5
V16              SOIL       18         0.4        0.2        0.1        5          5          1.5
V16              STORAGE    18         0.67       0          0
V16              DRAIN      1.2360     0.5        3          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
H1               H1               1       2120       0          0          100        0
H2               H2               1       655        0          0          100        0
H4               H4               1       950        0          0          100        0
H5               H5               1       1010       0          0          100        0
H6               H6               1       860        0          0          100        0
H7               H7               1       765        0          0          100        0
H8HR1            H8HR1            1       32465      0          0          100        0
H9HR2            H9HR2            1       7430       0          0          100        0
M1MR1K1          M1MR1K1          1       98870      0          0          100        0
V1               V1               1       5865       0          0          100        0
V2               V2               1       5840       0          0          100        0
V3               V3               1       1920       0          0          100        0
V4               V4               1       2820       0          0          100        0
V5               V5               1       4520       0          0          100        0
V6               V6               1       1855       0          0          100        0
V7               V7               1       4800       0          0          100        0
V8               V8               1       3100       0          0          100        0
V9               V9               1       4850       0          0          100        0
V10              V10              1       16475      0          0          100        0
```

```
V11VR2           V11VR2           1        20200     0          0          100        0
V12VR1           V12VR1           1        7105      0          0          100        0
V13              V13              1        2945      0          0          100        0
V14              V14              1        7862      0          0          100        0
V15              V15              1        12540     0          0          100        0
V16              V16              1        3300      0          0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
POC-25           0          FREE                        NO

[DIVIDERS]
;;               Invert     Diverted         Divider
;;Name           Elev.      Link             Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
D14              0          to-14            CUTOFF     0.97079    0          0          0          0
D11R2            0          to-11R2          CUTOFF     2.377933   0          0          0          0
D-K1             0          to-K1            CUTOFF     10.27385   0          0          0          0

[STORAGE]
;;               Invert   Max.     Init.    Storage    Curve                       Ponded   Evap.
;;Name           Elev.    Depth    Depth    Curve      Params                      Area     Frac.    Infiltration Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- -----------------------
Basin14          0        8        0        TABULAR    Basin14                     19705    1
B-11R2           0        4        0        TABULAR    B-11R2                      26225    1
B-K1             0        8        0        TABULAR    B-K1                        154700   1

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
to-14            D14              Basin14          10         0.01       0          0          0          0
By-14            D14              POC-25           10         0.01       0          0          0          0
By-11R2          D11R2            POC-25           10         0.01       0          0          0          0
to-11R2          D11R2            B-11R2           10         0.01       0          0          0          0
By-K1            D-K1             POC-25           10         0.01       0          0          0          0
to-K1            D-K1             B-K1             10         0.01       0          0          0          0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet          Qcoeff/                     Flap
;;Name           Node             Node             Height     Type            QTable           Qexpon     Gate
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- ----
Out14            Basin14          POC-25           0          TABULAR/HEAD    Out14                       NO
O-11R2           B-11R2           POC-25           0          TABULAR/HEAD    O-11R2                      NO
Out-K1           B-K1             POC-25           0          TABULAR/HEAD    Out-K1                      NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
to-14            DUMMY        0                0          0          0          1
By-14            DUMMY        0                0          0          0          1
By-11R2          DUMMY        0                0          0          0          1
to-11R2          DUMMY        0                0          0          0          1
By-K1            DUMMY        0                0          0          0          1
to-K1            DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Out-K1           Rating     0.000      0.000
Out-K1                      0.125      0.822
Out-K1                      0.250      2.325
Out-K1                      0.375      4.271
Out-K1                      0.500      6.576
Out-K1                      0.625      8.993
Out-K1                      0.750      10.384
Out-K1                      0.875      11.610
Out-K1                      1.000      12.718
Out-K1                      1.125      13.737
Out-K1                      1.250      14.686
Out-K1                      1.375      15.577
Out-K1                      1.500      16.419
Out-K1                      1.625      17.220
Out-K1                      1.750      17.986
```

Out-K1		1.875	18.721
Out-K1		2.000	19.427
Out-K1		2.125	20.109
Out-K1		2.250	20.769
Out-K1		2.375	21.408
Out-K1		2.500	22.029
Out-K1		2.625	22.632
Out-K1		2.750	23.220
Out-K1		2.875	23.794
Out-K1		3.000	24.353
Out-K1		3.125	24.901
Out-K1		3.250	25.436
Out-K1		3.375	25.961
Out-K1		3.500	26.475
Out-K1		3.625	26.979
Out-K1		3.750	27.474
Out-K1		3.875	27.961
Out-K1		4.000	28.439
Out-K1		4.125	28.909
Out-K1		4.250	29.371
Out-K1		4.375	29.827
Out-K1		4.500	30.275
Out-K1		4.625	30.717
Out-K1		4.750	31.153
Out-K1		4.875	31.583
Out-K1		5.000	32.007
Out-K1		5.125	32.425
Out-K1		5.250	32.838
Out-K1		5.375	33.246
Out-K1		5.500	33.649
Out-K1		5.625	34.047
Out-K1		5.750	34.441
Out-K1		5.875	34.830
Out-K1		6.000	35.215
Out-K1		6.125	38.335
Out-K1		6.250	43.722
Out-K1		6.375	50.582
Out-K1		6.500	58.634
Out-K1		6.625	67.713
Out-K1		6.750	77.711
Out-K1		6.875	88.545
Out-K1		7.000	100.154
Out-K1		7.125	112.486
Out-K1		7.250	125.501
Out-K1		7.375	139.163
Out-K1		7.500	153.443
Out-K1		7.625	168.312
Out-K1		7.750	183.749
Out-K1		7.875	199.733
Out-K1		8.000	216.244
O-11R2	Rating	0.000	0.000
O-11R2		0.083	0.261
O-11R2		0.167	0.738
O-11R2		0.250	1.356
O-11R2		0.333	2.088
O-11R2		0.417	2.856
O-11R2		0.500	3.297
O-11R2		0.583	3.686
O-11R2		0.667	4.038
O-11R2		0.750	4.362
O-11R2		0.833	4.663
O-11R2		0.917	4.946
O-11R2		1.000	5.213
O-11R2		1.083	5.468
O-11R2		1.167	5.711
O-11R2		1.250	5.944
O-11R2		1.333	6.169
O-11R2		1.417	6.385
O-11R2		1.500	6.595
O-11R2		1.583	6.798
O-11R2		1.667	6.995
O-11R2		1.750	7.186
O-11R2		1.833	7.373
O-11R2		1.917	7.555
O-11R2		2.000	7.733
O-11R2		2.083	7.907

O-11R2		2.167	8.077
O-11R2		2.250	8.243
O-11R2		2.333	8.407
O-11R2		2.417	8.567
O-11R2		2.500	8.724
O-11R2		2.583	9.773
O-11R2		2.667	11.561
O-11R2		2.750	13.829
O-11R2		2.833	16.485
O-11R2		2.917	19.476
O-11R2		3.000	22.765
O-11R2		3.083	26.327
O-11R2		3.167	30.141
O-11R2		3.250	34.190
O-11R2		3.333	38.462
O-11R2		3.417	42.944
O-11R2		3.500	47.627
O-11R2		3.583	52.502
O-11R2		3.667	57.562
O-11R2		3.750	62.800
O-11R2		3.833	68.209
O-11R2		3.917	73.785
O-11R2		4.000	79.522

Out14	Rating	0.000	0.000
Out14		0.083	0.099
Out14		0.167	0.281
Out14		0.250	0.517
Out14		0.333	0.745
Out14		0.417	0.881
Out14		0.500	0.999
Out14		0.583	1.105
Out14		0.667	1.201
Out14		0.750	1.290
Out14		0.833	1.373
Out14		0.917	1.452
Out14		1.000	1.526
Out14		1.083	1.597
Out14		1.167	1.665
Out14		1.250	1.731
Out14		1.333	1.794
Out14		1.417	1.854
Out14		1.500	1.913
Out14		1.583	1.971
Out14		1.667	2.026
Out14		1.750	2.080
Out14		1.833	2.133
Out14		1.917	2.184
Out14		2.000	2.234
Out14		2.083	2.283
Out14		2.167	2.332
Out14		2.250	2.379
Out14		2.333	2.425
Out14		2.417	2.470
Out14		2.500	2.515
Out14		2.583	2.558
Out14		2.667	2.601
Out14		2.750	2.644
Out14		2.833	2.685
Out14		2.917	2.726
Out14		3.000	2.767
Out14		3.083	2.807
Out14		3.167	2.846
Out14		3.250	2.885
Out14		3.333	2.923
Out14		3.417	2.960
Out14		3.500	2.998
Out14		3.583	3.034
Out14		3.667	3.071
Out14		3.750	3.107
Out14		3.833	3.142
Out14		3.917	3.177
Out14		4.000	3.212
Out14		4.083	3.246
Out14		4.167	3.280
Out14		4.250	3.314
Out14		4.333	3.347

Out14		4.417	3.380
Out14		4.500	3.413
Out14		4.583	3.445
Out14		4.667	3.477
Out14		4.750	3.509
Out14		4.833	3.541
Out14		4.917	3.572
Out14		5.000	3.603
Out14		5.083	3.633
Out14		5.167	3.664
Out14		5.250	3.694
Out14		5.333	3.724
Out14		5.417	3.754
Out14		5.500	3.783
Out14		5.583	3.812
Out14		5.667	3.841
Out14		5.750	3.870
Out14		5.833	3.899
Out14		5.917	3.927
Out14		6.000	3.955
Out14		6.083	4.580
Out14		6.167	5.698
Out14		6.250	7.138
Out14		6.333	8.838
Out14		6.417	10.763
Out14		6.500	12.888
Out14		6.583	15.196
Out14		6.667	17.673
Out14		6.750	20.308
Out14		6.833	23.092
Out14		6.917	26.018
Out14		7.000	29.078
Out14		7.083	32.268
Out14		7.167	35.582
Out14		7.250	39.015
Out14		7.333	42.563
Out14		7.417	46.223
Out14		7.500	49.992
Out14		7.583	53.866
Out14		7.667	57.842
Out14		7.750	61.919
Out14		7.833	66.092
Out14		7.917	70.362
Out14		8.000	74.724

B-K1	Storage	0.00	107009
B-K1		0.25	108583
B-K1		0.50	110151
B-K1		0.75	111714
B-K1		1.00	113272
B-K1		1.25	114824
B-K1		1.50	116371
B-K1		1.75	117913
B-K1		2.00	119449
B-K1		2.25	120980
B-K1		2.50	122505
B-K1		2.75	124025
B-K1		3.00	125540
B-K1		3.25	127049
B-K1		3.50	128553
B-K1		3.75	130051
B-K1		4.00	131544
B-K1		4.25	133032
B-K1		4.50	134514
B-K1		4.75	135991
B-K1		5.00	137462
B-K1		5.25	138929
B-K1		5.50	140389
B-K1		5.75	141845
B-K1		6.00	143294
B-K1		6.25	144739
B-K1		6.50	146178
B-K1		6.75	147612
B-K1		7.00	149040
B-K1		7.25	150463
B-K1		7.50	151881
B-K1		7.75	153293

```
B-K1                         8.00       154700

B-11R2           Storage     0.00       21405
B-11R2                       0.25       21706
B-11R2                       0.50       22008
B-11R2                       0.75       22309
B-11R2                       1.00       22610
B-11R2                       1.25       22911
B-11R2                       1.50       23213
B-11R2                       1.75       23514
B-11R2                       2.00       23815
B-11R2                       2.25       24116
B-11R2                       2.50       24418
B-11R2                       2.75       24719
B-11R2                       3.00       25020
B-11R2                       3.25       25321
B-11R2                       3.50       25623
B-11R2                       3.75       25924
B-11R2                       4.00       26225

Basin14          Storage     0.00       9847
Basin14                      0.25       10100
Basin14                      0.50       10355
Basin14                      0.75       10611
Basin14                      1.00       10868
Basin14                      1.25       11126
Basin14                      1.50       11385
Basin14                      1.75       11645
Basin14                      2.00       11907
Basin14                      2.25       12170
Basin14                      2.50       12434
Basin14                      2.75       12699
Basin14                      3.00       12965
Basin14                      3.25       13232
Basin14                      3.50       13501
Basin14                      3.75       13771
Basin14                      4.00       14042
Basin14                      4.25       14314
Basin14                      4.50       14587
Basin14                      4.75       14861
Basin14                      5.00       15137
Basin14                      5.25       15414
Basin14                      5.50       15692
Basin14                      5.75       15971
Basin14                      6.00       16251
Basin14                      6.25       16532
Basin14                      6.50       16815
Basin14                      6.75       17099
Basin14                      7.00       17384
Basin14                      7.25       17670
Basin14                      7.50       17957
Basin14                      7.75       18245
Basin14                      8.00       18535

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LAKE_WHOL        FILE "L-Wohlf.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 650.000 2800.000 8350.000 7200.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-25           4500.000           5000.000
D14              7000.000           4400.000
```

```
D11R2            7000.000           5540.000
D-K1             2000.000           4700.000
Basin14          7000.000           4000.000
B-11R2           6500.000           6000.000
B-K1             2500.000           4350.000

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
By-14            4482.176           4984.722

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
H1-D-S           2500.000           3000.000
H2-D-S           3000.000           3000.000
H4-D-S           3500.000           3000.000
H5-D-S           4000.000           3000.000
H6-D-S           4500.000           3000.000
H7-D-S           5000.000           3000.000
H8-D-S           1000.000           3500.000
HR1-D-S          1000.000           4000.000
H9-D-S           1000.000           4500.000
HR2-D-S          1000.000           5000.000
M1-D-S           1000.000           3000.000
K1-D-S           1500.000           3000.000
MR1-D-S          2000.000           3000.000
V1-D-S           2500.000           7000.000
V2-B-S           1000.000           7000.000
V2-C-S           1500.000           7000.000
V2-D-S           2000.000           7000.000
V3-B-S           3000.000           7000.000
V3-D-S           3500.000           7000.000
V4-C-S           8000.000           6000.000
V4-D-S           7500.000           5500.000
V5-C-S           4000.000           7000.000
V6-C-S           7000.000           3500.000
V7-B-S           5000.000           7000.000
V7-C-S           5500.000           7000.000
V7-D-S           5500.000           6500.000
V8-C-S           6000.000           7000.000
V8-D-S           6500.000           7000.000
V9-B-S           1000.000           6500.000
V9-C-S           1000.000           6000.000
V9-D-S           1000.000           5500.000
V10-C-S          7500.000           5000.000
V10-D-S          8000.000           5500.000
V11-B-S          7000.000           7000.000
V11-C-S          7500.000           7000.000
V11-D-S          8000.000           7000.000
VR2-B-S          8000.000           6500.000
VR2-C-S          6500.000           6500.000
V12-B-S          8000.000           5000.000
VR1-B-S          8000.000           4500.000
VR1-C-S          8000.000           4000.000
VR1-D-S          8000.000           3500.000
V13-B-S          4333.000           7000.000
V13-D-S          4666.000           7000.000
V14-B-S          7500.000           3000.000
V14-D-S          8000.000           3000.000
V15-B-S          7000.000           3000.000
V15-D-S          6500.000           3000.000
V16-B-S          5500.000           3000.000
V16-D-S          6000.000           3000.000
H1               2500.000           4000.000
H2               3000.000           4000.000
H4               3500.000           4000.000
H5               4000.000           4000.000
H6               4500.000           4000.000
H7               5000.000           4000.000
H8HR1            2000.000           5000.000
H9HR2            2000.000           5300.000
M1MR1K1          2000.000           4000.000
V1               2500.000           6000.000
V2               2000.000           6000.000
V3               3000.000           6000.000
V4               7000.000           5350.000
```

```
V5               4000.000           6000.000
V6               6500.000           4000.000
V7               5000.000           6000.000
V8               6000.000           6000.000
V9               2000.000           5650.000
V10              7000.000           5000.000
V11VR2           7000.000           6000.000
V12VR1           7000.000           4700.000
V13              4500.000           6000.000
V14              7496.991           3747.222
V15              6000.000           4000.000
V16              5500.000           4000.000
OFF-1-B          5500.000           6000.000
OFF-1-D          3500.000           6000.000

