Configuration Keywords

Last updated 3 November, 2023 • 69 min read

For a full description of the keywords used, see the Configuration Parameters section If a # precedes a keyword then this feature is not changed. The default option is used by the model. The keyword by itself means this feature is turned on and will be active in XPSWMM.

This page contains the following topics:

0 - 9

1993

XP-SWMM Version in 1993.

 Keywords associated with this option are:

OLDVOL , OLDGTCUR , OLDSTORE , STORETOP , NODETIM , DEPTHX , OLDHEAD , PITLOSS , WOBBLE , LASTOM , OLDOMEGA , FLAT , SUBNORM , OLDHOT , OLDVOL , NCNEW1 , NCNEW2 , NCNEW3 , NCNEW4 , NCNEW5 , TRAPEZOD , POWER , TIDEGATE , HFRIC , HSLOPE , HCONT , JLOOP , OLDSTNS , NEGNC , STREF , NEGNC1 , PERV , OLDSCS , EXOUT , OLDEGG , AS , JNCORF , QNORM , COMBIN , OLDECLOSS , OLDTIME , MAXWIDE , WSLOT , LOGNORM , OLDFLOOD , FLDCHN , USERINIT

1994a

XPSWMM version first half of 1994.

Keywords associated with this option are:

OLDVOL , OLDGTCUR , OLDSTORE , STORETOP , DEPTHX , OLDHEAD , PITLOSS , WOBBLE , LASTOM , FLAT ,OLDLOSS , OLDHOT , OLDVOL , NCNEW1 , NCNEW2 , NCNEW3 , NCNEW4 , NCNEW5 , TRAPEZOD , POWER , TIDEGATE , OLDSTNS , NEGNC , STREF , NEGNC1 , PERV , OLDSCS , EXOUT , OLDEGG , AS , JNCORF , QNORM , COMBIN , OLDECLOSS , OLDTIME , MAXWIDE , LOGNORM , OLDFLOOD , FLDCHN , USERINIT

1994b

XPSWMM Version second half of 1994.

Keywords associated with this option are:

STORETOP , NODETIM , DEPTHX , DEEPLIM , PITLOSS , FLAT , OLDHOT , OLDVOL ,TRAPEZOD , TIDEGATE , WOBBLE , NEGNC , STREF , NEGNC1 , PERV , OLDSCS , EXOUT , AS , JNCORF , QNORM , COMBIN , OLDECLOSS , OLDTIME , MAXWIDE , LOGNORM , OLDFLOOD , FLDCHN , USERINIT

1995a

XPSWMM Versionfirst half of 1995.

Keywords associated with this option are:

STORETOP ,DEPTHX , DEEPLIM , OLDVOL ,OLDVOL1 ,TRAPEZOD , TIDEGATE , WOBBLE , NEGNC , STREF , NEGNC1 , PERV , OLDSCS , EXOUT , AS , JNCORF , QNORM , COMBIN , OLDECLOSS , OLDTIME , MAXWIDE , LOGNORM , OLDFLOOD , FLDCHN , USERINIT

1995b

XPSWMM Versionsecond half of 1995.

Keywords associated with this option are:

TIDEGATE , PERV , OLDSCS , AS , JNCORF , QNORM , OLDTIME , MAXWIDE , LOGNORM , FLDCHN

24HR_LOOP

This option repeats the first 24 hours of the user input hydrographs at a node for all days of the simulation. Same words: 24HOUR_LOOP, 24HOURLOOP, 24HOURS. The repeated user inflows are entered in the Hydraulics layer of XPSWMM .

4TURNS

4 halvings of the time in isol=2 and isol=3 solutions. The default is 2 halvings of the time step.

8TURNS

8 halvings of the time in isol=2 and isol=3 solutions. The default is 2 halvings of the time step.

A

ADJUSTNL

Calculate the non-linear term based on the minimum difference between the upstream area and the downstream cross sectional area or the default method. The default is to use the difference between the upstream and the downstream cross sectional area.

ADVNL

Calculate the non-linear term based on the max difference between the upstream area and the middle cross sectional area, or the downstream and middle. The default is to use the difference between the upstream and the downstream cross sectional area.

AE

Area/elevation in variable storage areas.

ALSORAIN

If this option is used in the SWMM Configuration Parameters dialog box then rainfall and flow are compared in one table in the STATS Module output file. This allows the user of the STATS Module to analyze the rainfall and flow totals, averages and peaks in all of the events generated by runoff and saved in the SWMM interface file.

ALTEROMEGA

The program default is to start lowering the value of omega when it detects oscillations in the solution. This will only be for oscillations occurring for iterations above 5 in the current time step solution. Oscillations may occur in the node water surface elevation and the sum of the flow into the node.

ALWAYSKW

Always use kinematic wave routing for all conduits no matter what the conduit factors dialog is defined as in the interface.

ALWAYSNL

Always use non-linear term routing for all conduits no matter what the conduit factors dialog is defined as in the interface.

ARCH_RISE

If this option is used then the major axis in an ARCH conduit is the span.

ARCH_SPAN

If this option is used then the major axis in an ARCH conduit is the rise.

AREA_IMPLICIT

If this option is used then the area of the node at the new time step always uses the implicit time step. In other words, the new node depth calculation does not use the old time step area value but only the new time step area.

AREA_PRE10

If this configuration parameter is implemented the calculation of surface area when dry conduits are attached to nodes will be reverted to the calculation methodology prior to version 10. Using this parameter takes back the change for the computation of the contributing conduit surface areas to determine nodal depths. The change is becoming effective if the middle of the conduit is dry.

AS

Area/stage in variable storage areas. Default.

AUTO_PUMP

Same as the old configuration parameter FALLON. If the AUTO_PUMP feature or option is used and the option PUMPHEAD is used then the downstream node and downstream conduit flow from the pump is automatically calculated by the program. The user defined inflow hydrograph is actually used to turn the pump on and off. The flow that the pump will pump is based on the choice the user defines by using the options: PUMPBEG, PUMPMID and PUMPEND.

B

BADHRAD

Problem before 5/96 involving the hydraulic radius calculations of surcharged rectangular conduits for full initial conditions. Hrad was pinned to the fudge value. Default is the correct Hrad calculation.

BADRECT

Problem before 5/96 involving the hydraulic radius calculations of surcharged rectangular conduits. Default is the correct Hrad calculation.

BASIN_RELAX_PRE10

Adding this parameter will resort to the old relaxation policy that applies relaxation also for water depth values of storage basins (-->high continuity errors).

BEST97

In Extran solve all conduits connected to node, then all boundary conditions at the node and finally the nodal depths during any one time step. The default method is to solve one nodal depth and any associated conduits and boundary conditions during one time step.

BESTPUMP

Best features for pump optimization.

These features will achieve the best continuity error and execution speed for Extran models with many pumps. This flag will signal the use of NOZCONT1 and PUMPWT keyword options.

BMEGA

On use omega from bb line for ISOL=2 solution. Off don't use omega. This is a way to change the omega underrelaxation parameter in the ISOL=2 solution.

BMH_OPTION1

If this option is used then the displayed water surface elevation in a bolted manhole is the ground elevation + 0.1 This is the same as option BOLTMH

BMH_OPTION2

If this option is used then the displayed water surface elevation in a bolted manhole is the actual water surface elevation. This is the same as option BOLTMH1

BOLTMH

If this option is used then the displayed water surface elevation in a bolted manhole is the ground elevation + 0.1 This is the same as option BMH_OPTION

BOLTMH1

If this option is used then the displayed water surface elevation in a bolted manhole is the actual water surface elevation. This is the same as option BMH_OPTION1

BX=

Set the B multiplier used by the RAFTS hydrology.

C

CATSLOPE

Set the Catchment Slope as percentage or unitless.

e.g.

```
CATSLOPE=%, or
```

```
CATSLOPE=M/M, or
```

```
CATSLOPE=FT/FT
```

CDM_SHAPES

This item is superceeded by the interface as elliptical and arch pipes can now be explicitly selected. If this option is used then a gothic conduit in the interface is modeled as a Horizontal elliptical conduit in the SWMM engine. If this option is used then a catenary conduit in the interface is modeled as a vertical elliptical conduit in the SWMM engine. If this option is used then a semi-elliptical conduit in the interface is modeled as an ARCH conduit in the SWMM engine. Other older configuration parameters H_ELLIPSE, V_ELLIPSE and ARCH made these switches singularly.

CMIN

Off old FACT defaults for ISOL=2. On new FACT defaults for ISOL=2. Options added in 2/5/95.

CMIN=1.0

Command line argument to change the internal time step in Extran.

CN-x

This option changes the default curve number for the impervious area in SCS Hydrology. For example use CN=99 to change the default CN of 98 to a CN of 99. If you are using SCS hydrology and use the impervious area data field in the watershed dialog box then the program will created a composite CN based on the value of the CN for pervious area that you entered and a CN of 98 for impervious area. This options allows you the flexibility to change the default impervious CN.

COMBIN

On means use unformmated files in the combine block. Off means use binary files in the combine block - 8/4/95.

Combine block

Options added in 1995.

COMP

Composite CN in SCS hyrology with the % Impervious ignored. Value entered in Pervious CN is the weighted CN. PERV is the default CN option.

CONDTIME

Adjust the Extran time step based on conduits with rapidly changing conduit flows. 6/96.

CONDUIT-x

Default conduit shape in Extran.

example:

```
CONDUIT=1
```

Circular

```
CONDUIT=2
```

Rectangular.

CONVERGE

Off means use default method for non-convergent junctions. On use new method and smaller iterations to reach convergence.

CPOL#-x

```
CPOL1=
```

```
CPOL2=
```

```
CPOL3=

CPOL4=

CPOL5=

CPOL6=

CPOL7=

CPOL8=

CPOL9=
```

The CPOL#= values are the constant concentrations for the constant user inflow in the Hydraulics Mode of XPSWMM. The 1, 2, 3, 4, 5, 6 etc refer to the order of the pollutants in the pollutant list. This feature was added before the concentrations and Temporal Patterns were explicitly defined in the interface.

CREF-x

All of the pollutant concentrations in Extran are set to this concentration. This option can be used in conjunction with the option CPOL?=value

```
CPOL1=

CPOL2=

CPOL3=

CPOL4=

CPOL5=

CPOL6=

CPOL7=

CPOL8=

CPOL9=
```

The CPOL?= values are the constant concentrations for the constant user inflow in the Hydraulics layer of XP-SWMM. The 1, 2, 3, 4, 5, 6 etc refer to the order of the pollutants in the pollutant list. This feature was added before the concentrations were explicitly defined in the XP interface.

CULVNEW

Do not use the exit loss coefficient for culverts except for situations in which the culvert is outlet controlled. If the culvert is inlet controlled then the program will use a value of 0.0 for the exit loss even though the exit loss coefficient is entered by the user in the conduit factors dialog.

D

DEBUG

Set DEBUG to have XP-Culvert2000 generate .DBG file.

DEBUG_REVIEW

For XP Software internal use for debugging the review results linkage with XP.

DEEPLIM

Use 7.5 ft(m) for max nc depth in modify conduits. On means use 7.5 ft(m) for the natural channel depth limitation in Extran modify conduits. Off means use 17.5 ft(m) for the natural channel depth limitation in Extran modify conduits.

DEEP-x

Default conduit depth in Extran. . For example DEEP=1.0

DELT43

On means change the time step dynamically in version 4.3 (ISOL=2). Off is the default - use a constant time step. Option added in 1/28/95

DEPTH

Option added in 5/27/95. Off use 2, 26 for loop in depthx. On use 1,26 for loop in subroutine depthx. The loop of 2,26 is used in epa-swmm.

DEPTHX

Option added on 7/7/95. Off use new do loops as done in the 1995 version of Extran subroutine head. On use do loops as done in 1993 and 1994 versions of Extran. Basically, a loop of 2,26 for normal depth and 1,26 for critical depth for trapezoidal channels only. All other channels used 1,26 for both normal and critical depth.

DESIGN_EXT

This option is now explicitly in the job control interface of Hydraulics. The program will increase the pipe size of any conduit that surcharges. The definition of surcharging is that the water depth at any end of the conduit is equal to or above the 0.96 * diameter level. The pipe sizes will increase by 2 inches to 1 foot, 3 inches to 2 feet and 6 inches above a diameter of 2 feet.

DESIGN_RESTART

This configuration parameter forces the analysis to restart after every conduit resizing in a design run. The simulation progress bar will repedetly return to zero % complete and eventually reach 100%. This is the default solution. The alternative is to use the configuration parameter **NO_DES_RESTART** which dynamically alters the conduit diameters throughout the simulation. This is effectively a changing pipe diameter throughout the run and does not represent any reasonable physical representation.

DESIGN_ROUGH

The program will decrease the roughness of any conduit that surcharges. If the conduit surcharges, then the program will decrease the roughness so that more flow can pass though the conduit. The definition of surcharging is that the water depth at any end of the conduit is equal to or above the 0.96 * diameter level.

DESIGN_SLOPE

The program will increase the slope of any conduit that surcharges. If the conduit surcharges, then the program will increase the roughness so that more flow can pass though the conduit. The definition of surcharging is that the water depth at any end of the conduit is equal to or above the 0.96 * diameter level.

DIFFUSION

If this option is used then the diffusion wave solution is used in Hydraulics Layer (Extran).

DJREF-x

Change the itertion allowance in Extran to 'x' for nodal depth changes at any one iteration. For example DJREF=0.01.

DWF-x

Options added in 12/03/94

> DWF=1

> Off do not use new FILTH options in transport. On use new FILTH options in transport. Use sewage flow in dwf at at transport node as mean flow. Users can now select this method in the interface as "Direct".

> DWF=2

> Options added in 12/12/94 Off do not use new FILTH options in transport. On use this new FILTH options in transport. Use sewage flow in dwf as (cfs/person)*area*(people/area) or (liters/s/person)*area*(people/area) at transport node as mean flow. Users can now select this method in the interface as "Census-Based".