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LAKE_WHOL        6600.000           5075.000
```

ATTACHMENT 7

EPA SWMM FIGURES AND EXPLANATIONS

Per the attached, the reader can see the screens associated with the EPA-SWMM Model in both pre-development and post-development conditions. Each portion, i.e., sub-catchments, outfalls, storage units, weir as a discharge, and outfalls (point of compliance), are also shown.

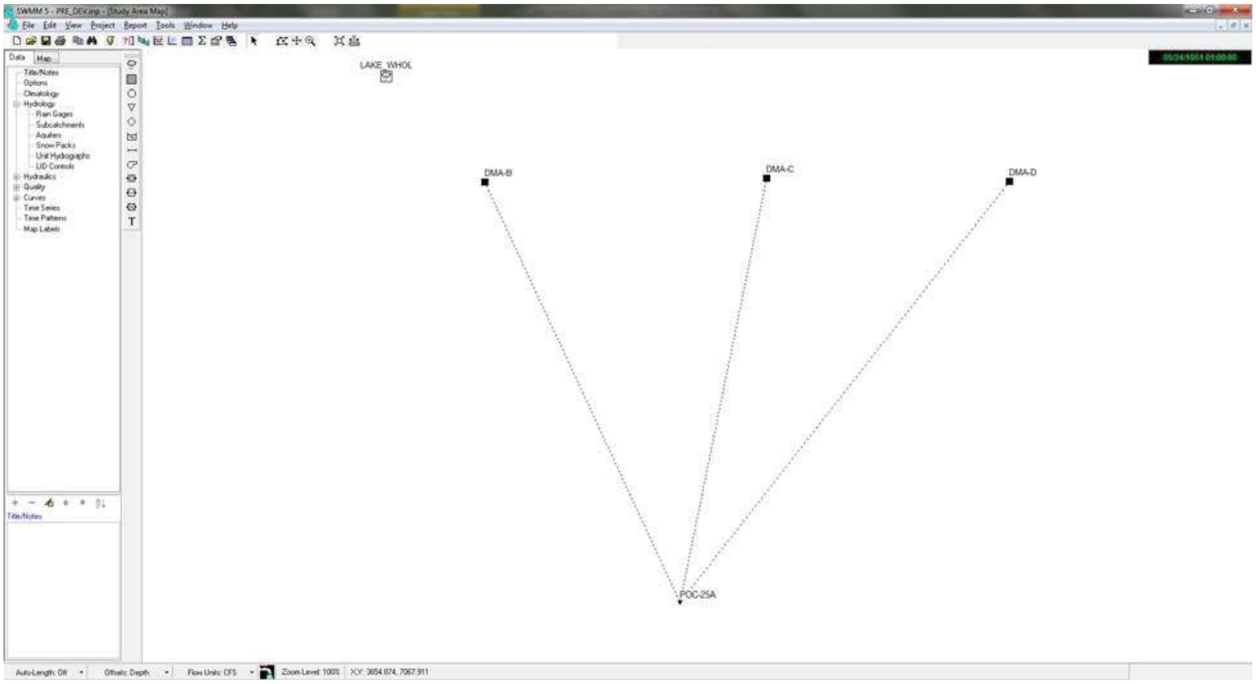
Variables for modeling are associated with typical recommended values by the EPA-SWMM model, typical values found in technical literature (such as Maidment's Handbook of Hydrology). Recommended values for the SWMM model have been attained from the interim Orange County criteria established for their SWMM calibration. Currently, no recommended values have been established by the San Diego County HMP Permit for the SWMM Model.

Soil characteristics of the existing soils were determined from the site specific NRCS Web Soil Survey (located in Attachment 8 of this report).

Some values incorporated within the SWMM model have been determined from the professional experience of REC using conservative assumptions that have a tendency to increase the size of the needed BMP and also generate a long-term runoff as a percentage of rainfall similar to those measured in gage stations in Southern California by the USGS.

A technical document prepared by Tory R Walker Engineering for the Cities of San Marcos, Oceanside and Vista (Reference [1]) can also be consulted for additional information regarding typical values for SWMM parameters.

PRE-DEVELOPED CONDITION



Rain Gage LAKE_WHOL

Property	Value
Name	LAKE_WHOL
X-Coordinate	1525.424
Y-Coordinate	6864.407
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	LAKE_WHOL
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

User-assigned name of rain gage

Outfall POC-25A

Property	Value
Name	POC-25A
X-Coordinate	3762.923
Y-Coordinate	2844.115
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

User-assigned name of outfall

Subcatchment DMA-B

Property	Value
Name	DMA-B
X-Coordinate	2273.231
Y-Coordinate	6063.052
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25A
Area	21.882
Width	510
% Slope	20
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Subcatchment DMA-C

Property	Value
Name	DMA-C
X-Coordinate	4425.929
Y-Coordinate	6092.899
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25A
Area	16.074
Width	437
% Slope	10
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

Infiltration Editor

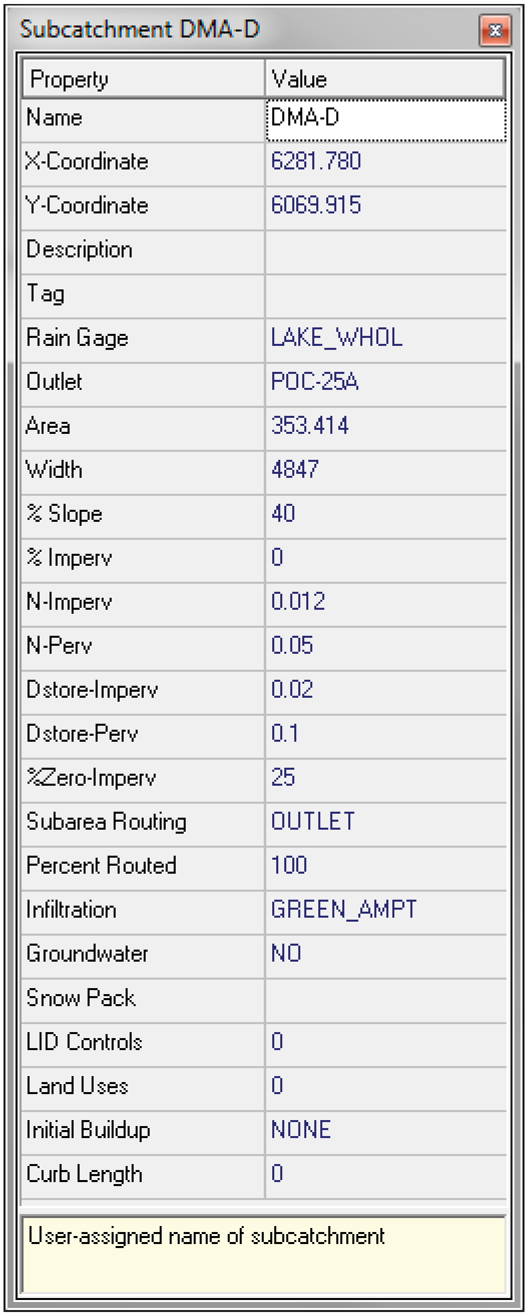
Infiltration Method: GREEN_AMPT

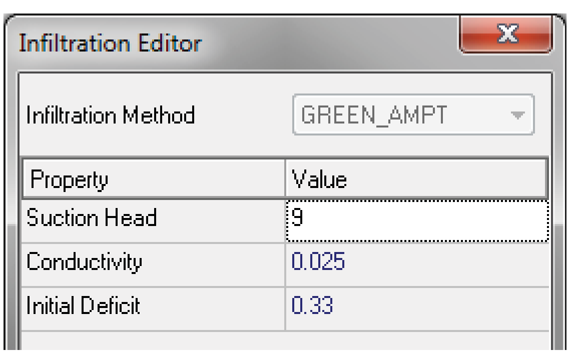
Property	Value
Suction Head	3
Conductivity	0.2
Initial Deficit	0.31

Infiltration Editor

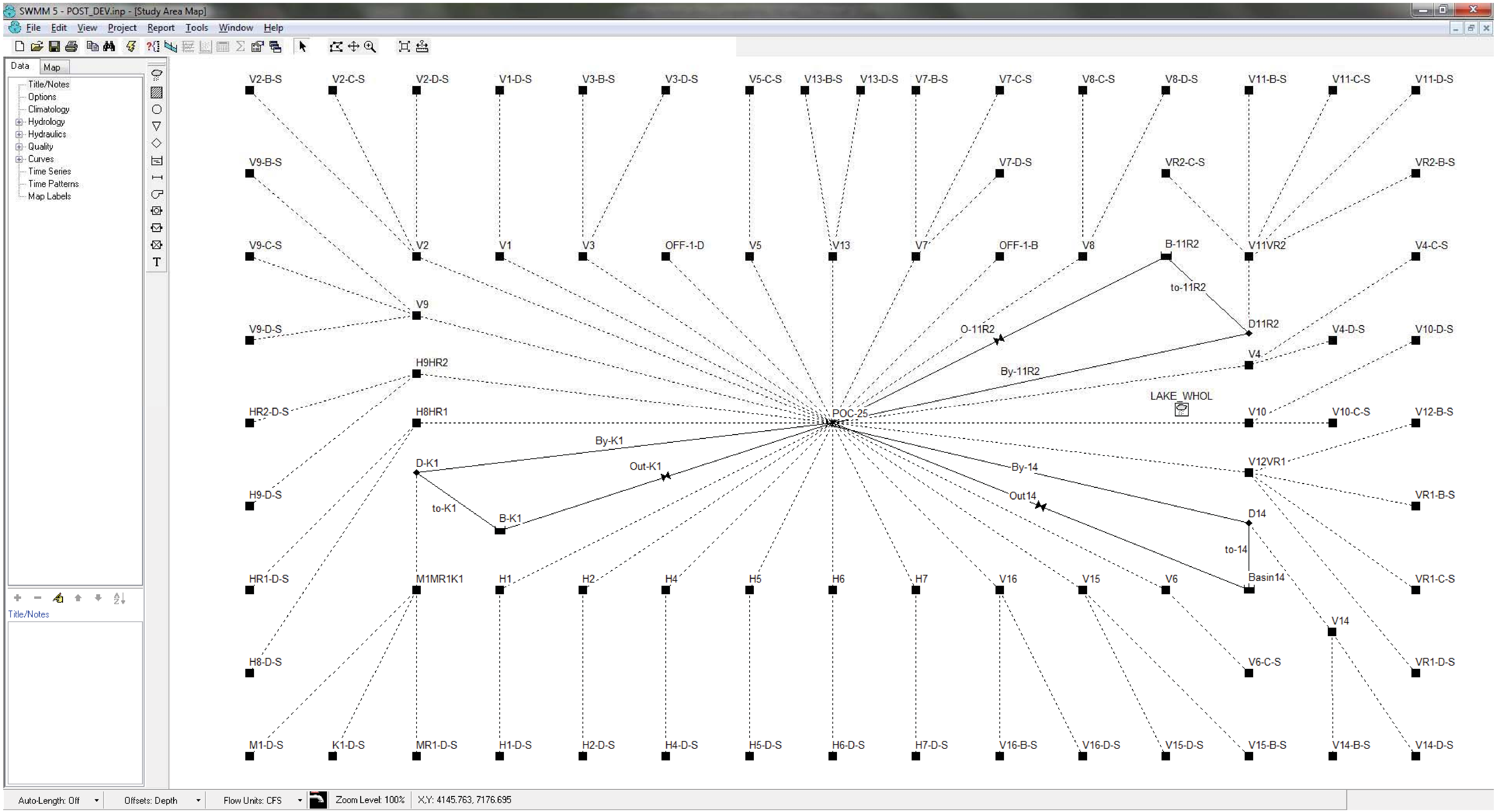
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6
Conductivity	0.1
Initial Deficit	0.32


Subcatchment DMA-D
Property
Value
Name
DMA-D
X-Coordinate
6281.780
Y-Coordinate
6069.915
Description
Tag
Rain Gage
LAKE_WHOL
Outlet
POC-25A
Area
353.414
Width
4847
% Slope
40
% Imperv
0
N-Imperv
0.012
N-Perv
0.05
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
Curb Length
0
User-assigned name of subcatchment


Infiltration Editor
Infiltration Method
GREEN_AMPT
Property
Value
Suction Head
9
Conductivity
0.025
Initial Deficit
0.33

POST-DEVELOPED CONDITION



Rain Gage LAKE_WHOL

Property	Value
Name	LAKE_WHOL
X-Coordinate	6600.000
Y-Coordinate	5075.000
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	LAKE_WHOL
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

User-assigned name of rain gage

Outfall POC-25

Property	Value
Name	POC-25
X-Coordinate	4500.000
Y-Coordinate	5000.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

User-assigned name of outfall

Subcatchment H1-D-S

Property	Value
Name	H1-D-S
X-Coordinate	2500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H1
Area	1.523
Width	439
% Slope	1.5
% Imperv	67.08
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H2-D-S

Property	Value
Name	H2-D-S
X-Coordinate	3000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H2
Area	0.429
Width	103
% Slope	1.4
% Imperv	67.27
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H4-D-S

Property	Value
Name	H4-D-S
X-Coordinate	3500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H4
Area	0.665
Width	115
% Slope	1.2
% Imperv	67.13
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H5-D-S

Property	Value
Name	H5-D-S
X-Coordinate	4000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H5
Area	0.637
Width	113
% Slope	1.3
% Imperv	67.37
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H6-D-S

Property	Value
Name	H6-D-S
X-Coordinate	4500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H6
Area	0.615
Width	111
% Slope	1.4
% Imperv	67.09
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H7-D-S

Property	Value
Name	H7-D-S
X-Coordinate	5000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H7
Area	0.541
Width	114
% Slope	1.4
% Imperv	67.11
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H8-D-S

Property	Value
Name	H8-D-S
X-Coordinate	1000.000
Y-Coordinate	3500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H8HR1
Area	18.138
Width	707
% Slope	1.5
% Imperv	65.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment HR1-D-S

Property	Value
Name	HR1-D-S
X-Coordinate	1000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H8HR1
Area	4.173
Width	212
% Slope	1.2
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

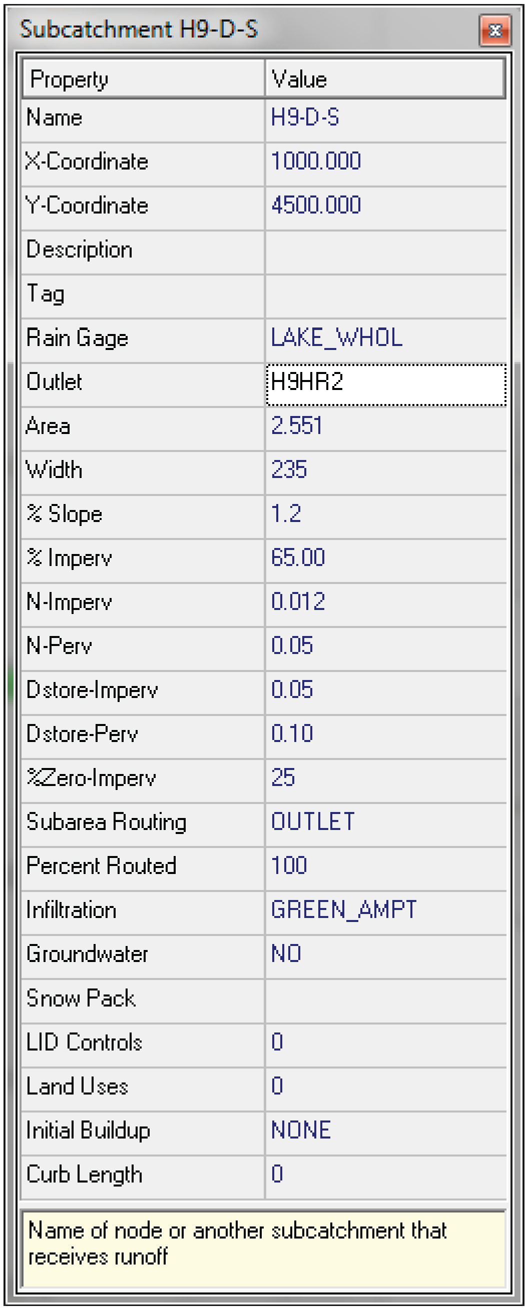
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

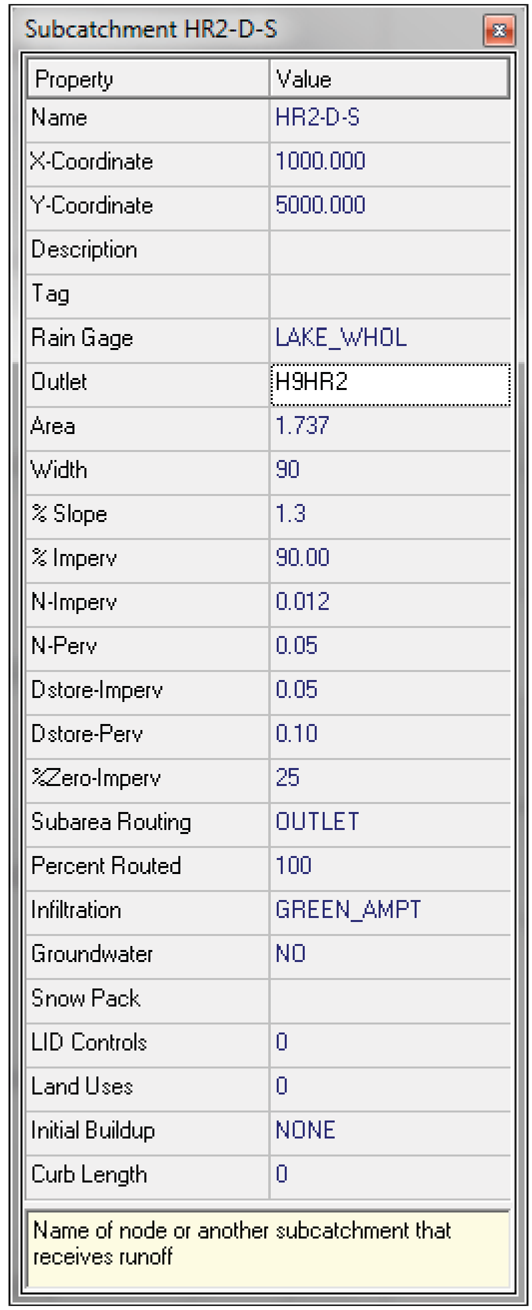
Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33



Subcatchment H9-D-S

Property	Value
Name	H9-D-S
X-Coordinate	1000.000
Y-Coordinate	4500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H9HR2
Area	2.551
Width	235
% Slope	1.2
% Imperv	65.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

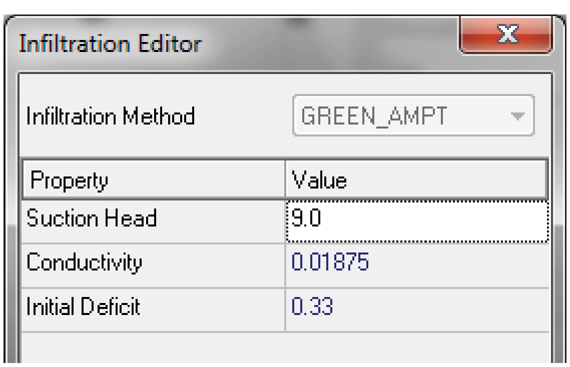
Name of node or another subcatchment that receives runoff



Subcatchment HR2-D-S

Property	Value
Name	HR2-D-S
X-Coordinate	1000.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	H9HR2
Area	1.737
Width	90
% Slope	1.3
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

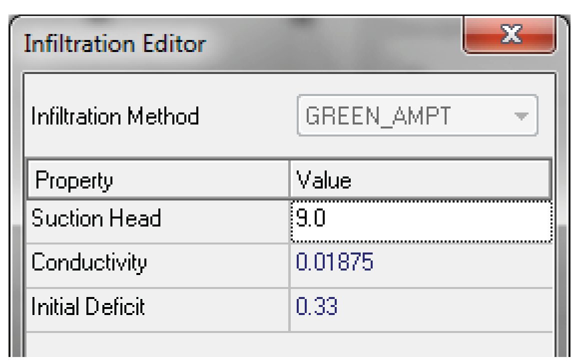
Name of node or another subcatchment that receives runoff



Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33



Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment M1-D-S

Property	Value
Name	M1-D-S
X-Coordinate	1000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	M1MR1K1
Area	39.309
Width	1093
% Slope	1.4
% Imperv	65.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment K1-D-S

Property	Value
Name	K1-D-S
X-Coordinate	1500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	M1MR1K1
Area	4.398
Width	717
% Slope	1.5
% Imperv	74.77
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment MR1-D-S

Property	Value
Name	MR1-D-S
X-Coordinate	2000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	M1MR1K1
Area	4.706
Width	40
% Slope	1.5
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V1-D-S

Property	Value
Name	V1-D-S
X-Coordinate	2500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V1
Area	3.328
Width	213
% Slope	1.2
% Imperv	78.03
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V2-B-S

Property	Value
Name	V2-B-S
X-Coordinate	1000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V2
Area	1.872
Width	211
% Slope	1.3
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V2-C-S

Property	Value
Name	V2-C-S
X-Coordinate	1500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V2
Area	0.100
Width	17
% Slope	1.2
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V2-D-S

Property	Value
Name	V2-D-S
X-Coordinate	2000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V2
Area	1.354
Width	514
% Slope	1.4
% Imperv	82.43
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V3-B-S

Property	Value
Name	V3-B-S
X-Coordinate	3000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V3
Area	0.172
Width	114
% Slope	1.5
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Subcatchment V3-D-S

Property	Value
Name	V3-D-S
X-Coordinate	3500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V3
Area	0.911
Width	170
% Slope	1.3
% Imperv	78.63
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V4-C-S

Property	Value
Name	V4-C-S
X-Coordinate	8000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V4
Area	0.398
Width	280
% Slope	1.3
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V4-D-S

Property	Value
Name	V4-D-S
X-Coordinate	7500.000
Y-Coordinate	5500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V4
Area	1.268
Width	202
% Slope	1.2
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V5-C-S

Property	Value
Name	V5-C-S
X-Coordinate	4000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V5
Area	2.572
Width	226
% Slope	1.5
% Imperv	78.03
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V6-C-S

Property	Value
Name	V6-C-S
X-Coordinate	7000.000
Y-Coordinate	3500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V6
Area	1.053
Width	95
% Slope	1.3
% Imperv	78.04
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V7-B-S

Property	Value
Name	V7-B-S
X-Coordinate	5000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V7
Area	1.977
Width	168
% Slope	1.3
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Subcatchment V7-C-S

Property	Value
Name	V7-C-S
X-Coordinate	5500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V7
Area	0.025
Width	64
% Slope	1.2
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V7-D-S

Property	Value
Name	V7-D-S
X-Coordinate	5500.000
Y-Coordinate	6500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V7
Area	0.725
Width	191
% Slope	1.4
% Imperv	86.40
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V8-C-S

Property	Value
Name	V8-C-S
X-Coordinate	6000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V8
Area	2.418
Width	250
% Slope	1.5
% Imperv	51.47
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V8-D-S

Property	Value
Name	V8-D-S
X-Coordinate	6500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V8
Area	0.092
Width	122
% Slope	1.4
% Imperv	50.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V9-B-S

Property	Value
Name	V9-B-S
X-Coordinate	1000.000
Y-Coordinate	6500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V9
Area	0.329
Width	287
% Slope	1.2
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V9-C-S

Property	Value
Name	V9-C-S
X-Coordinate	1000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V9
Area	2.276
Width	309
% Slope	1.4
% Imperv	78.67
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V9-D-S

Property	Value
Name	V9-D-S
X-Coordinate	1000.000
Y-Coordinate	5500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V9
Area	0.141
Width	198
% Slope	1.5
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V10-C-S

Property	Value
Name	V10-C-S
X-Coordinate	7500.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V10
Area	0.717
Width	96
% Slope	1.2
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V10-D-S

Property	Value
Name	V10-D-S
X-Coordinate	8000.000
Y-Coordinate	5500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V10
Area	8.862
Width	277
% Slope	1.4
% Imperv	78.20
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V11-B-S

Property	Value
Name	V11-B-S
X-Coordinate	7000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V11VR2
Area	3.321
Width	190
% Slope	1.5
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Subcatchment V11-C-S

Property	Value
Name	V11-C-S
X-Coordinate	7500.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V11VR2
Area	6.342
Width	392
% Slope	1.3
% Imperv	80.48
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V11-D-S

Property	Value
Name	V11-D-S
X-Coordinate	8000.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V11VR2
Area	0.128
Width	103
% Slope	1.4
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment VR2-B-S

Property	Value
Name	VR2-B-S
X-Coordinate	8000.000
Y-Coordinate	6500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V11VR2
Area	1.569
Width	80
% Slope	1.2
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment VR2-C-S

Property	Value
Name	VR2-C-S
X-Coordinate	6500.000
Y-Coordinate	6500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V11VR2
Area	0.033
Width	17
% Slope	1.5
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V12-B-S

Property	Value
Name	V12-B-S
X-Coordinate	8000.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V12VR1
Area	0.190
Width	38
% Slope	1.4
% Imperv	92.89
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment VR1-B-S

Property	Value
Name	VR1-B-S
X-Coordinate	8000.000
Y-Coordinate	4500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V12VR1
Area	0.860
Width	90
% Slope	1.3
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Subcatchment VR1-C-S

Property	Value
Name	VR1-C-S
X-Coordinate	8000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V12VR1
Area	0.141
Width	114
% Slope	1.4
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment VR1-D-S

Property	Value
Name	VR1-D-S
X-Coordinate	8000.000
Y-Coordinate	3500.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V12VR1
Area	2.273
Width	70
% Slope	1.5
% Imperv	90.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V13-B-S

Property	Value
Name	V13-B-S
X-Coordinate	4333.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V13
Area	1.887
Width	113
% Slope	1.5
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V13-D-S

Property	Value
Name	V13-D-S
X-Coordinate	4666.000
Y-Coordinate	7000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V13
Area	1.601
Width	156
% Slope	1.5
% Imperv	78.17
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V14-B-S

Property	Value
Name	V14-B-S
X-Coordinate	7500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V14
Area	2.459
Width	230
% Slope	1.3
% Imperv	80.51
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V14-D-S

Property	Value
Name	V14-D-S
X-Coordinate	8000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V14
Area	2.511
Width	209
% Slope	1.3
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V15-B-S

Property	Value
Name	V15-B-S
X-Coordinate	7000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V15
Area	3.984
Width	274
% Slope	1.2
% Imperv	80.42
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V15-D-S

Property	Value
Name	V15-D-S
X-Coordinate	6500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V15
Area	3.314
Width	222
% Slope	1.5
% Imperv	75.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V16-B-S

Property	Value
Name	V16-B-S
X-Coordinate	5500.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V16
Area	2.114
Width	191
% Slope	1.3
% Imperv	51.79
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V16-D-S

Property	Value
Name	V16-D-S
X-Coordinate	6000.000
Y-Coordinate	3000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	V16
Area	0.553
Width	132
% Slope	1.2
% Imperv	50.00
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H1

Property	Value
Name	H1
X-Coordinate	2500.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.04867
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H2

Property	Value
Name	H2
X-Coordinate	3000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.01504
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H4

Property	Value
Name	H4
X-Coordinate	3500.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.02181
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H5

Property	Value
Name	H5
X-Coordinate	4000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.02319
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H6

Property	Value
Name	H6
X-Coordinate	4500.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.01974
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H7

Property	Value
Name	H7
X-Coordinate	5000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.01756
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment H8HR1

Property	Value
Name	H8HR1
X-Coordinate	2000.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.74529
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment H9HR2

Property	Value
Name	H9HR2
X-Coordinate	2000.000
Y-Coordinate	5300.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.17057
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment M1MR1K1

Property	Value
Name	M1MR1K1
X-Coordinate	2000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	D-K1
Area	2.26974
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V1

Property	Value
Name	V1
X-Coordinate	2500.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.13464
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V2

Property	Value
Name	V2
X-Coordinate	2000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.13407
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V3

Property	Value
Name	V3
X-Coordinate	3000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.04408
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V4

Property	Value
Name	V4
X-Coordinate	7000.000
Y-Coordinate	5350.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.06474
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V5

Property	Value
Name	V5
X-Coordinate	4000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.10376
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Subcatchment V6

Property	Value
Name	V6
X-Coordinate	6500.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.04258
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V7

Property	Value
Name	V7
X-Coordinate	5000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.11019
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

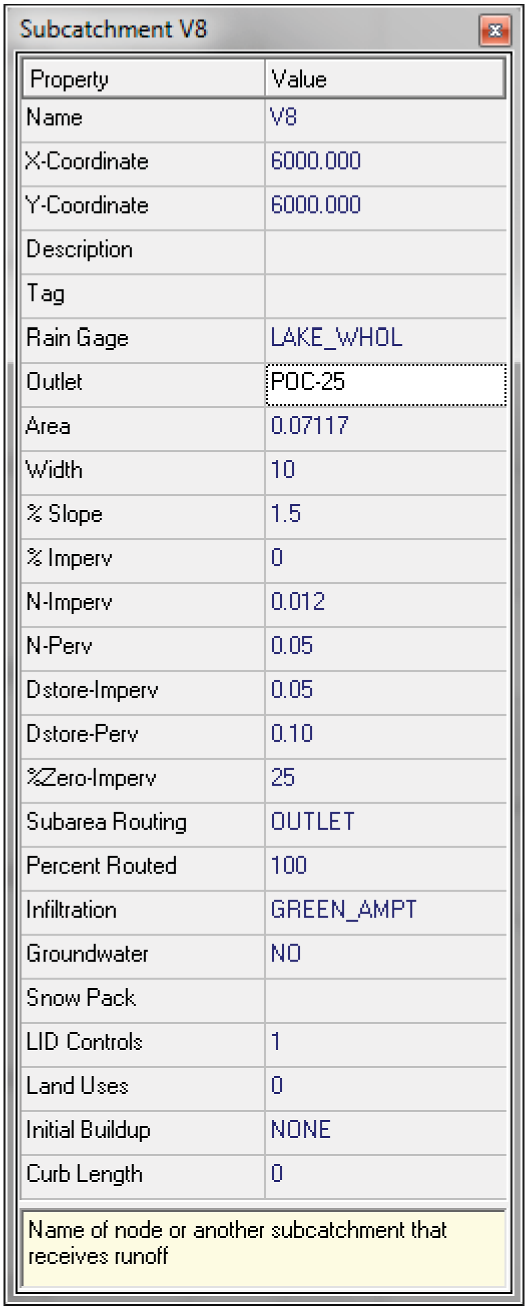
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

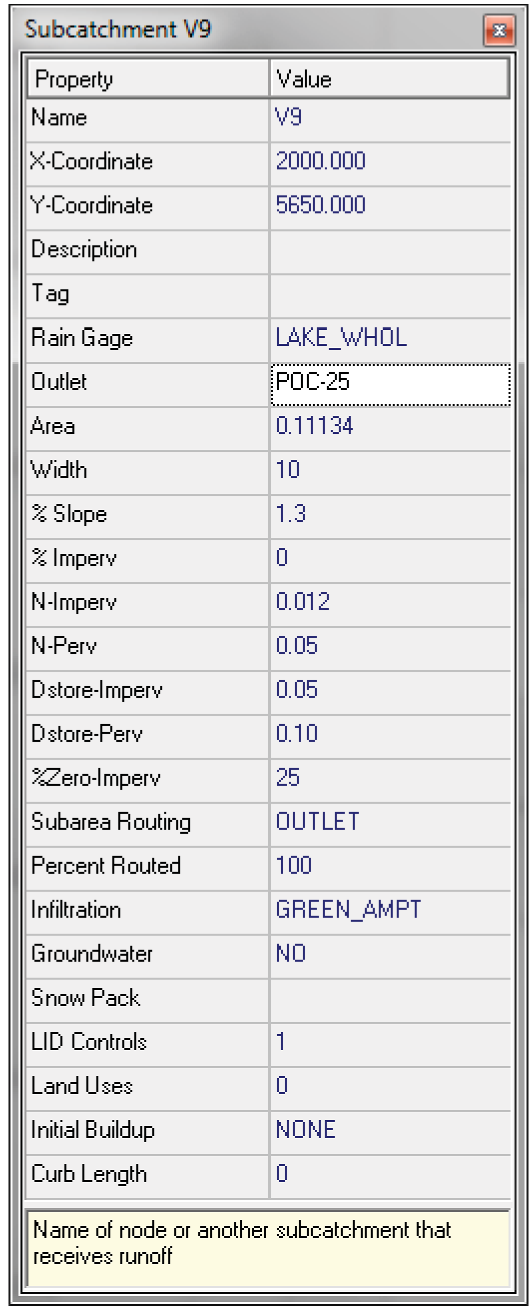
Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33



Subcatchment V8

Property	Value
Name	V8
X-Coordinate	6000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.07117
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

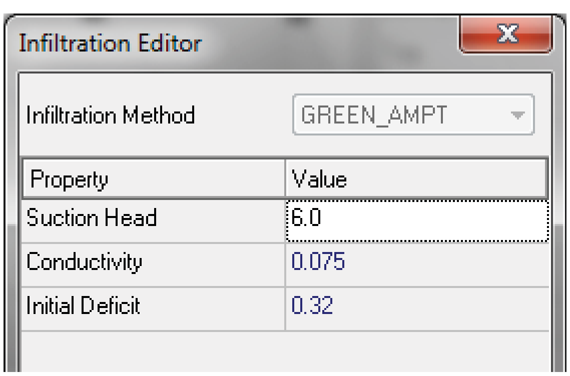
Name of node or another subcatchment that receives runoff



Subcatchment V9

Property	Value
Name	V9
X-Coordinate	2000.000
Y-Coordinate	5650.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.11134
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

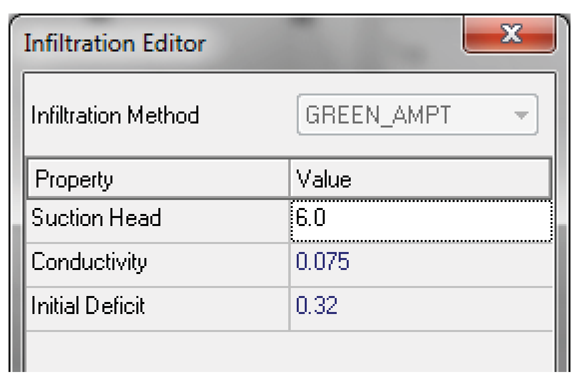
Name of node or another subcatchment that receives runoff



Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32



Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V10

Property	Value
Name	V10
X-Coordinate	7000.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.37821
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V11VR2

Property	Value
Name	V11VR2
X-Coordinate	7000.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	D11R2
Area	0.463728
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	6.0
Conductivity	0.075
Initial Deficit	0.32

Subcatchment V12VR1

Property	Value
Name	V12VR1
X-Coordinate	7000.000
Y-Coordinate	4700.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.16311
Width	10
% Slope	1.3
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V13

Property	Value
Name	V13
X-Coordinate	4500.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.06761
Width	10
% Slope	1.2
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9.0
Conductivity	0.01875
Initial Deficit	0.33

Subcatchment V14

Property	Value
Name	V14
X-Coordinate	7496.991
Y-Coordinate	3747.222
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	D14
Area	0.180487
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Subcatchment V15

Property	Value
Name	V15
X-Coordinate	6000.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.28788
Width	10
% Slope	1.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Name of node or another subcatchment that receives runoff