> DWF=3

> Off do not use new FILTH options in transport. On use this new FILTH options in transport. Use sewage flow in dwf as (cfs/acre)*area or (cms/hectare)*area at a transport node as mean flow. Users can now select this method in the interface as "Unit Flow Rate".

DYNAMIC

Never use kinematic wave in Hydraulics (Extran). Option added in 1/16/95. Off use kinematic wave under some conditions in Hydraulics. On never use kinematic wave, use only dynamic wave in Hydraulics.

E

E404

Use version SWMM 4.04 natural channel solution. Default is version 4.30 solution.

E405

Use version SWMM 4.05 natural channel solution. Default is version 4.30 solution.

E420

Use version SWMM 4.20 natural channel solution. Default is version 4.30 solution.

ECLOSS

Use correction for expansion/contraction flow direction. On means use correction to expansion/contraction loss for the flow direction. Off means do not use the correction.

ENDVOL1

Option added in 7/2/95. Off use old ending volume calculation. On use newer ending volume calculation.

ENDVOL2

Option added in 9/21/95. Off use old ending volume calculation. On use the smaller continuity error of the old or the newer ending volume calculation.

ENDVOL

Option added in 11/17/94. Off use old ending volume calculation. On use new ending volume calculation

ENERGY

On use energy grade line profile in review results and plot. Option added in 5/6/95. Off use HGL water surface profile in review results and xsect plot. On use energy grade line profile in review results and xsect plot.

EXINTIME

If this option is used then the starting time of the day of the simulation is taken from the interface file. For example, if the starting time of the interface file is 6 hours then the model will start at 6 hours. The starting time from Hydraulics Job Control is ignored.

EXOUT

Print elevations in conduit summary table not offsets. Printout of Extran conduit elevations in the conduit summary table - 9/11/95. Off for new printout. On for old printout.

EXPORTALL

If you use this option (or EXPORT_ALL) then all of the nodes of Hydraulics will be saved to the created interface file from Hydraulics layer. The sum of the flow into the node will be saved to the interface file. If this option is not used then only the outfall nodes will be saved to the interface file.

EXPORTJPRT

If you use this option (or EXPORT_JPRT) then only the nodes with **Detailed Printout Flag** enabled in of Hydraulics Layer will be saved to the interface file created from the Hydraulics layer. The sum of the flow into the node will be saved to the interface file. If this option is not used then only the outfall nodes will be saved to the interface file.

EXPORTUS

If you use this option (or EXPORT_US) then only the most upstream nodes of Hydraulics Layer will be saved to the interface file created from the Hydraulics layer. The sum of the flow into the node will be saved to the interface file. If this option is not used then only the outfall nodes will be saved to the interface file.

EXT_EVAP (or HDR_EVAP)

Use this option to model the evaporation loss from storage nodes in Hydraulics. The program will use the evaporation data entered in the Hydraulics layer Job Control of XP.

EXTERNAL_XLS

If you use this option then instead of saving the detailed node and conduit data information to the output file of SWMM, it will be saved to an external file. The detailed node and conduit data is saved if the **Detailed Printout** check box is clicked on in the node and conduit dialogs. The file will have the same name as the .XP file but will have an .XLS extension. It will be comma delimited text file. See also **EXTERNAL_CSV**.

EXTERNAL_CSV

If you use this option then instead of saving the detailed node and conduit data information to the output file of SWMM, it will be saved to an external file. The detailed node and conduit data is saved if the **detailed printout** check box is clicked on in the node dialog (under options) and/or the Print Flow Details under Output Control on the conduit dialog. The filename will be the .XP filename with a .CSV extension. The file will be a comma delimited text file. The frequency of the reporting is controlled by Configuration->Job Control->Hydraulics using the settings under Output control->Summary Interval.

EXOUT

Print elevations in conduit summary table not offsets. Printout of Extran conduit elevations in the conduit summary table - 9/11/95. Off for new printout. On for old printout.

EXTEST

Run concurrent runs of the comparison between EXTRA and default solution.

EXTRA1

Extrapolate node depths and conduit flows based on past time.

EXTRA2

Extrapolate node depths and conduit flows based on past time.

EXTRA3

Extrapolate node depths and conduit flows based on past time.

EXTRA

Extrapolate node depths and conduit flows based on past time.

EXTRANWQ

Extran WQ routing. Options added in 1/28/95. Off no Extran water quality for interface file. On Extran water quality routing using data from the interface file. This is now selected in the Hydraulics Job Control of the user interface.

EXTRAONE

Test Extrapolation of node depths and conduit flows.

F

FASNH

Off means don't use fasnh factor in subroutine head. On means use fasnh factor in subroutine head.

FAST_PUMP

If used then the pbsj or energy pipe solution is used for the first pipe downstream from a pump. This also activates the PUMPOMEGA option. If the FAST_PUMP option is used then the model will not restrict the pump flows to only change by 10 percent at each iteration. Allowing only the pumps to change by 10 percent at each time step is the default. An iterative solution is used to match the pump flow to the pump curve.

FASTCONV

Reduce omega during iteration cycle for iterations > 10.

FIT_PUMP_CURVE

FLAT

On to artificially increase the friction slope of flat slopes (0%) in Extran. Options added in 2/28/95. On Control over very flat slopes. Control was the default in 1993 and 1995, during part of 1994 the default was no control.

FLDCHN

Correction to storage ponding area calculation. Use ground z. On means no correction. Off means correction. Remove the coefficient from the surface ponding equation in subroutine bound - 9/29/94

FLIP_STORAGE

There are two ways to model the outlets from storage nodes in the Sanitary layer (transport). In one way the first equation goes to the downstream conduit and the second equation flow goes to the diversion conduit. This is the default method. The option FLIP_STORAGE makes the second equation go to the downstream conduit and the overflow go to the diversion conduit.

FLOOD

On - Use only ground elevation in flooded node calculations. Option added in 5/18/95. Off use actual flood depth in node.

FRICTAVG

On means use friction slope based on mean of up and down link conditions. Off means use friction slope based on harmonic mean estimate.

FRICTGEO

On means use friction slope based on geometric function. Off means use friction slope based on harmonic mean estimate.

FRICTMID

On means use friction slope based on middle of conduit. Off means use friction slope based on harmonic mean estimate which is the default friction slope calculation.

FULL_NODE

If this option is used then at each time step the node and only the nodes use a time weighting value of 1.0 new time step no matter what the value of the time weighting parameter is in Hydraulics Job Control. The time weighting value in Job Control only applies to the Hydraulics Conduits. This means the model is completely implicit.

FUZZYQ

Alternate between the default dynamic wave solution and the solution defined in the command word NEWROUTE.

G

GPM

Flow in gpm in syf file and output file

GRELEV

Change the ground elevation of open channels to match the max depth + invert elevation in the node. This was the default option before 1998. It is now an option and the non-change of the ground elevation is the default (see **NOGRELEV**).

H

H_TOL-x

Allows the simulation tolerance for head to be relative rather than fixed. For example, H_TOL=1 is a 1% tolerance and H_TOL=0.5 is a 0.5% tolerance.