Infiltration Editor

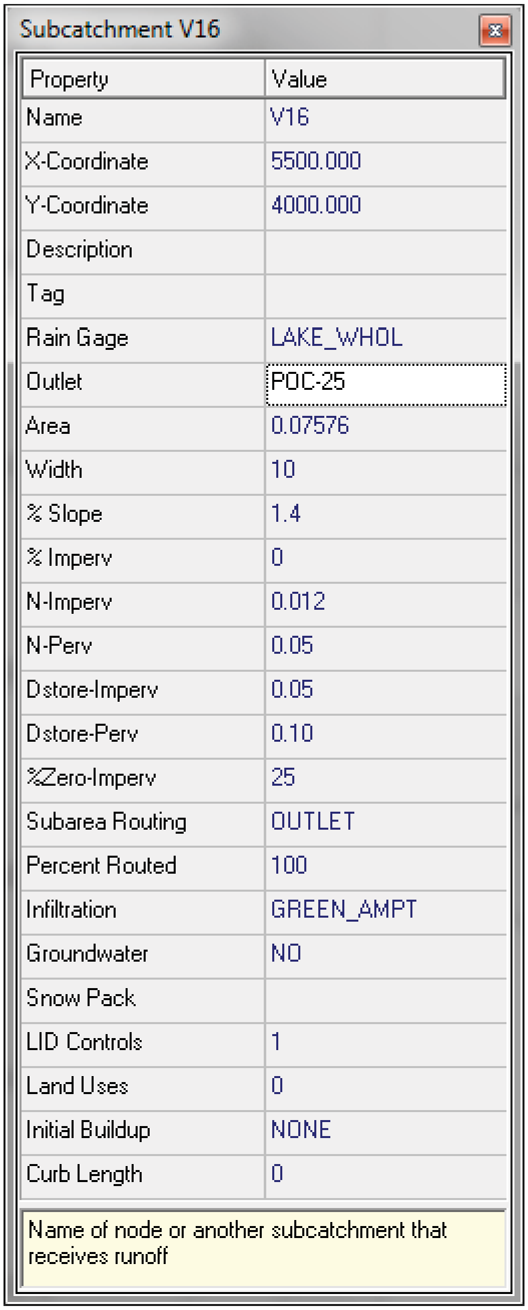
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

Infiltration Editor

Infiltration Method: GREEN_AMPT

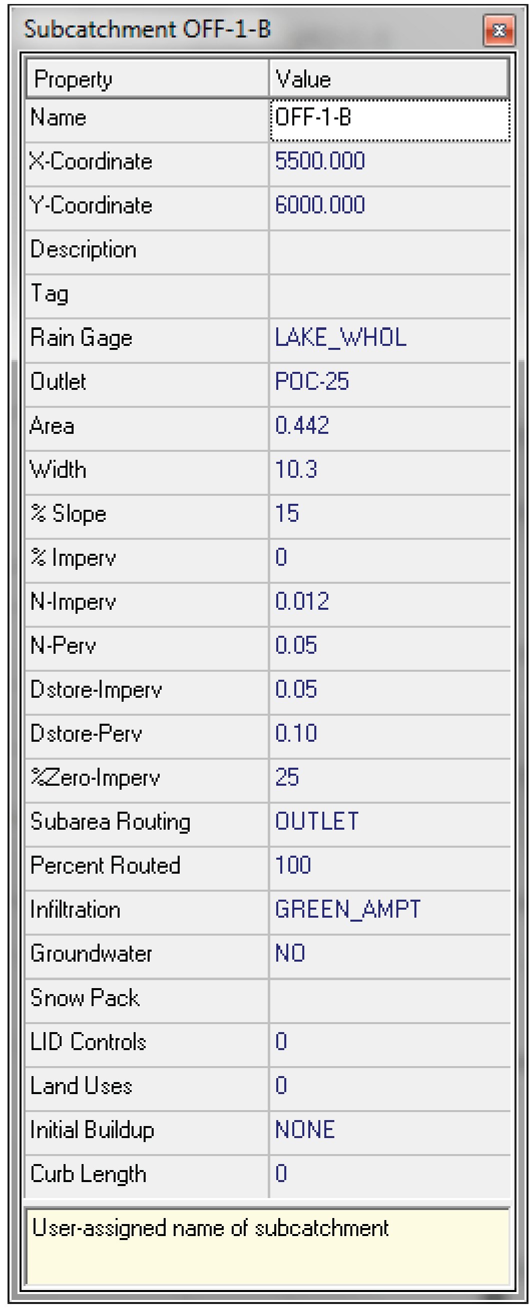
Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31



Subcatchment V16

Property	Value
Name	V16
X-Coordinate	5500.000
Y-Coordinate	4000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.07576
Width	10
% Slope	1.4
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

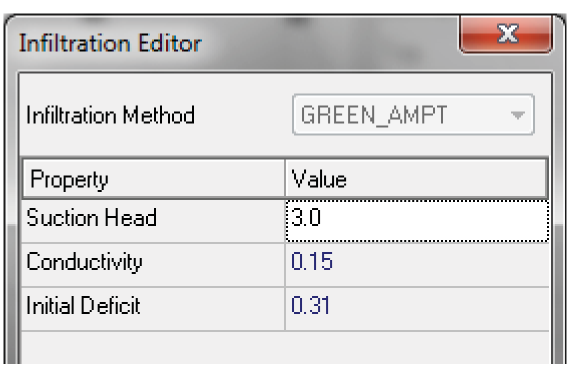
Name of node or another subcatchment that receives runoff



Subcatchment OFF-1-B

Property	Value
Name	OFF-1-B
X-Coordinate	5500.000
Y-Coordinate	6000.000
Description	
Tag	
Rain Gage	LAKE_WHOL
Outlet	POC-25
Area	0.442
Width	10.3
% Slope	15
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.05
Dstore-Perv	0.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

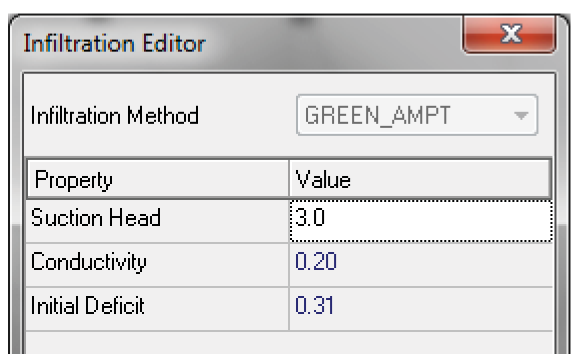
User-assigned name of subcatchment



Infiltration Editor

Infiltration Method: GREEN_AMPT

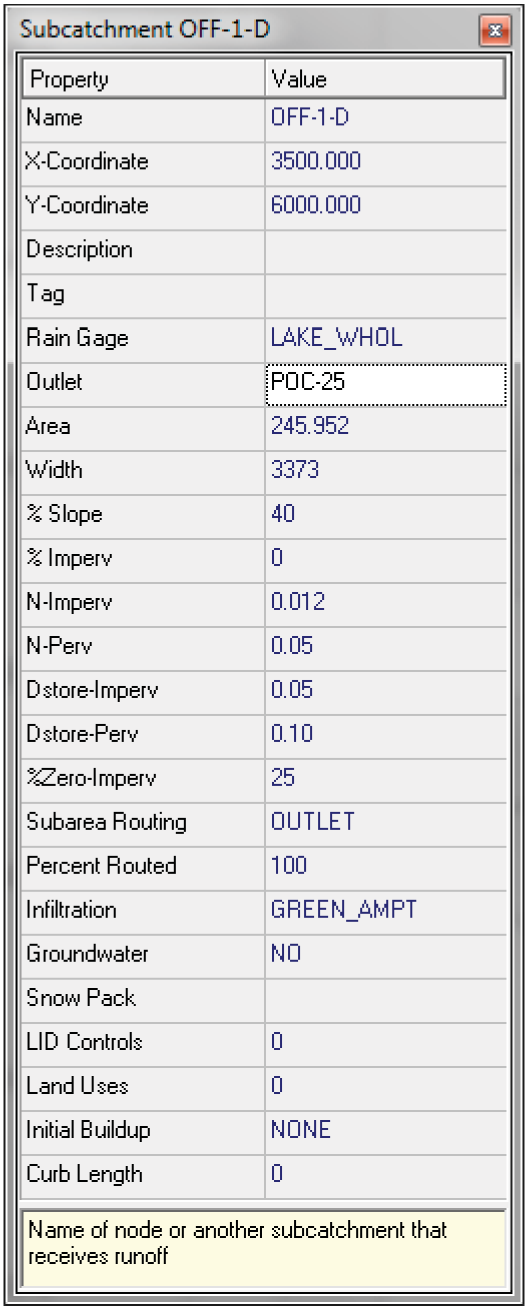
Property	Value
Suction Head	3.0
Conductivity	0.15
Initial Deficit	0.31

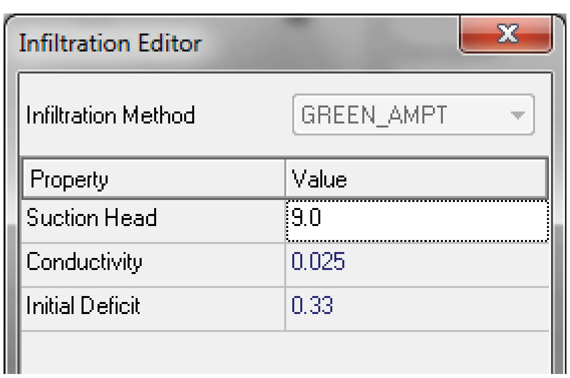


Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	3.0
Conductivity	0.20
Initial Deficit	0.31


Subcatchment OFF-1-D
Property | Value
Name | OFF-1-D
X-Coordinate | 3500.000
Y-Coordinate | 6000.000
Description
Tag
Rain Gage | LAKE_WHOL
Outlet | POC-25
Area | 245.952
Width | 3373
% Slope | 40
% Imperv | 0
N-Imperv | 0.012
N-Perv | 0.05
Dstore-Imperv | 0.05
Dstore-Perv | 0.10
%Zero-Imperv | 25
Subarea Routing | OUTLET
Percent Routed | 100
Infiltration | GREEN_AMPT
Groundwater | NO
Snow Pack
LID Controls | 0
Land Uses | 0
Initial Buildup | NONE
Curb Length | 0
Name of node or another subcatchment that receives runoff


Infiltration Editor
Infiltration Method | GREEN_AMPT
Property | Value
Suction Head | 9.0
Conductivity | 0.025
Initial Deficit | 0.33

EXPLANATION OF SELECTED VARIABLES

Sub-Catchment Areas:

Please refer to the attached diagrams that indicate the DMA and Bio-Retention BMP (BMP) sub areas modeled within the project site at both the pre and post developed conditions draining to the POC.

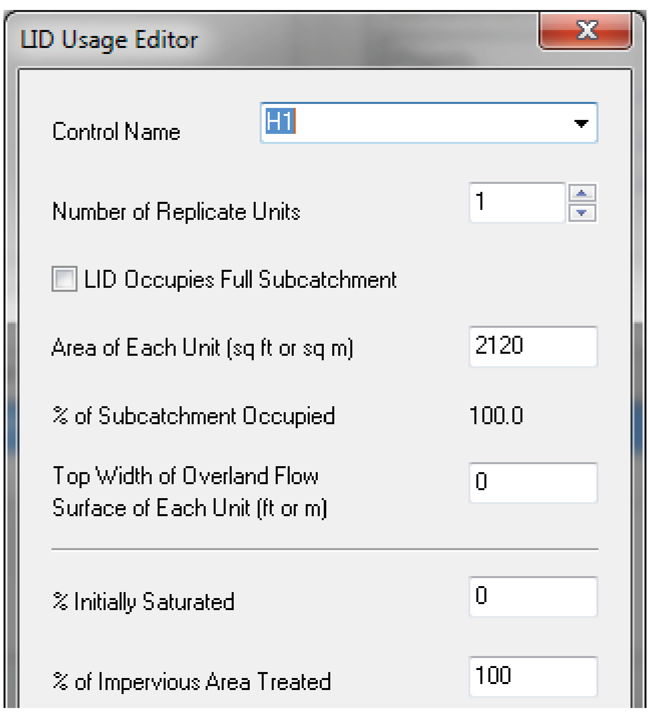
Parameters for the pre- and post-developed models include soils type B, C, and D as determined from the site specific Natural Resources Conservation Service (NRCS) (attached at the end of this appendix). Suction head, conductivity and initial deficit corresponds to average values expected for these soils types, according to sources consulted, professional experience, and approximate values obtained by the interim Orange County modeling approach.

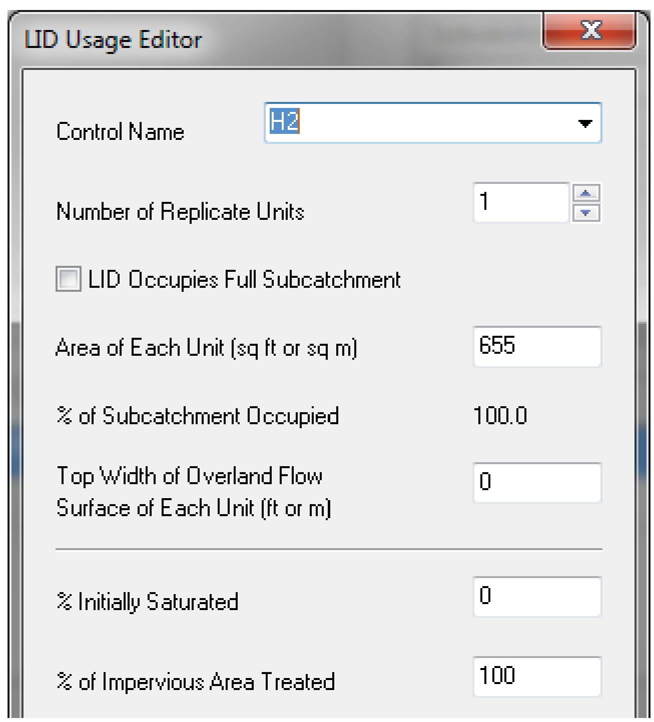
REC selected infiltration values, such that the percentage of total precipitation that becomes runoff is realistic for the soil types and slightly smaller than measured values for Southern California watersheds.

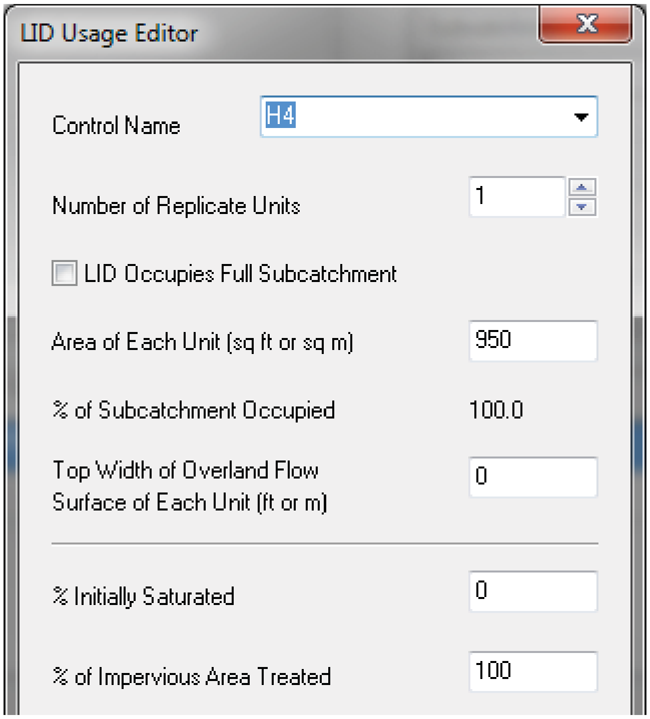
Selection of a Kinematic Approach: As the continuous model is based on hourly rainfall, and the time of concentration for the pre-development and post-development conditions is significantly smaller than 60 minutes, precise routing of the flows through the impervious surfaces, the underdrain pipe system, and the discharge pipe was considered unnecessary. The truncation error of the precipitation into hourly steps is much more significant than the precise routing in a system where the time of concentration is much smaller than 1 hour.

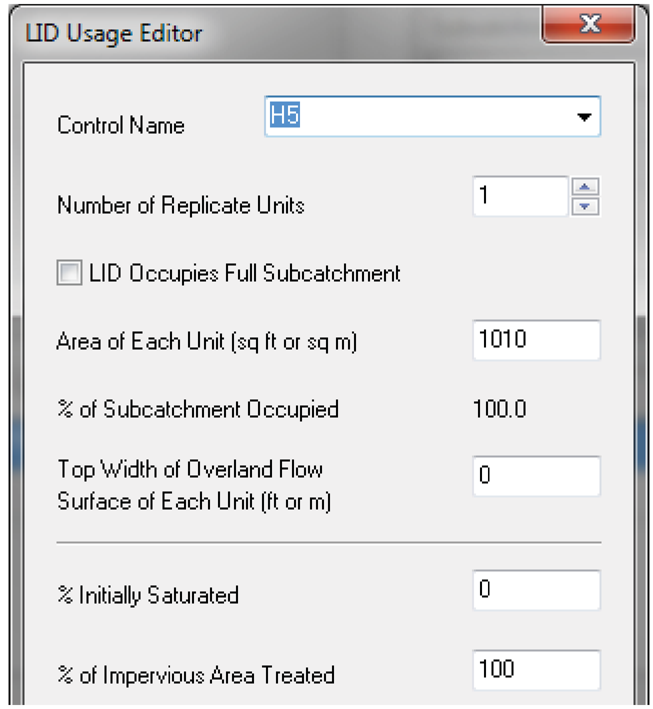
Sub-Catchment BMP:

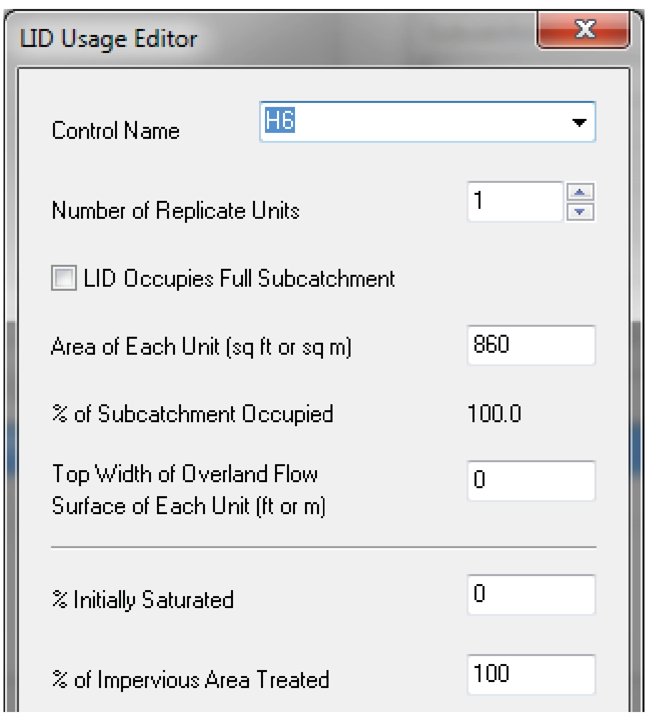
The area of bio-filtration must be equal to the area of the development tributary to the bioretention facility (area that drains into the biofiltration, equal external area plus bio-filtration itself). Five (5) decimal places were given regarding the areas of the bio-filtration to insure that the area used by the program for the LID subroutine corresponds exactly with this tributary.

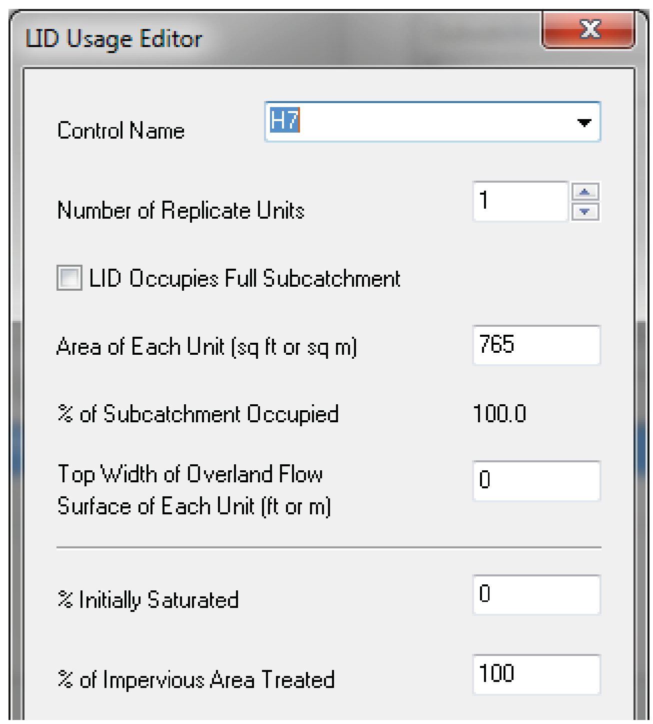


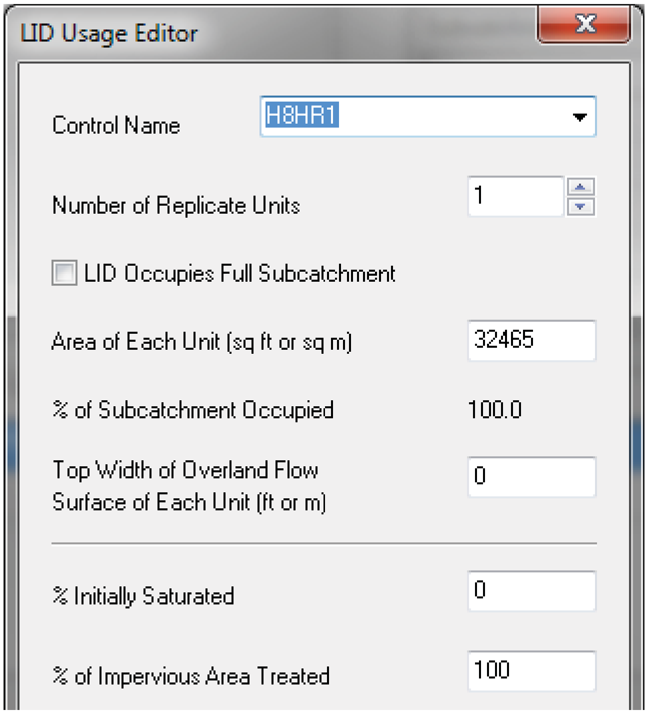


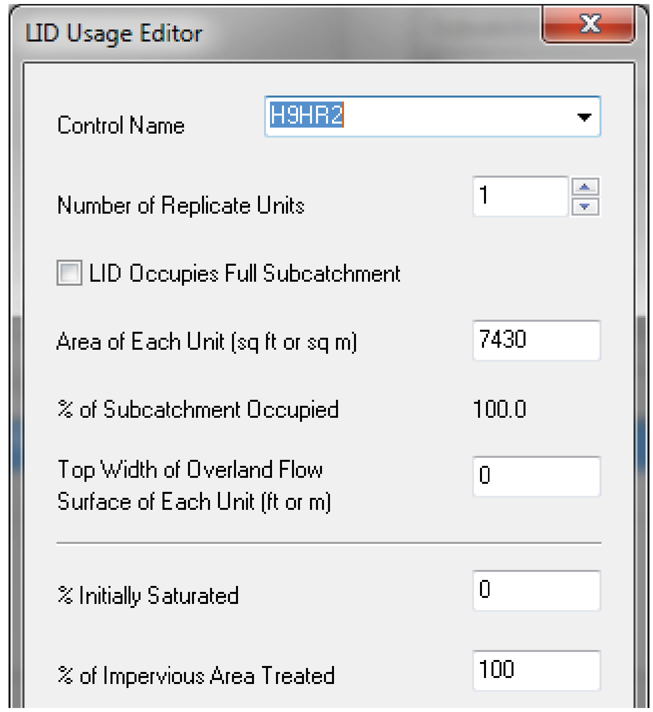

LID Usage Editor
Control Name
H4
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
950
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

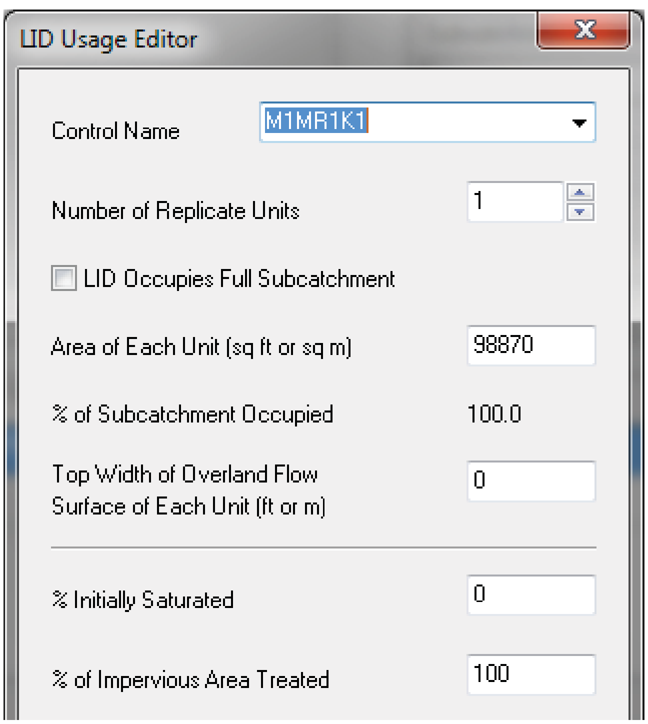

LID Usage Editor
Control Name
H5
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
1010
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

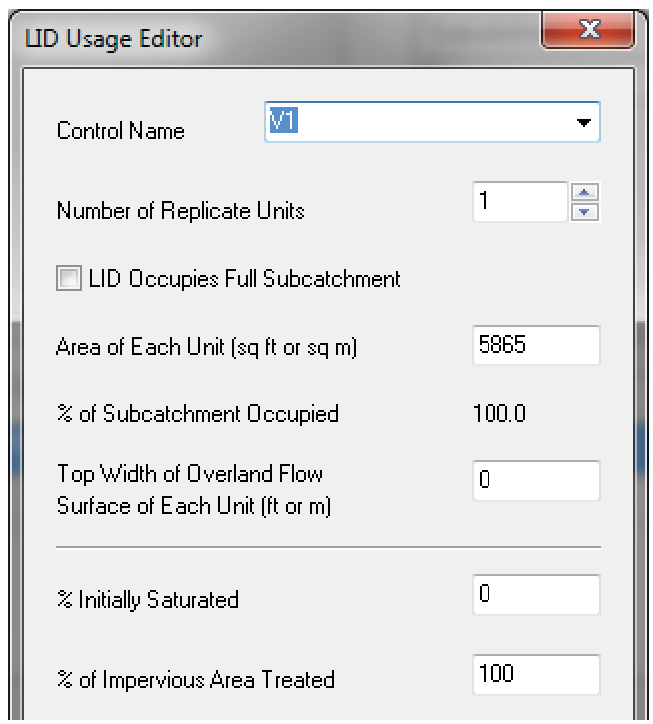

LID Usage Editor
Control Name
H6
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
860
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

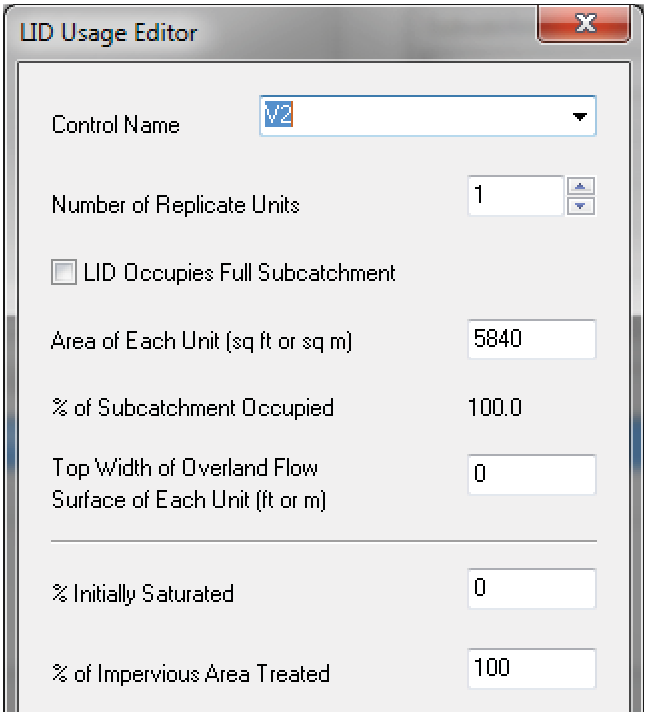

LID Usage Editor
Control Name
H7
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
765
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

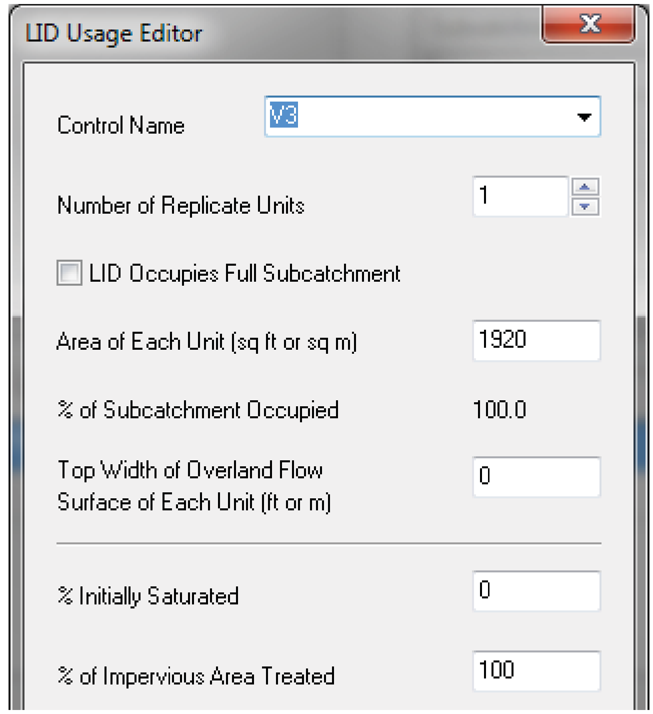

LID Usage Editor
Control Name
H8HR1
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
32465
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

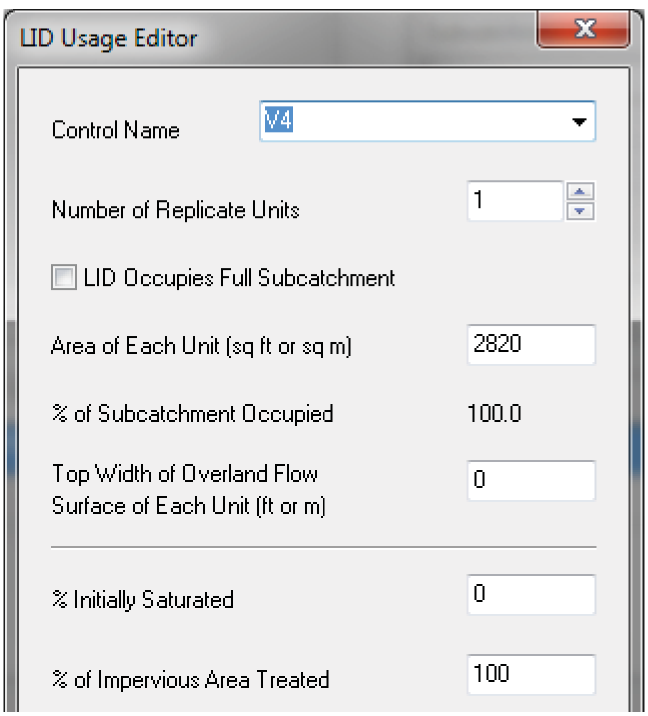

LID Usage Editor
Control Name
H9HR2
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
7430
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

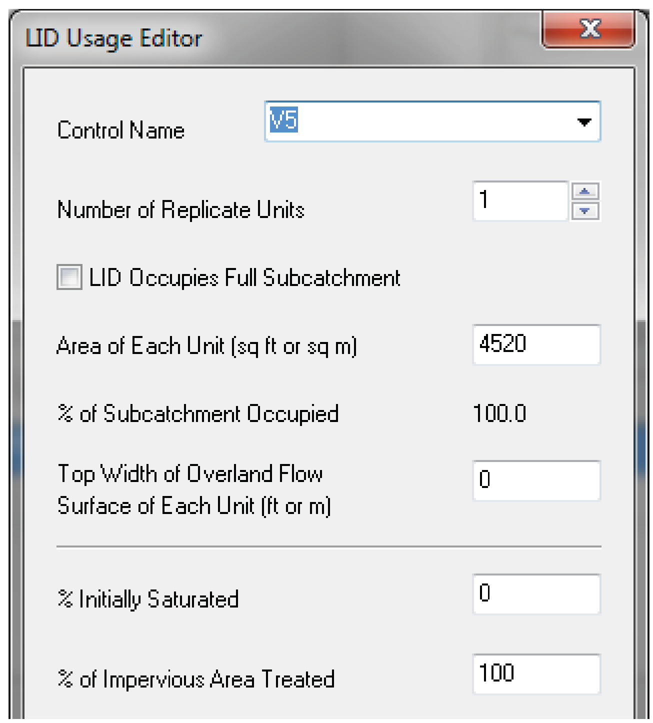

LID Usage Editor
Control Name
M1MR1K1
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
98870
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

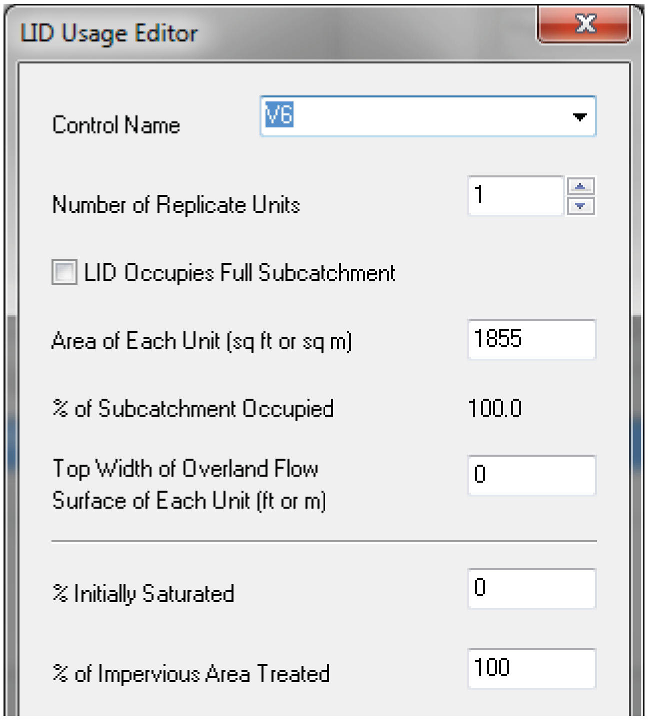

LID Usage Editor
Control Name
V1
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
5865
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

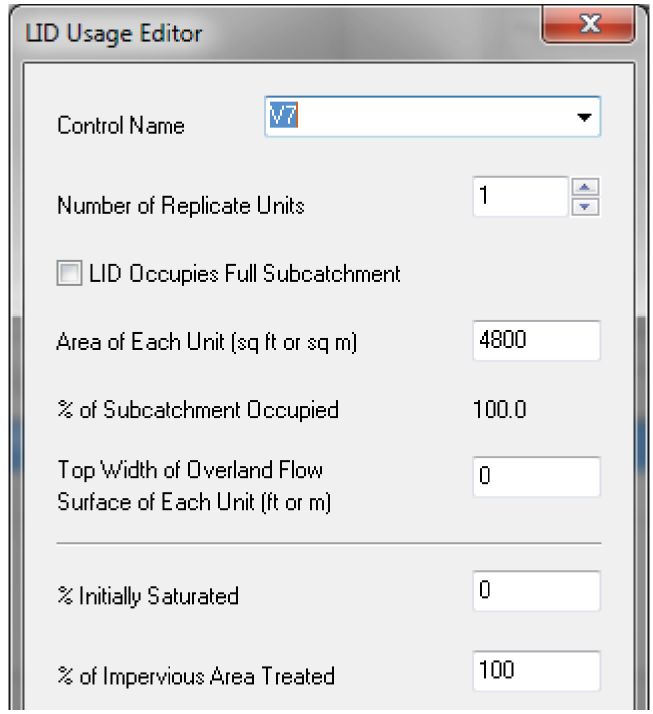

LID Usage Editor
Control Name
V2
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
5840
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

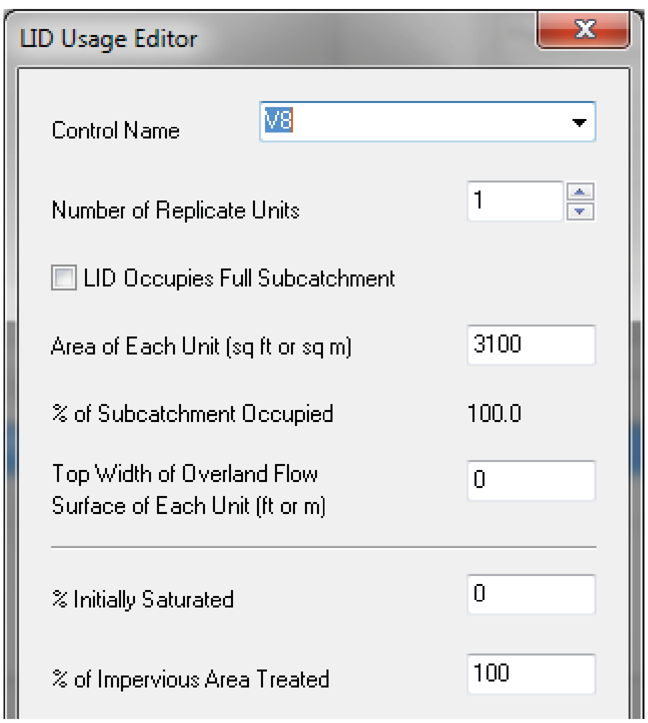

LID Usage Editor
Control Name
V3
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
1920
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

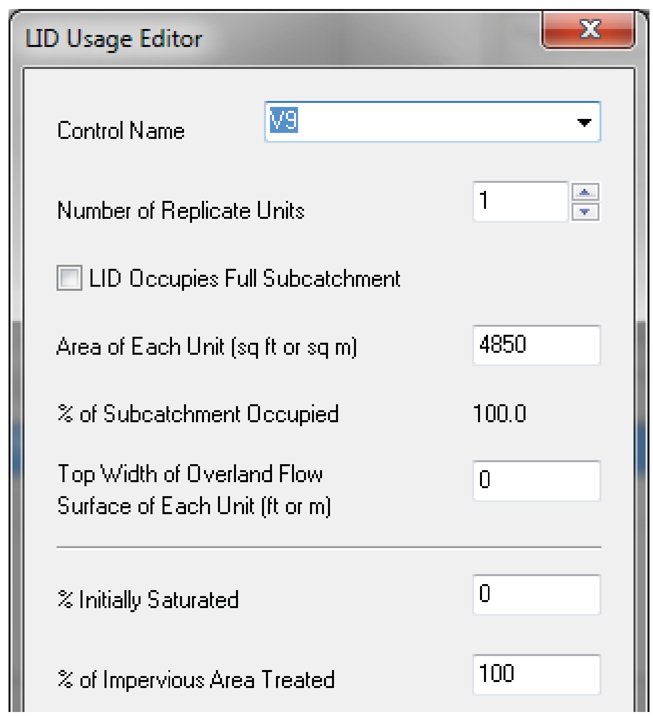

LID Usage Editor
Control Name
V4
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
2820
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

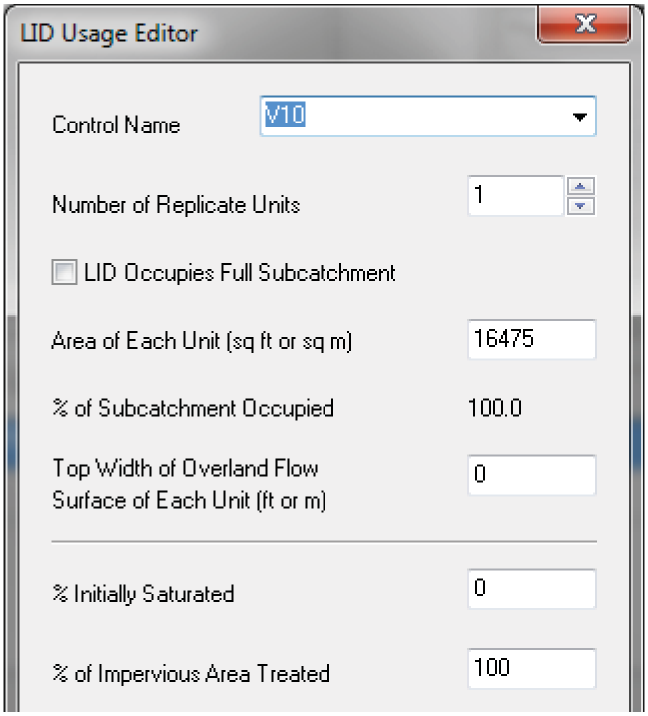

LID Usage Editor
Control Name
V5
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
4520
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

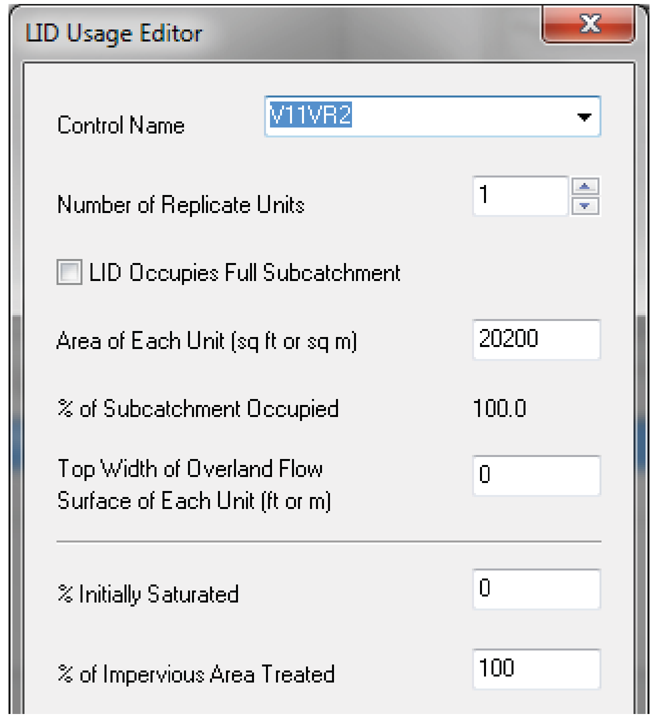

LID Usage Editor
Control Name
V6
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
1855
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

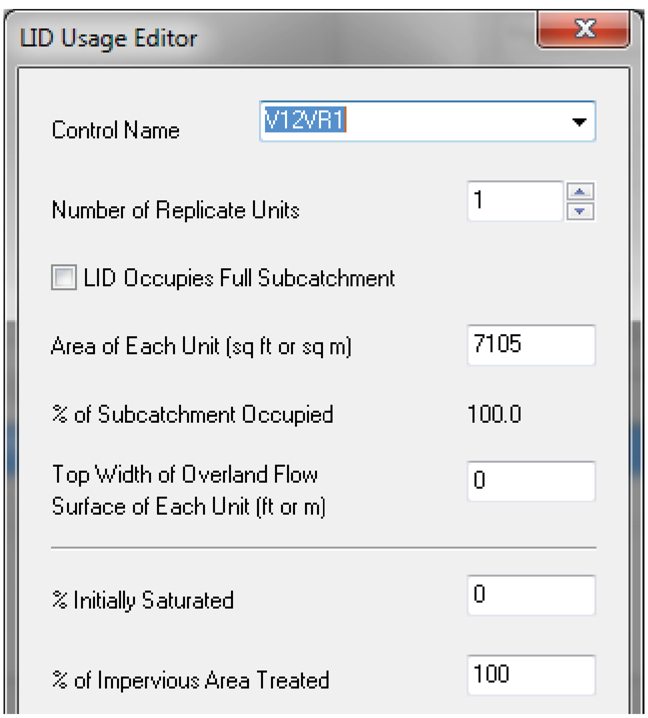

LID Usage Editor
Control Name
V7
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
4800
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

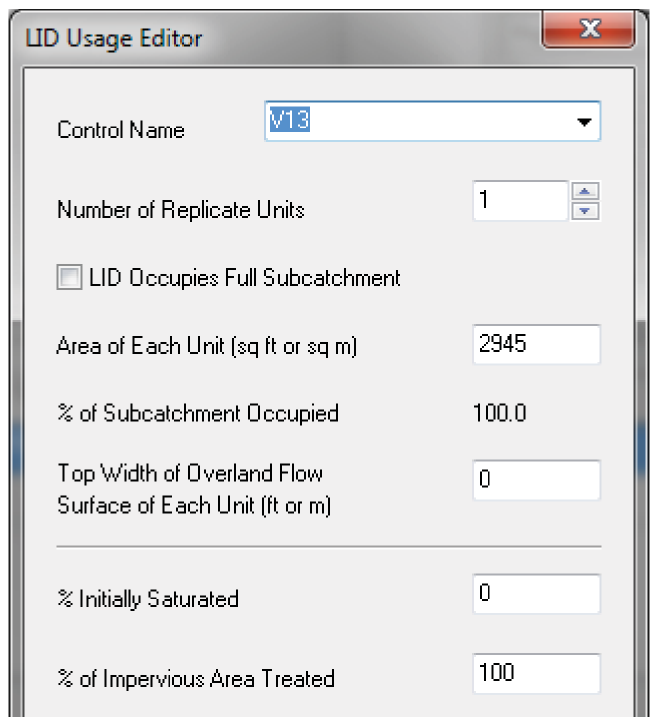

LID Usage Editor
Control Name
V8
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
3100
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

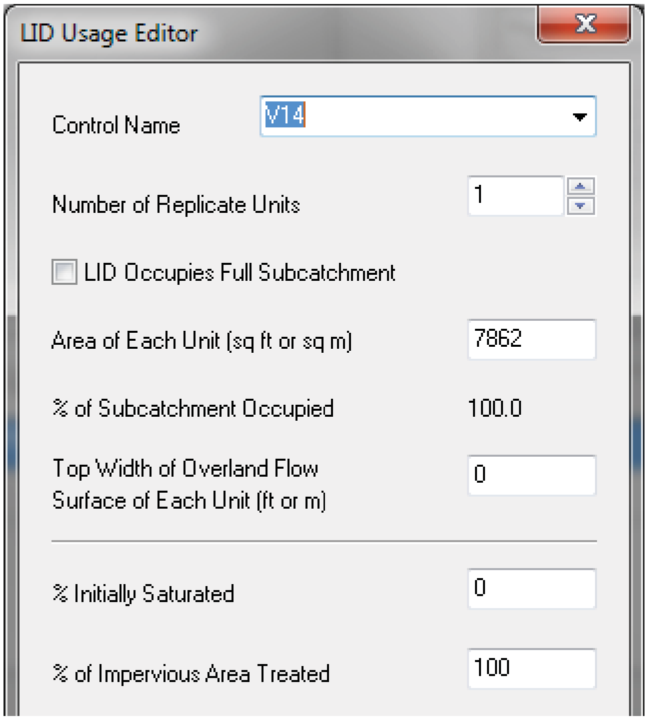

LID Usage Editor
Control Name
V9
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
4850
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

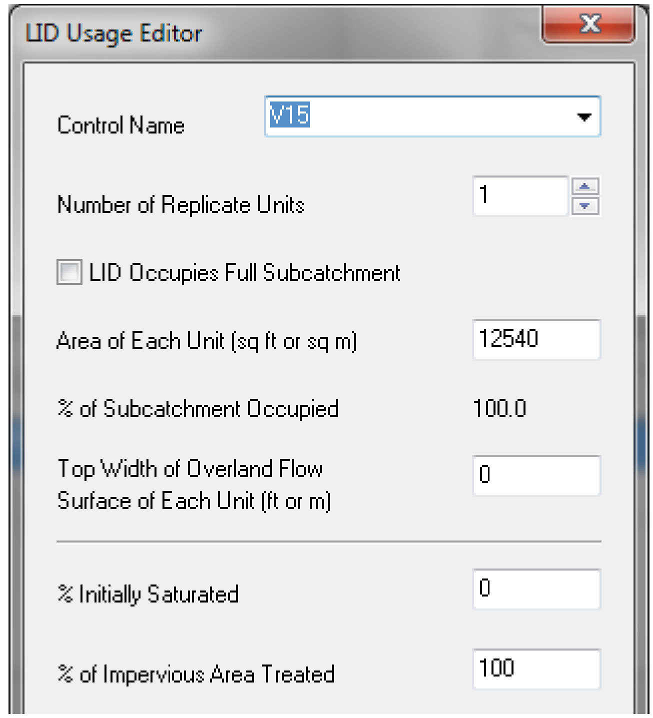

LID Usage Editor
Control Name
V10
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
16475
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

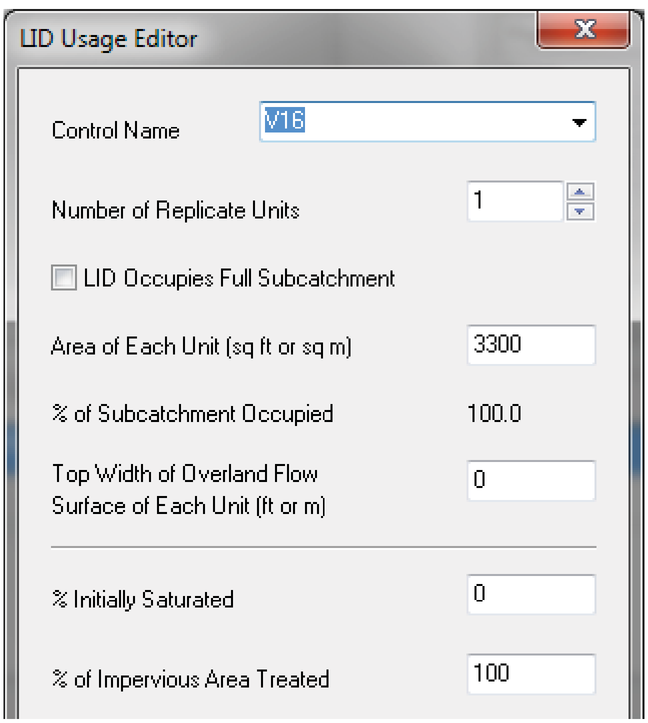

LID Usage Editor
Control Name
V11VR2
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
20200
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100


LID Usage Editor
Control Name
V12VR1
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
7105
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100


LID Usage Editor
Control Name
V13
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
2945
% of Subcatchment Occupied
100.0
Top Width of Overland Flow Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

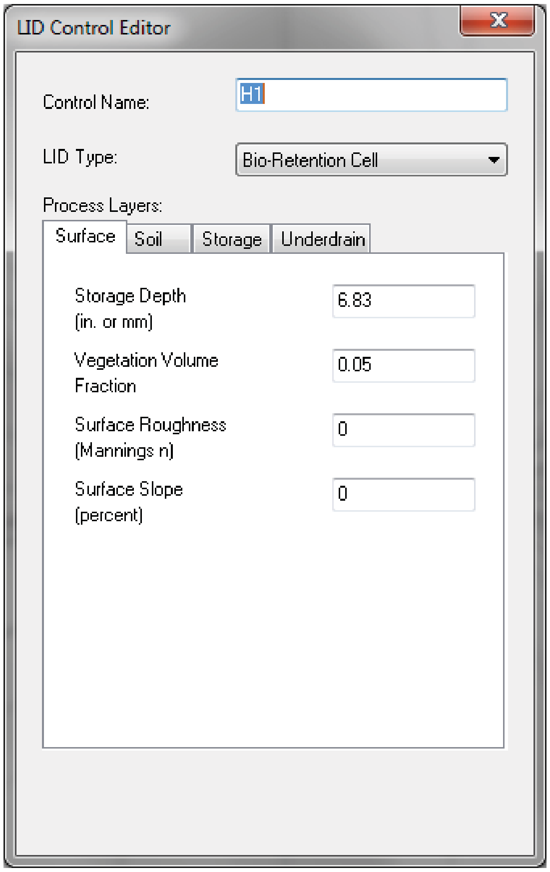

LID Usage Editor
Control Name
V14
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
7862
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

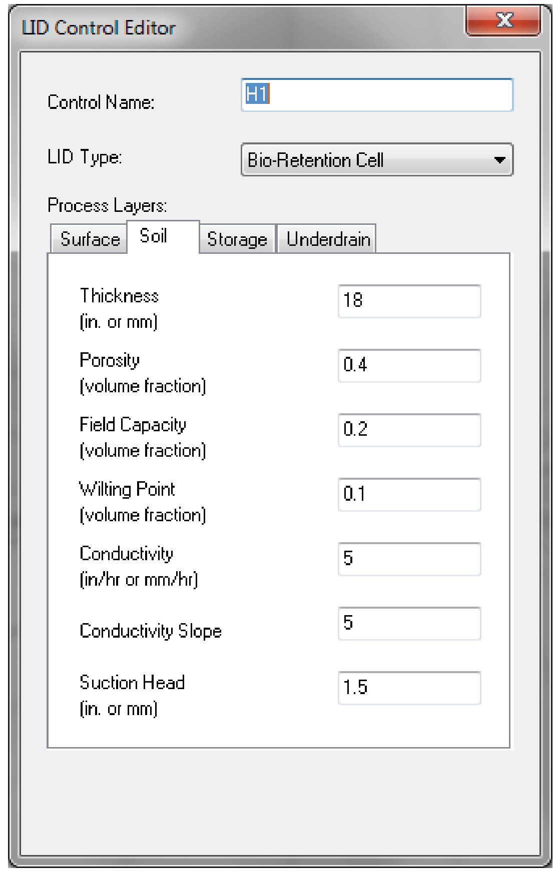

LID Usage Editor
Control Name
V15
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
12540
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

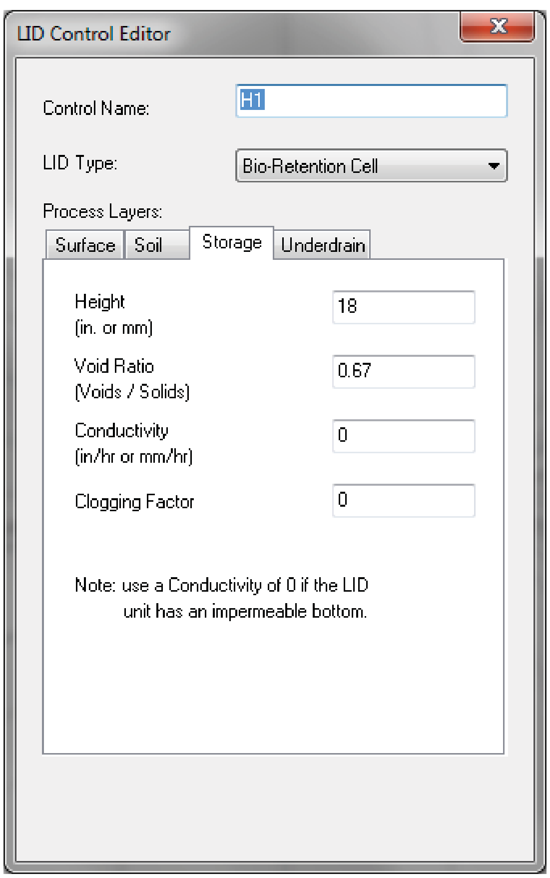

LID Usage Editor
Control Name
V16
Number of Replicate Units
1
LID Occupies Full Subcatchment
Area of Each Unit (sq ft or sq m)
3300
% of Subcatchment Occupied
100.0
Top Width of Overland Flow
Surface of Each Unit (ft or m)
0
% Initially Saturated
0
% of Impervious Area Treated
100

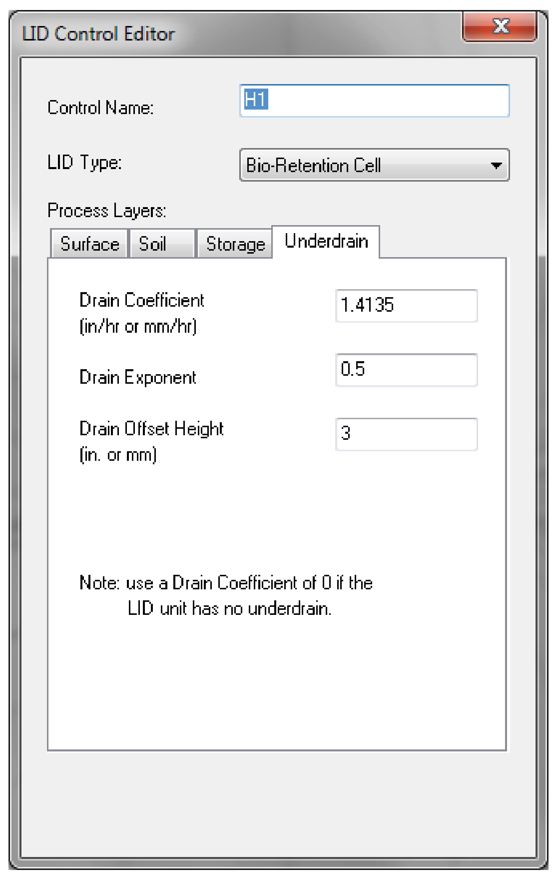
Determination of surface Depth for SWMM Model

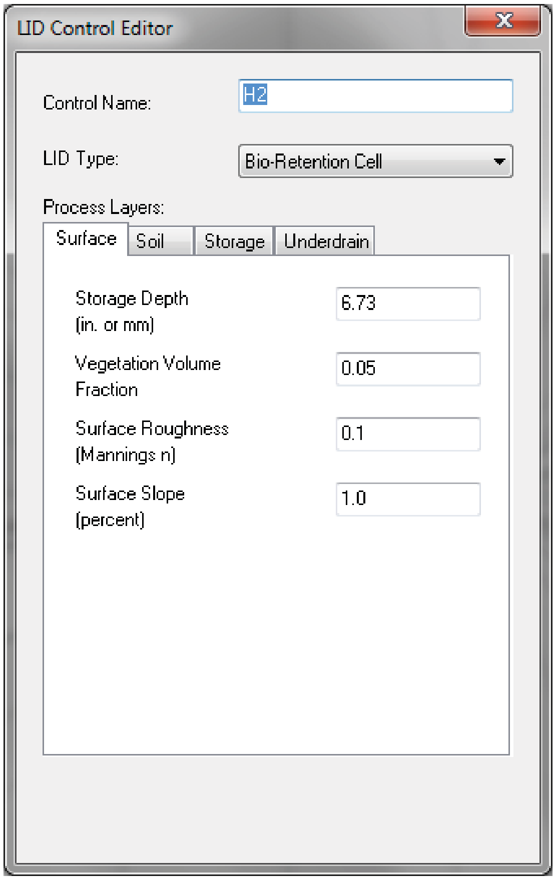
BMP	Bottom area = BMP area, A_{BMP} (ft^2)	Area at lowest surface inlet elevation (A_2, ft^2)	Elev. @ A_2 (h, ft)	Elev. In SWMM (h_{eq}, in) [$h_{eq}=6\cdot(1+A_2/A_{BMP})\cdot h$]
H1	2,120	2,703	0.50	6.83
H2	655	815	0.50	6.73
H4	950	1,190	0.50	6.76
H5	1,010	1,220	0.50	6.62
H6	860	1,055	0.50	6.68
H7	765	965	0.50	6.78
H8HR1	32,465	33,595	0.50	6.10
H9HR2	7,430	8,000	0.50	6.23
M1MR1K1	94,224	107,009	2.00	25.63
V1	5,865	6,525	0.50	6.34
V2	5,840	6,395	0.50	6.29
V3	1,920	2,325	0.50	6.63
V4	2,820	3,265	0.50	6.47
V5	4,520	5,190	0.50	6.44
V6	1,855	2,220	0.50	6.59
V7	4,800	5,575	0.50	6.48
V8	3,100	3,550	0.50	6.44
V9	4,850	5,300	0.50	6.28
V10	16,475	17,480	0.50	6.18
V11VR2	20,200	21,405	1.00	12.36
V12VR1	7,105	8,230	0.50	6.48
V13	2,945	3,270	0.50	6.33
V14	7,862	9,847	2.00	27.03
V15	12,540	13,895	0.50	6.32
V16	3,300	3,665	0.50	6.33

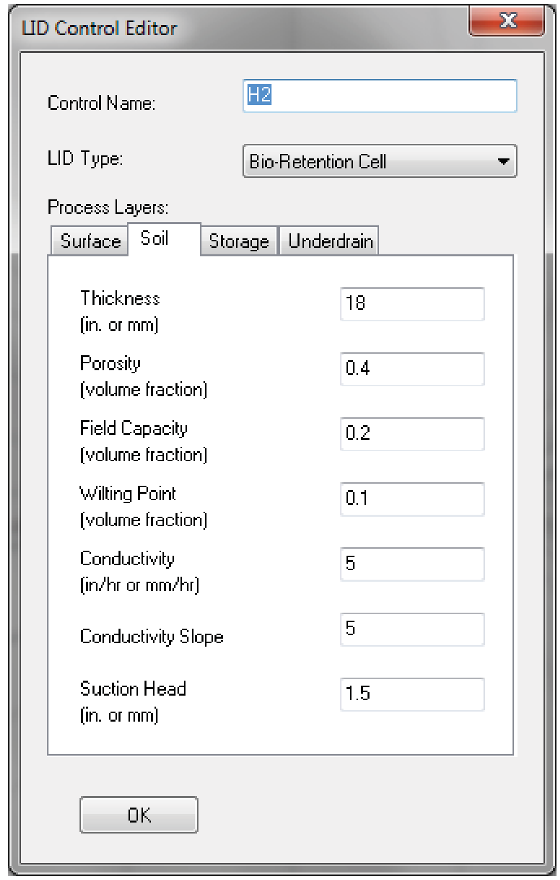

LID Control Editor
Control Name:
H1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.83
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

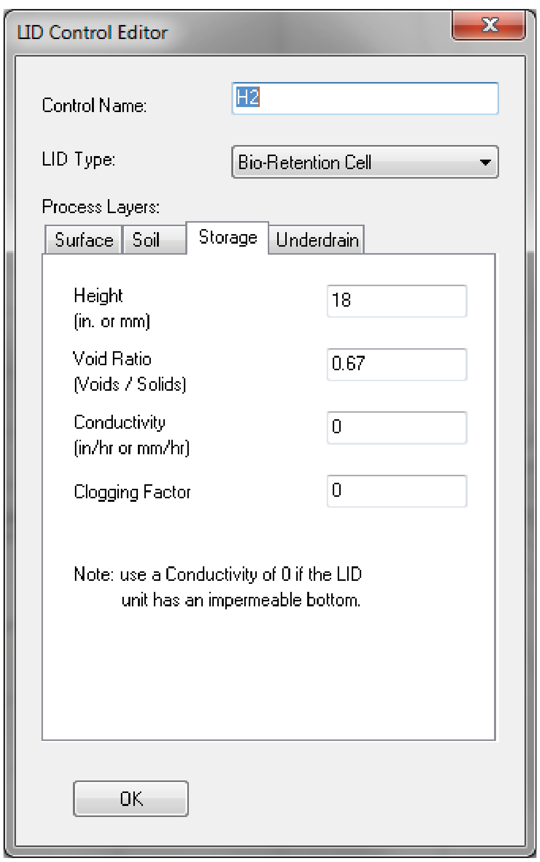

LID Control Editor
Control Name:
H1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

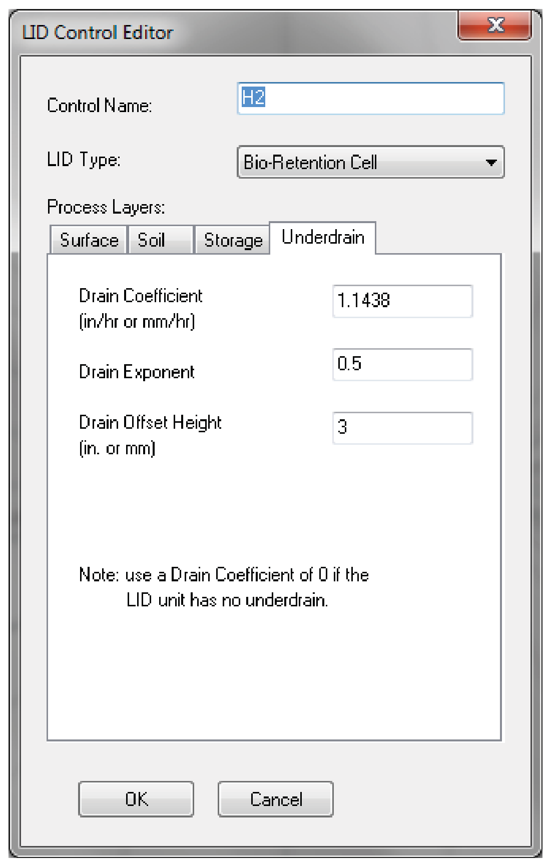

LID Control Editor
Control Name:
H1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

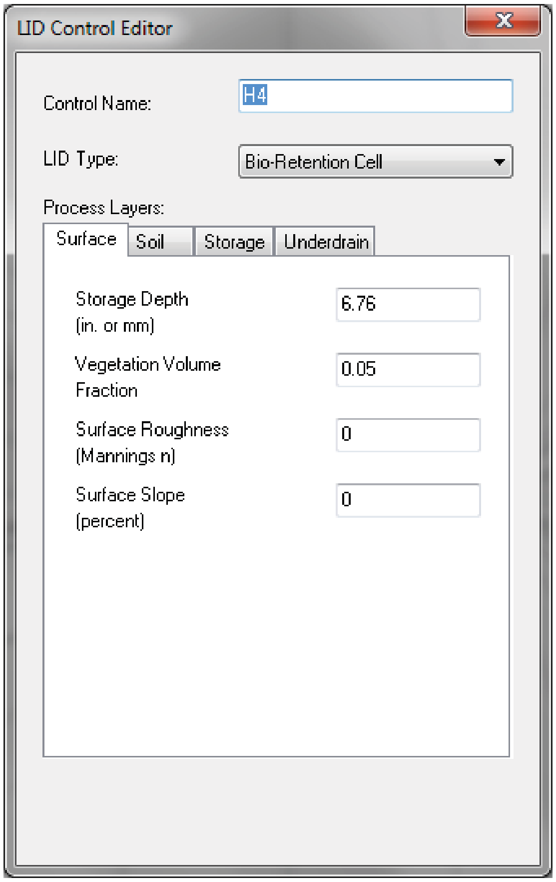

LID Control Editor
Control Name:
H1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.4135
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.

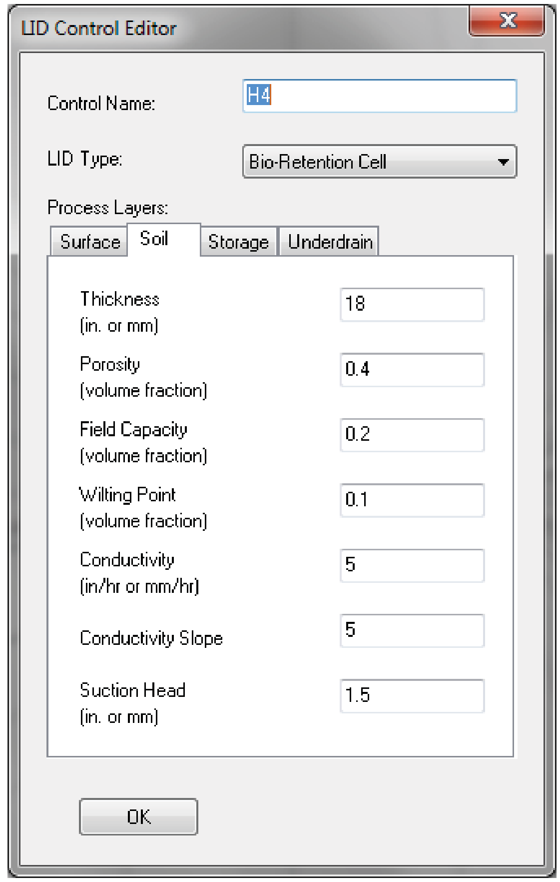

LID Control Editor
Control Name:
H2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm)
6.73
Vegetation Volume Fraction
0.05
Surface Roughness (Mannings n)
0.1
Surface Slope (percent)
1.0

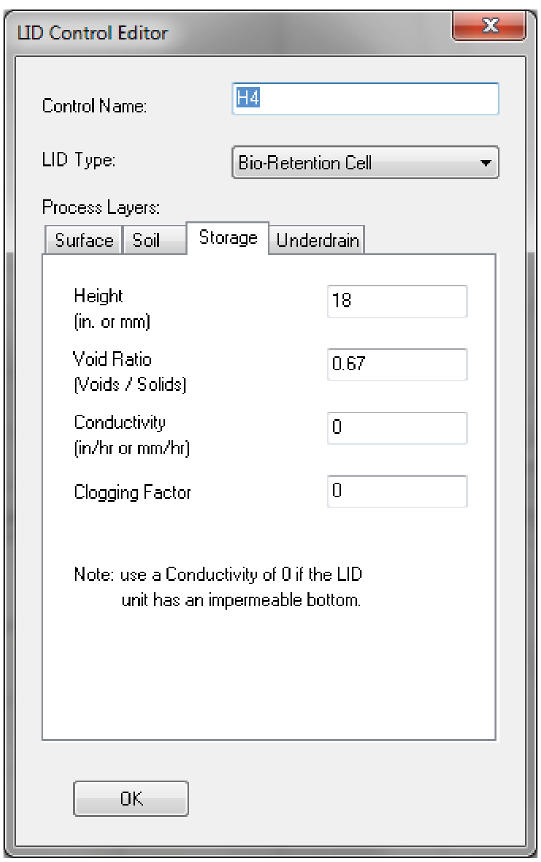

LID Control Editor
Control Name:
H2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm)
18
Porosity (volume fraction)
0.4
Field Capacity (volume fraction)
0.2
Wilting Point (volume fraction)
0.1
Conductivity (in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head (in. or mm)
1.5
OK

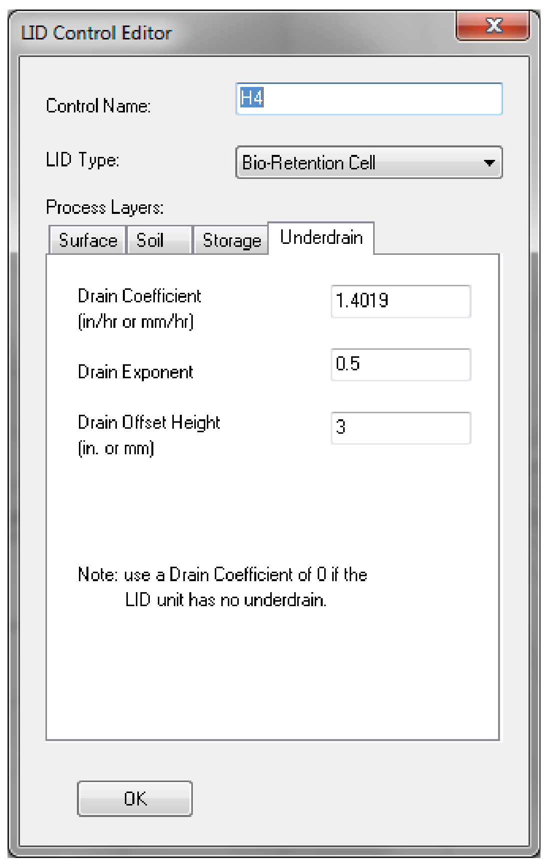

LID Control Editor
Control Name:
H2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm)
18
Void Ratio (Voids / Solids)
0.67
Conductivity (in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
OK

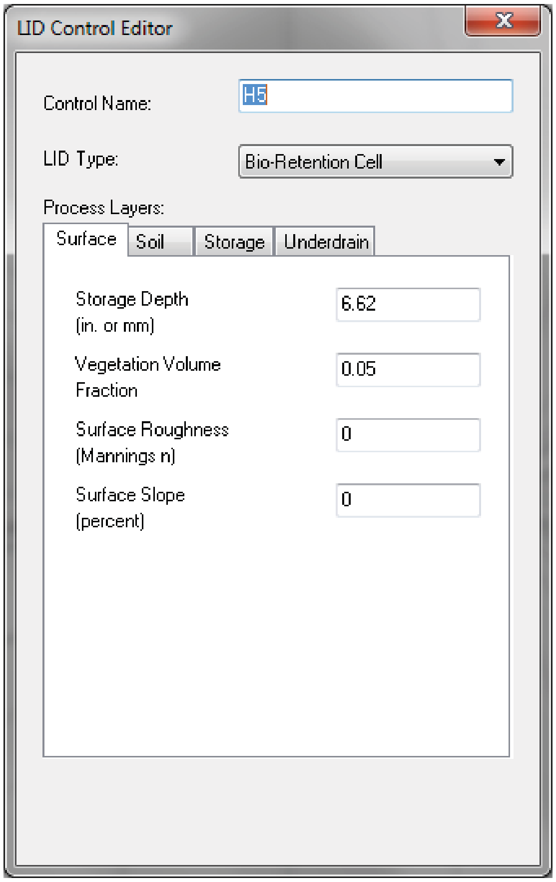

LID Control Editor
Control Name:
H2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr)
1.1438
Drain Exponent
0.5
Drain Offset Height (in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK
Cancel

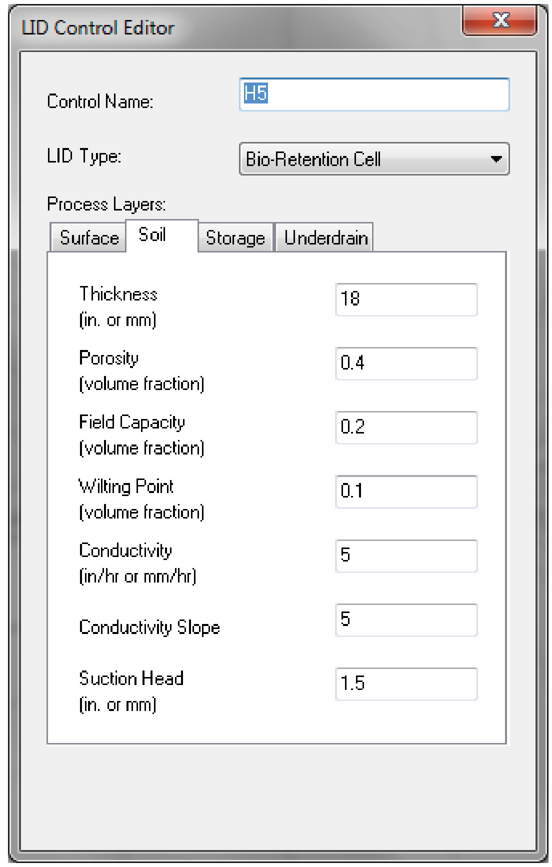

LID Control Editor
Control Name:
H4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.76
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

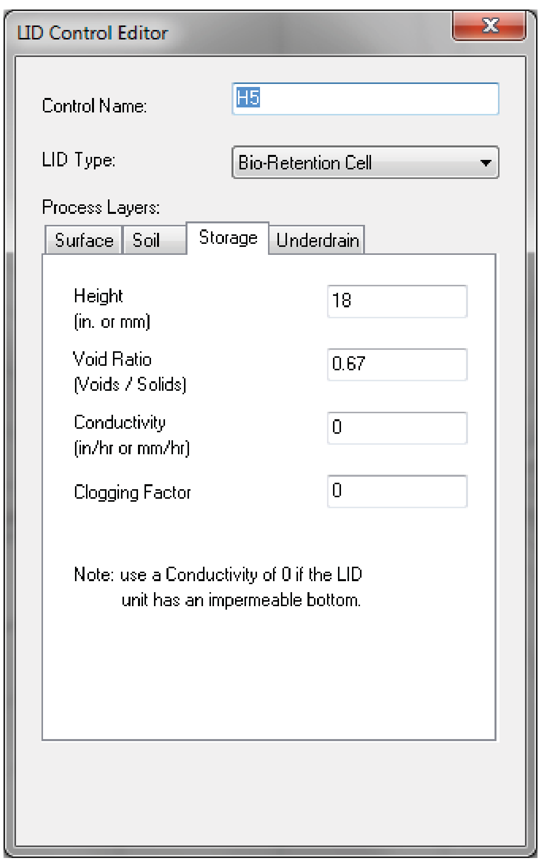

LID Control Editor
Control Name:
H4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK

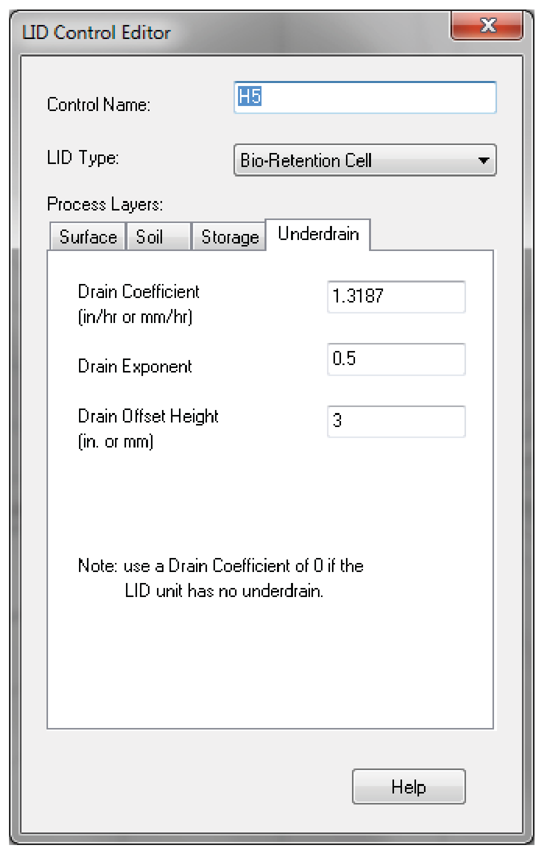

LID Control Editor
Control Name:
H4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK

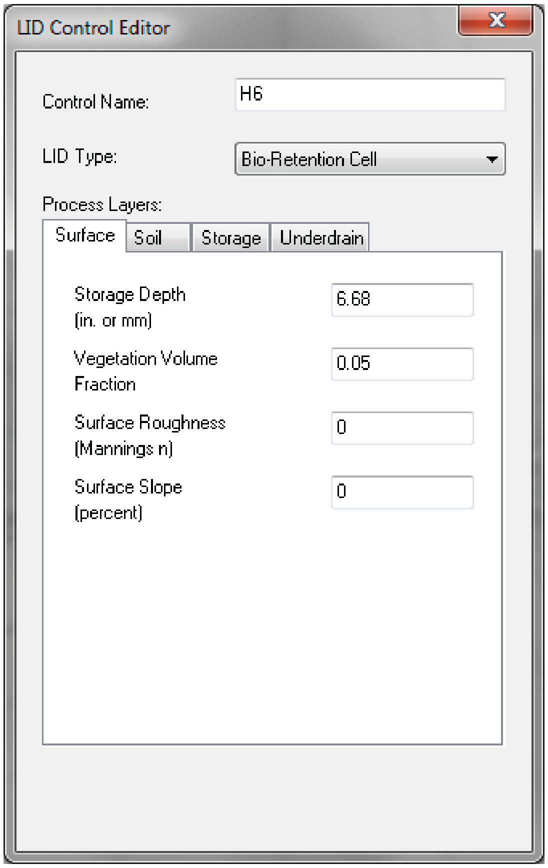

LID Control Editor
Control Name:
H4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.4019
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK

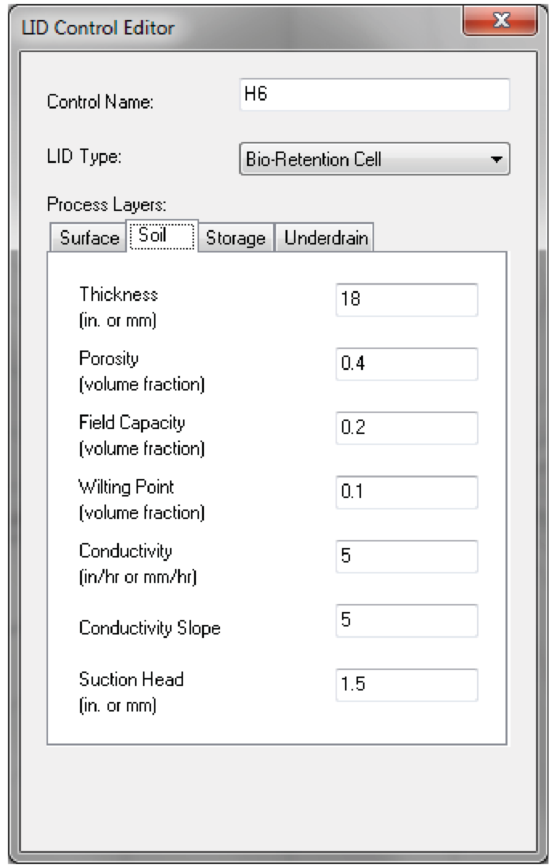

LID Control Editor
Control Name: H5
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 6.62
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

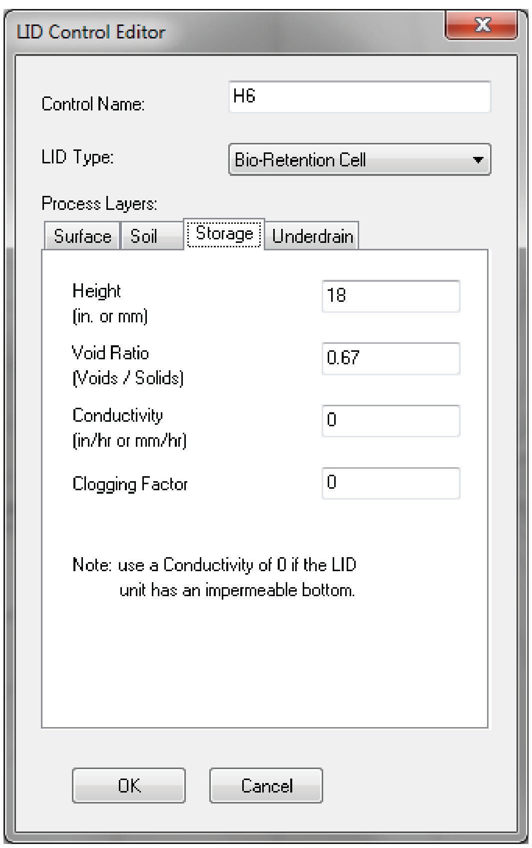

LID Control Editor
Control Name: H5
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

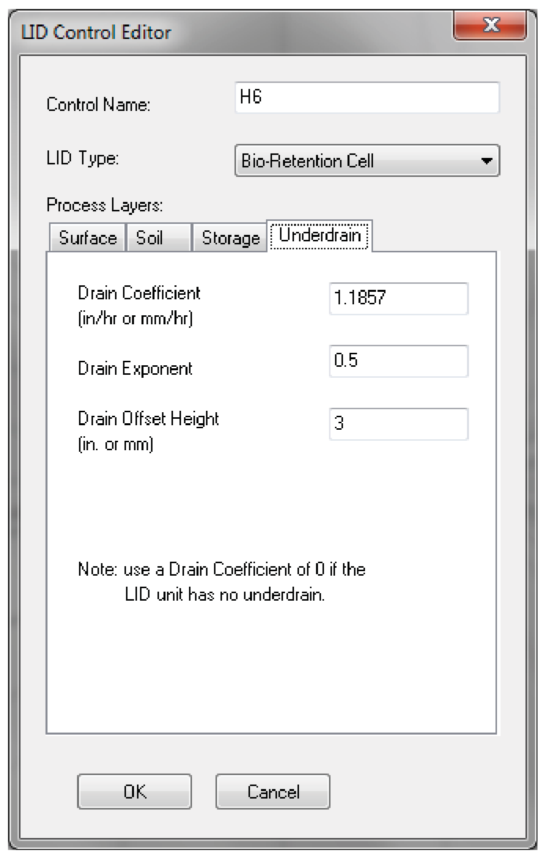

LID Control Editor
Control Name: H5
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

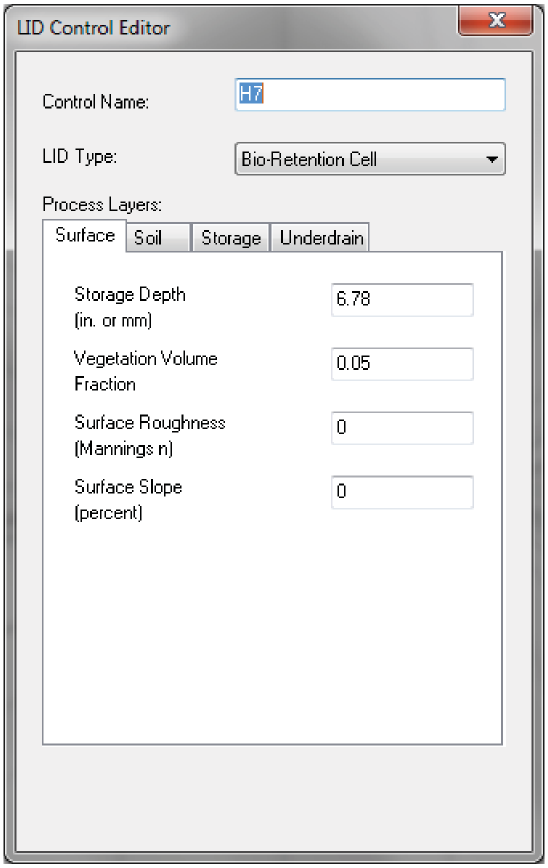

LID Control Editor
Control Name: H5
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 1.3187
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Help

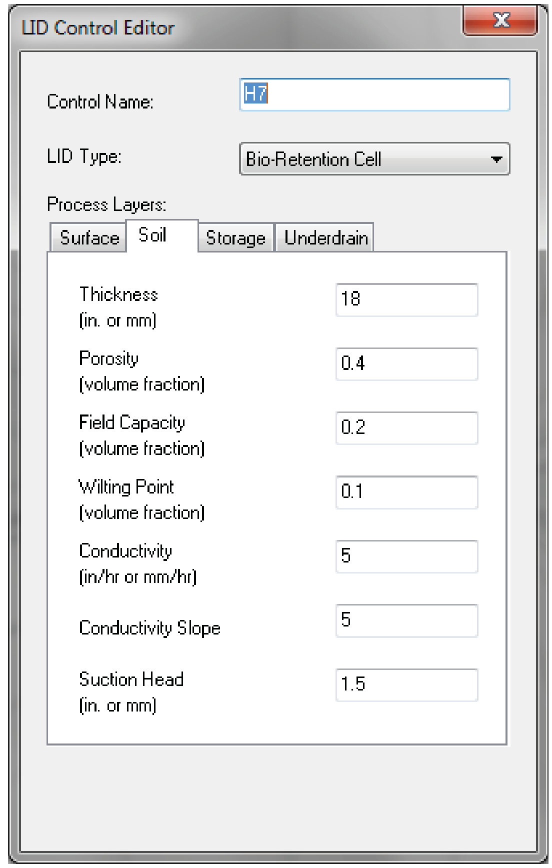

LID Control Editor
Control Name: H6
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm) 6.68
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

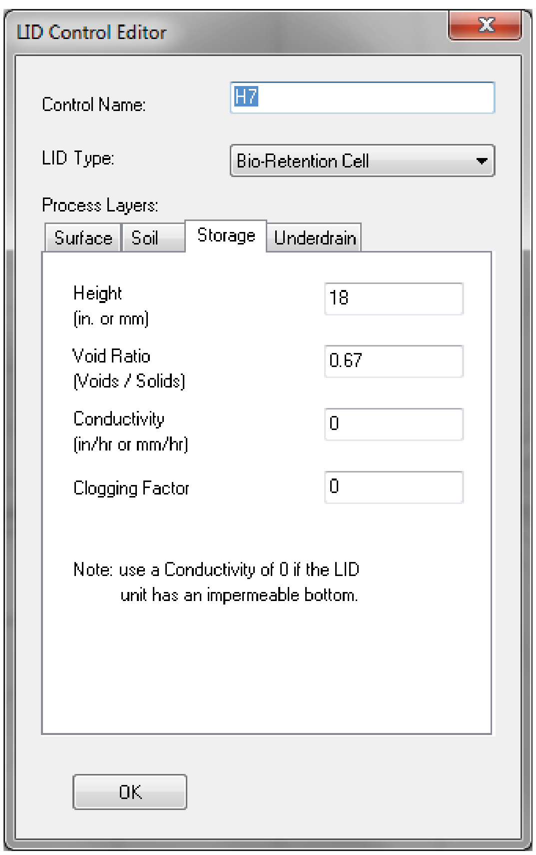

LID Control Editor
Control Name: H6
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

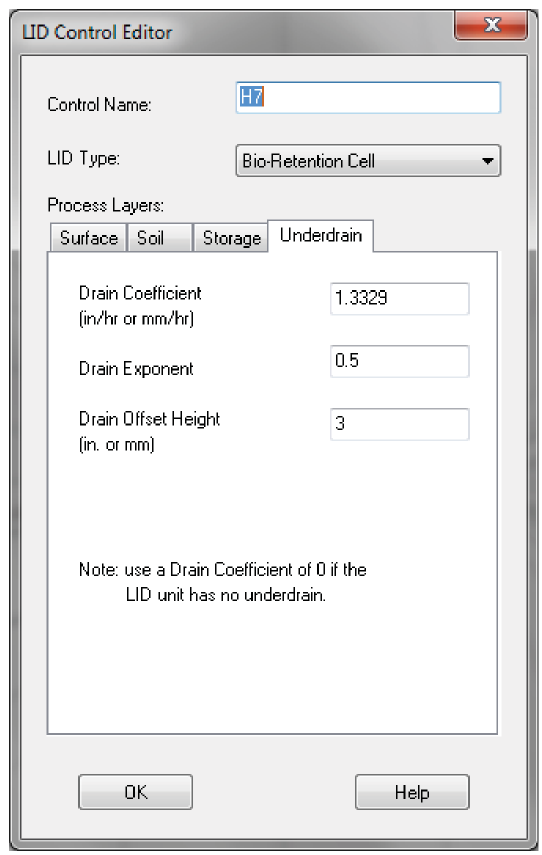

LID Control Editor
Control Name: H6
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
OK
Cancel

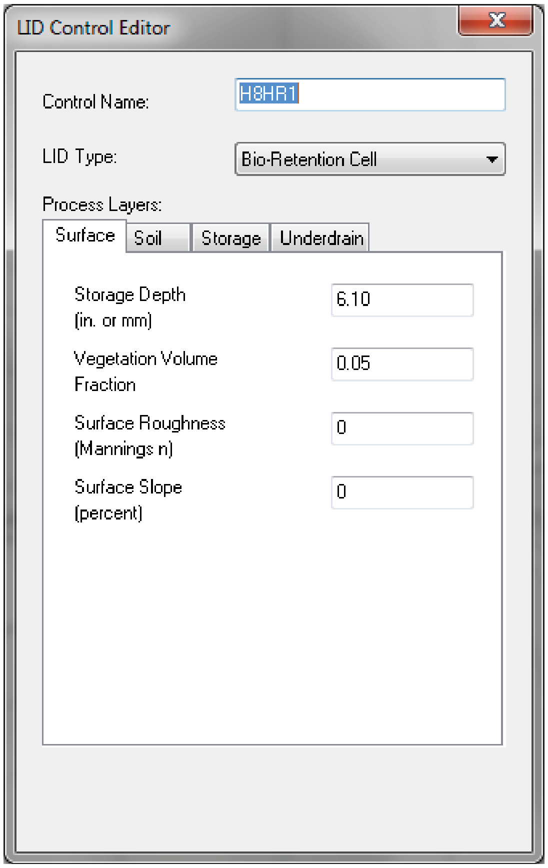

LID Control Editor
Control Name: H6
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr) 1.1857
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK
Cancel

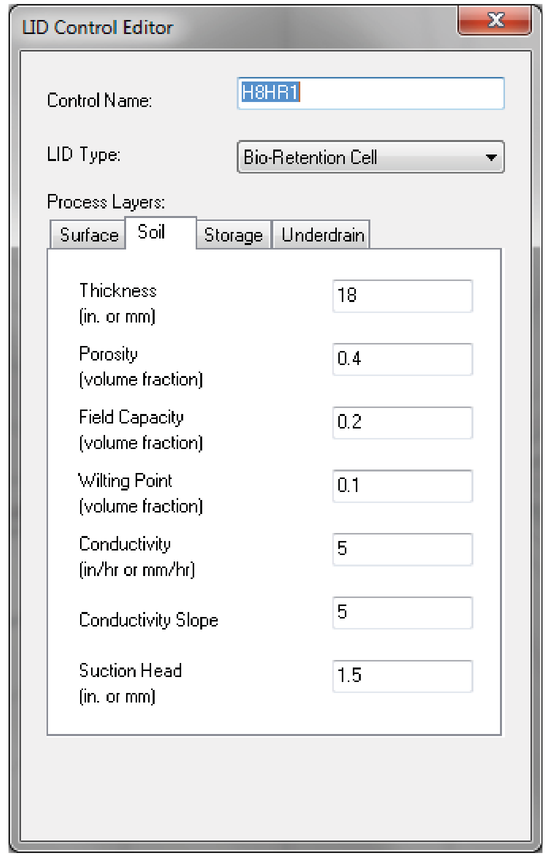

LID Control Editor
Control Name: H7
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm) 6.78
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

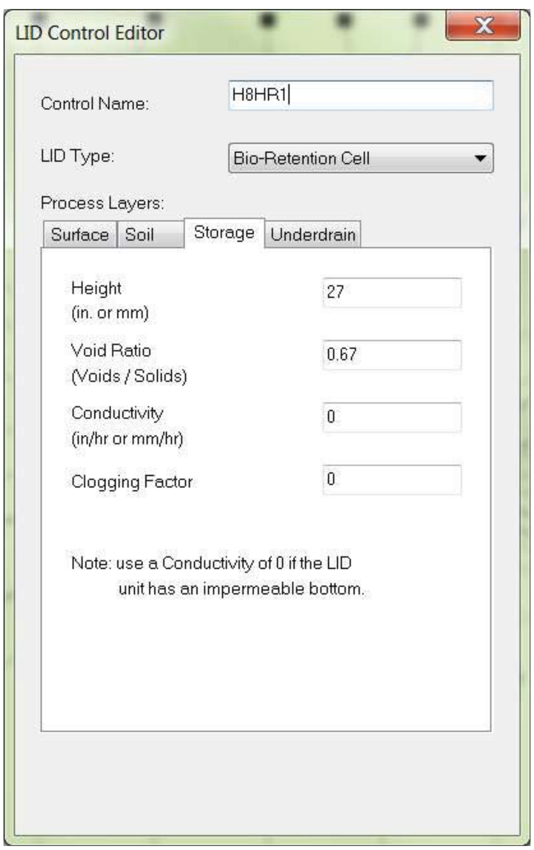

LID Control Editor
Control Name: H7
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

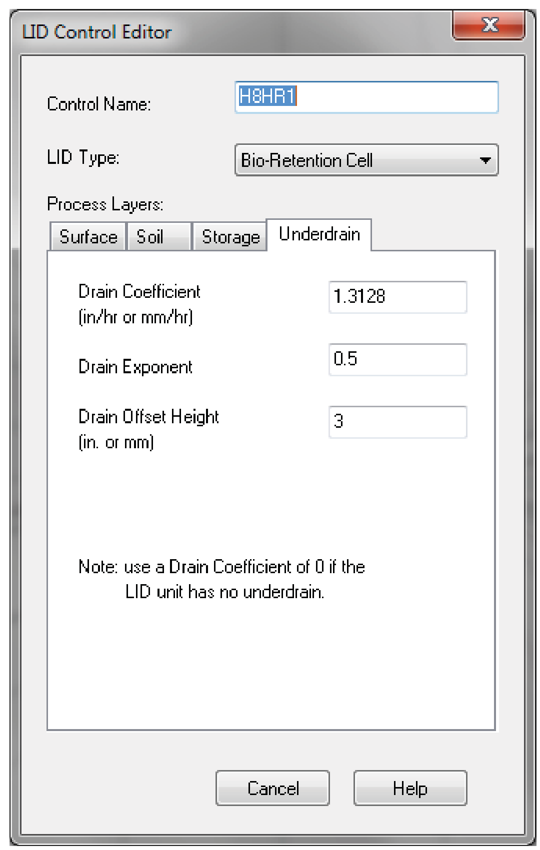

LID Control Editor
Control Name: H7
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
OK

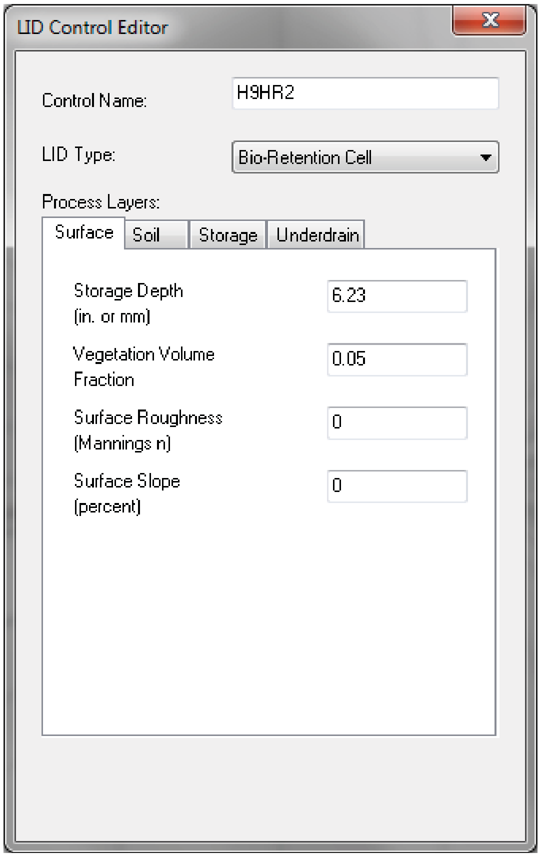

LID Control Editor
Control Name: H7
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr) 1.3329
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK
Help

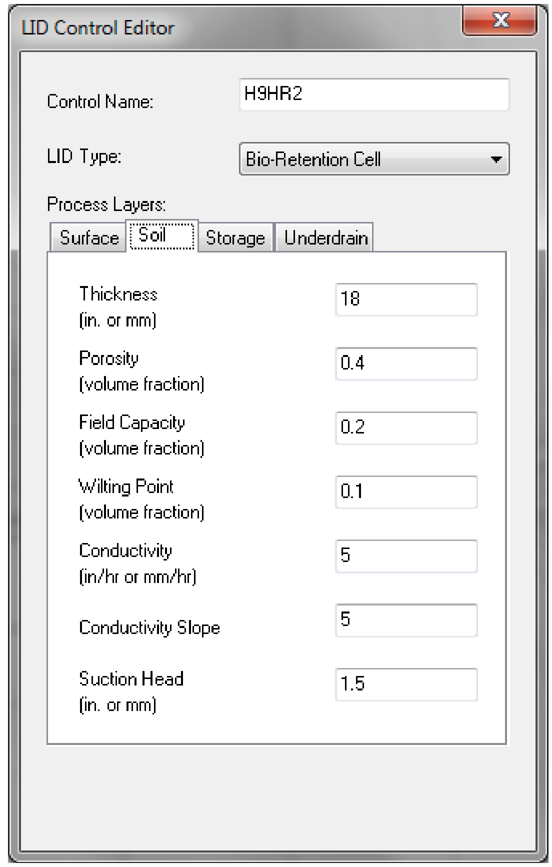

LID Control Editor
Control Name:
H8HR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.10
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

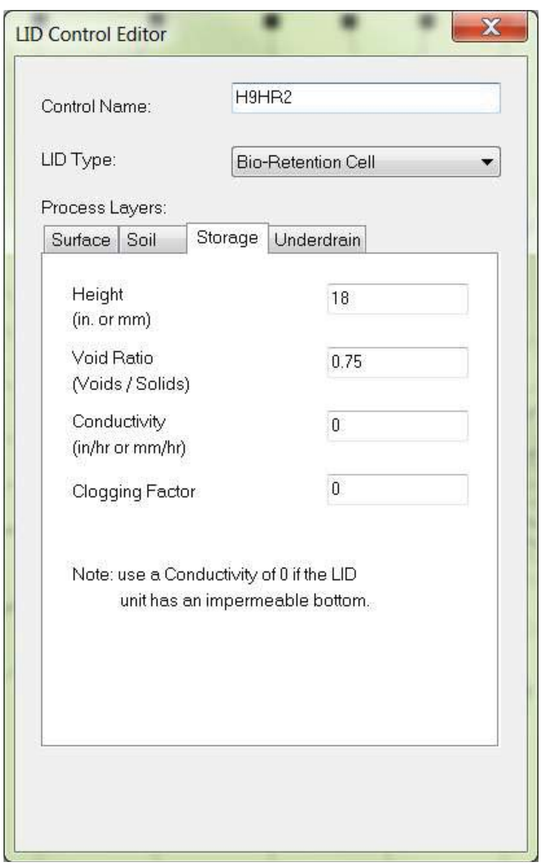

LID Control Editor
Control Name:
H8HR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

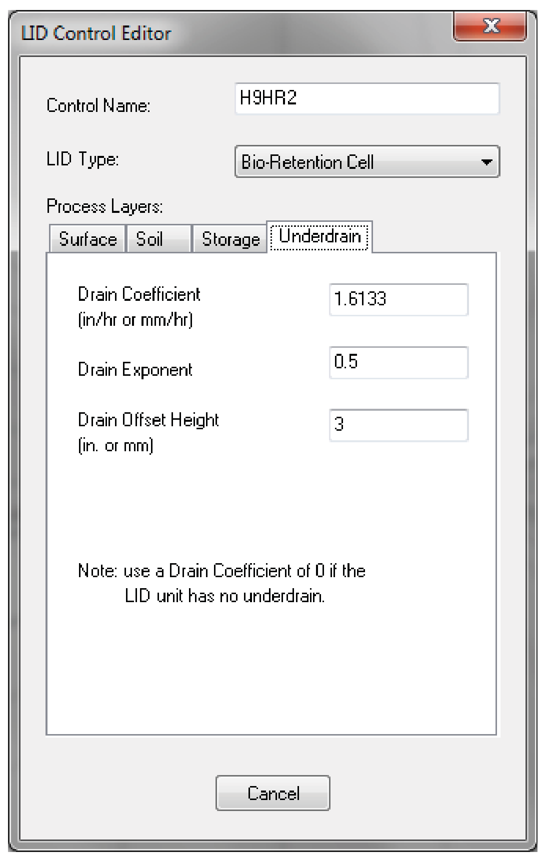

LID Control Editor
Control Name:
H8HR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
27
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

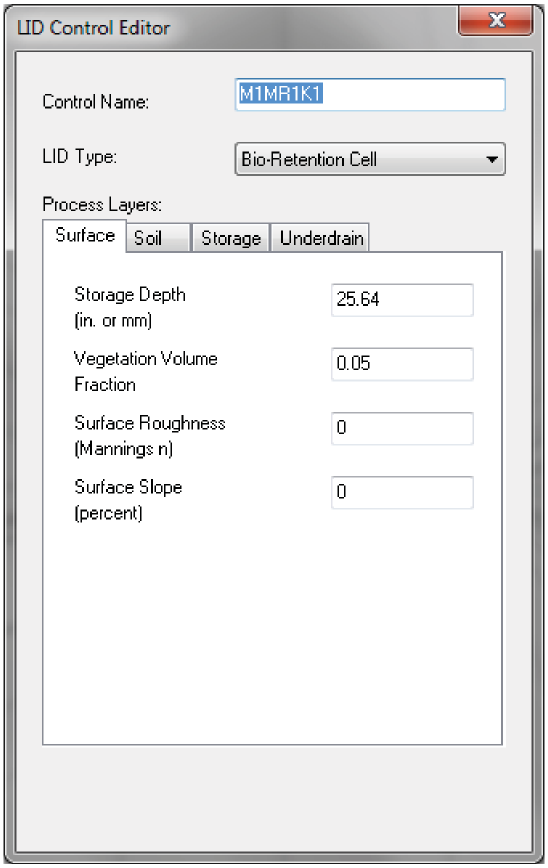

LID Control Editor
Control Name:
H8HR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.3128
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
Cancel
Help

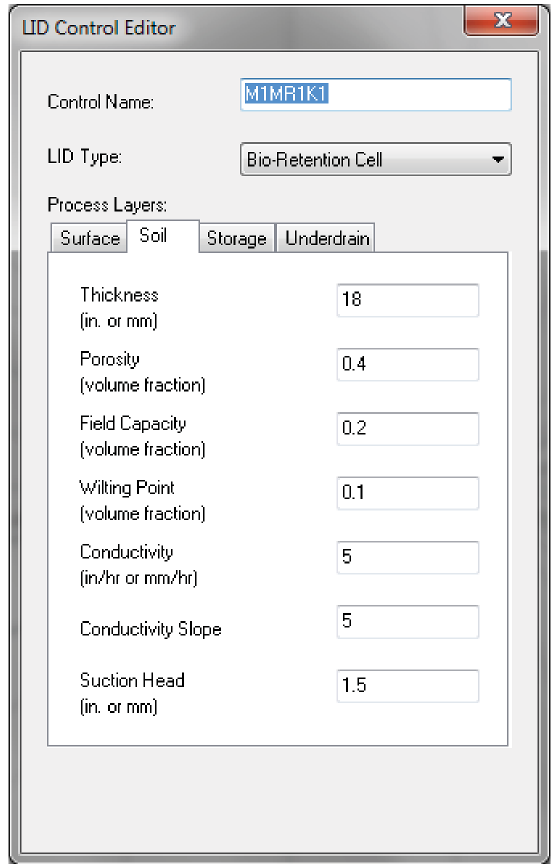

LID Control Editor
Control Name: H9HR2
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm) 6.23
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

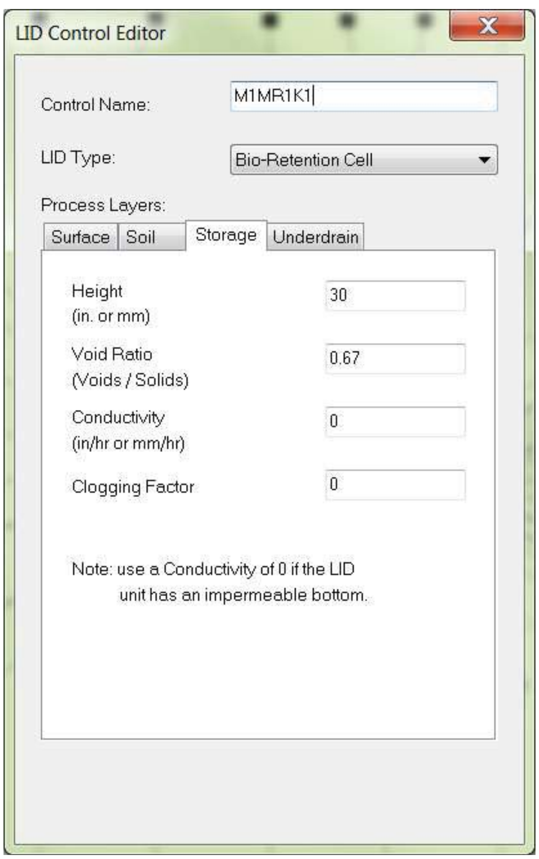

LID Control Editor
Control Name: H9HR2
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

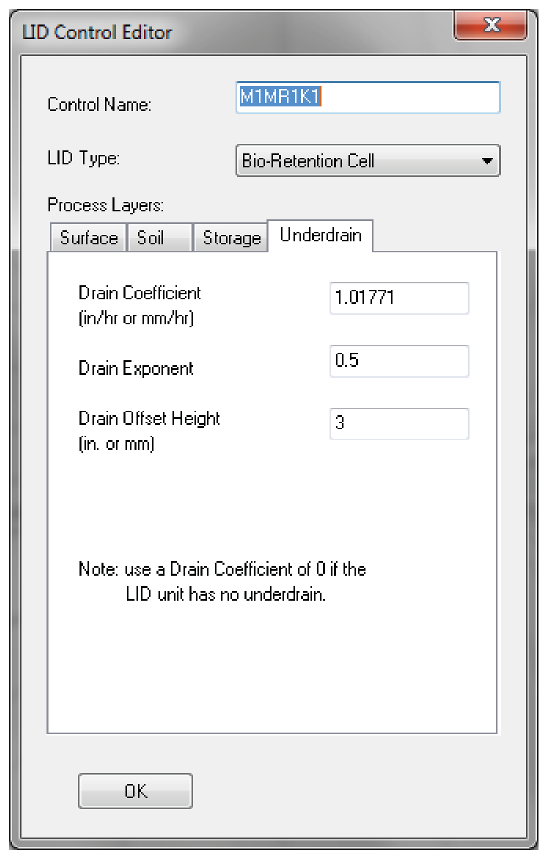

LID Control Editor
Control Name: H9HR2
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.75
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

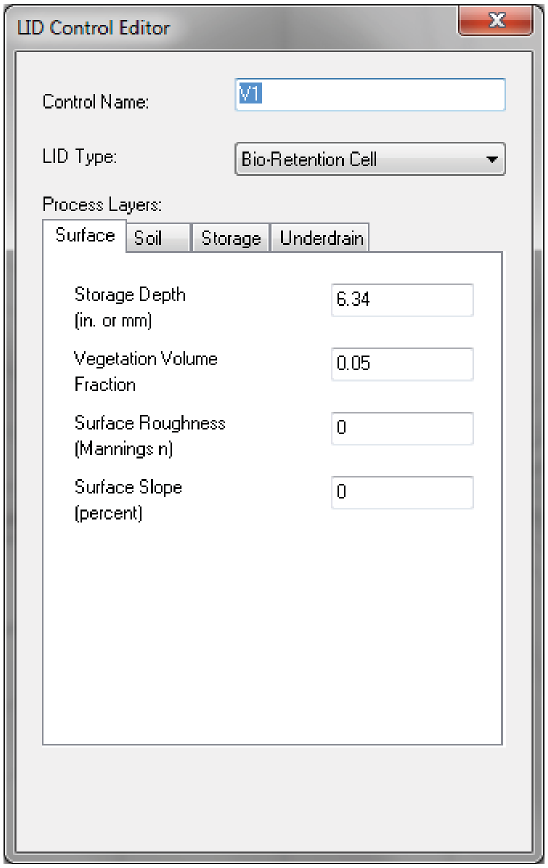

LID Control Editor
Control Name: H9HR2
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr) 1.6133
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel

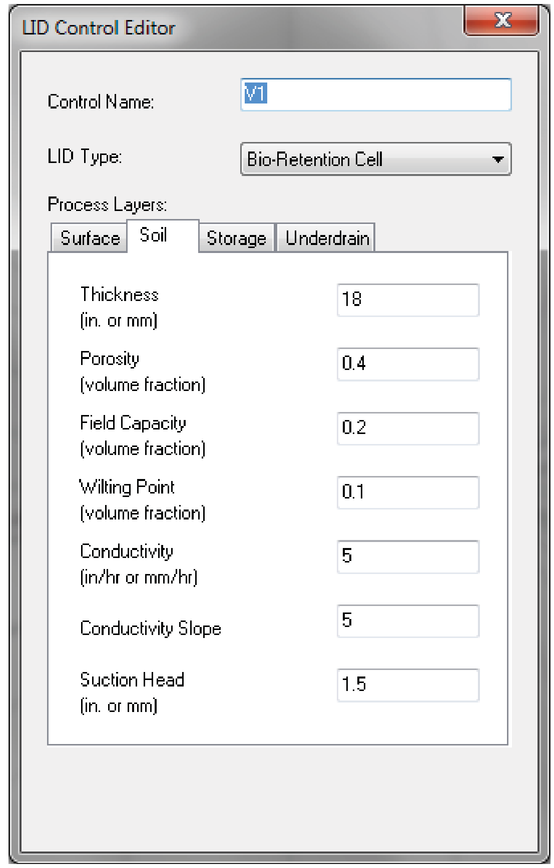

LID Control Editor
Control Name:
M1MR1K1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm)
25.64
Vegetation Volume Fraction
0.05
Surface Roughness (Mannings n)
0
Surface Slope (percent)
0

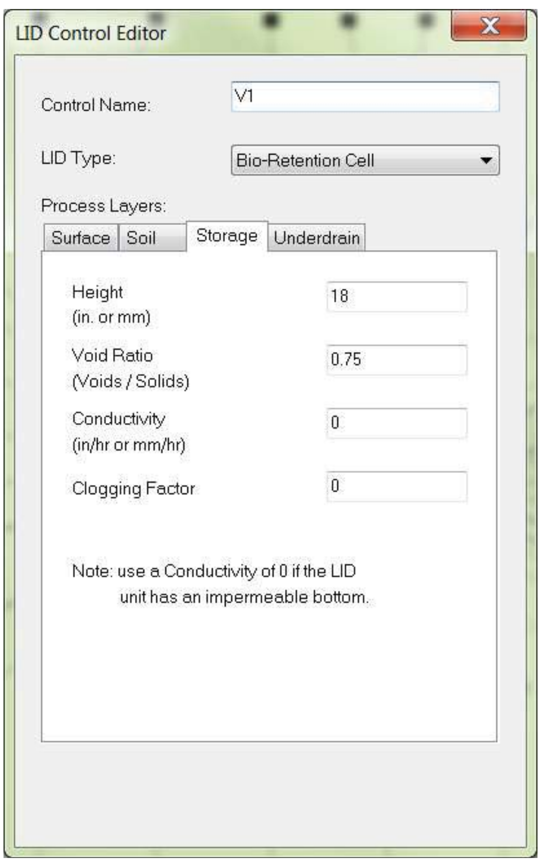

LID Control Editor
Control Name:
M1MR1K1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm)
18
Porosity (volume fraction)
0.4
Field Capacity (volume fraction)
0.2
Wilting Point (volume fraction)
0.1
Conductivity (in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head (in. or mm)
1.5

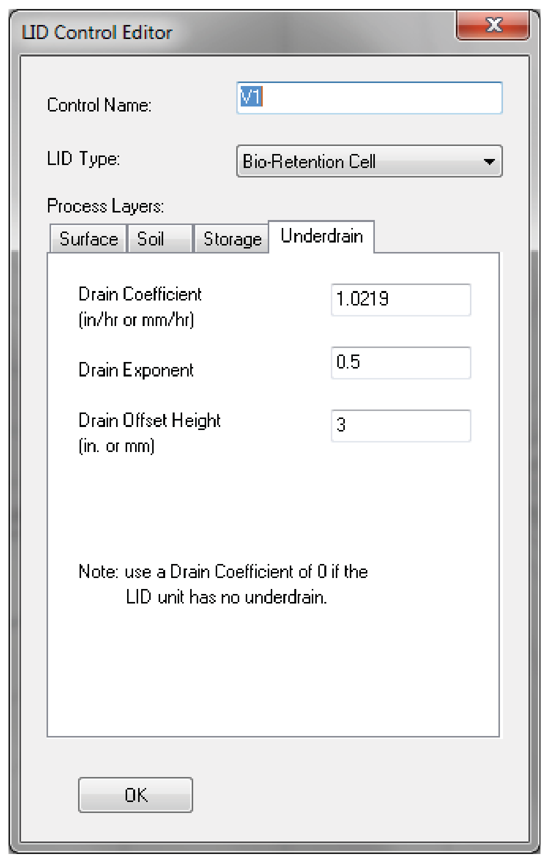

LID Control Editor
Control Name:
M1MR1K1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm)
30
Void Ratio (Voids / Solids)
0.67
Conductivity (in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

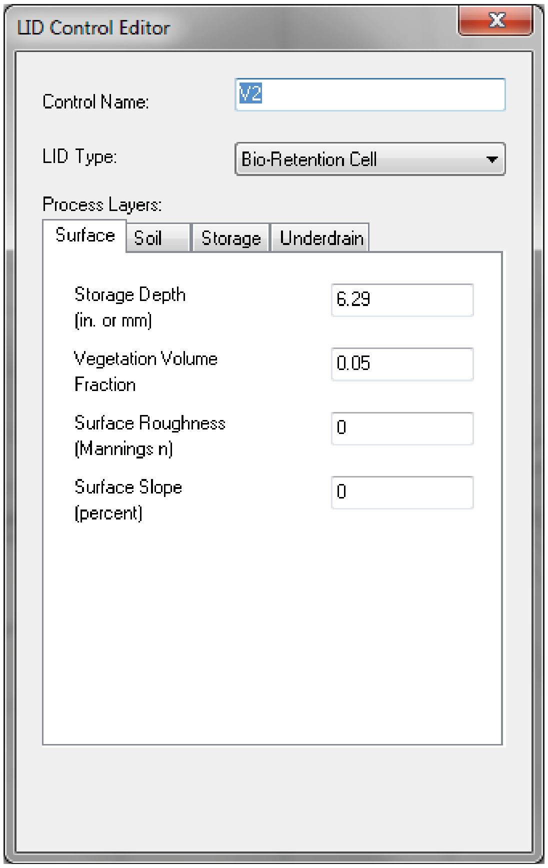

LID Control Editor
Control Name:
M1MR1K1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr)
1.01771
Drain Exponent
0.5
Drain Offset Height (in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK

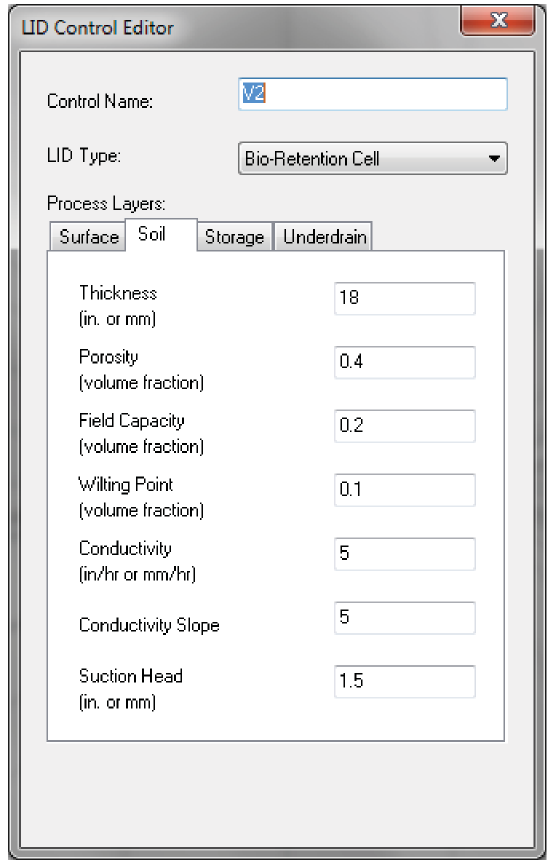

LID Control Editor
Control Name:
V1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.34
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

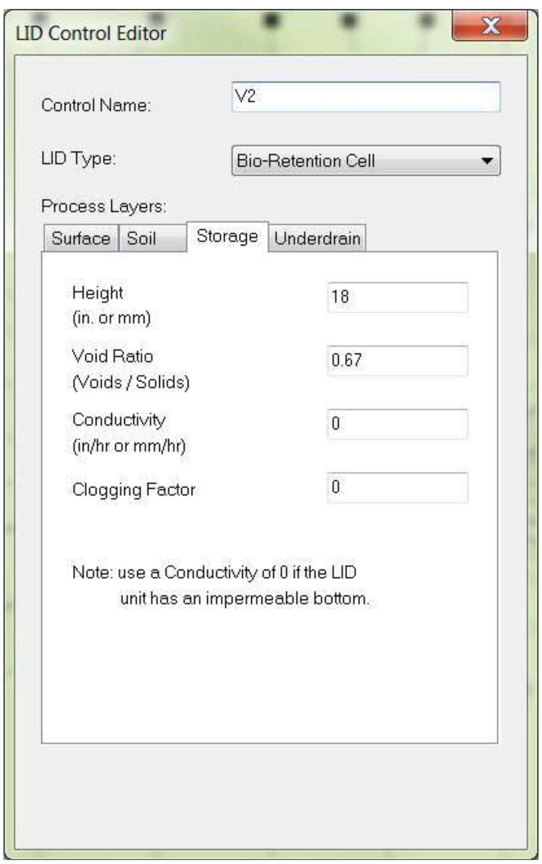

LID Control Editor
Control Name:
V1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

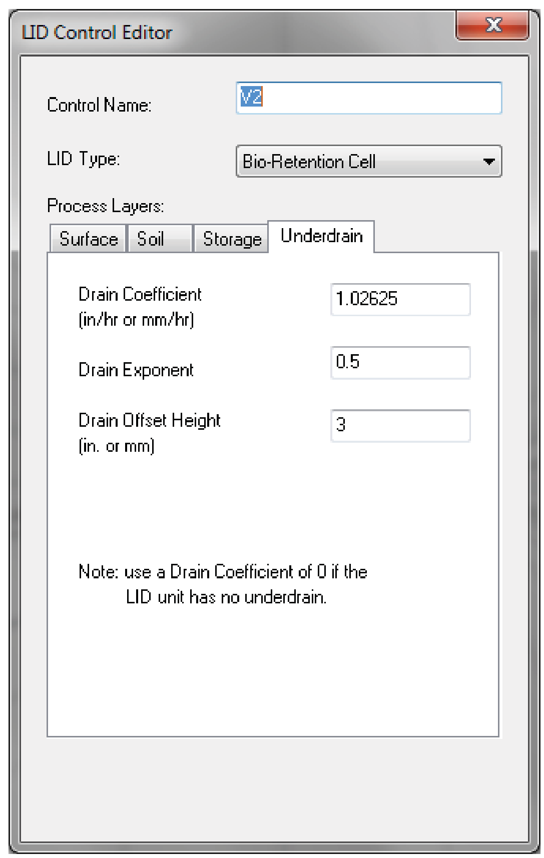

LID Control Editor
Control Name:
V1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.75
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

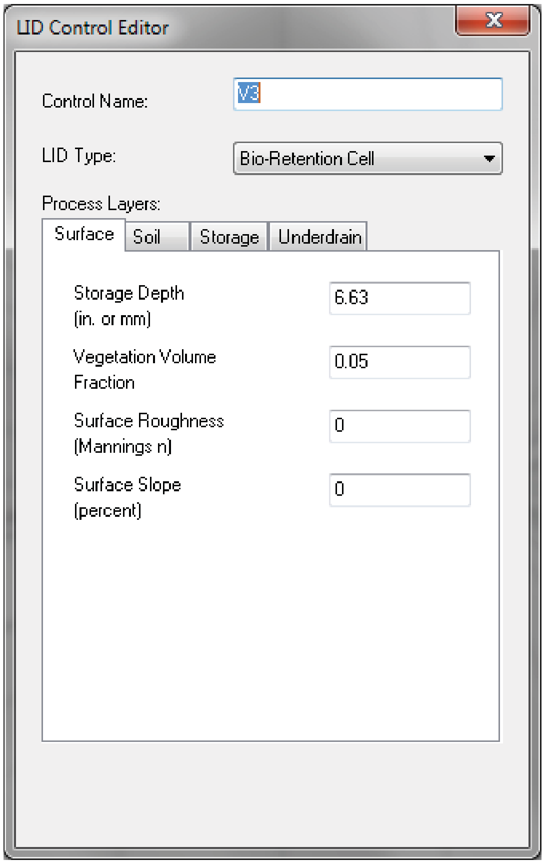

LID Control Editor
Control Name:
V1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.0219
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK

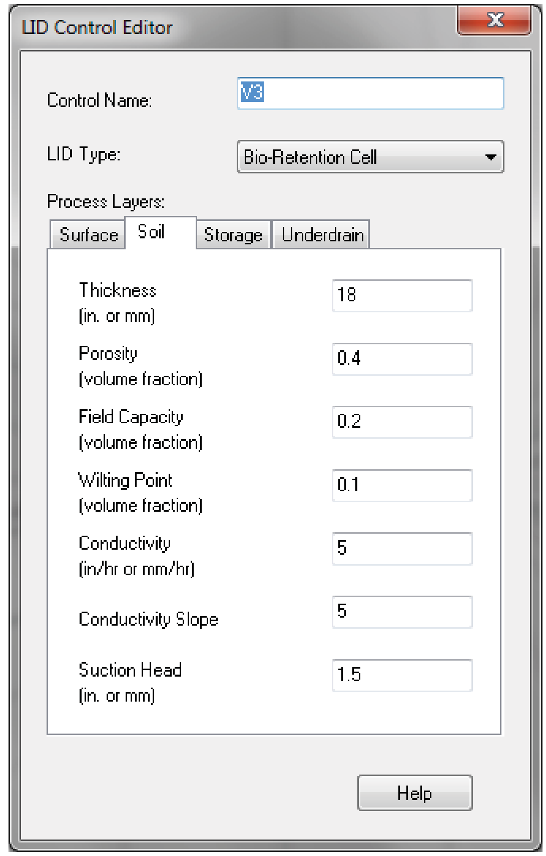

LID Control Editor
Control Name: V2
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 6.29
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

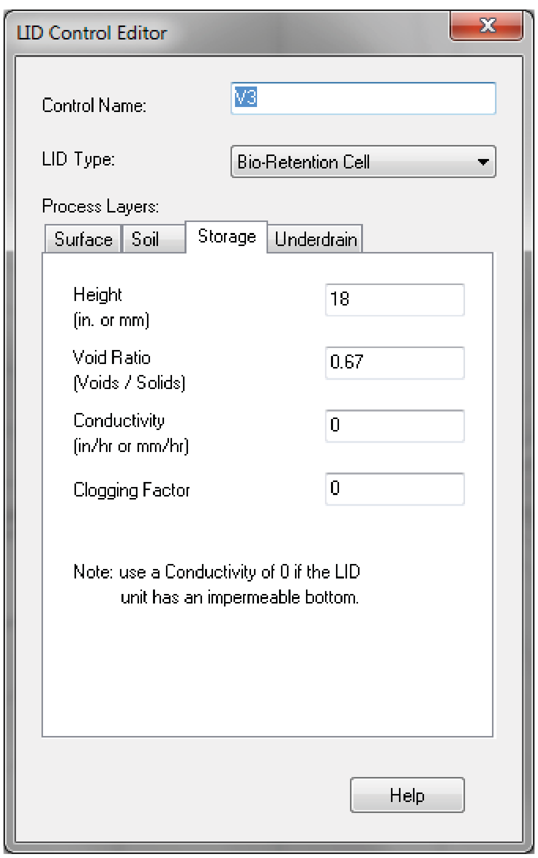

LID Control Editor
Control Name: V2
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

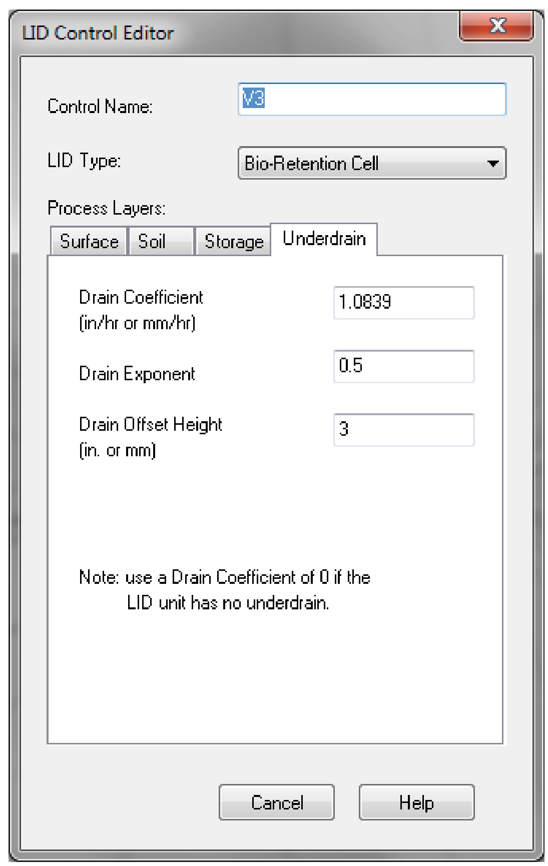

LID Control Editor
Control Name: V2
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

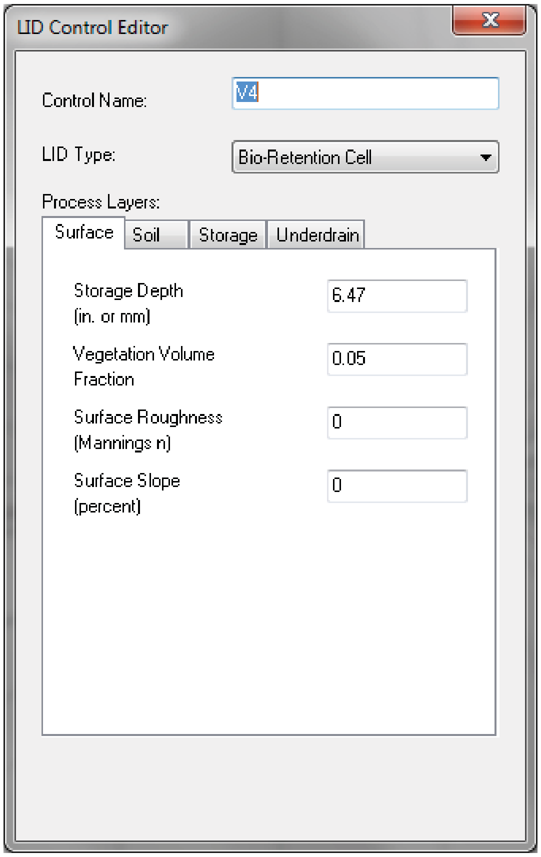

LID Control Editor
Control Name: V2
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 1.02625
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.

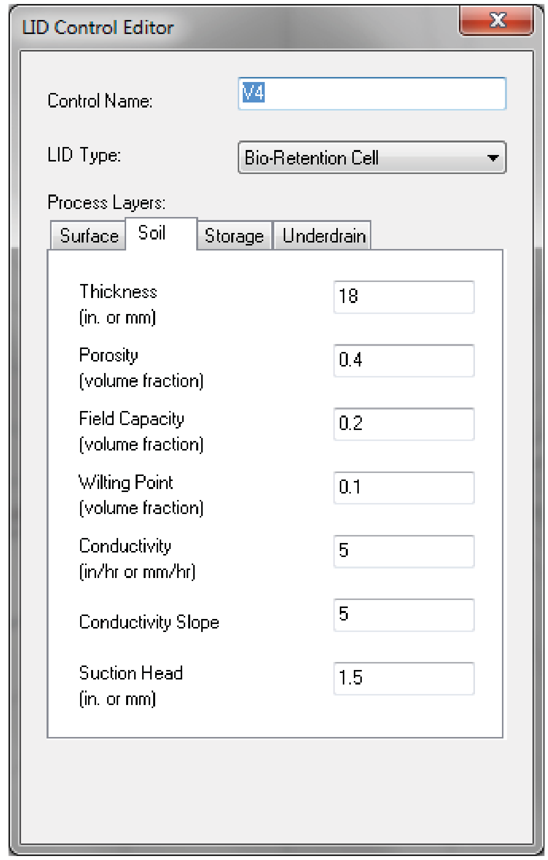

LID Control Editor
Control Name:
V3
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.63
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

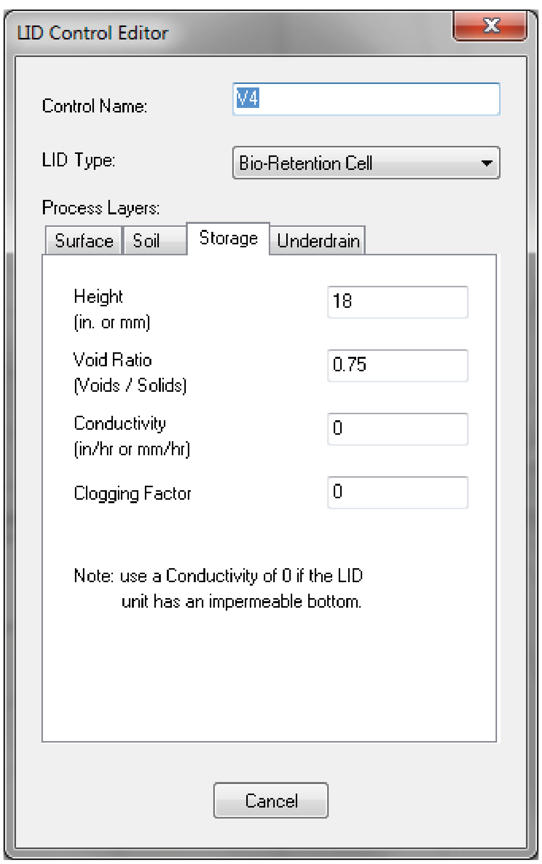

LID Control Editor
Control Name:
V3
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
Help

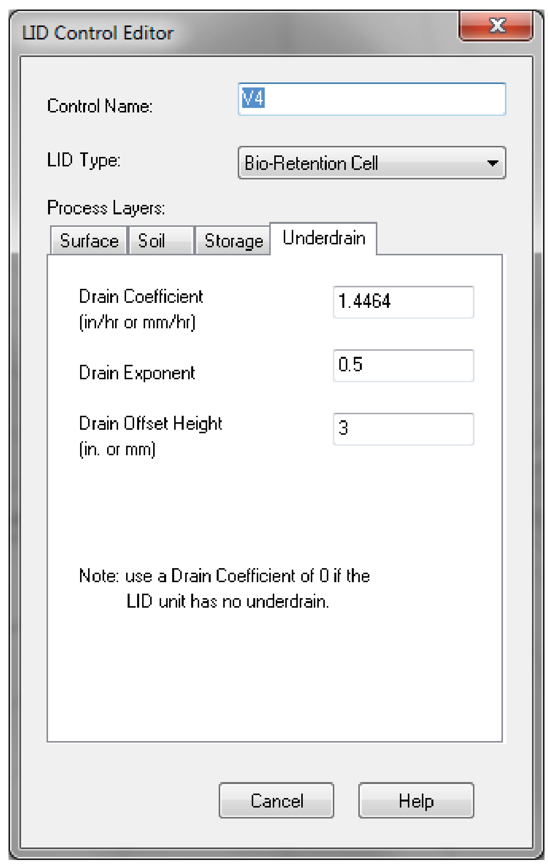

LID Control Editor
Control Name:
V3
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
Help

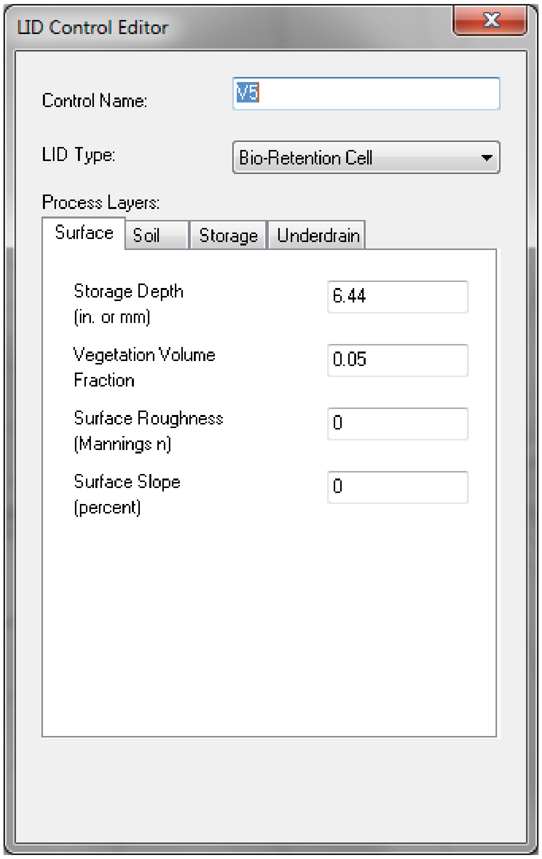

LID Control Editor
Control Name:
V3
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.0839
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel
Help

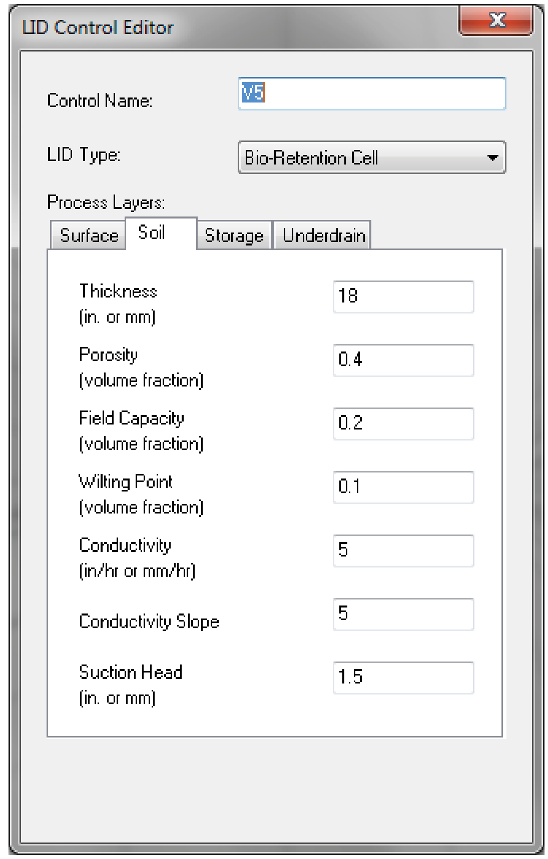

LID Control Editor
Control Name:
V4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm)
6.47
Vegetation Volume Fraction
0.05
Surface Roughness (Mannings n)
0
Surface Slope (percent)
0

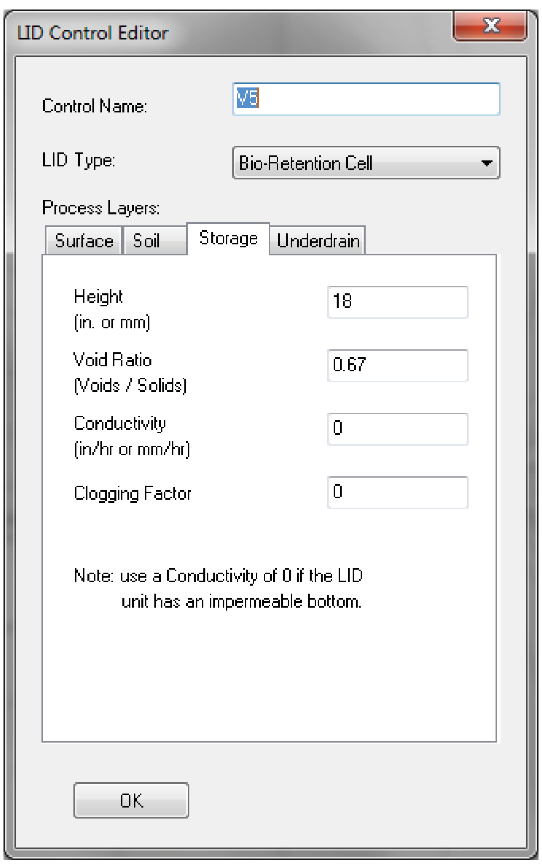

LID Control Editor
Control Name:
V4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm)
18
Porosity (volume fraction)
0.4
Field Capacity (volume fraction)
0.2
Wilting Point (volume fraction)
0.1
Conductivity (in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head (in. or mm)
1.5

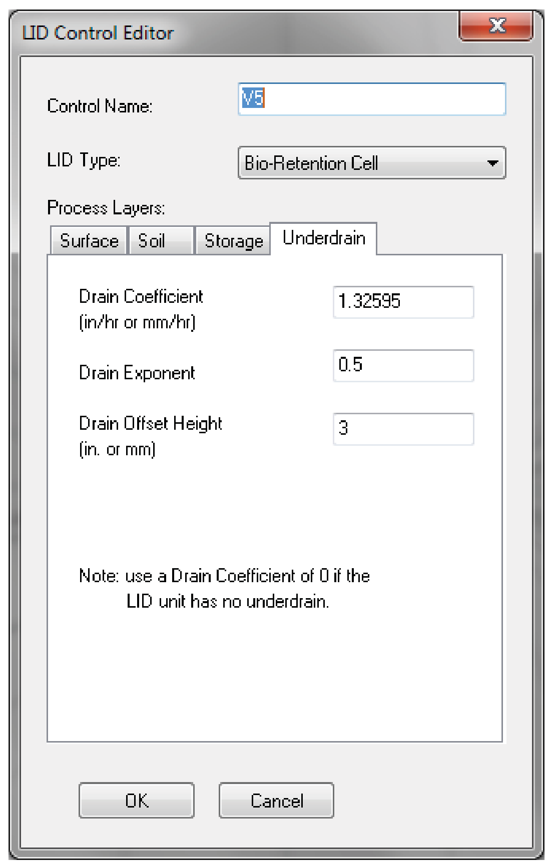

LID Control Editor
Control Name:
V4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm)
18
Void Ratio (Voids / Solids)
0.75
Conductivity (in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
Cancel

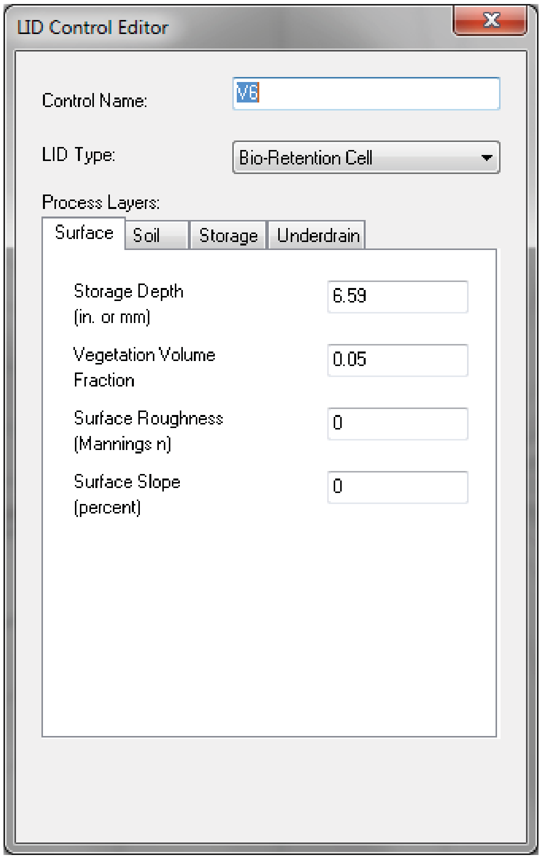

LID Control Editor
Control Name:
V4
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr)
1.4464
Drain Exponent
0.5
Drain Offset Height (in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel
Help

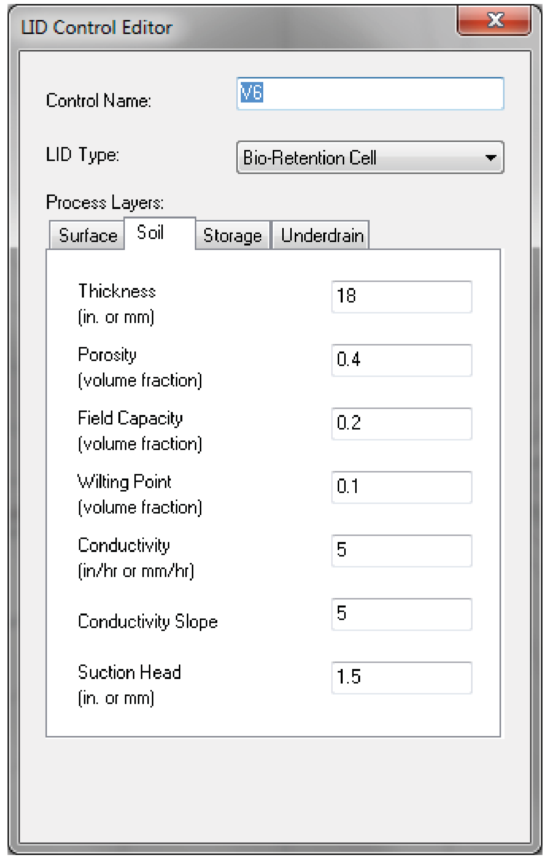

LID Control Editor
Control Name:
V5
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.44
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

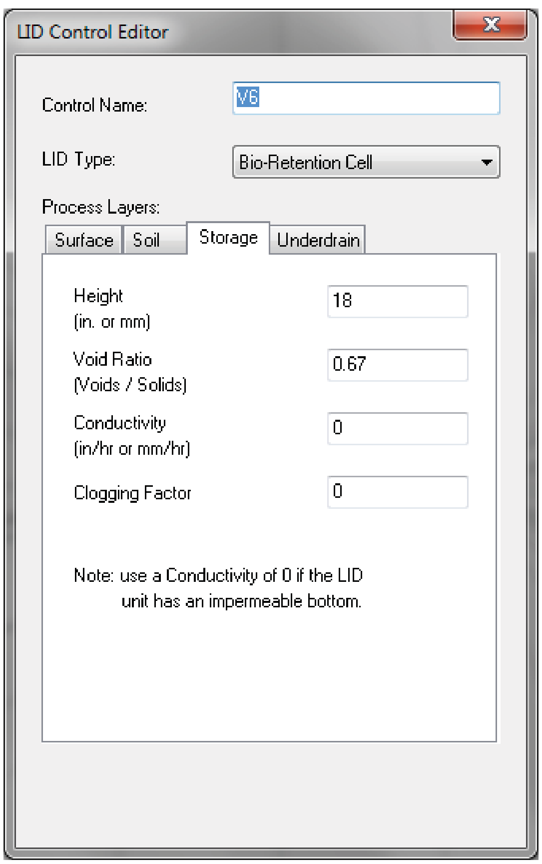

LID Control Editor
Control Name:
V5
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

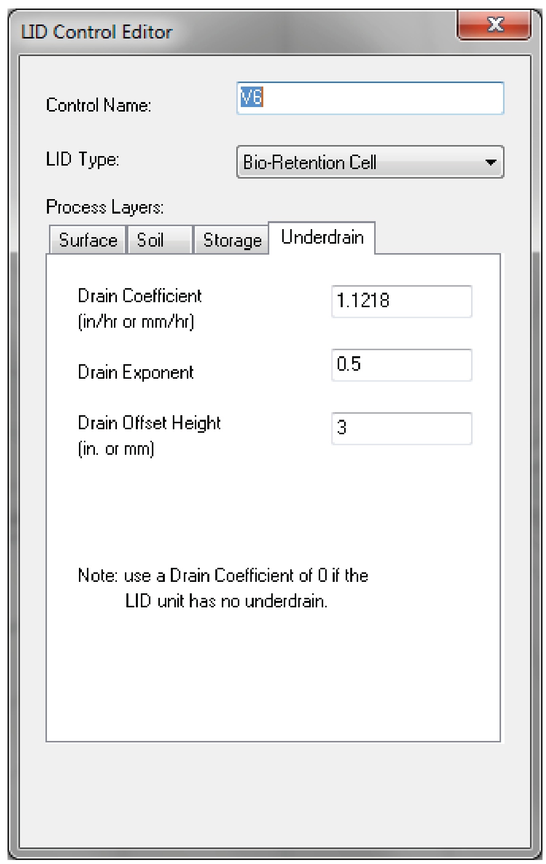

LID Control Editor
Control Name:
V5
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK

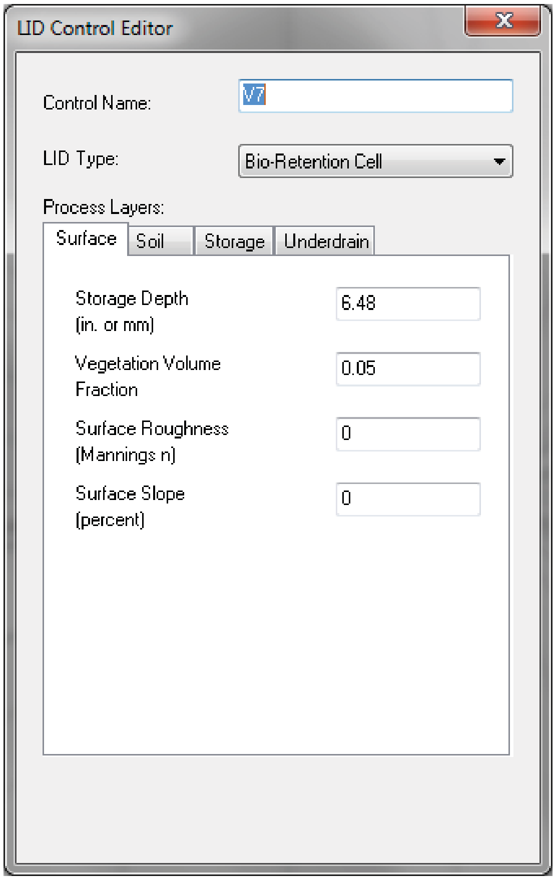

LID Control Editor
Control Name:
V5
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.32595
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel

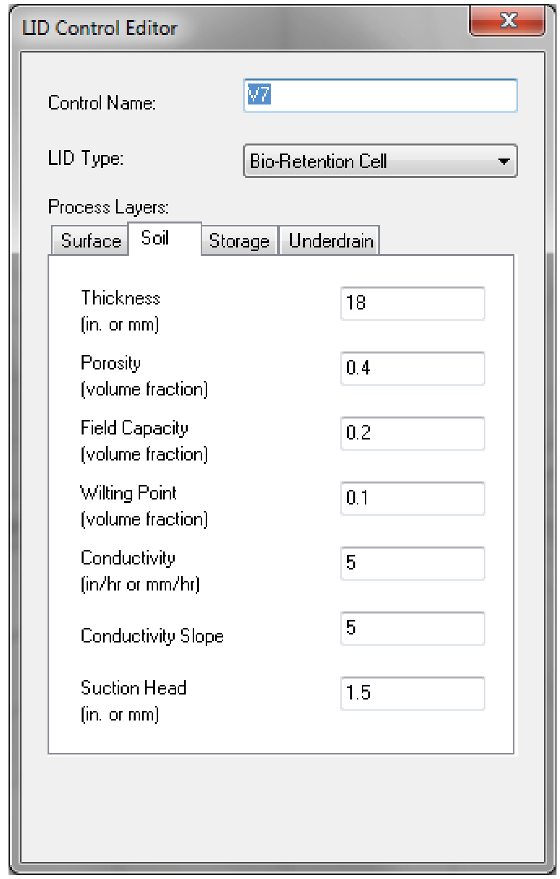

LID Control Editor
Control Name:
V6
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm)
6.59
Vegetation Volume Fraction
0.05
Surface Roughness (Mannings n)
0
Surface Slope (percent)
0

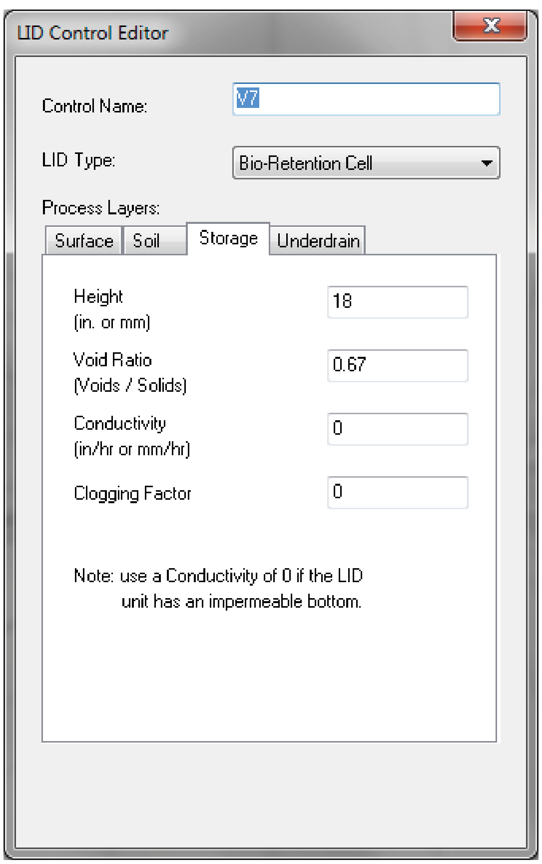

LID Control Editor
Control Name:
V6
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm)
18
Porosity (volume fraction)
0.4
Field Capacity (volume fraction)
0.2
Wilting Point (volume fraction)
0.1
Conductivity (in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head (in. or mm)
1.5

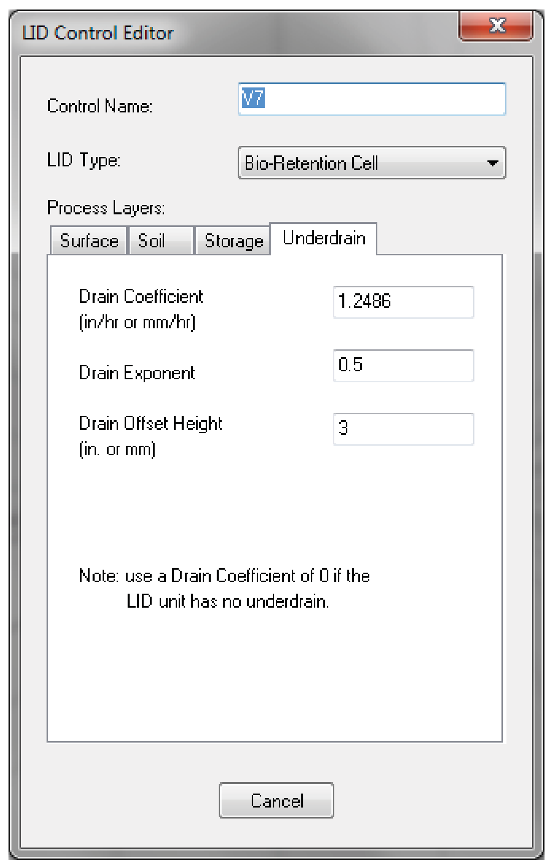

LID Control Editor
Control Name:
V6
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm)
18
Void Ratio (Voids / Solids)
0.67
Conductivity (in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

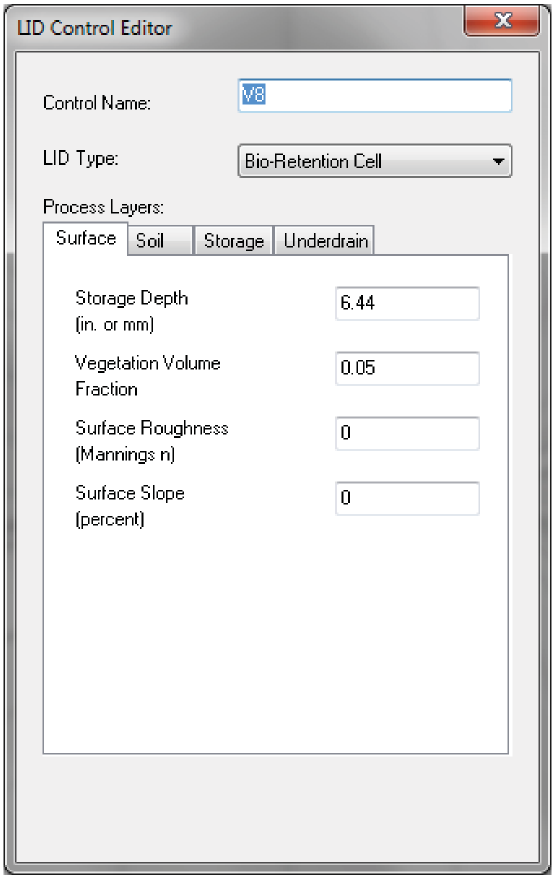

LID Control Editor
Control Name:
V6
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr)
1.1218
Drain Exponent
0.5
Drain Offset Height (in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.

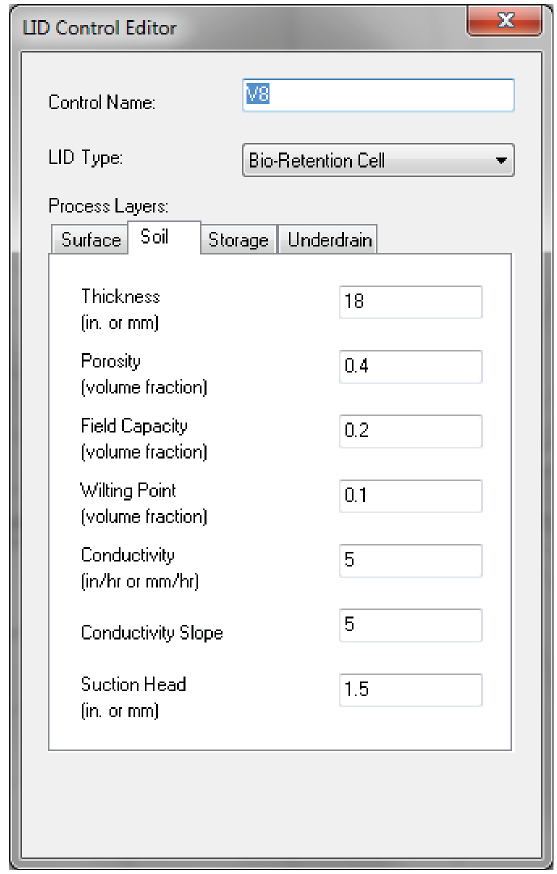

LID Control Editor
Control Name:
V7
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.48
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

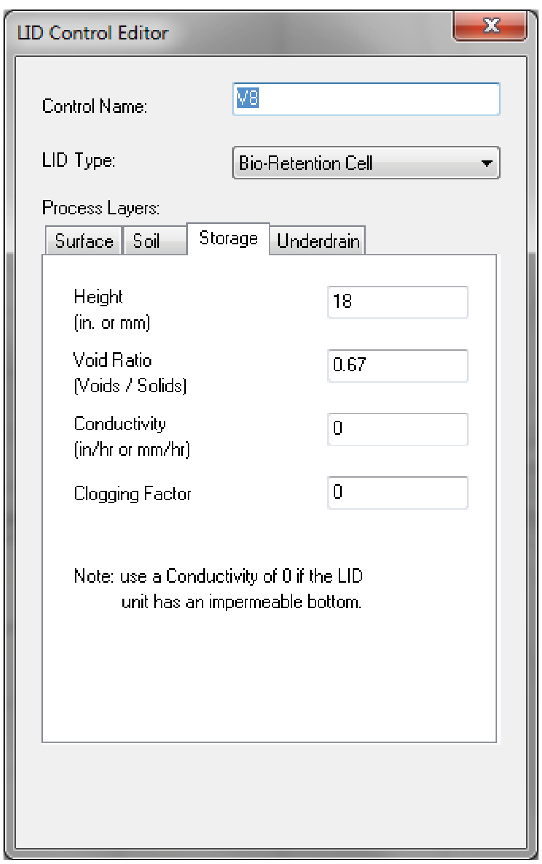

LID Control Editor
Control Name:
V7
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

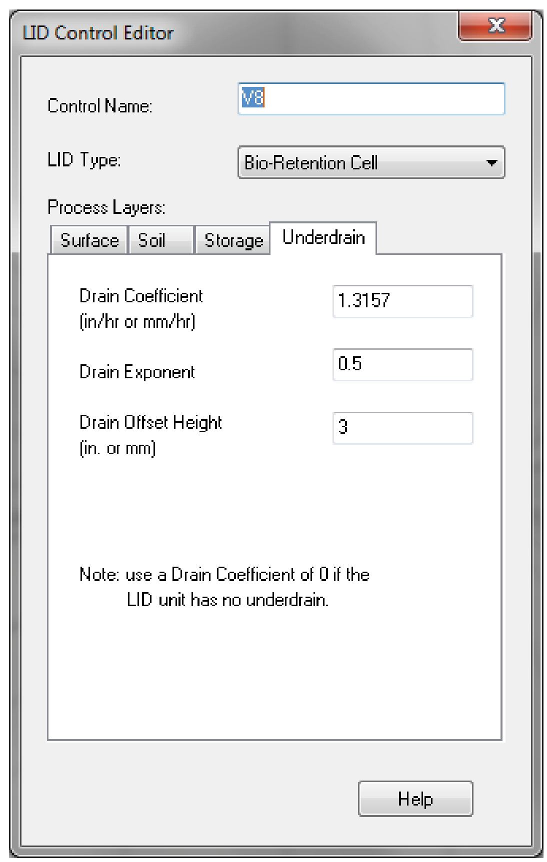

LID Control Editor
Control Name:
V7
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

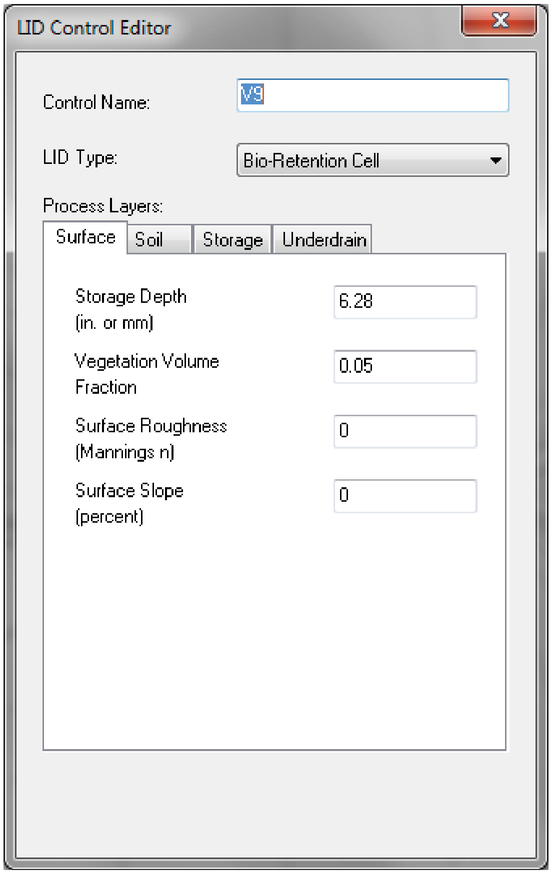

LID Control Editor
Control Name:
V7
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.2486
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
Cancel

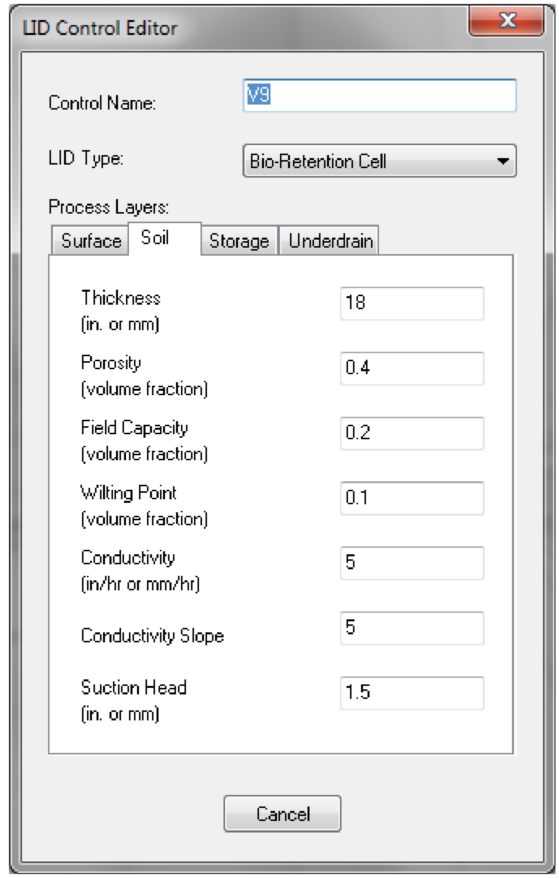

LID Control Editor
Control Name:
V8
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.44
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

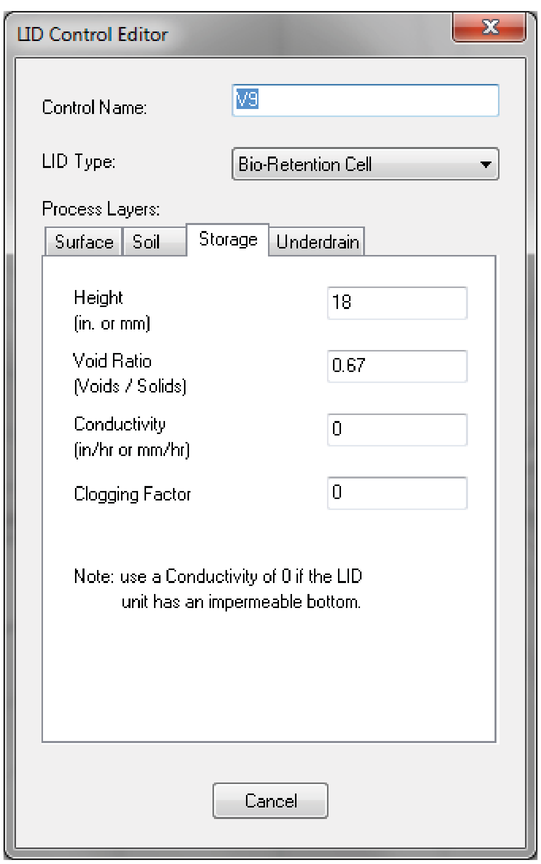

LID Control Editor
Control Name:
V8
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5

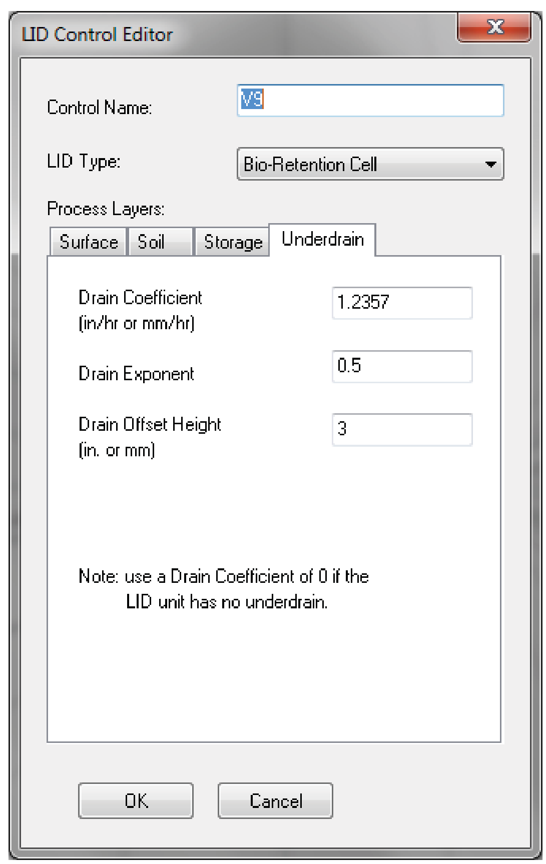

LID Control Editor
Control Name:
V8
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

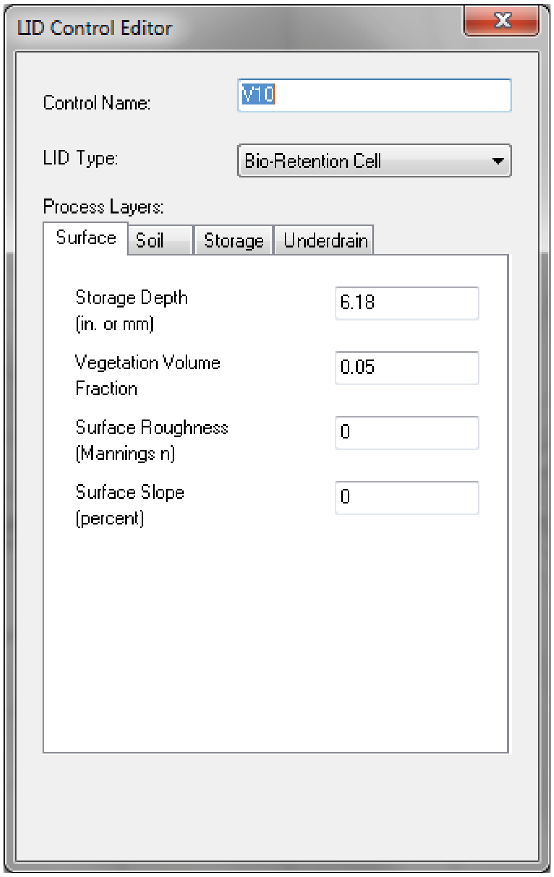

LID Control Editor
Control Name:
V8
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.3157
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
Help

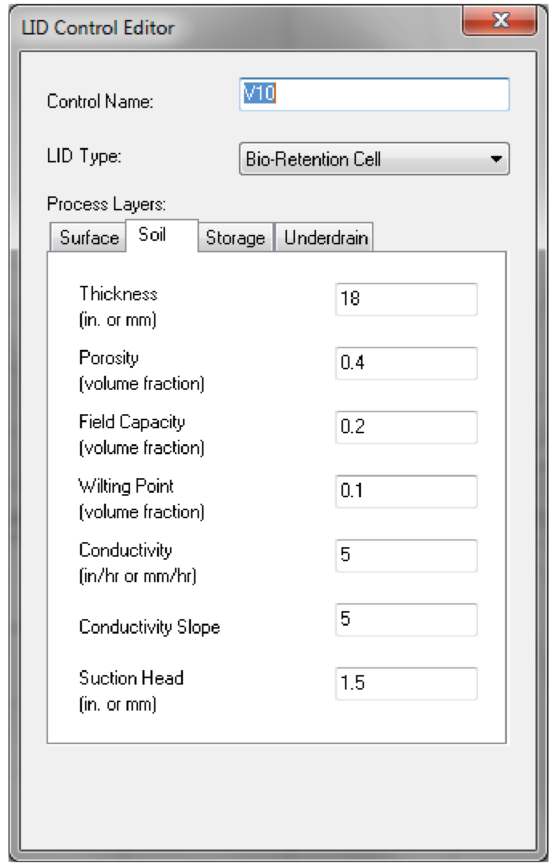

LID Control Editor
Control Name:
V9
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.28
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

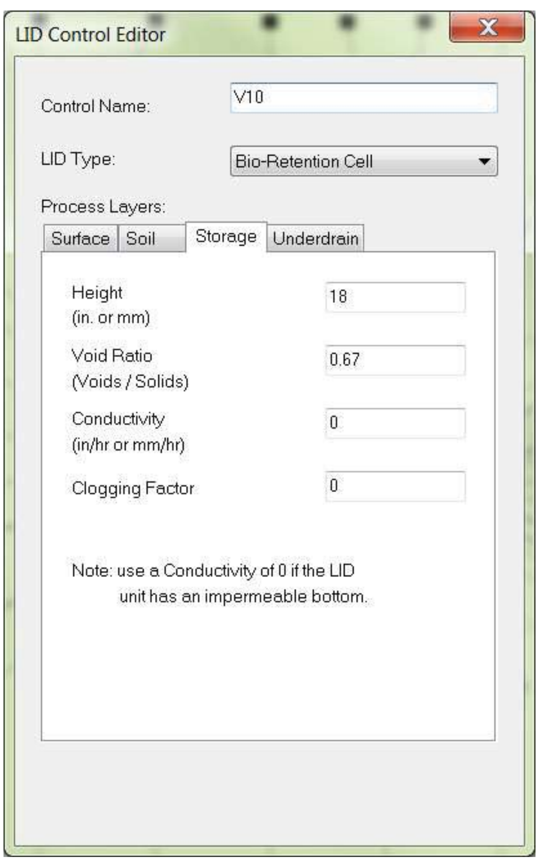

LID Control Editor
Control Name:
V9
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
Cancel

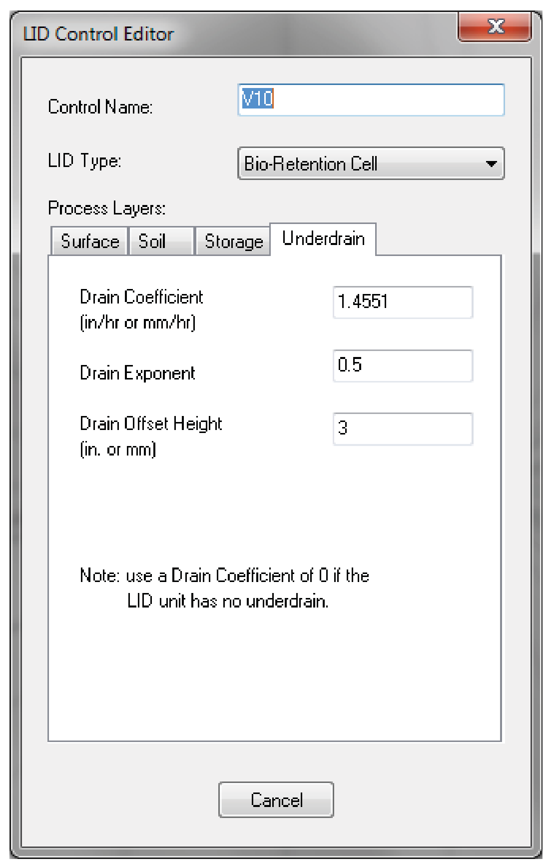

LID Control Editor
Control Name:
V9
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
Cancel

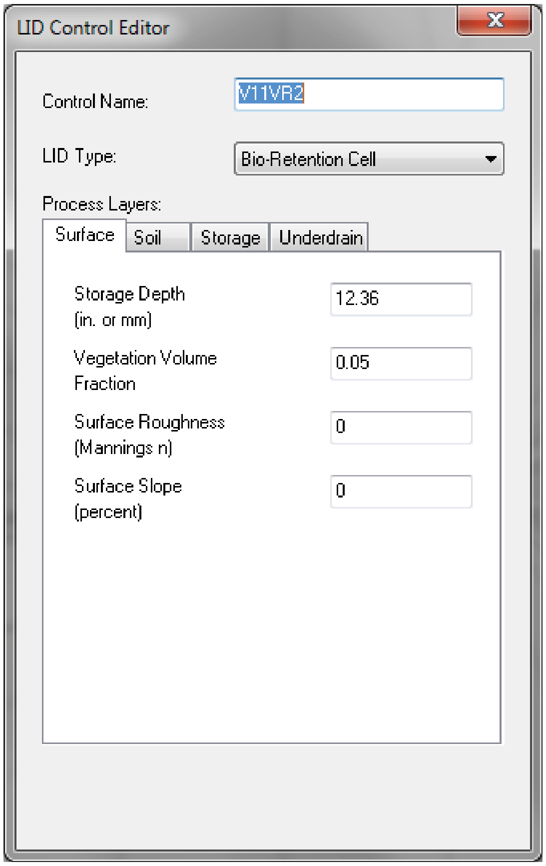

LID Control Editor
Control Name:
V9
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.2357
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel

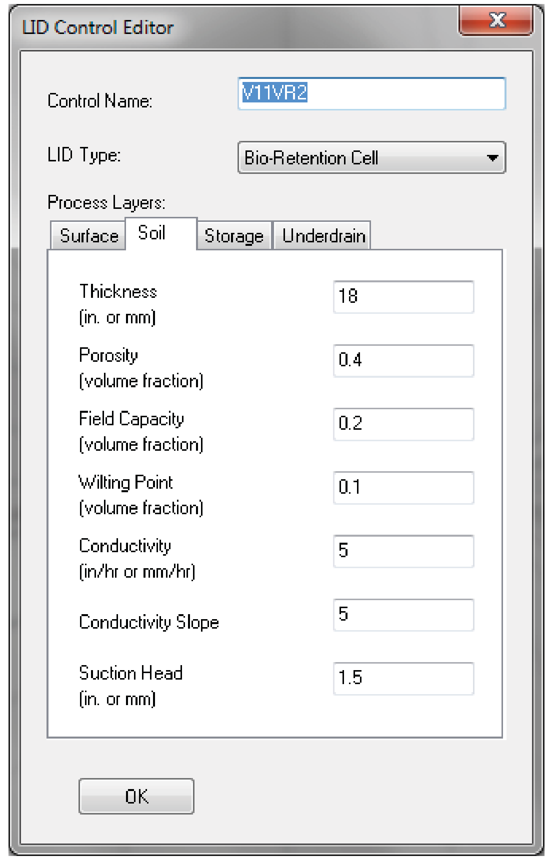

LID Control Editor
Control Name: V10
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 6.18
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

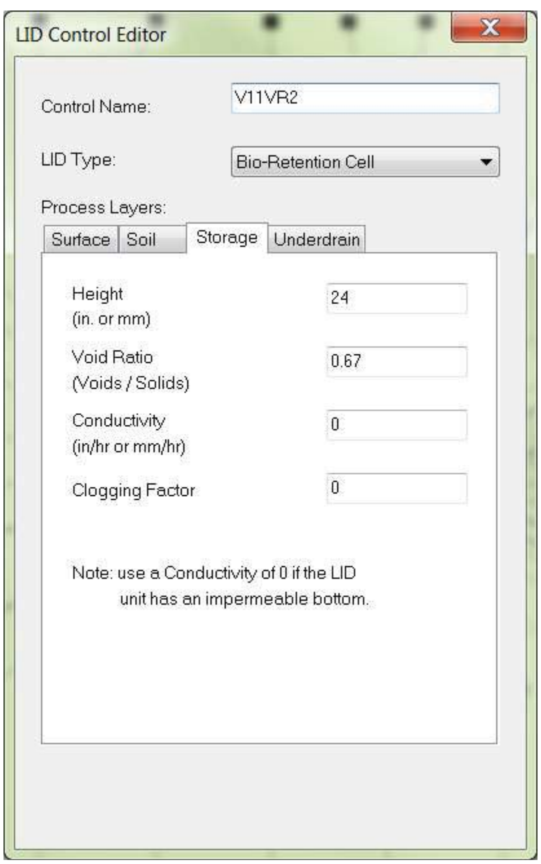

LID Control Editor
Control Name: V10
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

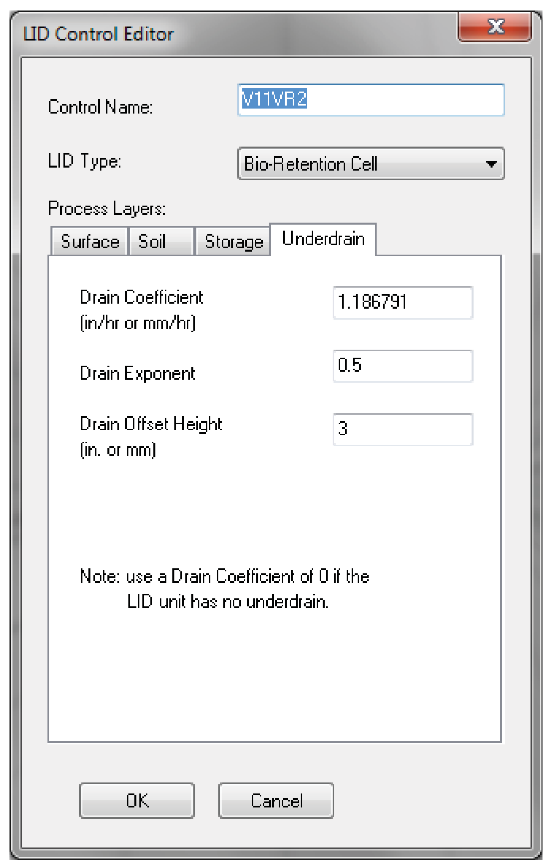

LID Control Editor
Control Name: V10
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

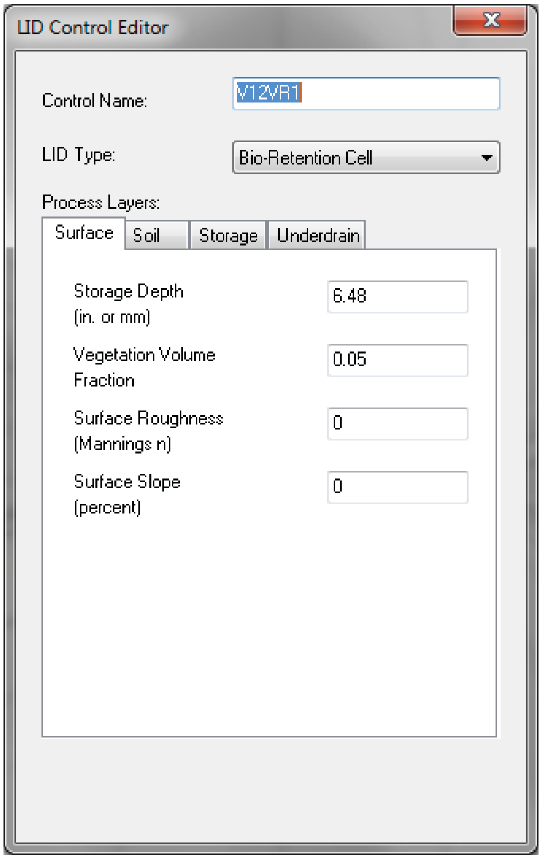

LID Control Editor
Control Name: V10
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 1.4551
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel

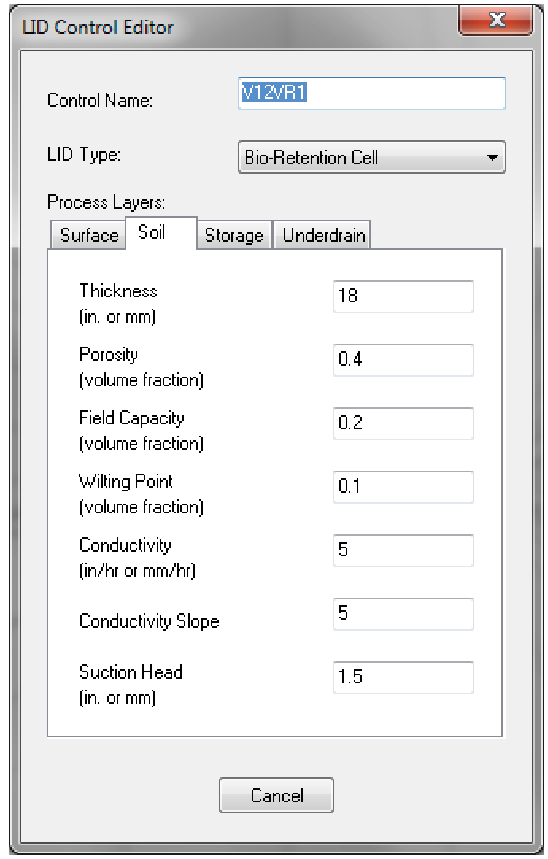

LID Control Editor
Control Name:
V11VR2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
12.36
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

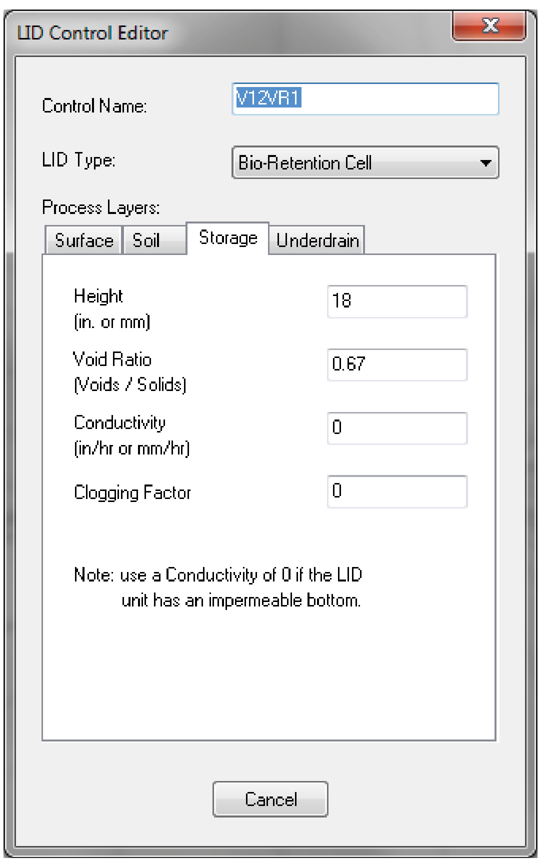

LID Control Editor
Control Name:
V11VR2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK

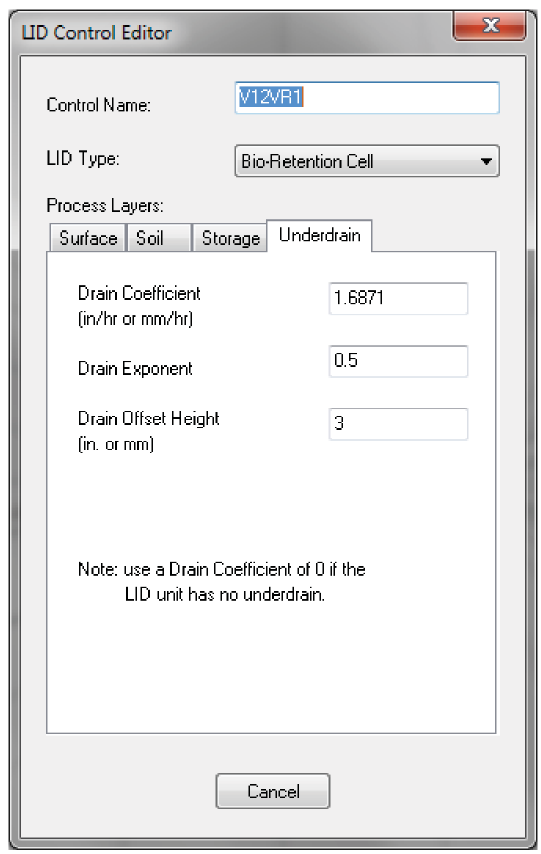

LID Control Editor
Control Name:
V11VR2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
24
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

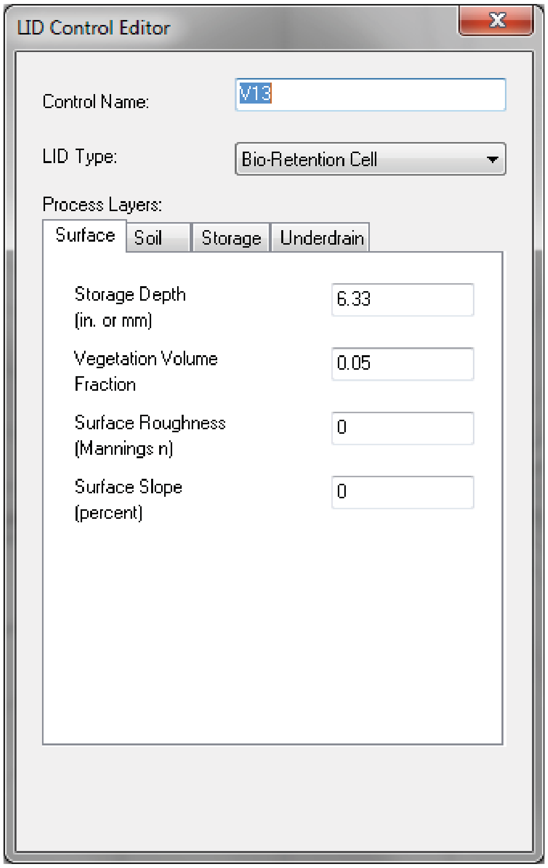

LID Control Editor
Control Name:
V11VR2
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.186791
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel

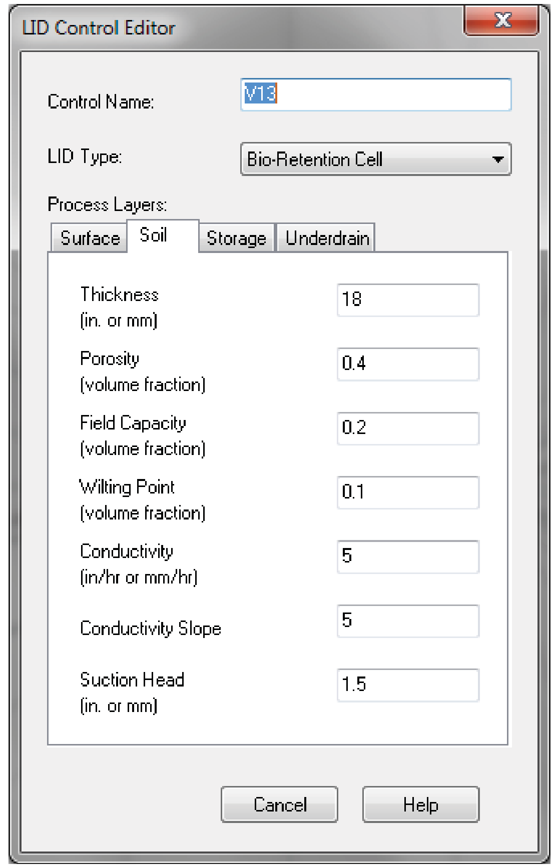

LID Control Editor
Control Name:
V12VR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm)
6.48
Vegetation Volume Fraction
0.05
Surface Roughness (Mannings n)
0
Surface Slope (percent)
0

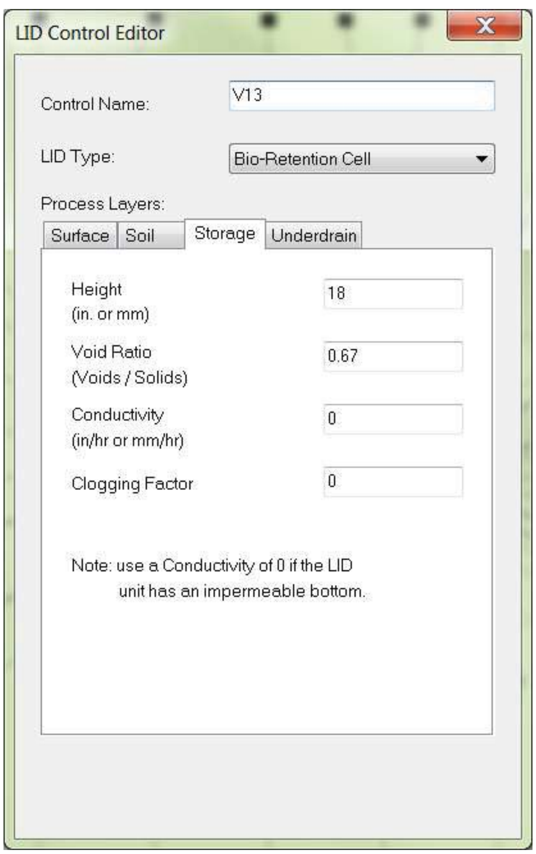

LID Control Editor
Control Name:
V12VR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm)
18
Porosity (volume fraction)
0.4
Field Capacity (volume fraction)
0.2
Wilting Point (volume fraction)
0.1
Conductivity (in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head (in. or mm)
1.5
Cancel

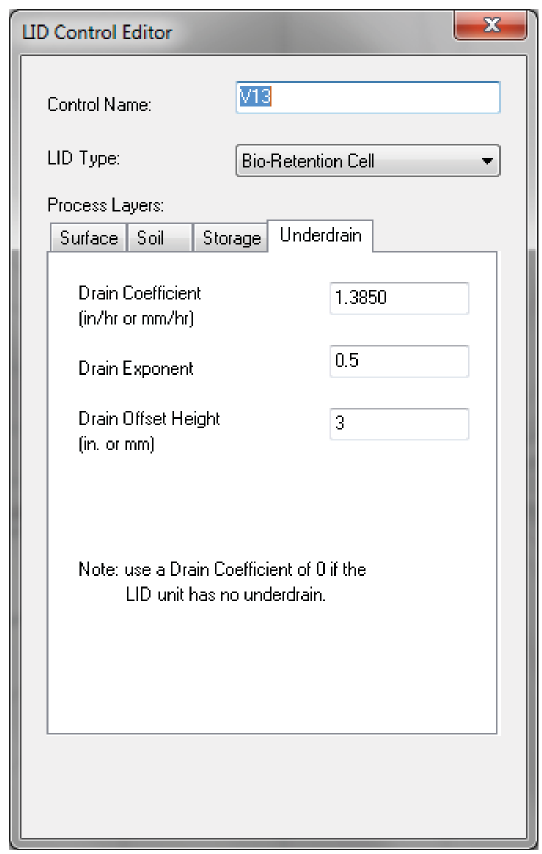

LID Control Editor
Control Name:
V12VR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm)
18
Void Ratio (Voids / Solids)
0.67
Conductivity (in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
Cancel

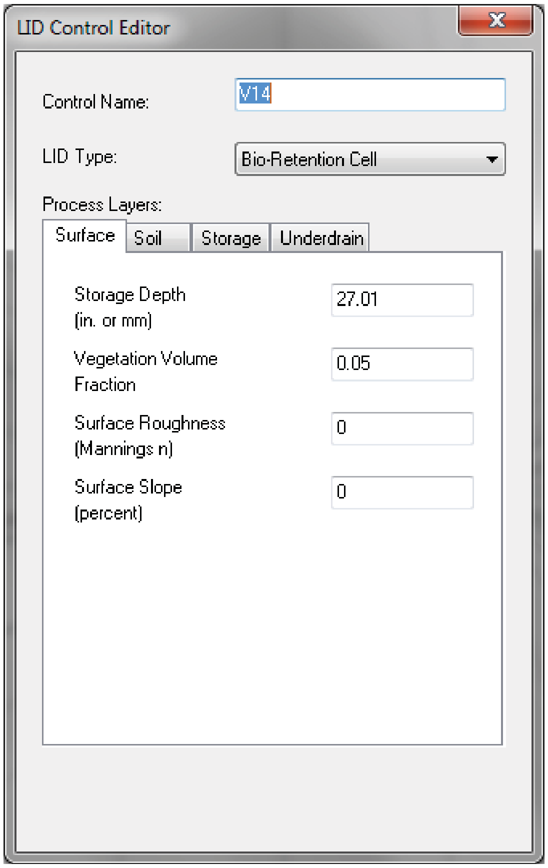

LID Control Editor
Control Name:
V12VR1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr)
1.6871
Drain Exponent
0.5
Drain Offset Height (in. or mm)
3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel

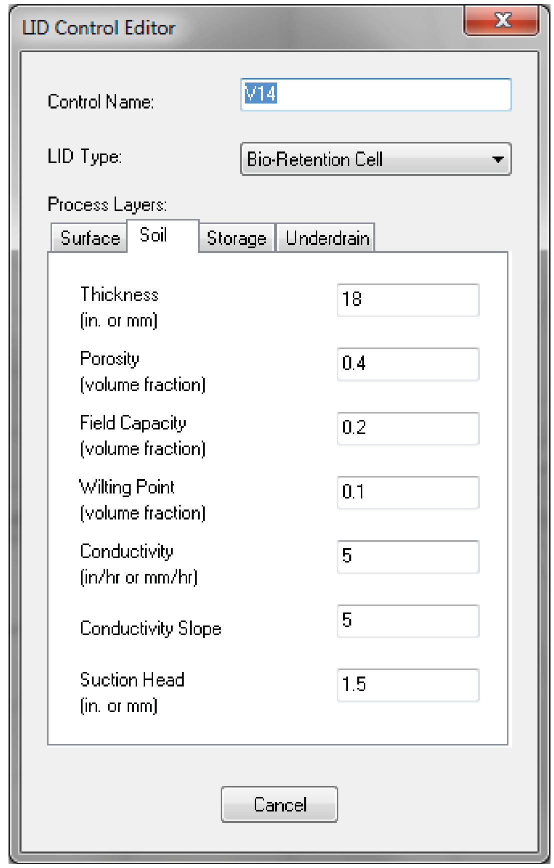

LID Control Editor
Control Name:
V13
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
6.33
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0
Surface Slope
(percent)
0

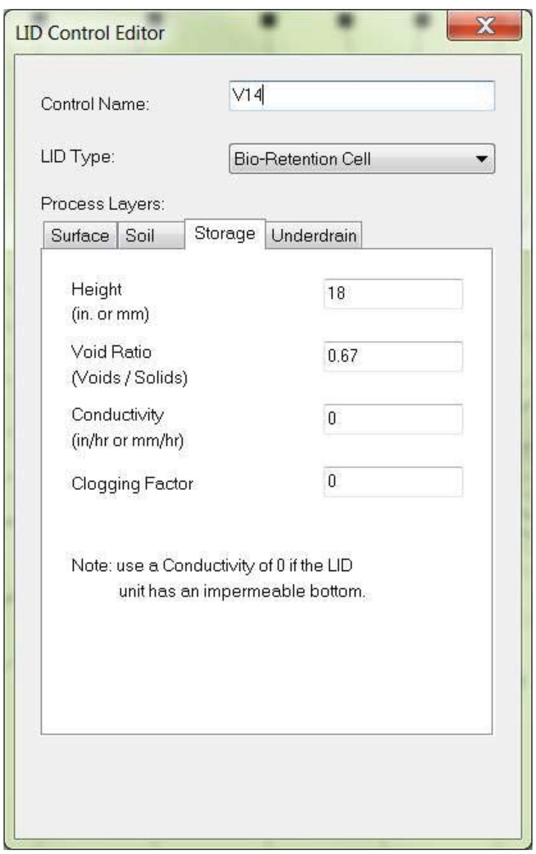

LID Control Editor
Control Name:
V13
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
Cancel
Help

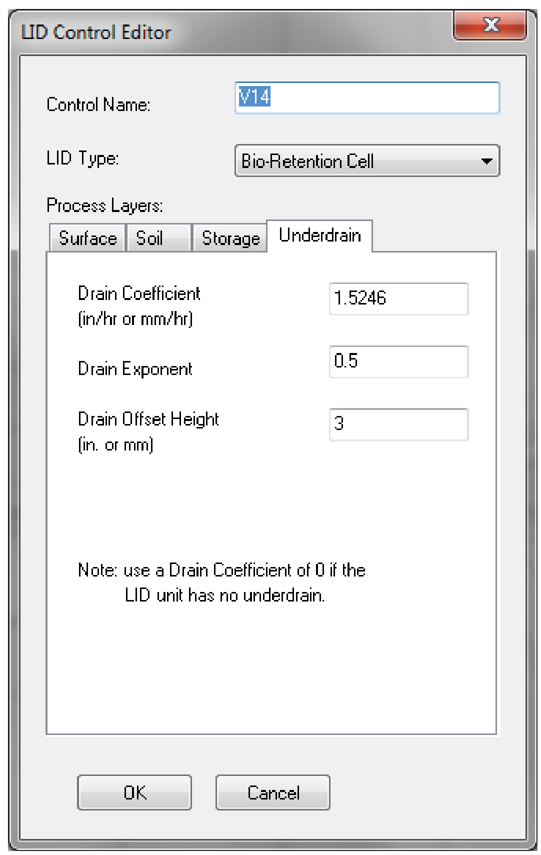

LID Control Editor
Control Name:
V13
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
0.67
Conductivity
(in/hr or mm/hr)
0
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.

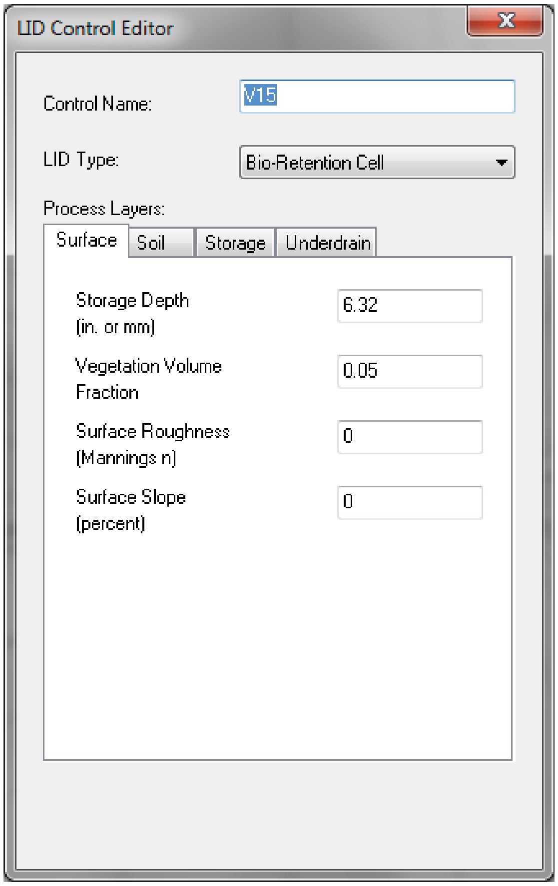

LID Control Editor
Control Name:
V13
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
1.3850
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
3
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.

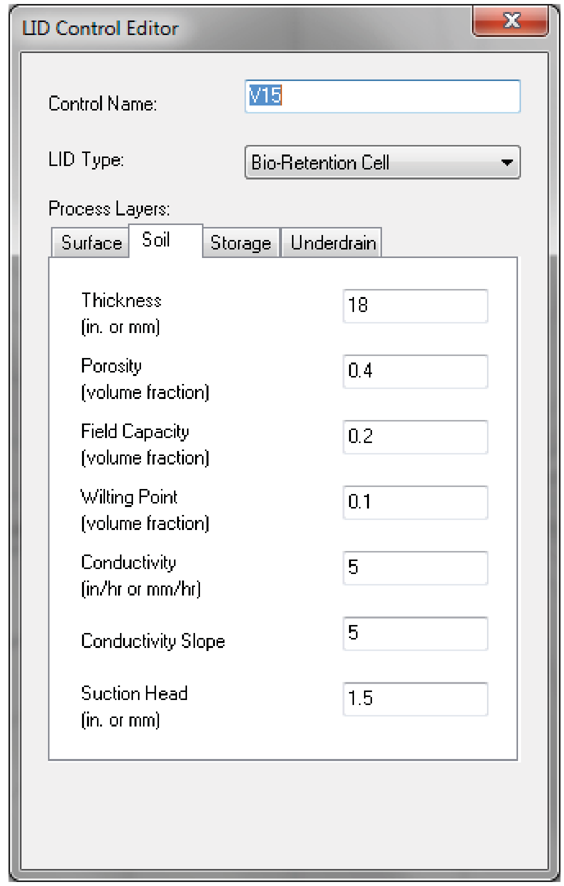

LID Control Editor
Control Name: V14
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 27.01
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

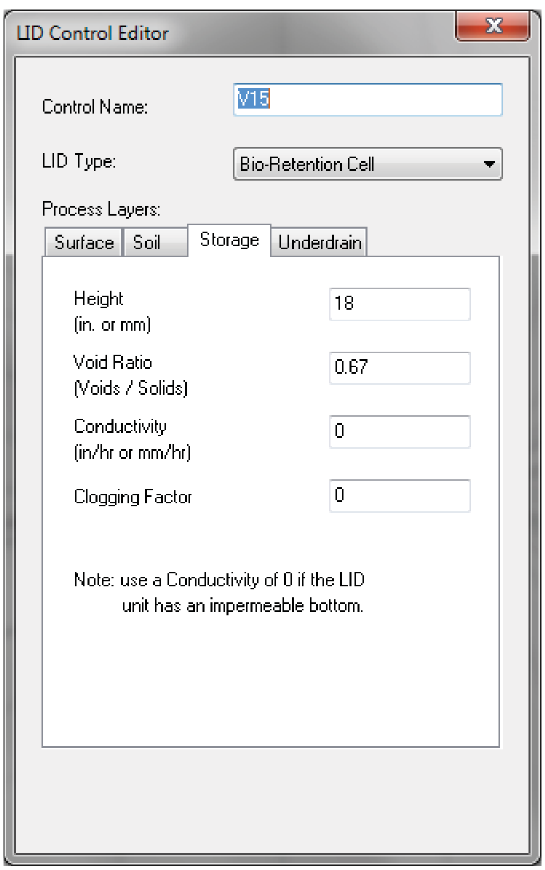

LID Control Editor
Control Name: V14
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5
Cancel

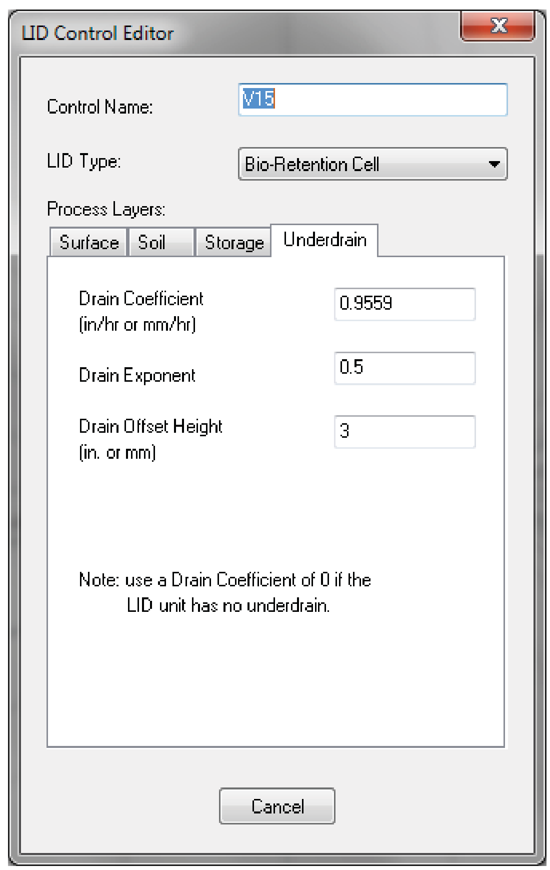

LID Control Editor
Control Name: V14
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.

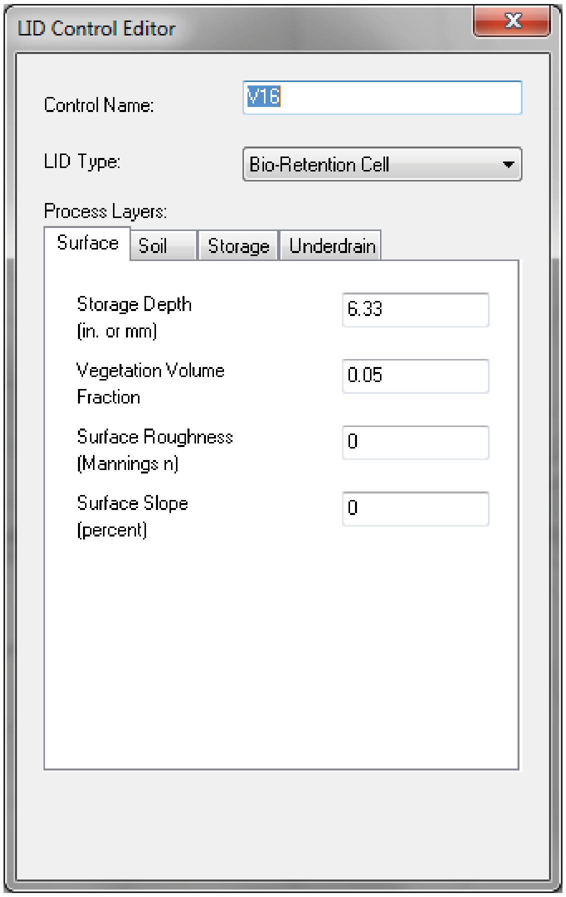

LID Control Editor
Control Name: V14
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 1.5246
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK Cancel

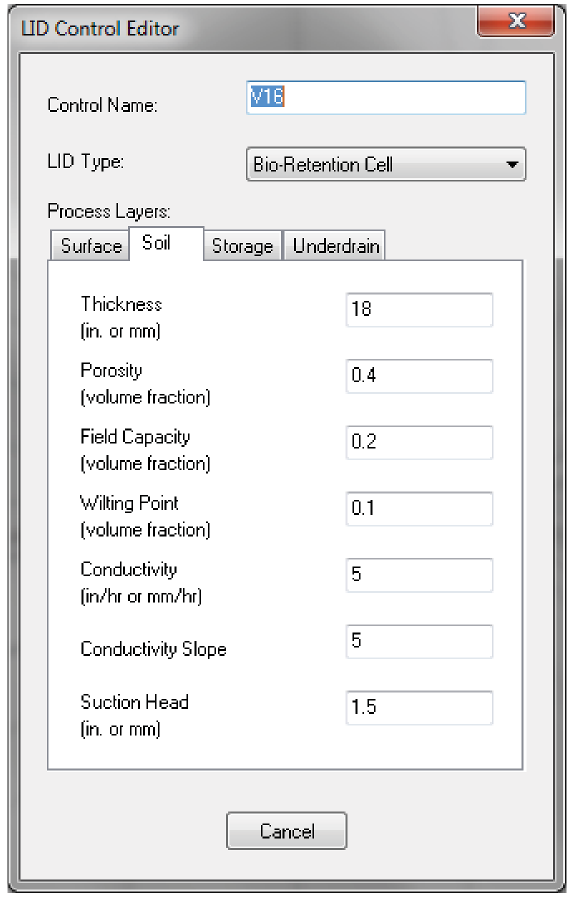

LID Control Editor
Control Name: V15
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 6.32
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0

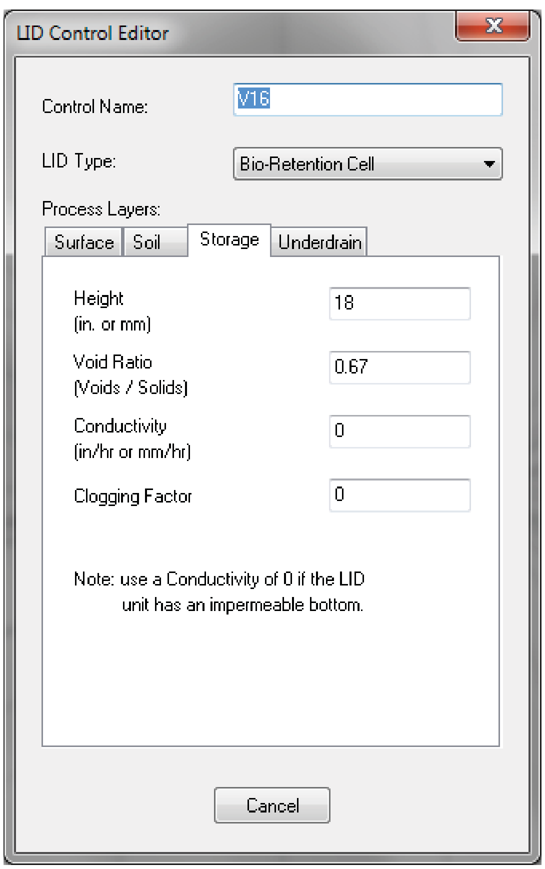

LID Control Editor
Control Name: V15
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5

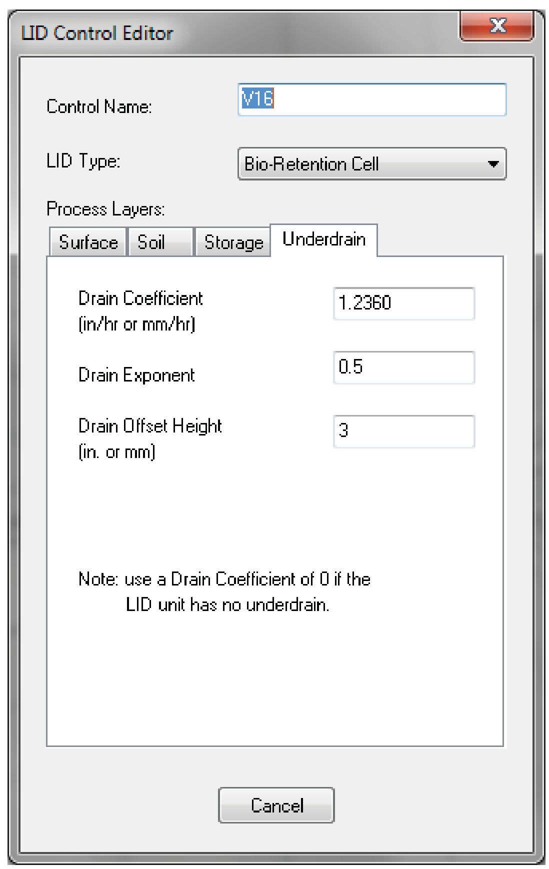

LID Control Editor
Control Name: V15
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.


LID Control Editor
Control Name: V15
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 0.9559
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel


LID Control Editor
Control Name: V16
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth (in. or mm) 6.33
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0
Surface Slope (percent) 0


LID Control Editor
Control Name: V16
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5
Cancel


LID Control Editor
Control Name: V16
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 0.67
Conductivity (in/hr or mm/hr) 0
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
Cancel


LID Control Editor
Control Name: V16
LID Type: Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient (in/hr or mm/hr) 1.2360
Drain Exponent 0.5
Drain Offset Height (in. or mm) 3
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
Cancel

LID Control Editor: Explanation of Significant Variables

Storage Depth:

The storage depth variable within the SWMM model is representative of the storage volume provided beneath the first surface riser outlet and the engineered soil and mulch components of the bioretention facility.

In those cases where the surface storage has a variable area that is also different to the area of the gravel and amended soil, the SWMM model needs to be calibrated as the LID module will use the storage depth multiplied by the BMP area as the amount of volume stored at the surface.

Let A_{BMP} be the area of the BMP (area of amended soil and area of gravel). The proper value of the storage depth S_D to be included in the LID module can be calculated by using geometric properties of the surface volume. Let A_0 be the surface area at the bottom of the surface pond, and let A_i be the surface area at the elevation of the invert of the first row of orifices (or at the invert of the riser if not surface orifices are included). Finally, let h_i be the difference in elevation between A_0 and A_i. By volumetric definition:

$$A_{BMP} \cdot S_D = \frac{(A_0+A_i)}{2} h_i \qquad (1)$$

Equation (1) allows the determination of S_D to be included as Storage Depth in the LID module.

Porosity: A porosity value of 0.4 has been selected for the model. The amended soil is to be highly sandy in content in order to have a saturated hydraulic conductivity of approximately 5 in/hr.

REC considers such a value to be slightly high; however, in order to comply with the HMP Permit, the value recommended by the Copermittees for the porosity of amended soil is 0.4, per Appendix A of the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011. Such porosity is equal to the porosity of the gravel per the same document.

Void Ratio: The ratio of the void volume divided by the soil volume is directly related to porosity as n/(1-n). As the underdrain layer is composed of gravel, a porosity value of 0.4 has been selected (also per Appendix A of the Final HMP document), which results in a void ratio of 0.4/(1-0.4) = 0.67 for the gravel detention layer.

Conductivity: BMPs H8HR1, H9HR2, M1MR1K1, V1, V2, V10, V11VR2, V13, and V14 will be unlined to allow for infiltration into the underlying soil. Table-3 on this report shows the conductivity values used to model the infiltration of these basins. The remaining BMPs will be lined to prevent any infiltration into the underlying soil and therefore will have a conductivity of 0.00 in/hr.

Clogging factor: A clogging factor was not used (0 indicates that there is no clogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMP sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

Drain (Flow) coefficient: The flow coefficient C in the SWMM Model is the coefficient needed to transform the orifice equation into a general power law equation of the form:

$$q = C(H - H_D)^n \qquad (2)$$

where q is the peak flow in in/hr, n is the exponent (typically 0.5 for orifice equation), H_D is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and in our design equal to 0) and H is the depth of the water in inches.

The general orifice equation can be expressed as:

$$Q = \frac{\pi}{4} c_g \frac{D^2}{144} \sqrt{2g \frac{(H - H_D)}{12}} \qquad (3)$$

where Q is the peak flow in cfs, D is the diameter in inches, c_g is the typical discharge coefficient for orifices (0.61-0.63 for thin walls and around 0.75-0.8 for thick walls), g is the acceleration of gravity in ft/s^2, and H and H_D are defined above and are also used in inches in Equation (3).

It is clear that:

$$q \left(\frac{in}{hr}\right) X \frac{A_{BMP}}{12 \; X \; 3600} = Q \; (cfs) \qquad (4)$$

Surface Storage and Rating curves

Storage Unit Basin14

Property	Value
Name	Basin14
X-Coordinate	7000.000
Y-Coordinate	4000.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	8
Initial Depth	0
Ponded Area	19705
Evap. Factor	1
Infiltration	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	Basin14

User-assigned name of storage unit

Outlet Out14

Property	Value
Name	Out14
Inlet Node	Basin14
Outlet Node	POC-25
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	Out14

User-assigned name of outlet

Storage Curve Editor

Curve Name: Basin14

Description:

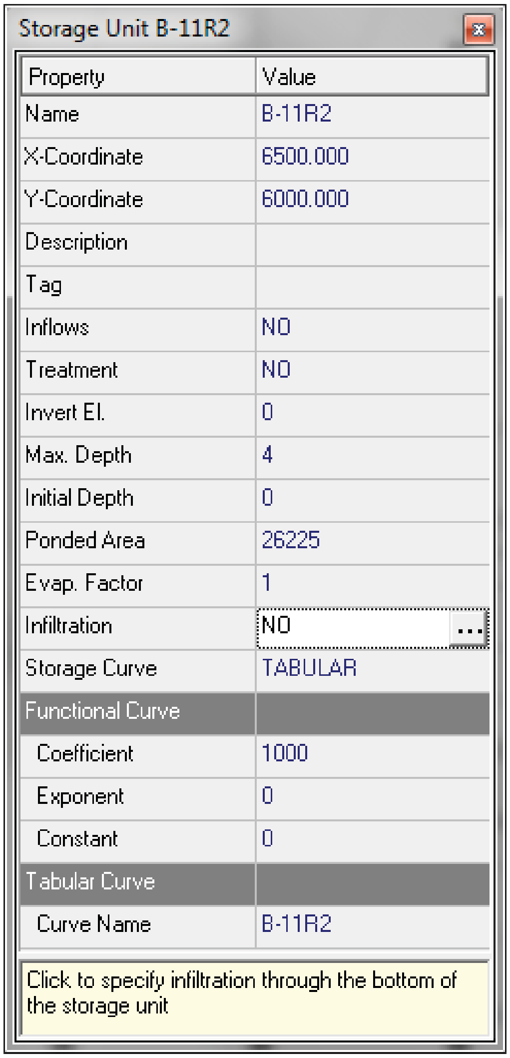
	Depth (ft)	Area (ft2)
1	0.00	9847
2	0.25	10100
3	0.50	10355
4	0.75	10611
5	1.00	10868
6	1.25	11126
7	1.50	11385
8	1.75	11645
9	2.00	11907

Rating Curve Editor

Curve Name: Out14

Description:

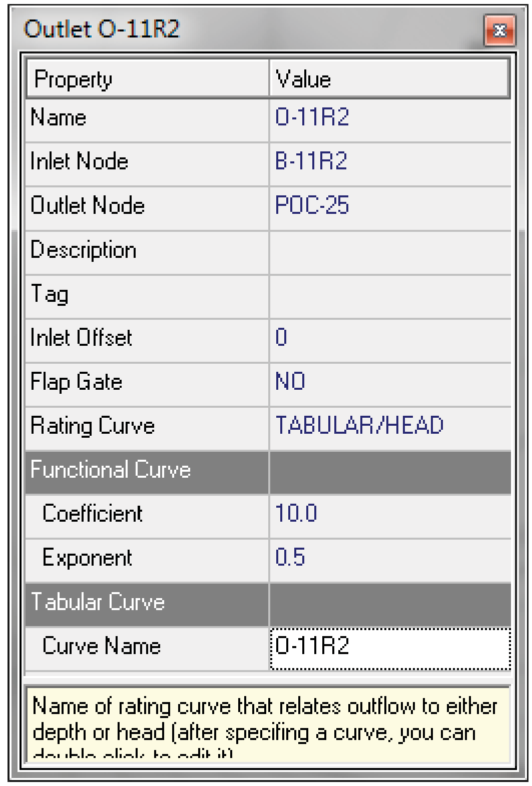
	Head (ft)	Outflow (CFS)
1	0.000	0.000
2	0.083	0.099
3	0.167	0.281
4	0.250	0.517
5	0.333	0.745
6	0.417	0.881
7	0.500	0.999
8	0.583	1.105
9	0.667	1.201



Storage Unit B-11R2

Property	Value
Name	B-11R2
X-Coordinate	6500.000
Y-Coordinate	6000.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	4
Initial Depth	0
Ponded Area	26225
Evap. Factor	1
Infiltration	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	B-11R2

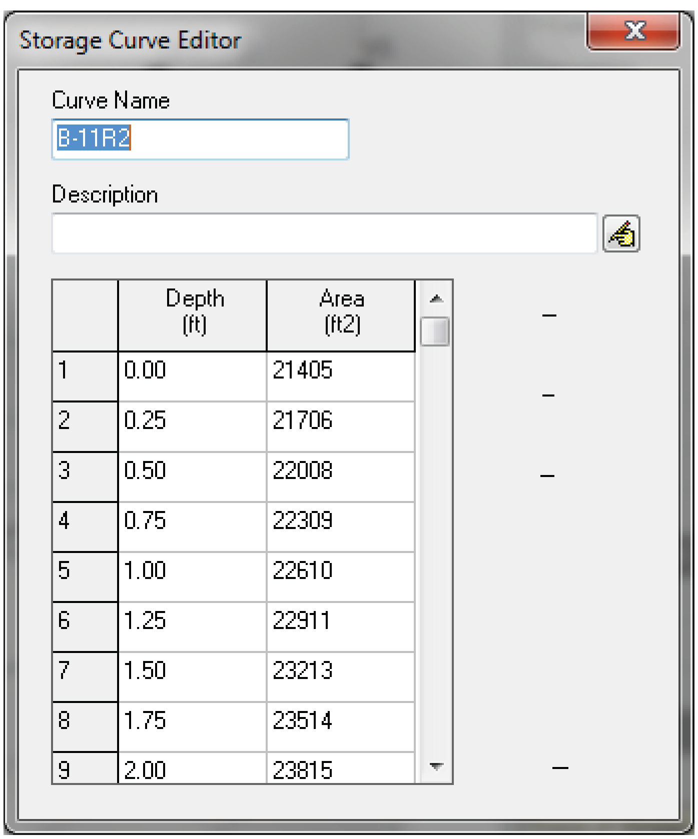
Click to specify infiltration through the bottom of the storage unit



Outlet O-11R2

Property	Value
Name	O-11R2
Inlet Node	B-11R2
Outlet Node	POC-25
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	O-11R2

Name of rating curve that relates outflow to either depth or head (after specifing a curve, you can [illegible]



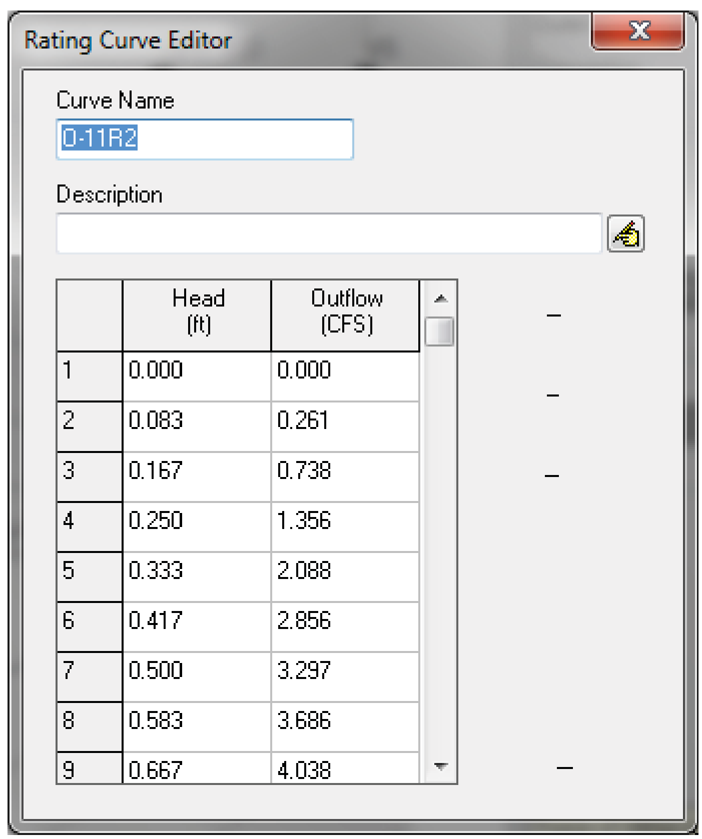
Storage Curve Editor

Curve Name

B-11R2

Description

	Depth (ft)	Area (ft2)
1	0.00	21405
2	0.25	21706
3	0.50	22008
4	0.75	22309
5	1.00	22610
6	1.25	22911
7	1.50	23213
8	1.75	23514
9	2.00	23815



Rating Curve Editor

Curve Name

O-11R2

Description

	Head (ft)	Outflow (CFS)
1	0.000	0.000
2	0.083	0.261
3	0.167	0.738
4	0.250	1.356
5	0.333	2.088
6	0.417	2.856
7	0.500	3.297
8	0.583	3.686
9	0.667	4.038

Storage Unit B-K1

Property	Value
Name	B-K1
X-Coordinate	2500.000
Y-Coordinate	4350.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	8
Initial Depth	0
Ponded Area	154700
Evap. Factor	1
Infiltration	NO ...
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	B-K1

Click to specify infiltration through the bottom of the storage unit

Outlet Out-K1

Property	Value
Name	Out-K1
Inlet Node	B-K1
Outlet Node	POC-25
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	Out-K1

User-assigned name of outlet

Storage Curve Editor

Curve Name: B-K1

Description:

	Depth (ft)	Area (ft2)
1	0.00	107009
2	0.25	108583
3	0.50	110151
4	0.75	111714
5	1.00	113272
6	1.25	114824
7	1.50	116371
8	1.75	117913
9	2.00	119449

Rating Curve Editor

Curve Name: Out-K1

Description:

	Head (ft)	Outflow (CFS)
1	0.000	0.000
2	0.125	0.822
3	0.250	2.325
4	0.375	4.271
5	0.500	6.576
6	0.625	8.993
7	0.750	10.384
8	0.875	11.610
9	1.000	12.718

Overland Flow Manning's Coefficient per TRWE (Reference [6])

appeal of a de facto value, we anticipate that jurisdictions will not be inclined to approve land surfaces other than short prairie grass. Therefore, in order to provide SWMM users with a wider range of land surfaces suitable for local application and to provide Copermittees with confidence in the design parameters, we recommend using the values published by Yen and Chow in Table 3-5 of the EPA SWMM Reference Manual Volume I – Hydrology.

SWMM-Endorsed Values Will Improve Model Quality

In January 2016, the EPA released the SWMM Reference Manual Volume I – Hydrology (SWMM Hydrology Reference Manual). The SWMM Hydrology Reference Manual complements the SWMM 5 User's Manual and SWMM 5 Applications Manual by providing an in-depth description of the program's hydrologic components (EPA 2016). Table 3-5 of the SWMM Hydrology Reference Manual expounds upon SWMM 5 User's Manual Table A.6 by providing Manning's *n* values for additional overland flow surfaces[3]. The values are provided in Table 1:

Table 1: Manning's *n* Values for Overland Flow (EPA, 2016; Yen 2001; Yen and Chow, 1983).

Overland Surface	Light Rain (< 0.8 in/hr)	Moderate Rain (0.8-1.2 in/hr)	Heavy Rain (> 1.2 in/hr)
Smooth asphalt pavement	0.010	0.012	0.015
Smooth impervious surface	0.011	0.013	0.015
Tar and sand pavement	0.012	0.014	0.016
Concrete pavement	0.014	0.017	0.020
Rough impervious surface	0.015	0.019	0.023
Smooth bare packed soil	0.017	0.021	0.025
Moderate bare packed soil	0.025	0.030	0.035
Rough bare packed soil	0.032	0.038	0.045
Gravel soil	0.025	0.032	0.045
Mowed poor grass	0.030	0.038	0.045
Average grass, closely clipped sod	0.040	0.050	0.060
Pasture	0.040	0.055	0.070
Timberland	0.060	0.090	0.120
Dense grass	0.060	0.090	0.120
Shrubs and bushes	0.080	0.120	0.180
Land Use			
Business	0.014	0.022	0.035
Semibusiness	0.022	0.035	0.050
Industrial	0.020	0.035	0.050
Dense residential	0.025	0.040	0.060
Suburban residential	0.030	0.055	0.080
Parks and lawns	0.040	0.075	0.120

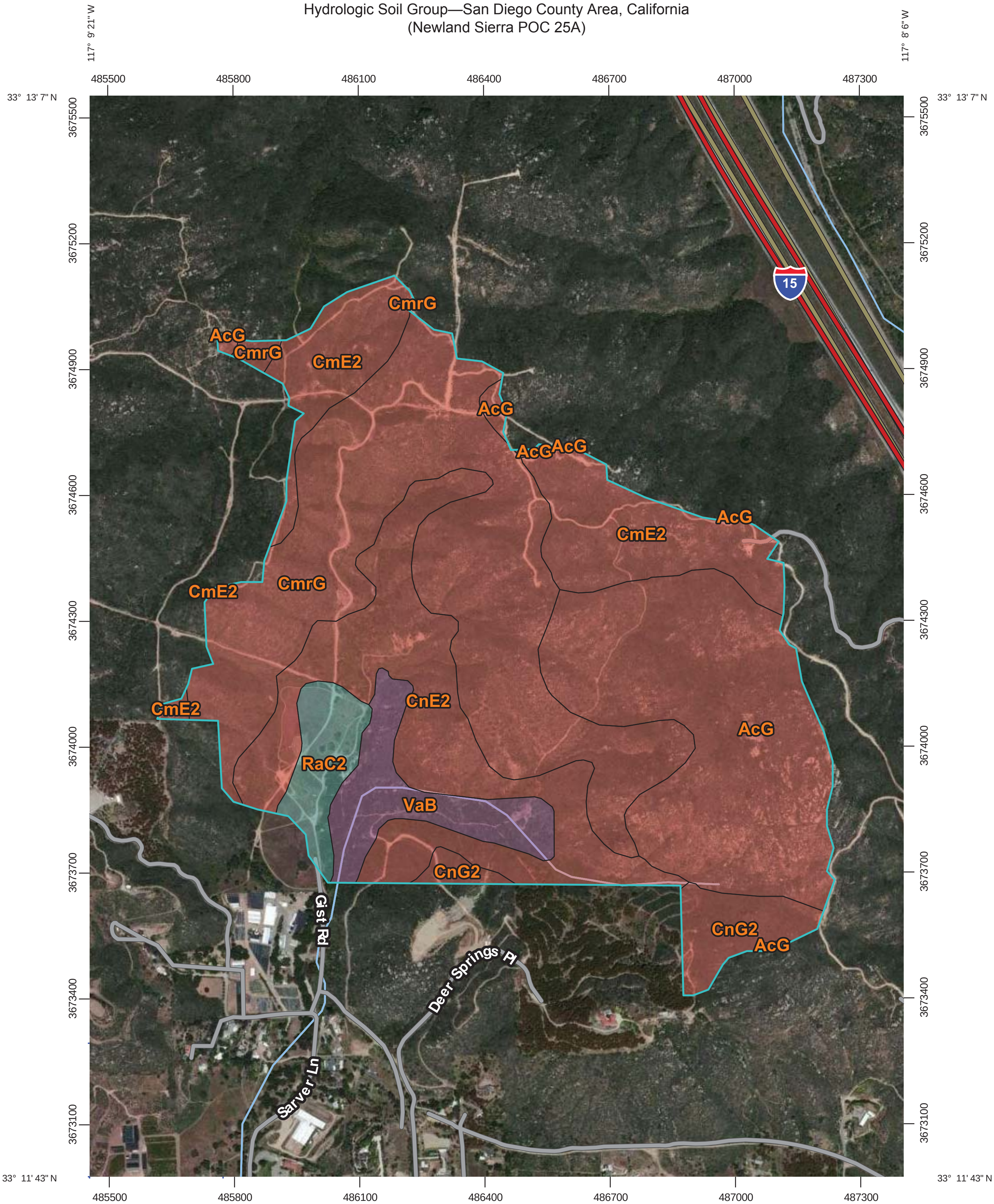
For purposes of local hydromodification management BMP design, these Manning's *n* values are an improvement upon the values presented by Engman (1986) in SWMM 5 User's Manual Table A.6. Values from SWMM 5 User's Manual Table A.6, while completely suitable for the intended application to certain agricultural land covers, comes with the disclaimer that the provided Manning's *n* values are valid for shallow-depth overland flow that match the conditions in the experimental plots (Engman,

[3] Further discussion is provided on page 6 under "Discussion of Differences Between Manning's *n* Values"

ATTACHMENT 8

Soils Maps

Hydrologic Soil Group—San Diego County Area, California
(Newland Sierra POC 25A)



Map Scale: 1:12,600 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AcG	Acid igneous rock land	D	91.9	23.9%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	D	49.3	12.8%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	127.8	33.2%
CnE2	Cieneba-Fallbrook rocky sandy loams, 9 to 30 percent sl opes, eroded	D	66.3	17.2%
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded	D	14.8	3.9%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	13.2	3.4%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	21.6	5.6%
Totals for Area of Interest			**385.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

ATTACHMENT 9

Summary Files from the SWMM Model

PRE_DEV

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ MAY-24-1951 00:00:00
Ending Date .............. MAY-23-2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......     31860.779       976.900
Evaporation Loss .........      1184.668        36.324
Infiltration Loss ........     24534.189       752.256
Surface Runoff ...........      6665.067       204.361
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -1.642


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......      6665.067      2171.912
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........      6665.067      2171.912
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-C	976.90	0.00	8.99	893.45	76.69	33.47	15.97	0.078
DMA-B	976.90	0.00	2.50	948.66	26.52	15.76	17.37	0.027
DMA-D	976.90	0.00	39.66	733.67	221.18	2122.52	412.17	0.226