HALFEC

Calculate the non-linear term based on the difference between the upstream area and the middle cross sectional area. The default is to use the difference between the upstream and the downstream cross sectional area.

HALFNL

Do not use the continuity equation in the Extran momentum equation. Default is to use the combined continuity & momentum equation.

HALF_AREA

Off older subcritical junction option for natural channels. On newer subcritical junction option for nchannels, half of channel area assigned to upstream and downstream nodes under all conditions. This feature is used if a large open channel is unstable due to oscillating between critical upstream and critical downstream. The default is the assigning of all conduit area to either the upstream or downstream node for all critical node situations.

HALF_NODE

If this option is used then at each time step the node and only the nodes use a time weighting value of 0.5 for the old time step and the new time step no matter what the value of the time weighting parameter is in Hydraulics Job Control. The time weighting value in Job Control only applies to the Hydraulics Conduits.

HCONT

On means do not use omega weighted non-linear term. Off means do use omega weighted non-linear term. This affects the dynamic wave solution. On for 1993 version of XP. Off for post 1994 version of the software.

HDR_EVAP (or EXT_EVAP)

Use this option to model the evaporation loss from storage nodes in Hydraulics. The program will use the evaporation data entered in the Hydraulics layer Job Control of XP.

HDSLOW

The maximum number of points in a SCS unit hydrograph. For example, if you were simulating a 24 hour storm with a 1 minute time step this value would be 1440.

HFRIC

On means do not use omega weighted friction slope. Off means do use omega weighted friction slope. This affects the dynamic wave solution. On for 1993 version of of XP. Off for post 1994 version of the software.

HGLMEAN

Previously created the .riz file data. Now it also activates the creation of the .riz file. Before only the keyword PUMPMEAN would create the .riz, .pbs. .pbp and .pbt files. Either of these keywords now also activates the PUMPMEAN keyword. Now use just one keyword to make the four pbsj files.

HSLOPE

On means do not use omega weighted water surface slope. Off means do use omega weighted slope. This affects the dynamic wave solution. On for 1993 version of XP. Off for post 1994 version of the software.

HYDRO

Use a hydrologic time step whenever the total system has no inflow and the flow is near zero in your Extran model.

I

IHH

The default hourly values in the rain module have to be between 0 and 23. Hourly values in the rain module have to be between 1 and 24 if this option is used in the rainfall analysis.

IMPLCT (IMPLICIT)

Off not to use implicit time step check for conduits. Option added in 11/15/94. **ON** = do not use implicit time step check. **ON** = do use implicit time step check as an upper bound for the time step. Extran works better with this enabled. On for 1993 and 1994 version of XP. Off for post 1995 version of the software.

INTERTIME

If this option is used then the date and time from the interface file is ignored by the program. This is important if you are reading a RAFTS interface file or an interface file with a predefined starting date. If this option is used then the simulation date from the Extran job control is used as the date on the interface file.

INTERP_DWF=

Use as INTERP_DWF=ON or OFF. On is the default since Version 8 which means that the DWF temporal pattern is interpreted linearly from one hour to the next. Older versions had a constant peaking factor for the entire hour. Use OFF to reproduce older version DWF results.

IR_PRE2013

After 2013, Inlet Capacity depth calculation considers the surface area in the surcharged case. Backward compatibility can be obtained by using this configuration parameter.

ISOL3

Means use the ISOL=3 solution for the ISOL=2 solution. Vary the courant time step factor, theta, and omega.

J

JCUBE

If this option is used then the flow event totals are in units of cfs and cms; not units of inches and millimeters in the STATS Module tables. This is a feature of EPA SWMM 4.4 that is not in the interface of XP.

JLOOP

Off means run the junction loop from 1 to nj and back again. On means run the junction loop from 1 to nj. On for 1993 version of XP. Off for post 1994 version of the software.

JNCORF

Use this parameter to reproduce an old bug (not recommended) to prevent the lowering of the downstream node invert. The current situation is that the downstream node invert is lowered appropriately to match the invert of the equivalent pipe. When a created bottom orifice equivalent pipe was generated before the fix the invert of the equivalent pipe could be below the invert of the node. In this case some low flow results were not representative of the true condition. Fixed on 11/12/95.

JNWEIR

Allow old bug for lower junction of a created bottom orifice to affect the weir crest of any connecting weir. Fixed on 1/17/96.

JUNTIME

Check for junction time step limitation at each time step, using factor of 0.10. Default is no junction time step checking. This is the post 1995 preferred method for Extran.

JUNTIME1

Check for junction time step limitation at each time step, using factor of 0.25. Default is no junction time step checking.

K

KEYS

Superceeded option as the Analysis Engine now has a Stop button. Allow checking of function keys during the simulation.

KINDYN1

Allow no oscillations between normal flow and dynamic flow after 3 iterations on 10/14/95. Default is after 3 iterations and between time steps.

KINDYN2

Allow oscillations between normal flow and dynamic flow after any iterations on 10/14/95. Default is after 3 iterations and between time steps.

KODEA

This is a feature of EPA SWMM 4.4 that is not in the interface of XP. This option deals with the treatment of cumulative rainfall values in the RAIN Module.

- KODEA = 0, DON'T INCLUDE NCDC CUMULATIVE VALUES IN RAINFALL TIME SERIES. HISTORICAL SWMM METHOD (DEFAULT).
- KODEA = 1, AVERAGE CUMULATIVE VALUES (NCDC CODE = "A") OVER PRECEDING TIME PERIOD.
- KODEA = 2, TREAT CUMULATIVE VALUE AS INSTANTANEOUS VALUE AT INDICATED TIME.

KODEPR

This is a feature of EPA SWMM 4.4 that is not in th interface of XP. The option deals with the printing of special missing rainfall codes.

- KODEPR = 0, DON'T PRINT INDICATION OF SPECIAL CODES FOR ALL DATES, ONLY FOR DATES OF EVENTS (DEFAULT).
- KODEPR = 1, PRINT INDICATOR IN EVENT SUMMARY FOR ANY DATE ON WHICH SPECIAL CODES ARE PRESENT.

KWAVE

Use kinematic wave overland flow routing.

KWLOSS

If you use this option the entrance and exit loss slopes are added to the water surface slope in the kinematic wave or "normal" wave solution.

L

L/S

Flow in l/s in syf file and output file

LASTCUL

Save culvert (include non-culvert shapes) information for all time steps for steady state comparison. The default is only all closed conduits.

LASTOM

Off means use 0.04 for the cutoff value of omega. This is default value in 1994 and 1995. On means use 0.01 for the cutoff value of omega. This is default value in 1992 and 1993.

LAW_WEIR

In the transport layer only let the flow go over the weir and not the secondary conduit. The normal or default is to allow both primary or secondary flow.

LINEAR

options added 12/16/94 Off do not use new linear reservoir option in runoff for subcatchments or watersheds. On use new linear reservoir option in runoff for subcatchments or watersheds. Option added in 2/16/95

LOGNORM

Switch for lognormal or normal emc in water quality. Use the lognormal distribution for emc calculations. Off use the normal distribution for emc calculations.

LOOPTEST

Run Extran twice to test variable initialization.

LRRM

Use non-linear cascading reservoirs.

M

MAVHEAD

Extrapolation is based on the formula:

$Yn = Yn + [(Yn -Yn-1) + (Yn-1 - Yn-2)] / 2$

This applies to the flows and node heads.

MAKE_XPX

Creates a .EXP file from a solve containing the system topography in the XPX format. Very useful in importing the lengths of conduits calculated using the **USE_XYINFO** configuration parameter. **Discontinued** in Version 10.

MAX_YN_YC

As the name suggests: At an outfall node use the maximum of the ycritical or ynormal depth instead of the minimum of the ycritical or ynormal depth.

MAXPTS=x

The maximum number of Runoff and Sanitary result points to store in the binary result files. For example when using Review Results. Usage: **MAXPTS=200000** would result in allowing up to 200000 points in the file. If the limit is reached the results will be cutoff.

MAXQ_PUMP3

Using this parameter allows for a maximum flow rate for dynamic head pump (type3) at zero or negative head difference (d/s-u/s). This parameter is similar to PUMP3_MAXQ.

MAXWIDE

Change the Preissmann slot width for user defined conduits on 10/12/95. Off is the new default. On is the old default of 0.01 × conduit width.

MGD

Flow in mgd in syf file and output file of Hydraulics (Extran). The default is either units of cfs or cms.

MIN_TS

Allows the user to set the minimum time step for the Hydraulics solution. The default is 1 second. Example, MIN_TS=0.2 will allow the program to lower the time step in the hydraulic solution down to 0.2 seconds if the simulation warrants that detail.

MIN/SEC

On - Use seconds for on-screen Extran printout (time to go). Off - Use minutes.

MINLEN

This parameter is used to alter the minimum length of conduits within the Analysis Engine. Currently the minimum is 30 feet.

MINOR43

Use minor losses in epa Extran solutions. On means use minor losses in conduit factors dialog in the epa Extran solutions. Off means do not use minor losses in epa Extran solutions.

MINOR_LOSS

Estimates the loss terms in the explicit solution or the epa swmm solution. Calculate pit loss terms - added to version 4 solutions - 7/15/95. DELQ5 is the sum of the loss at both ends of the conduit ANH = Used in Exit loss, it uses the current time step velocity. ANL = Used in Entrance loss, it uses the current time step velocity The loss = $[1/2*K*V^2/g]$ is factored into the momentum equation similarly to the friction slope

The loss momentum term = $g*A * [1/2*K*V^2/g]$

$= g*A * [1/2*K*Q/A*Q/A/g]$

$= g * [1/2*K*|Q/A| /g] * Q$

The loss term is then solved for implicity at each time step.

MOORE_QCAL

This is the default method in EPA SWMM for weirs that surcharge. The weir that surcharges equivalent rectangular orifice is based on the theoretical head and flow that the weir can handle rather than the default current weir flow.

MTVE

Generate intemediate Extran printout for MTVE or epa-swmm compatible intermediate output. Incomplete.

MWPUMP

The default pump solution uses the difference between the downstream and upstream node water surface elevations. If the option MWPUMP is used then the pump curve interpolation will use the difference between the upstream and downstream pump node water surface elevations to interpolate the pump flow based on the dynamic head. This is another alternative way to simulate pumping downhill.

N

NASH

These options added in 10/10/94 Off regular SCS Curvilinear Hydrograph. On use the NASH hydrograph. This was an earlier option, now the user can select this runoff method in the XPSWMM interface.

NATDEEP_0.05

If the configuration parameter NATDEEP_0.05 is present, natural channels are treated the same as other conduits and depth values equal to or less than 0.05 are permitted. By default values from 0 to 0.05 mean the entire cross section is to be used and not trimmed.

NCDN

Use the composite channel roughness calculated from the depth at the downstream end of the channel. Default value prior to 6/4/96.

NCFLOOD

Treat the left, center and right overbanks as separate channels with a vertical wall between the different sections. Option added 1/10/96.

NCFLOOD1

Treat the left, center and right overbanks as separate channels with a vertical wall in the calculation of the left and right channel hydraulic radius. Option added 1/10/96.

NCFLOOD2

Treat the left, center and right overbanks as separate channels with a vertical wall in the calculation of the center channel hydraulic radius. Option added 1/10/96.

NCFLOOD3

Treat the left, center and right overbanks as separate channels with no vertical wall in the calculation of the center, left and right channel hydraulic radius. Option added 1/10/96.

NCMID

Use the composite channel roughness calculated from the depth at the middle of the channel. (DEFAULT)

NCNEW1

Option added on 7/2/95. Off use new getcur or natural channel calculations. On use old getcur for natural channels if statements that preceded Feb 19, 1994.

NCNEW2

Option added on 7/2/95. Off use new getcur or natural channel calculations. On use old getcur for natural channels if statements that preceded November, 1993.

NCNEW3

Option added on 7/2/95. Off use new getcur or natural channel calculations. On use old getcur for natural channels if statements that preceded 1/11/1994.

NCNEW4

Option added on 7/10/95. Off use new getcur or natural channel calculations. Use 0.02 instead of 0.01 for cutoff of natural channel cross sectional area.

NCNEW5

Option added on 12/12/95. On use old method for nc small width.

NCNLOW

Use conveyance modified roughnesses less than the center channel roughness. The default is to use as a minimum the center channel roughness in a natural channel.

NCONVY

Alter the calculation of the weighted roughness by using the actual left, right and center hydraulic radius in the calculation of the weighted roughness. Option added 1/25/96. Use vertical walls in the calculation of the left, center and right hydraulic radius.

NCONVY1

Alter the calculation of the weighted roughness by using the actual left, right and center hydraulic radius in the calculation of the weighted roughness. Option added 1/25/96. Use vertical walls in the calculation of the left and right hydraulic radius.

NCONVY2

Alter the calculation of the weighted roughness by using the actual left, right and center hydraulic radius in the calculation of the weighted roughness. Option added 1/25/96. Use vertical walls in the calculation of the center hydraulic radius.

NCONVY3

Alter the calculation of the weighted roughness by using the actual left, right and center hydraulic radius in the calculation of the weighted roughness. Option added 1/25/96. Don't use vertical walls in the calculation of the left, center and right hydraulic radius.

NCONVY4

Alter the calculation of the weighted roughness by using the actual left, right and center hydraulic radius in the calculation of the weighted roughness. Option added 1/25/96. Don't use vertical walls in the calculation of the left, center and right hydraulic radius. Use adjusted left, center and right roughness.

NCONVY5

Alter the calculation of the weighted roughness by using the sum of the conveyances of the left and right overbanks to calculate the weighted roughness for each vertical slice. Option added 2/5/96. Same as NCONVY4 but for each slice instead of only at full depth. Don't use vertical walls in the calculation of the left, center and right hydraulic radius.

NCTWO

Double the number of data points used in natural channels by linear interpolation. Option added on 1/23/96.