```
Analysis begun on:  Thu Nov 03 13:37:35 2016
Analysis ended on:  Thu Nov 03 13:37:50 2016
Total elapsed time: 00:00:15
```

POST_DEV

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------



*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ MAY-24-1951 00:00:00
Ending Date .............. MAY-23-2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit to-14

WARNING 04: minimum elevation drop used for Conduit By-14

WARNING 04: minimum elevation drop used for Conduit By-11R2

WARNING 04: minimum elevation drop used for Conduit to-11R2

WARNING 04: minimum elevation drop used for Conduit By-K1

WARNING 04: minimum elevation drop used for Conduit to-K1

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......     32193.004       976.900
Evaporation Loss .........      2530.322        76.783
Infiltration Loss ........     17354.736       526.631
Surface Runoff ...........     12501.300       379.353
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -0.601


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......     12501.300      4073.735
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........     12501.108      4073.673
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.179         0.058
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.
```

POST_DEV

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*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
```

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***************************
Subcatchment Runoff Summary
***************************
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Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
H1-D-S	976.90	0.00	98.06	214.80	676.86	27.99	1.99	0.693
H2-D-S	976.90	0.00	98.89	213.84	676.25	7.88	0.56	0.692
H4-D-S	976.90	0.00	100.13	215.42	671.88	12.13	0.87	0.688
H5-D-S	976.90	0.00	100.13	213.71	673.84	11.66	0.83	0.690
H6-D-S	976.90	0.00	99.65	215.47	672.76	11.23	0.80	0.689
H7-D-S	976.90	0.00	99.15	215.09	674.24	9.90	0.71	0.690
H8-D-S	976.90	0.00	104.91	233.52	643.84	317.10	23.51	0.659
HR1-D-S	976.90	0.00	132.71	65.56	784.32	88.87	5.51	0.803
H9-D-S	976.90	0.00	100.60	230.99	653.29	45.25	3.33	0.669
HR2-D-S	976.90	0.00	132.16	65.52	785.12	37.03	2.29	0.804
M1-D-S	976.90	0.00	107.61	235.11	638.51	681.53	50.35	0.654
K1-D-S	976.90	0.00	107.73	164.95	715.17	85.41	5.77	0.732
MR1-D-S	976.90	0.00	155.02	67.04	756.66	96.69	5.47	0.775
V1-D-S	976.90	0.00	117.00	144.82	721.75	65.22	4.37	0.739
V2-B-S	976.90	0.00	102.54	230.14	652.24	33.15	2.35	0.668
V2-C-S	976.90	0.00	102.17	217.24	667.22	1.81	0.13	0.683
V2-D-S	976.90	0.00	112.44	114.19	764.53	28.11	1.78	0.783
V3-B-S	976.90	0.00	96.43	229.33	664.54	3.10	0.22	0.680
V3-D-S	976.90	0.00	111.42	139.50	737.27	18.24	1.20	0.755
V4-C-S	976.90	0.00	97.77	216.51	676.56	7.31	0.51	0.693
V4-D-S	976.90	0.00	108.54	163.59	715.14	24.62	1.66	0.732
V5-C-S	976.90	0.00	108.84	191.21	684.52	47.81	3.32	0.701
V6-C-S	976.90	0.00	109.11	191.17	684.12	19.56	1.36	0.700
V7-B-S	976.90	0.00	104.04	230.36	649.47	34.87	2.48	0.665
V7-C-S	976.90	0.00	95.78	216.17	679.81	0.46	0.03	0.696
V7-D-S	976.90	0.00	117.74	88.42	783.75	15.43	0.96	0.802
V8-C-S	976.90	0.00	73.49	423.75	486.95	31.97	3.01	0.498
V8-D-S	976.90	0.00	79.37	324.74	587.85	1.47	0.12	0.602
V9-B-S	976.90	0.00	96.09	229.28	665.09	5.94	0.41	0.681
V9-C-S	976.90	0.00	107.57	185.34	693.29	42.85	2.94	0.710
V9-D-S	976.90	0.00	102.40	162.08	728.96	2.79	0.18	0.746
V10-C-S	976.90	0.00	103.24	217.42	665.04	12.95	0.92	0.681
V10-D-S	976.90	0.00	122.40	144.91	714.14	171.85	11.59	0.731
V11-B-S	976.90	0.00	106.02	230.64	646.09	58.26	4.16	0.661
V11-C-S	976.90	0.00	114.90	170.14	698.00	120.20	8.21	0.715
V11-D-S	976.90	0.00	103.38	162.28	726.97	2.53	0.17	0.744
VR2-B-S	976.90	0.00	129.69	92.03	760.44	32.40	2.04	0.778
VR2-C-S	976.90	0.00	116.41	86.52	788.55	0.71	0.04	0.807
V12-B-S	976.90	0.00	123.57	65.22	799.29	4.12	0.25	0.818
VR1-B-S	976.90	0.00	123.66	91.87	769.52	17.97	1.12	0.788
VR1-C-S	976.90	0.00	115.29	86.48	790.49	3.03	0.18	0.809
VR1-D-S	976.90	0.00	136.65	65.80	778.91	48.07	2.99	0.797
V13-B-S	976.90	0.00	105.73	230.60	646.58	33.13	2.36	0.662
V13-D-S	976.90	0.00	113.79	143.13	728.77	31.68	2.10	0.746
V14-B-S	976.90	0.00	111.16	179.38	693.83	46.33	3.12	0.710
V14-D-S	976.90	0.00	111.68	164.48	708.57	48.31	3.29	0.725
V15-B-S	976.90	0.00	113.29	180.42	689.38	74.58	5.06	0.706
V15-D-S	976.90	0.00	112.57	164.75	706.85	63.61	4.35	0.724
V16-B-S	976.90	0.00	71.92	445.28	466.03	26.75	2.48	0.477
V16-D-S	976.90	0.00	82.09	327.96	577.62	8.67	0.72	0.591
H1	976.90	21180.55	1286.25	0.00	21090.11	27.87	1.94	0.952
H2	976.90	19289.27	1271.04	0.00	19176.94	7.83	0.54	0.946
H4	976.90	20485.94	1275.58	0.00	20387.39	12.07	0.85	0.950
H5	976.90	18509.57	1261.55	0.00	18390.73	11.58	0.81	0.944
H6	976.90	20959.77	1280.42	0.00	20868.86	11.19	0.78	0.951
H7	976.90	20772.51	1280.64	0.00	20680.40	9.86	0.69	0.951

H8HR1	976.90	20060.61	1252.35	0.00	19945.11	403.63	28.06	0.948
H9HR2	976.90	17765.63	1256.58	0.00	17625.90	81.64	5.50	0.940
M1MR1K1	976.90	14012.78	1194.98	0.00	13880.65	855.48	35.94	0.926
V1	976.90	17839.96	1257.52	0.00	17698.75	64.71	4.18	0.941
V2	976.90	17325.86	1267.06	0.00	17173.93	62.52	4.07	0.938
V3	976.90	17830.16	1267.97	0.00	17689.70	21.17	1.36	0.941
V4	976.90	18166.09	1278.32	0.00	18020.09	31.68	2.12	0.941
V5	976.90	16967.90	1255.94	0.00	16818.76	47.39	3.22	0.937
V6	976.90	16918.29	1254.83	0.00	16770.57	19.39	1.31	0.937
V7	976.90	16963.67	1259.56	0.00	16810.22	50.30	3.34	0.937
V8	976.90	17303.87	1256.73	0.00	17158.95	33.16	3.03	0.939
V9	976.90	17060.62	1265.29	0.00	16905.84	51.11	3.42	0.937
V10	976.90	17994.16	1237.35	0.00	17861.30	183.43	12.13	0.942
V11VR2	976.90	17002.59	1249.09	0.00	16852.59	212.20	14.06	0.937
V12VR1	976.90	16526.02	1239.17	0.00	16374.27	72.52	4.44	0.936
V13	976.90	35303.31	1342.44	0.00	35302.85	64.81	4.38	0.973
V14	976.90	19310.84	1269.15	0.00	19174.21	93.97	3.82	0.945
V15	976.90	17677.53	1252.90	0.00	17531.79	137.04	8.97	0.940
V16	976.90	17220.38	1255.14	0.00	17075.93	35.13	3.07	0.938
OFF-1-B	976.90	0.00	2.52	949.24	25.88	0.31	0.34	0.026
OFF-1-D	976.90	0.00	29.97	729.58	220.33	1471.44	286.84	0.226

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LID Performance Summary
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Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	Pcnt. Error
H1	H1	22157.45	1286.34	0.00	1881.26	19210.27	0.00	0.00	-0.99
H2	H2	20266.17	1271.36	0.00	1390.29	17791.51	0.00	0.00	-0.92
H4	H4	21462.84	1275.68	0.00	1715.18	18673.89	0.00	0.00	-0.94
H5	H5	19486.47	1261.79	0.00	1219.21	17175.04	0.00	0.00	-0.87
H6	H6	21936.67	1280.28	0.00	1858.21	19008.37	0.00	0.00	-0.96
H7	H7	21749.41	1280.54	0.00	1785.09	18893.74	0.00	0.00	-0.97
H8HR1	H8HR1	21037.51	1252.39	0.00	1613.78	18331.96	0.00	0.00	-0.76
H9HR2	H9HR2	18742.53	1256.63	0.00	939.56	16687.05	0.00	0.00	-0.75
M1MR1K1	M1MR1K1	14989.68	1195.02	0.00	73.15	13807.99	0.00	0.00	-0.58
V1	V1	18816.86	1257.55	0.00	903.45	16795.70	0.00	0.00	-0.74
V2	V2	18302.76	1267.13	0.00	730.49	16444.33	0.00	0.00	-0.76
V3	V3	18807.06	1268.10	0.00	822.14	16869.36	0.00	0.00	-0.81
V4	V4	19142.99	1278.40	0.00	967.76	17053.46	0.00	0.00	-0.82
V5	V5	17944.80	1255.93	0.00	696.43	16122.15	0.00	0.00	-0.72
V6	V6	17895.19	1254.73	0.00	677.73	16091.51	0.00	0.00	-0.72
V7	V7	17940.57	1259.58	0.00	639.25	16171.16	0.00	0.00	-0.72
V8	V8	18280.77	1256.84	0.00	1341.66	15818.83	0.00	0.00	-0.75
V9	V9	18037.52	1265.32	0.00	708.56	16197.80	0.00	0.00	-0.74
V10	V10	18971.06	1237.38	0.00	925.18	16936.59	0.00	0.00	-0.68
V11VR2	V11VR2	17979.49	1249.13	0.00	353.20	16500.01	0.00	0.00	-0.68
V12VR1	V12VR1	17502.92	1239.22	0.00	480.90	15894.14	0.00	0.00	-0.64
V13	V13	36280.21	1342.54	0.00	6513.20	28792.05	0.00	0.00	-1.01
V14	V14	20287.74	1269.20	0.00	239.12	18935.83	0.00	0.00	-0.77
V15	V15	18654.43	1252.95	0.00	854.12	16678.38	0.00	0.00	-0.70
V16	V16	18197.28	1255.23	0.00	1144.37	15932.73	0.00	0.00	-0.74

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Node Depth Summary
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Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
POC-25	OUTFALL	0.00	0.00	0.00	0	00:00
D14	DIVIDER	0.00	0.00	0.00	0	00:00
D11R2	DIVIDER	0.00	0.00	0.00	0	00:00
D-K1	DIVIDER	0.00	0.00	0.00	0	00:00
Basin14	STORAGE	0.00	0.84	0.84	5674	10:20
B-11R2	STORAGE	0.00	0.74	0.74	15931	21:26
B-K1	STORAGE	0.00	0.77	0.77	5674	10:31

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Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
POC-25	OUTFALL	380.14	386.76	15229 17:00	2911.779	4073.370
D14	DIVIDER	3.82	3.82	15931 21:00	93.970	93.970
D11R2	DIVIDER	14.06	14.06	15229 17:15	212.204	212.204
D-K1	DIVIDER	35.94	35.94	15931 21:15	855.480	855.480
Basin14	STORAGE	0.00	2.85	15931 21:00	0.000	0.798
B-11R2	STORAGE	0.00	11.68	15229 17:15	0.000	2.902
B-K1	STORAGE	0.00	25.67	15931 21:15	0.000	3.386

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
D14	DIVIDER	499679.02	0.000	0.000
D11R2	DIVIDER	499679.02	0.000	0.000
D-K1	DIVIDER	499679.02	0.000	0.000
Basin14	STORAGE	499679.02	0.837	7.163
B-11R2	STORAGE	499679.02	0.740	3.260
B-K1	STORAGE	499679.02	0.766	7.234

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Basin14	0.001	0	1	8.597	8	5674 10:19	1.38
B-11R2	0.003	0	1	16.169	17	15931 21:25	4.32
B-K1	0.010	0	1	83.770	8	5674 10:31	10.54

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
POC-25	3.99	7.59	386.76	4073.370
System	3.99	7.59	386.76	4073.370

****
Link Flow Summary
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Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth

to-14	DUMMY	2.85	15931	21:00
By-14	DUMMY	0.97	4280	14:23
By-11R2	DUMMY	2.38	4280	07:12
to-11R2	DUMMY	11.68	15229	17:15
By-K1	DUMMY	10.27	5674	07:34
to-K1	DUMMY	25.67	15931	21:15
Out14	DUMMY	1.38	5674	10:20
O-11R2	DUMMY	4.32	15931	21:26
Out-K1	DUMMY	10.54	5674	10:31

****
Conduit Surcharge Summary
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	Hours Full			Hours	Hours
Conduit	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
to-14	0.01	0.01	0.01	499679.02	0.01
By-14	0.01	0.01	0.01	499679.02	0.01
By-11R2	0.01	0.01	0.01	499679.02	0.01
to-11R2	0.01	0.01	0.01	499679.02	0.01
By-K1	0.01	0.01	0.01	499679.02	0.01
to-K1	0.01	0.01	0.01	499679.02	0.01

Analysis begun on: Thu Nov 03 12:52:10 2016
Analysis ended on: Thu Nov 03 12:53:33 2016
Total elapsed time: 00:01:23

Attachment 2b

Hydromodification Management Exhibit

See Attachment 1c

Attachment 2c

Management of Critical Course Sediment Yield Areas

TECHNICAL MEMORANDUM:

Analysis of PCCSYAs for Newland Sierra

Prepared For:

Fuscoe Engineering

August 19, 2016. Revised: 10/6/16, 11/3/16 & 12/15/16.

Prepared by:

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TECHNICAL MEMORANDUM: ANALYSIS OF PCCSYAs FOR NEWLAND SIERRA

1. SUMMARY

The purpose of this Technical Memo is to demonstrate that the Newland Sierra Project generates a No Net Impact in the Critical Coarse Sediment Yield (CCSY) for 10 unnamed tributaries and sub-tributaries emanating from the large contributing area of the project. The tributaries and their corresponding POCs and receiving creeks are as follows: (a) five tributaries with 6 POCs (10, 13A + 13B, 16, 19, and 20) draining towards the east to the South Fork of Moosa Canyon Creek; (b) four tributaries with 5 POCs (21, 25A + 25B, 26 and 27) draining to Twin Oaks Valley Creek, and (c) one tributary with 3 POCs (29A + 29B + 29C) draining to the South Fork of Gopher Canyon Creek. The methodology explained in Appendix H (reference [1]) of the County of San Diego BMP Design Manual (updated by the Critical Coarse Sediment Technical Advisory Committee on March 2016, from which the City of San Diego, The County of San Diego, Technical Experts and representatives of the Water Quality Control Board were present, see Appendix 1) will be used to conclude that the Potential Critical Coarse Sediment Yield Areas (PCCSYAs) within the Newland Sierra Project are not significant and can be removed from Critical Designation, and their removal will not impact negatively the three receiving streams.

2. METHODOLOGY TO IDENTIFY CCSYAs

2.1 Identification of CCSYAs

The Watershed Management Area Analysis (WMAA) PCCSYA Map prepared by the County of San Diego (commonly known as the Rash Map where PCCSYA are depicted in red) is used in the memo to identify PCCSYA in the project. Figure 1, prepared by Fuscoe Engineering, displays the WMAA areas identified for the project (in light purple). Further refinement options will be applied to determine if the PCCSYA identified areas become CCSYAs or Non-CCSYAs.

2.2 First Preliminary Analysis: Allowable 5% Encroachment into WMAA Areas

Table 1 displays the PCCSYAs draining to each of the 14 POCs to be analyzed in this report. From the review of Table 1, it is clear than the drainage areas of the following nine POCs are encroaching 5% or less into the WMAA Map: POCs 10, 13A, 16, 21, 25B, 27, 29A, 29B and 29C. Therefore, those POCs can be removed from further consideration, as ***95% or more of the PCCSYAs contributing to these POCs are being preserved and/or by-passed downstream to the receiving POC***. The remaining five (5) POCs will require further analysis: POCs 13B, 19, 20, 25A and 26.

Table 1. Encroachment into WMAA Areas

Basin	Total Area (acre)	PCCSYA (acre)	Impacted area (acre)	Percentage (%)
10	439.82	162.42	8.10	5.0%
13A	35.99	12.72	0.50	3.9%
13B	82.26	40.45	11.99	29.6%
16	27.75	16.05	0.80	5.0%
19	70.63	20.48	15.66	76.5%
20	10.62	0.01	0.01	100.0%
21	29.74	3.67	0.13	3.5%
25A	391.37	142.14	23.18	16.3%
25B	170.53	62.38	0.86	1.4%
26	142.12	11.59	6.49	56.0%
27	45.16	11.00	0.53	4.8%
29A	54.63	7.88	0.16	2.0%
29B	16.30	8.37	0.32	3.8%
29C	40.28	25.72	1.29	5.0%

2.3 Second Preliminary Analysis: De Minimis PCCSYAs

In accordance to Section H.3.3 of the BMP Manual, all areas that (a) are not significant contributors of bed sediment yield due to their small size and (b) are considered as not practicable to by-pass to the downstream water of the state, can be excluded from the analysis as those areas are below the minimum significant threshold of applicability of protection (i.e. are De Minimis PCCSYAs).

The PCCSYA from POC-20 is only 0.01 acre (25 times smaller than the De Minimis Area) and it appears to be a legacy area from a GIS Methodology applied at a macro-scale to determine PCCSYAs in the WMAA Map for the entire County of San Diego. Consequently, POC-20 is excluded from further analysis. The remaining 4 POCs will be analyzed in this report: POCs 13B, 19, 25A and 26.

2.4 Refinement Options

2.4.1 Depositional Analysis

If it can be demonstrated that the potential source of coarse sediment is deposited into the existing system prior to reaching the first downstream unlined water of the state, then PCCSYA can be removed from further considerations. Depositional systems may include natural sinks, existing structural BMPs, existing hardened MS4 systems or other existing similar features that produce a peak velocity from the discrete 2-year, 24 hour runoff event of less than 3 ft/s in the system being analyzed. It is clear for the location of the remaining PCCSYAs that a deposition of coarse sediments before reaching the first erodible upstream tributaries is not feasible, as the PCCSYA drain directly into the creek. Therefore, this refinement option is considered unnecessary for this project.

An additional consideration can be made in regards to POCs 13B and 19: there is sufficient slope to ensure transport of critical coarse sediment adjacent to the pipe discharge (on each branch upstream of POC 13B, and at the discharge of the pipe upstream of POC-19), but downstream of both POCs (and after the flow is piped underneath HWY 15) the potential for coarse sediment transport is reduced downstream. The reson for this is that] once the water reaches the South Fork Moosa Canyon Creek (alongside HWY 15) this creek eventually confluences with Moosa Canyon Creek (coming from Old Castle Road) to increase the contributing area of Moosa Canyon Creek, which then discharges into an artificial lake with recreational uses at the All Seasons R.V. Park, just north of the confluence of Gopher Canyon Road and Old Hwy 395, between Old Hwy 395 and HWY 15. This lake is approximately 800 ft long by 200 ft wide, and reduction of coarse sediment is beneficial for its recreational uses, as (a) removal of sediments extends the useful life of the lake and (b) coarse sediment cannot escape downstream as the coarse sediment will quickly settle in the lake. Therefore, any protection of the coarse sediment yield is irrelevant for the portion of the Moosa Canyon Creek downstream of the dam impounding the lake all the way to San Luis Rey River.

The argument related to the depositional analysis of the runoff from POCs 13B and 19 (and in extension to the runoff from POCs 10, 13A, and 20) will not be used by the project to re-assess PCCSYAs, because it could be argued that the little portion of the overall coarse sediment removed from those points could be necessary in the stream network from the tail of the lake upstream to the respective discharge points. However, this discussion is included in this study to add perspective of the relatively minor relevance of this coarse sediment geomorphic utility downstream, which in turn suggest (a) a less stringent view for the remaining POCs draining to Moosa Canyon Creek (13B and 19) and (b) another aspect to reduce even more the importance of the 0.01 acre of PCCSYAs draining to POC-20. In other words, from the remaining POCs to analyze, the relative importance of POCs 25A + 26 is higher than that of POCs 13B + 19, as the runoff from the former is not impounded about three miles downstream as the runoff from the later. Nevertheless, depositional analysis will not be used to exclude POCs 13B and 19 from further considerations.

2.4.2 Threshold Channel Analysis

A threshold channel is a stream channel in which channel boundary material has no significant movement during the design flow. If there is no movement of bed load in the stream channel, then it is not anticipated that reductions in sediment supply will be detrimental to stream stability because the channel bed consists of the parent material and not coarse sediment supplied from upstream. In such a situation, changes in sediment supply are not considered a geomorphic condition of concern.

An approximate threshold channel analysis was performed for the remaining POCs: 13B, 19, 25A and 26. The following are the assumptions and results:

- Upstream and Downstream analyses extend identically as the downstream and upstream analyses prepared by Chang in two different reports (Hydromodification Screening for Newland Sierra, January 14, 2015 (reference [2]) which analyzed 6 POCs, and Hydromodification Screening for Newland Sierra, July 8, 2016 (reference [3]) which analyzed other 4 POCs; see maps in Appendix 2). Therefore, measurements, results, and/or assumptions made in both of Chang's studies will be useful for analyses in this report.
- For calculations of Specific Stream Power Q_{10}, slope S and channel width w are needed. S and w will be obtained from [2], [3], while Q_{10} will be obtained following the methodology of the updated Appendix H (see Appendix 1 of this study).
- For Q_{10} calculations, the post-development percentage of impervious area draining to the channel is needed to determine the Adjustment Factor AF from Figure H.7-2 (See Appendix 1). The following conservatively large and realistic values of impervious percentage are used per BMP: POC-13B: 30%; POC-19: 60%; POC-25A: 30% (later reviewed in the SWMM model to be 26.5%), and POC-26: 60%. Those values determine conservative values of AF per POC: POC-13B: AF=1.23; POC-19: AF=1.31; POC-25A: AF=1.23; POC-26: AF=1.31. Those AF values are used to ensure that the conclusions of the Threshold Channel Analysis are valid regardless of the impervious percentage (see Table 2).
- As a susceptibility analysis of the results as a function of AF, additional calculations where made with the largest possible value of AF per POC (see Table 2). Notice that AF changes little with high changes of AF, and therefore, the results remain the same even with 90% value of imperviousness on the portion developed on each POC (which determines 60%, 33%, 88%, 82% and 60% of imperviousness on POCs 13B reach 2, 13B reach 3, 19, 26 and 25A respectively).
- For the calculation of an overall d_{50} value, the values obtained in 2015 Chang's study will be applied here for POC 25-A (see reference [2] and Table 2 for results).
- The different values of d_{50} will be used in the equation of Figure H.7-1 to determine if the channel is a threshold channel or an alluvial channel, as the 10-year Specific Stream Power ω will be known at each POC. In other words, if $\omega > 16.7 \cdot d_{50}^{0.75}$ then the channel is a threshold channel and PCCSYAs become CCSYAs.
- For those instances where d_{50} cannot be determined (POCs 13B, 19 and 26), a theoretical d_{50} that satisfies the braided equilibrium condition will be obtained. The value of d_{50} will be calculated according to $d_{50} = (\omega/16.7)^{4/3}$. This value will be compared to the corresponding equivalent value estimated indirectly by the author based on a Geotechnical Letter prepared by Leighton and Associates, Inc. (Appendix 2) dated 6/10/16, revised 10/5/16, where it is explained that the permissible shear stress will be in excess of 10 pounds, and therefore the equivalent d_{50} should be at least 24" according to Fischenich.

Table 2 shows the results of the Threshold Channel Calculation based on information collected in [2] and [3], and methodology detailed in final version of Appendix H (see Appendix 1). From the result of the calculations, it is clear that POCs 13B, 19 and 26 drain to Threshold Channels (as the minimum d_{50} required is much less than 610 mm) while POC 25A is located in an Alluvial Channel. Also, it is clear that the results show little sensitivity to AF.

Table 2. Threshold Channel Calculations: Results with average AF and Maximum AF.

POC	Reach	Slope, S	Width, W (m)	Area, A (mi^2)	P, (in)	AF(1)	Q_{10} (cfs)(2)	Q_{10} (m^3/s)	SSP (W/m^2)(3)	d_{50} (mm)(6)	ω-BE (W/m^2)(4)	ω-BE > SSP(5)?
13B	2	0.1250	1.5	0.0446	14.6	1.23	11.8	0.33	272.9	***41.5***	272.9	YES
13B	3	0.3604	3.0	0.0213	14.6	1.23	6.2	0.18	206.8	***28.7***	206.8	YES
19	1	0.1047	1.2	0.1187	14.6	1.31	29.4	0.83	713.1	***149.2***	713.1	YES
26	4	0.0584	2.4	0.2376	14.6	1.31	53.8	1.52	363.7	***60.8***	363.7	YES
25A	3	0.0202	6.1	0.7626	14.6	1.23	139.4	3.95	128.2	11.0	100.9	**NO**
POC	**Reach**	**Slope, S**	**Width, W (m)**	**Area, A (mi^2)**	**P, (in)**	**AF(1)**	**Q_{10} (cfs)(2)**	**Q_{10} (m^3/s)**	**SSP (W/m^2)(3)**	**d_{50} (mm)(6)**	**ω-BE (W/m^2)(4)**	**ω-BE > SSP(5)?**
13B	2	0.1250	1.5	0.0446	14.6	1.31	12.6	0.36	290.6	***45.1***	290.6	YES
13B	3	0.3604	3.0	0.0213	14.6	1.24	6.2	0.18	208.5	***29.0***	208.5	YES
19	1	0.1047	1.2	0.1187	14.6	1.36	30.5	0.86	740.3	***156.9***	740.3	YES
26	4	0.0584	2.4	0.2376	14.6	1.35	55.5	1.57	374.9	***63.3***	374.9	YES
25A	3	0.0202	6.1	0.7626	14.6	1.21	148.4	4.20	136.5	11.0	100.9	**NO**

(1): Adjustment Factor (AF) taken from Figure H.7-2 (See Appendix 1) with a conservative imperviousness approach for development conditions.
(2): Q (cfs) obtained with equation H.7-4 : $\mathbf{Q_{10} = AF \cdot 18.2 \cdot A^{0.87} \cdot P^{0.77}}$
(3): SSP (Specific Stream Power, Watt/m^2): Obtained with equation H.7-1 : $\mathbf{SSP = \Upsilon \cdot Q_{10} \cdot S/W}$ (International Units)
(4): ω-BE (Braided equilibrium Specific Power, Watt/m^2): Obtained with equation in Figure H.7-1 : $\mathbf{\omega\text{-}BE = 16.7 \cdot d_{50}^{0.75}}$ (d_{50} = mm)
(5) : If ω-BE > SSP then (d_{50} , SSP) plots below the braided equilibrium line in Figure H.7-1, and therefore the channel is a threshold channel (see **Appendix 1**).
(6) : Bold diameters are theoretical, and represent minimum diameter required to satisfy braided equilibrium. Equivalent diameter = 610 mm.

2.4.2.1 Considerations about Threshold Channel, Geology and Shear Stress

POC 13B, 19 and 26 provide a difficult challenge because a simple threshold channel method cannot be used as a d_{50} representative of the channel conditions cannot be measured (the channels are not granular: they are a mix of outcrops of hard rock, boulders and entrenched vegetation). As a consequence, the author decided to refer to Appendix H definition: *"The key factor for determining whether a channel is a threshold channel is the composition of its bed material. Larger bed sediment consisting primarily of cobbles and boulders are typically immobile, unless the channel is a large river with sufficient discharge to regularly transport such grain sizes as bed load. As a rule-of-thumb, channels with bed material that can withstand a 10-year peak discharge without incipient motion are considered threshold channels and not live-bed alluvial channels. Threshold channel beds typically consist of cobbles, boulders, bedrock, or very dense vegetation (e.g., a thicket)".*

It is clear from the December 2016 Leighton and Associated, Inc. letter included in the appendices that the typical structure of a threshold channel is satisfied by the observations in the field as the channels are composed of thick vegetation, boulders and bedrock.

Also, in the same Threshold Channel section Appendix H states*:*

"For a project to be exempt from coarse sediment supply requirements, the applicant must submit the following for approval by the County:

• Photographic documentation and grain size analysis used to determine the d_{50} of the bed material; and

• Calculations that show that the receiving water of concern meets the specific stream power criteria defined below ***or a finding from a geomorphologist*** *that the stream channel has existing grade control structures that protect the stream channel from hydromodification impacts".*

The first requirement is satisfied by (a) aerial photographic evidence now included in Appendix 2, (b) photographic records of a site visit performed on December 2016 also included, with the corresponding Exhibit indicating the location were the photos were taken and (c) determination of an equivalent d_{50} as explained in section 2.4.2.2. The determination of d_{50} on the opinion of the author of this study is irrelevant as the findings from a geomorphologist supersede a precise determination of d_{50}, because there is no explanation in Appendix H of how to relate d_{50} with the findings from a geomorphologist (in other words, d_{50} is only useful for the stream power criteria of the second bullet point above, but the existence of grade controls that protect the stream channel from hydromodification impacts as determined by a geomorphologist is unrelated with an specific value of d_{50}). Consequently, the discussion of d_{50} will only serve to complete the submittal requirements as shown in page H-37 of Appendix H. It should be pointed out that the opinion of Leighton and Associates (also in the December 2016 Geology Letter located in Appendix 2) satisfies the requirement of "findings from a geomorphologist".

2.4.2.2 <u>d_{50} Equivalent and Jet Testing Discussion</u>

According to the geology letter included in Appendix 2, the channel system for POC 13B, 19 and 26 is mainly composed of granite bedrock exposed, outcrops of very hard igneous rocks, and dense canopies of native brush, and there is a lack of observable sediment within the subject drainages that make impossible the determination of a d_{50}, simply because the channels are non-granular.

For non-granular channels, it has been clearly understood in the Technical literature that critical shear stress (the initial value of shear stress that starts erosion) is unrelated to the size of the soil particles. For example, in cohesive materials (channels in clayed soils) cohesion forces of electric nature are more important than gravitational forces associated with particle size. In vegetated channels, the root system of the plants keeps the soil in place and provides a resistance to erosion much larger than the equivalent resistance of the naked soil without vegetation. In channels excavated on rock, very high velocities are required to generate sufficient shear stress to break the rock surface in contact with the water and generate erosion. Appendix H recognizes this issue (page H-50) and the use of in-situ jet test, reference tables, or empirical relationships is suggested, without specifying what references can be valid and what references are not. However, 2 references are cited as valid: ASCE No. 77 (1992) and Fischenich (2001).

A brief discussion and criticism of in-situ jet test is included in this paragraph, as a response to a County comment: in-situ jet test is a test that requires heavy machinery, pumps, significant amount of water and calibrated instrumentation to be performed. Such equipment is unpractical in the field, especially to transport to channels were access on foot is extremely difficult and were water is not present to do the test. A cistern truck delivering water would be necessary in Southern California Climate, and such water delivery would cause additional problems and would be considered an illegal discharge (or would require a special permit). For this reason, the author of this study believes that in-situ jet test is a completely unpractical technicality impossible in Southern California except in very large creeks (see, among others, https://naldc.nal.usda.gov/download/10012/PDF).

Continuing with the non-granular channel discussion, from previous experience of the author of this study, and based upon studies approved in the region (even studies directly approved by the SDRWQCB, such as the River District in the City of San Marcos) the Fischenich Table has been used as a linkage between vegetated channels and a d_{50} equivalent: the procedure consist on determine the critical shear stress for a given vegetation characteristics and knowing this value, calculate an equivalent d_{50} which means the determination of what would be the d_{50} size that will have the same shear stress resistance than a specified vegetated channel.

In regards to the vegetation encountered on the site visit, it was dense, stable and in many cases impassable, so a conservative value of the permissible shear stress should be between 1.7 to 2.5 lb/ft^2 (good quality long native grass to food quality hardwood tree planting), and an average value of 2.0 lb/ft^2 is assumed. Noticing that the relationship between d_{50} (inches) and the critical shear stress τ_c (lb/ft^2) in the Fischenich table is $\tau_c = 0.422 \cdot d_{50}$ (or $d_{50} = 2.38 \cdot \tau_c$) we can conclude that $d_{50} \approx 4.8''$ for the vegetation portion. In regards to the hard rock portion, Fischenich Table does not display values of velocities or permissible shear stress for rock lined channels. The only reference the author is aware of is Table 8-4, Reference [6] (National Engineering Handbook, USDA 2007, Chapter 8, Threshold Channel Design) were velocities of 20 ft/s are suggested as maximum velocities for good rocks (igneous and hard metamorphic, as present on the field). This velocity will translate into a shear stress of about 12.5 lb/ft^2, which in turn would correspond to an approximate $d_{50} = 30''$ using the linear relationship described. Such large value of d_{50} is not surprising, considering that the type of rock existing on site is the rock material used in quarry operations to produce rocks for rip-rap.

As summary d_{50} = 4.8" (vegetation portion of the channels) and d_{50} = 30" (hard rock portion of the channels). Those values denote the significant erosion resistance that the materials in the field have, and give additional credibility to the expert opinion of the Leighton letter in Appendix 2.

2.4.2.3 Specific Stream Power (SSP) Criteria

As a consequence of the updated sections 2.4.2.1 and 2.4.2.2, this section is no longer needed. However, calculations in Table 3 are included in light gray to avoid breaking the continuity of the table enumeration and avoid changing reference to comments. Please be aware that results displayed in Table 3 are irrelevant now to define channels as Threshold Channels.

Table 3. Detail Depth, Shear Stress, and SSP Calculations

Large "n" scenario

POC	Reach	Slope	W (ft)	z:1	$Q_{10,max}$	h (ft)	n	Q_M (cfs)	R_H (ft)	τ (lb/ft^2)	v (ft/s)	A (sq-ft)	P (ft)	F	τ_B (lb/ft^2)	v_B (ft/s)	SSP
13B	2	0.1250	4.921	2	12.55	0.545	0.080	12.55	0.445	3.47	3.8	3.28	7.36	0.99	4.3	4.7	290.5
13B	3	0.3604	9.843	2	6.25	0.178	0.080	6.25	0.171	3.85	3.4	1.82	10.64	1.46	4.0	3.6	208.4
19	1	0.1047	3.937	1.5	30.54	0.883	0.055	30.54	0.652	4.26	6.6	4.64	7.12	1.38	5.8	8.8	740.0
26	4	0.0584	7.874	2	55.46	0.999	0.055	55.46	0.799	2.91	5.6	9.86	12.34	1.09	3.6	7.0	374.7

Small "n" scenario

POC	Reach	Slope	W (ft)	z:1	$Q_{10,max}$	h (ft)	n	Q_M (cfs)	R_H (ft)	τ (lb/ft^2)	v (ft/s)	A (sq-ft)	P (ft)	F	τ_B (lb/ft^2)	v_B (ft/s)	SSP
13B	2	0.1250	4.921	2	12.555	0.416	0.050	12.55	0.353	2.75	5.2	2.39	6.78	1.53	3.2	6.1	290.5
13B	3	0.3604	9.843	2	6.248	0.135	0.050	6.25	0.130	2.93	4.6	1.36	10.44	2.23	3.0	4.7	208.4
19	1	0.1047	3.937	1.5	30.545	0.684	0.035	30.54	0.530	3.46	9.0	3.39	6.40	2.11	4.5	11.3	740.0
26	4	0.0584	7.874	2	55.455	0.772	0.035	55.45	0.642	2.34	7.6	7.27	11.32	1.65	2.8	9.1	374.7

Critical Flow Scenario (F = 1)

POC	Reach	Slope	W (ft)	z:1	$Q_{10,max}$	h (ft)	T (ft)	$Q^2/g-A^3/T$	R_H (ft)	τ (lb/ft^2)	v (ft/s)	A (sq-ft)	P (ft)	F	τ_B (lb/ft^2)	v_B (ft/s)	SSP
13B	2	0.1250	4.921	2	12.55	0.543	7.09	0.00	0.444	3.46	3.8	3.26	7.35	1.000	4.2	4.7	290.5
13B	3	0.3604	9.843	2	6.25	0.228	10.76	0.00	0.217	4.87	2.7	2.35	10.86	1.000	5.1	2.8	208.4
19	1	0.1047	3.937	1.5	30.54	1.068	7.14	0.00	0.760	4.96	5.2	5.91	7.79	1.000	7.0	7.3	740.0
26	4	0.0584	7.874	2	55.46	1.051	12.08	0.00	0.834	3.04	5.3	10.49	12.58	1.000	3.8	6.7	374.7

2.4.2.4 Conclusions of Threshold Channel Analysis

As a conclusion of this section, the reaches on POC 13B, 19 and 26 are Threshold Channels, under different approaches analyzed. Threshold channel analysis eliminates the contributing area of 3 POCs as PCCSYAs and transforms those areas in Non-CCSYAs: 13B, 19 and 26. Only the contributing area of POC 25A is not eliminated from further analysis.

2.4.3 Coarse Sediment Source Area Verification

A sieve analysis has not been performed for the remaining area POC-25A. Therefore, this optional analysis is not included. In other words, potential exclusion of POC-25A contingent upon the results of the Sieve Analysis is not considered necessary as simple inspection of the soils in the area denote a relatively significant presence of coarse sediments.

2.4.4 Verification of Geomorphic Landscape Units (GLUs)

GLU analysis was performed for the contributing area of POC 25A and a verification of the slope, land use and geology of the area confirms that GLU analysis will not remove PCCSYA areas. Therefore, all PCCSYAs draining to POC 25-A are in fact CCSYAs, and a no net impact demonstration is needed for this portion of the project.

2.5. Conclusion of the Refinement Options

After a refinement analysis a PCCSYA has two options: it is either a Critical Coarse Sediment Yield Area (CCSYA) or it becomes a Non Critical Coarse Sediment Yield Area (Non-CCSYA). Only one of the refinement options needs to produce a positive result for PCCSYA to become a Non-CCSYA. If no positive result occurs, then PCCSYA becomes CCSYA. As at least one refinement option shown in Table 3 produces a positive result for all POCs except 25A, then all areas of Figure 1 are considered Non-CCSYA (except for POC-25A) and no protection of those Non-CCSYAs (avoidance or no net impact demonstration) is required. Further analysis is required only for CCSYAs draining to POC-25A.

Table 4. Refinement Options Results

Basin	Is PCCSYA a CCSYA or a Non-CCSYA?	Refinement Option used	Basin	Is PCCSYA a CCSYA or a Non-CCSYA?	Refinement Option used
10	Non-CCSYA	<5% encroachment	25A	CCSYA	**None. No Net Impact needed.**
13A	Non-CCSYA	<5% encroachment	25B	Non-CCSYA	<5% encroachment
13B	Non-CCSYA	Threshold channel	26	Non-CCSYA	Threshold channel
16	Non-CCSYA	<5% encroachment	27	Non-CCSYA	<5% encroachment
19	Non-CCSYA	Threshold channel	29A	Non-CCSYA	<5% encroachment
20	Non-CCSYA	De Minimis	29B	Non-CCSYA	<5% encroachment
21	Non-CCSYA	<5% encroachment	29C	Non-CCSYA	<5% encroachment

Note: All basins encroaching < 5% do contain CCSYAs that are effectively identified, avoided and by-passed if they are upstream, or simply identified and avoided if they are downstream of the proposed development.

3. AVOIDANCE AND BYPASS

The project cannot avoid the totality of the CCSYAs included within the boundary of POC-25A as many of those areas are located in places planned for development. Therefore, Avoidance and By-Pass will be used to the maximum extent practicable to protect as many as possible CCSYAs draining to POC-25A: as a matter of fact, all undisturbed natural areas (including CCSYAs embedded into them) will by-pass downstream basins, per section H.3.11 of the BMP Manual. As by-pass by itself is insufficient, please refer to the No Net Impact Section where it is demonstrated that enough protection/flow control is achieved to conclude that No Net Impact occurs at POC-25A. Finally, it must be noticed that avoidance and by-pass is also included in POCs where PCCSYAs < 5%: 13A, 16, 21, 25B, 27, 29A, 29B and 29C. Basically the remaining 95%+ of PCCSYAs are downstream and protected or in few cases, a portion of the PCCSYAs is upstream and by-passed to the POC.

3.1 General Hydraulic Considerations of By-Pass Velocities

Let the San Diego Standard Type A drainage ditch be used to by-pass natural flows. This is a concrete triangular channel, with lateral slope 1.25:1, n = 0.013, and geometry defined according to the following equations: flow area A = $1.25 \cdot h^2$, wetted perimeter P = 3.2016·h and hydraulic radius R = 0.3904·h, with h being the depth of the flow. Let a velocity v of 3 ft/s be defined as the minimum acceptable velocity for a 2 year peak flow Q_2. The use of the Manning's equation establishes:

$$v = \frac{1.486}{n}\sqrt{s} \cdot R^{2/3};\ \ hence\ \ 3 = \frac{1.486}{0.013}\sqrt{s}(0.3904 \cdot h)^{2/3}\ equivalent\ to:\ \ h = \frac{0.01089}{s^{3/4}}$$

Similarly, using Manning's equation for peak flow Q_2 :

$$Q_2 = \frac{1.486\sqrt{s} \cdot 0.3904^{2/3} \cdot 1.25 \cdot h^{8/3}}{n}\ ; then\ Q_2 = \frac{1.486\sqrt{s} \cdot 0.3904^{2/3} \cdot 1.25 \cdot 0.01089^{8/3}}{0.013 \cdot s^2}\ which\ is\ s = \frac{0.00583}{{Q_2}^{2/3}}$$

The design equation to guarantee a minimum of 3 ft/s velocity, under Type A concrete brow-ditch is:

$\boldsymbol{s \geq \frac{0.00583}{Q_2^{2/3}}}$ **for Q_2 > 0.15 cfs, and s ≥ 2% for Q_2 < 0.15 cfs** **(3.1)**

At this point the precise peak flows draining to the ditches have not being established because the precise design of the ditches will occur in final engineering. The project will guarantee compliance with equation (3.1) or compliance with Table in section H.3.1 for those cases where an 18" pipe is used as a by-pass conveyance system.

4. DEMONSTRATE NO NET IMPACT

The purpose of Chapter 4 of this study is to demonstrate that the portion of the Newland Sierra Project draining to POC-25A will generate No Net Impact in the Critical Sediment Yield to the aforementioned POC. No net impact will be achieved by equilibrating two different components: (a) the discharges of the sediment producing areas will be diverted as recommended in this analysis to adjust the Sediment Production S_P as close as possible to the original conditions and (b) the discharges of the developed areas will be adjusted by designing BMPs such that the work exercised by the discharged flows (the Erosion Potential E_P) is as close as possible to the pre-development work. By working simultaneously on those to factors (S_P and E_P), the project will achieve compliance as any reduction in the dimensionless Sediment Production Coefficient S_P will be compensated by similar reduction in the Erosion Potential Coefficient E_P so that no overall net impact downstream is achieved ($S_P/E_P < 1.1$).

4.1 Verification of Geomorphic Landscape Units (GLUs)

As an initial step, GLU areas will be mapped to determine the original critical coarse sediment yield of the CCSYAs draining to POC-25A. Appendix 3 shows the GIS results of the property combined with a Geology Map. It is clear from this analysis that (a) there are 2 geologic types occurring in the analyzed Area per the simplified classification of Section H.6.1 of Appendix H (Coarse Bedrock CB and Coarse Sedimentary Permeable CPS) of which CB is the dominant geology; (b) the land use of the analyzed area (associated mainly with existing vegetation) can be of 3 types: Scrubs and Shrubs, Forest and Agricultural + grasses, per order of importance; and (c) the influence of the slope is different depending on the geology and land use. Therefore, a slope analysis is needed to determine the amount of area of those categories.

A slope analysis is also included in Appendix 3 (for both pre-development and post-development conditions). The result of the slope analysis combined with the geology and the land use, determines 10 types of area producing Critical Coarse Sediment in Pre-development conditions, and only 4 types of area producing Critical Coarse Sediment (as the other 6 types are covered by developed lands). Area Types and magnitude can be seen in Table 4.

Cut and fill sloped areas are also analyzed (see corresponding graphic in Appendix 3), as those are the only developed areas allowed to be included in sediment production calculations of post-development conditions as long as they do not drain to any BMPs and do not include impervious areas. There will be 4 types of slope areas considered: cut and fill slopes in CB geology, and cut and fill slopes in CSP geology. Land-use of the cut and fill slopes is assumed to be a combination of grasses-forest land-use as a landscape land use is not included in section H.6.1 of Appendix H. It should be pointed out that the land use of the slopes cannot be considered developed, as per the Regional WMAA Attachment provided by the County of San Diego (and included in Appendix 1) developed land use is assumed a sediment production of 0 (which defeats the purpose of including slopes in the analysis of sediment-producing areas in post-development condition). Consequently an average land use of grass-forest was considered as representative of the potential sediment production of the landscape that will be occurring in many of the cut and fill slopes.

Table 5. GLU Units, Pre and Post-Development (with Corresponding Areas)

GLU: Pre-Development	Area (ac)	GLU: Post-Dev., Preserved	Area (ac)
CB-Agri/Grass-3	0.11	CB-Agri/Grass-3	0.11
CB-Agri/Grass-4	0.13	CB-Agri/Grass-4	0.13
CB-Forest-2	3.08	CB-Forest-2	0.73
CB-Forest-3	0.04	CB-Scrub/Shrub-4	142.87
CB-Forest-4	0.18	**GLU: Post-Dev., Slopes**	**Area (ac)**
CB-Scrub/Shrub-4	184.87	CB- Cut slope (P=0.5)	22.70
CSP-Agri/Grass-4	0.01	CB- Fill slope (P=0.25)	13.47
CSP-Forest-3	0.04	CSP- Cut slope (P=0.5)	0.00
CSP-Forest-4	0.24	CSP- Fill slope (P=0.25)	0.67
CSP-Scrub/Shrub-4	0.47		

4.2 S_P Calculation

For the determination of S_P (Sediment Supply Potential) the sediment yield in pre and post-development conditions is needed. The following procedure was followed (please see S_P detailed calculations in Appendix 4):

- In both pre and post-development conditions, the areas at each slope range (determined with the slope analysis) were obtained. This area was multiplied by the sediment yield depending on the slope, according to the information provided by the County included in Appendix 3 (Table A.4.2 from the Regional WMAA Analysis, reference [4])
- Only sediment yield from critical areas was considered (those areas classified in Table 4). Therefore, the total area considered is smaller than the total area contributing to POC-25A.
- The sediment yield from natural areas has been reduced from 1852 ton/yr to 1410 ton/yr.
- In post-development conditions, additional coarse sediment producing areas were considered from the slopes of the development. Sediment yield factors were corrected from Table A.4.2 to account for a change in P factor (P is a support practice factor, assumed 0.5 for fill slopes and 0.25 for cut slopes, per Appendix H; it can also be seen as a safety factor).
- The sediment yield of the post-development slopes is 201 ton/yr; therefore, the total post-development sediment yield based on RUSLE is 1611 ton/yr. As a consequence, SY_{RUSLE} can be determined as SY_{RUSLE} = 1611/1852 = 0.826.
- Sediment yield also must include channel analysis. Per the NHDPlus Channel Map included in Appendix 3, it has been estimated that approximately 6,800 ft of NHDPlus channels exists in pre-

development conditions, and those will become only about 1,400 ft of NHDPlus channels in post-development conditions. Consequently, $SY_{NHD} = 0.206$.

- Following the recommendations of Appendix H, a weighed factor of 0.3 is applied to waters that are part of the NHDPlus data set and 0.7 for the RUSLE data. Consequently, the following equation is used: $S_P = 0.7 \cdot SY_{RUSLE} + 0.3 \cdot SY_{NHD}$.
- Finally, the overall S_P is 0.671 (See Appendix 4).

4.3 E_P and E_P/S_P Calculation

To calculate E_P, REC follows the procedure explained in Appendix H, Section H.8.1.2, Standard E_P Method. The following is the procedure used here:

- Scaling factors are not necessary in this study, as the area of the watershed and the area of the portion of the project being analyzed are the same (in other words, 100% of the area draining to POC-25A is included as part of the project area).
- Hydraulic analysis follows a combination of Manning's equation and shear stress calculation, starting with the given peak flow Q, and the geometry of the channel per Chang's study (bottom width 3 ft, lateral slope z is 2.125:1, slope S is 0.0202, and Manning's coefficient assumed as 0.035)
- The sequence of the hydraulic calculation is as follows: a given Q (cfs) and a given geometry determine a given depth of flow h (Ft) per Manning's equation (1); the geometry of the channel determines an area A (ft^2) per (2), a hydraulic radius R (ft) per (3), an average velocity V (ft/s) per (4), a shear stress τ (lb/ft^2) per (5) and a dimensionless work W per (6). Results are displayed in Appendix 5.

$$Q = \frac{1.486\sqrt{s}}{n}\frac{(B \cdot h + z \cdot h^2)^{5/3}}{\left(B + 2h\sqrt{1+z^2}\right)^{2/3}} \qquad (1)$$

$$A = B \cdot h + z \cdot h^2 \qquad (2)$$

$$R = \frac{A}{B + 2h\sqrt{1+z^2}} \qquad (3)$$

$$V = {}^{Q}/_{A} \qquad (4)$$

$$\tau = \gamma \cdot R \cdot S \qquad (5)$$

$$W = V \cdot \sqrt{(\tau - \tau_c)^3} \qquad (6)$$

- The results of a continuous simulation model prepared for POC-25A using SWMM (see reference [5], prepared by REC) are used here in the calculations displayed in Appendix 5: the 2-year peak flow Q_2 (obtained with SWMM) is used to define the lower threshold as 50% of Q_2 because the receiving channel has low susceptibility per Chang's study.
- All flows larger than 50% of Q_2 in the continuous simulation (with one-hour duration) are gathered from the continuous simulation results both in pre-development and post-

development conditions. This option was preferred over working with bins because the amount of peaks was not very large and the precision of doing the calculations with the exact values instead of using the average values for each bin is worth the extra effort. There are 243 peaks to be analyzed in pre-development conditions and 199 in post-development conditions, which correspond with almost the same amount of calculations than if 100 bins per the SWMM results are used (see Appendix 5).

- According to the results of Appendix 5, the summation of the dimensionless work factors (that defines the total dimensionless work variables ΣW_{PRE} and ΣW_{POST} in pre-development and post-development conditions is used to obtain $E_P = \Sigma W_{POST} / \Sigma W_{PRE} = 183.82/268.23 = 0.685$.
- From the previous section, $S_P = 0.671$. Therefore, **$E_P/S_P = 1.022 < 1.1$**
- No net impact is achieved by proving that $E_P/S_P < 1.1$, according to Appendix H. Notice that the results of reference [5] demonstrate flow control beyond the minimum necessary by hydromodification considerations alone (demonstrated by the separation of the pre and post development Flow Duration Curves FDCs) so that E_P could be reduced to levels compatible with No Net Impact conditions.

4.3.1 Calculation of Critical Shear Stress (τ_C for Q = 50% of Q_2)

As an example of shear stress calculation, the critical shear stress is calculated as follows:

- 50% of Q_2 is assigned as the flow that produces critical shear stress. Therefore, $Q = 0.5 \cdot 162.84 = 81.42$ cfs
- From Chang (2015), bottom width W = 3 ft, lateral slope assuming symmetrical trapezoidal section is z =2.125, longitudinal channel slope is 0.0202, and Manning's coefficient is assumed equal to 0.035. The application of the Manning's equation determines a depth of 1.841 ft.
- The hydraulic radius R is determined with the area and wetted perimeter per equations (2), (3), and (4). R = 1.092 ft (at the flow that produces critical depth)
- The critical shear stress results from equation (5) as $\tau_C = 1.377$ lb/ft^2.

A similar procedure is used for all flows to determine the shear stress τ as a function of the peak flow Q, so that the work W can be calculated for each flow using equation (6).

4.4 Conclusion of Section 4.

This study has demonstrated that the proposed HMP BMPs provided for the portion of Newland Sierra draining to POC-25A in addition to the protection of the remaining natural area and the diversion of the runoff from the slope areas shown in Appendix 3 are sufficient to meet the No Net Impact Criteria defined as $E_P/S_P \leq 1.1$.

5 CONCLUSIONS OF THE STUDY

The Newland Sierra project avoids any impact into CCSYAs with the following measures: (a) by encroaching into less than 5% of the WMAA Areas draining into 9 POCs (POCs 10, 13A, 16, 21, 26, 27, 29A, 29B, 29C) and by-passing and protecting the remaining WMAA areas in those POCs; (b) by removing a PCCSYA 25 times smaller than the De Minimis Area (POC-20), (c) by proving that the sediment would be discharging into Threshold Channels that do not need such sediment (POCs 13B, 19 and 25B); and (d) by demonstrating No Net Impact via Continuous Simulation and E_P/S_P analysis in the remaining POC (POC-25A).

6 LIST OF APPENDICES

Appendix 1:

- Relevant Information from Appendix H
- Relevant Information from Regional WMAA CCSYA Quantitative Analysis

Appendix 2:

- Relevant Maps of Hydromodification Screening Reports (References [2] and [3])
- General Satellite Exhibit with Location of Site-Visit Photos of Contributing Areas to POCs 13B, 19 and 26; Dec. 2016)
- Photographic Records of December 2016 Site Visit
- Aerial Photography of the Location of POC-19, POC-13B and POC-26
- New Updated Letter by Geologist (Leighton and Associates Inc. Dated 12/15/16 that Supersedes previous Geology Letter Dated 6/10/16 and Revised 10/5/16)

Appendix 3:

- Pre and Post-Development Slope Analysis Maps (Fuscoe, August 2016)
- Pre and Post-Development GLU Areas (Fuscoe, October 2016)
- Fill and Cut Slope Map (Fuscoe, October 2016)
- NHD-Plus Channel Map (Fuscoe, October 2016)
- New Avoidance/Bypass Exhibits, (Fuscoe, December 2016)

Appendix 4: S_P Calculations.

Appendix 5: E_P Calculations. Summary of Results.

Appendix 6:

- Response to Comments, First Round
- Response of Comments Identified on 10/21/2016, Second Round

7 REFERENCES

[1] County of San Diego BMP Design Manual. Appendices. February 2016 – Appendix H.

[2] Chang Consultants: "Hydromodification Screening for Newland Sierra", January 14, 2015

[3] Chang Consultants: "Hydromodification Screening for Newland Sierra", July 8, 2016

[4] Regional WMAA Excerpt of CCSYA Quantitative Analysis. Provided by San Diego County.

[5] REC Consultants: "Technical Memorandum: SWMM Modeling for Hydromodification Compliance of Newland Sierra", August 18, 2016

[6] Part 654 Stream Restoration Design, National Engineering Handbook (USDA 2007). Chapter 8, Threshold Channel Design.