NCUP

Use the composite channel roughness calculated from the depth at the upstream end of the channel.

NEGNC

Correction to negative natural elevations on 9/20/95. On for previous version. Off for new version of natural channel negative depth correction.

NEGNC1

Correction to negative natural elevations on 12/12/95. On for previous version. Off for new version of natural channel negative depth correction.

NEVERNL

Never use non-linear term routing for all conduits no matter what the conduit factors dialog is defined as in the interface.

NEW_ERINFO

New earthinfo format - 12/06/97 Format for new EarthInfo format – modeled as IFORM=14 format in the rainfall block of SWMM.

NEW_NL_97

This option changes how the non-linear term is calculated in the Extran solution. The equation is:

IF(ANH.LT.10.0*ANL) DELQ3(1) = + -2.0*BELT*Q(N)*(AMID-ANL)/(A(N)*A(N)*LEN(N))

IF(ANH.GE.10.0*ANL) DELQ3(1) = + -2.0*BELT*Q(N)*(ANH-AMID)/(A(N)*A(N)*LEN(N))

where

ANH is the downstream area, ANL is the upstream area and AMID is the mid conduit area. This is the same option as NEWNLTRM1

NEW_NL_98

This option changes how the non-linear term is calculated in the Extran solution. The equation is:

2.0*BELT*Q(N)*(AMID-ANL)/(ANL*AMID*LEN(N))

where

ANH is the downstream area, ANL is the upstream area and AMID is the mid conduit area. This is the same option as NEWNLTRM

NEWAES-x

NEWAES=1

Alphanumeric new AES rainfall format with a "9" added for the year field. Similar to WCH IFORM=13. 6/96

NEWAES=2

Alphanumeric new AES rainfall format with a "19" added for the year field. Different from WCH IFORM=13. 6/96

NEWAPPEND

If this option is used then instead of adding newly read rainfall station information as another rainfall station in the already existing rainfall interface file the new rainfall information is appended to the already existing station on the interface file. The proper sequence of events in the use of this option is to make one interface file with the oldest rainfall data first, followed by the new stations using the SWMM configuration parameter NEWAPPEND.

NEWBOUND

This is now the default. Calculate the boundary conditions for each node individually rather than all nodes at one time. New bound subroutine for individual j - 7/6/97 after this date this is the default.

NEWCDMFILE

Prints out a file with the extension file .CDM that contains the final heads and flows. A simple Hot-Restart option

NEWCDMIABS

This is the upper limit of the infiltration loss in Runoff. The units are either inches or millimeters. This applies to Horton infiltration in the Runoff layer of XPSWMM. A storm event will not have more than this loss.

NEWCONV

Alternate omega during iteration cycle.

NEWEGG

Newer treatment of area in eggshaped conduits, similar to epa swmm, the input area is not ignored.

NEWEIR

Only calculate the weir flow based on the first iteration head differences. The default is to calculate every iteration.

NEWHOT

New Hot-Restart for CDM - 12/12/96. Automatic generation of a Hot-Restart file in two passes through Hydraulics (Extran). This automatically warms up your model.

NEWJTIME

A new way to calculate the junction time step in Extran. Change to sumqs not qin of juntime on 8/26/97

```
IF(IJARG(227).EQ.1.AND.JSKIP(J).EQ.0.AND.SUMQ(J).NE.0.0) THEN

IF(Y(J).LT.FUDGE) Y(J) = FUDGE

TMJUN = 0.10*Y(J)*AS(J)/ABS(SUMQ(J))

IF(TMJUN.LT.0.01*RDELT) TMJUN = 0.01*RDELT

ENDIF
```

NEWNCRGH

Use the upstream roughness with the upstream cross sectional area. Use the downstream roughness with the downstream cross sectional area. Use the middle roughness with the middle cross sectional area in non-linear slope calculations. 6/96

NEWNL

Calculate the non-linear term based on the minimum difference between the upstream area and the downstream cross sectional area or the default method. This method is similar to ADJUSTNL but uses a different variation of the non-linear term. The default is to use the difference between the upstream and the downstream cross sectional area.

NEWNLTRM

This option changes how the non-linear term is calculated in the Extran solution. The equation is:

2.0*BELT*Q(N)*(AMID-ANL)/(ANL*AMID*LEN(N))

where

ANH is the downstream area, ANL is the upstream area and AMID is the mid conduit area. This is the same option as NEW_NL_98

NEWNLTRM1

This option changes how the non-linear term is calculated in the Extran solution. The equation is

IF(ANH.LT.10.0*ANL) DELQ3(1) = + -2.0*BELT*Q(N)*(AMID-ANL)/(A(N)*A(N)*LEN(N))

IF(ANH.GE.10.0*ANL) DELQ3(1) = + -2.0*BELT*Q(N)*(ANH-AMID)/(A(N)*A(N)*LEN(N))

where:

ANH is the downstream area, ANL is the upstream area and AMID is the mid conduit area. This is the same option as NEW_NL_97

NEWOBBLE

These options activate different ways to estimate the wobble parameter – an estimate of conduit flow instability. The wobble equation for NEWOBBLE is:

$$Wobble = |Q_n - (Q_{n+1} + Q_{n-1})/2|$$

NEWOMEGA

Reduce omega by half during the iteration cycle for mfail/2.

NEWPUMP

On means do not use time dampened pumps. Off means use time dampened pumps. On means do not use omega weighted pump dynamic head. Only allow pump flows to change by 10 percent at each iteration. Default is to allow any change in flow during an iteration. Allow more than one iteration for each pump time step. Allow more than one Q calculation per time step for each junction connected to the pump.

NEWPUMP1

On means do not use time dampened pumps. Off means use time dampened pumps. On means do not use omega weighted pump dynamic head. Default is to allow any change in flow during an iteration. Allow more than one iteration for each pump time step. Allow more than one Q calculation per time step for each junction connected to the pump. This is not a good method.

NEWRES

New .RES file forHydraulics (Extran) pump diversions. Get rid of extran diversions in output res file - 11/16/96 It would eliminate the pump diversions for the .RES file

NEWROUTE

In Extran solve all conduits, then all boundary conditions and finally all nodal depths during any one iteration. The default method is to solve one nodal depth and any associated conduits and boundary conditions during one time step.

NEWSLOT

If the NEWSLOT option is used then whenever the conduit is surcharged the program will not use the non-linear term in the dynamic wave equation. The non-linear term is the partial (Q^2/A)/partial (X) term in the dynamic wave equation.

NEWSUB

Off older subcritical junction option for natural channels. On newer subcritical junction option for nchannels, half of channel area assigned to upstream and downstream nodes under all conditions. This feature is used if a large open channel is unstable due to oscillating between critical upstream and critical downstream. The default is the assigning of all conduit area to either the upstream or downstream node for all critical node situations.

NO_QCHECK

The default node stopping criterion for the node solution during each time step is the change in the node continuity equation. If the option NO_QCHECK is used then the differences in node depth alone are used as the stopping criterion not the node continuity equation.

NOAH_DRATIO

Instead of saving the dry time for a conduit – save the maximum depth in a conduit to the .RES file. You then printout the maximum depth in the conduit using the conduit "dry time" in report generation.

NEWSUB2

If this option is used then the program will not switch back from the half area option to critical upstream or critical downstream until value*the long time step in seconds has passed. The area options usually cause instabilities when on successive iterations or time steps the area of the conduits switches from half upstream and half downstream to all upstream or all downstream. If you use this option then the same area option will be used on successive time steps instead of oscillating between area options

NO_DES_RESTART

This configuration parameter dynamically alters the conduit diameters throughout the design simulation. This is effectively a changing pipe diameter throughout the run and does not represent any reasonable physical representation. Users are encouraged to use **DESIGN_RESTART** which is the default.

NO_DT_CHANGE

Means do not allow the model to change the time step based on the number of iterations used in the previous time step. If this option is not used then the model will for those situations in which the pumps turn on and off causing a large number iterations use a smaller time step than the input time step.

NO_GW_OUT

This configuration parameter suppresses all groundwater output in the output file.

NO_GW_SUM

This configuration parameter suppresses the groundwater summary in the output file.

NO_IMPLICIT

If this option is used then do not use the implicit time step check for conduits. The implicit time step is found by finding the smallest value of conduit length divided by velocity. The default is to use the smallest implicit time step to limit the largest internal time step size

NO_NEWEIR

Calculates the weir flow based on the head difference at the each iteration in a time step solution. The default is to calculate every iteration. This option should be used if the weirs are stable or if the use of the NEWEIR option causes a continuity error in the model.

NOCVEMC

Always use zero coefficient of variation for emc wq calculations - 9/28/95

NODETIM

On means use 0.5 for time weighting in node area calculations. Off means use theta weighted area calculations. This affects the dynamic wave solution. On for 1993 version of XP. Off for post 1994 version of the software.

NODOUBLE

Do not double the conduit calculations in dyanmic wave soln. Off means use double calculations for conduits in the solution. On means use only one calculation for the conduit in the time step.

NOFLAT

No Effect. Superceded by FLAT 2/28/96. Off for no control over flat slopes in Extran. Options added in 1/28/95. Off no control over very flat slopes. On Control over very flat slopes. Control was the default in 1993 and 1995, during part of 1994 the default was no control.

NOGRELEV

Do not change the ground elevation of open channels to match the max depth + invert elevation. 6/96.

NOKEYS

Superceede option as the Analysis Engine now has a Stop button. On means no checking of function keys during the simulation. Off means use f10 key to stop the simulation and print summary results. On means no checking for function for use with the PEST model. This is a feature that is needed for use with Windows'95. The defualt was changesd 5/96. Now nokeys is the default.

NOMODNC

Do not modify the length of natural channels in Extran. Option added in 5/19/95.

OFF = modify natural channels with nequal parameter.

ON = do not modify natural channels with nequal parameter or modify conduits dialog.

NONEGRAT

The new default for rating curve conduits is to allow negative flow through rating curve conduits. If you use the option NONEGRAT then a flow reversal will not be allowed in a rating curve conduit.

NONUSE

Don't let the model change the internal time step when more than 10 iterations are used in the previous time step.

NOPMPQOFF

If this option is used then when the pump flow is below the value of PQ_LIM the pump will still be turned on. This option supersedes the option PQ_LIM or the pump flow limitation can entered in the pump discharge dialog in the fourth row, first column of the special pump dialog box). This is the default option for pumps.

NOPONDCHK

Same as NOAUSECHK. If this option is not used then the area of a node is not allowed to change more than 25 percent in any one iteration. The area of a node includes both the actual node area and the connecting conduit area. If this option is used then the new area at each iteration is not controlled.

NOPLOAD

If this option is used then the precipitation load is not added to the pollutant washoff load. This will be true even if the user enters a precipitation concentration in the interface.

NOPUMPWT

This the default option. The pumps are iterated just as any other element in Extran until the flow difference in iterations meets the stopping criteria (i.e. the flow tolerance). This option should be combined with the **FAST_PUMP** option.

NOQALTER

In the default program solution the model will average the last time steps conduit flow value and the current conduit flow value when the number of iterations exceed the value of the user defined maximum number of iterations. If the option NOQALTER is used then the last conduit flow value calculated in the iteration process is used as the next time / steps conduit flow and no averaging is performed.

NOQEL

On means do not use omega weighted denom and numerator. Off means do use omega weighted denom and numerator.

NOQMOD

The use of this configuration parameter means that the flows in the non-pbsj conduits are not controlled at each iteration. Normally, the flow is only allowed to change by 25 percent in each iteration during a time step. The non-pbsj conduits are those conduits that are not immediately downstream of the pumps in the Fast_Pump solution option for pumps and force mains.

NOQUOTE

On means do not use quotes in output file. Off means use quotes in output file.

NORES

Off means create a results file (.res) for Extran. On means do not create the results file for Extran. The results file allows the output of the model to be used by XP in spatial reports, graphical encoding, and design flow.

NOSCOUR

If this option is used then the scour/deposition Shield's diagram options will not be used in the Hydraulics water quality routing.

NOSLOT

If this keyword is used then the width of the Preissmann slot is zero. This may slow the model down significantly when there is a lot of surcharged conduits.

NOSQRT

Do not print warning message about courant condition at the beginning of the Extran output.

NOSYF

Options added in 1/28/95. Off create Hydraulics (Extran) syf binary file. On do not create Hydraulics (Extran) syf binary file. The syf file, syr file and syt files are used with review results and HGL animation.

NOSYR

Suppresses the creation of the Runoff binary file for the Review Results graphing tool. Sometimes used to limit the amount of copious output when space is limited.

NOSYT

Suppresses the creation of the Sanitary binary file for the Review Results graphing tool. Sometimes used to limit the amount of copious output when space is limited.

NOSYQ

Suppresses the creation of the Hydraulics Water Quality binary file for the **Review Results** graphing tool. Sometimes used to limit the amount of copious output when space is limited.

NO_WEIR_MOD

This option changes how the flow over a weir is allowed to change in the model. The default is to only allow the weir flow to change by 5 percent in each iteration during the solution. This option will allow the flow to change by any amount in one iteration.

NOVOMEGA

The velocity in a conduit is calculated as a byproduct of the node head and conduit flows. The new center velocity is calculated after the iterations for the new node head and conduit flow has converged. The velocity uses the underrelaxation parameter so the new estimated velocity is a function of the last time step's velocity and the current time step's velocity. If the NOVOMEGA option is used then the underrelaxation parameter is not used and the new time step value of velocity is calculated as Q / A where A is the center channel or conduit cross sectional area.

NOZCONT

No iteration checks on maximum depth changes in a manhole. The default is a modulated depth change restricted to 1/25 of the diameter or depth of the smallest connecting conduit. This should be on for models with many pumps as the nodal depth needs to change very fast for pumps that turn on and off frequently.

NOZCONT1

No iteration checks on maximum depth changes in a manhole for nodes connected a pump. The default is a modulated depth change restricted to 1/25 of the diameter or depth of the smallest connecting conduit. This should be on for models with many pumps as the nodal depth needs to change very fast for pumps that turn on and off frequently.

NOZCONTALL

The use of this option means that the heads or depths at a node are not controlled at each iteration. Normally, the head is only allowed to change 0.1 feet or meters at each time step. If this option is not used it would mean that if a pump turned on and wanted to increase the head by 10 feet at a downstream node it would take 100 iterations.

O

OLD_SAN_Q_DIVIDE

In older version of XP-SWMM Sanitary layer flow dividers allowed the flow in excess of the flow threshold to travel in the primary conduit and the flow less than the threshold to be in the secondary. This has been changed in newer versions of the software so that the primary conduit receives up to the threshold and the excess flows travel in the secondary. Use this configuration parameter to be compatible with old versions.

OLD_SHAPES

If this option is used then a gothic conduit in the interface is modeled as gothic conduit in the SWMM engine. If this option is used then a catenary conduit in the interface is modeled as a catenary conduit in the SWMM engine. If this option is used then a semi-elliptical conduit in the interface is modeled as a semi-elliptical conduit in the SWMM engine. This is the default.

OLDBGHRAD

Fixes a bug in the EPA SWMM solution for initial conditions. Change YO to RADMAX for initial condition printout - 1/27/97

OLDBND

Previous calculations of boundary condition for tide gates. The default changed in 4/96.

OLDBOUND1

If the calculation of the boundary conditions at the beginning of the simulation interferes with the reading of the hot_restart file then do not calculate the boundary conditions but use the value from the hot-restart file.

OLDECOSS

Don't use correction for expansion/contraction flow direction. Off means use correction to expansion/contraction loss for the flow direction. On means do not use the correction.

OLDEGG

Older XPSWMM treatment of area in eggshaped conduits, there is no use of the input area, the default area is used by the model. This is the default. Change made on 9/13/94.

OLDFLOOD

Off - Use only ground elevation in flooded node calculations. Option added in 5/18/95. On use actual flood depth in node

OLDGTCUR

Switch for epa swmm getcur or natural channel solutions. Changes to natural channel solution in epa solution. On older than 8/25/94 natural channel GETCURX in epa solution. Off newer than 8/25/94 natural channel GETCURX

OLDHEAD

On to disable fix to epa swmm head calculations. Date implemeted -> 3/25/94 Off is for a fix to subroutine head in epa solution. On is for old subroutine head calculation in epa solution.

OLDHOT

Option added in 2/15/95. On use old hot start file variables. Off use new hot start file variables.

OLDHOT1

Option added in 7/5/95. Off use old hot start file variables. On use new hot start file variables. This is the second modification to the hot start file.

OLDHOT2

Option added on 10/10/95. Off use old hot start file variables. On use new hot start file variables. This is the third modification to the hot start file. Flag for normal flow conduits was added to the hot-start data file.

OLDLOSS

Off for 1994 correction to minor loss calculations. On for 1993 and post 1994 calculations of minor losses.

OLDOMEGA

Off means use 0.04 for the cutoff value of omega. This is default value in 1994 and 1995. On means use 0.01 for the cutoff value of omega. This is default value in 1992 and 1993. This flag will turn off the meaning of the flag LASTOM.

OLDPWT

The OLDPWT Option was added on 1/16/97. Only use one iteration during a time step and do not solve for the pump flow the second time the pump was solved for in the current time step. A pump is usually solved twice: (1) once when the upstream node is being solved and (2) once when the downstream node of the pump is being solved.

OLDROUGH

Use the downstream roughness for natural channels in Extran. No longer the default after 6/96.

OLDSCS

Off for scscont and scstb activated. On for scscont and scstb not activated.

OLDSTNS

Option added in 10/26/94. On use old natural channel method for nearest stations. Off use new natural channel method for nearest stations.

OLDSTORE

Automatically add interpolated data points to storage nodes. Date implemeted -> 9/8/94. On is for the old treatment of storage nodes. Off is for the new treatment of storage nodes. Automatically add more data points to eliminate or minimize any continuity errors

OLDTIME

On not to use implicit time step check for conduits and the Junction time step limitation check with 0.10 as the coefficient. Off is the default of IMPLCT and JUNTIME.

OLDVOL

Option added in 11/17/94. On use old ending volume calculation. Off use new ending volume calculation. Disable option added 12/18/95. This takes the place of ENDVOL.

OLDVOL1

Option added in 7/2/95. On use old ending volume calculation. Off use newer ending volume calculation. Disable option added 12/18/95. This takes the place of ENDVOL1.

OLDVOL2

Option added in 9/21/95. On use old ending volume calculation. Off use the smaller continuity error of the old or the newer ending volume calculation. Disable option added 12/18/95. This takes the place of ENDVOL2.

OMEGA

On use new omega weighting for ISOL=2 solution. Off don't use the omega weighting but the default of 0.65

OMEGA-x

Command line argument to change the iteration factor in Extran.. For example OMEGA=0.65

OPTIMAL97

In Hydraulics (Extran) solve all conduits, then all boundary conditions and finally all nodal depths during any one iteration. The default method is to solve one nodal depth and any associated conduits and boundary conditions during one time step.

ORFLEN

Makes the new orifice conduit based on the value of the largest time step and not the current time step. This bug fix was implemented on 7/30/96. Previously, the current (small time step) was used to calculate the new equivalent orifice for time varying orifices. Now the default is to use the user entered maximum time step to make a equivalent conduit when the orifice area, coefficient of discharge or depth changes with time.

ORFULL

Even though Hydraulics layer (Extran) makes an equivalent conduit for all orifices this option will modify the behavior of the orifice when the orifice is full. Normally in the program the equivalent surcharged pipe will handle more than the full orifice flow because the head difference is greater between the upstream and downstream nodes than the depth in the orifice. If the option ORFULL is used then the peak flow through the equivalent orifice will be calculated from the orifice equation.

ORSUBN

The program default is to use the subcritical condition for bottom orifices. This has been the default since 8/1/96. This means that half of the surface area of the equivalent conduit is assigned to the upstream and downstream nodes of the orifice. If the parameter USE_ORF_EQN is used as an option the normal condition of assigning the conduit surface area based on critical upstream, critical downstream and the normal subcritical half area will apply

P

PBSJ_PUMP

If used then the pbsj or energy pipe solution is used for the first pipe downstream from a pump. This also activates the PUMPOMEGA option. If the FAST_PUMP option is used then the model will not restrict the pump flows to only change by 10 percent at each iteration. Allowing only the pumps to change by 10 percent at each time step is the default. An iterative solution is used to match the pump flow to the pump curve.

PDX_INTERFACE

This parameter forces all of the interface file node names to be alphanumeric even if all node names are numeric.

PEAKQTOT

Substitute total conduit flow for dry time in Extran spatial reports. 5/96

PERV

Pervious CN with CN = 98 for impervious area in SCS hydrology. XPSWMM will create a weighted CN using the % Impervious entered in the subcatchment dialog.

PITLOSS

Configuration paramenter (or Keyword) entered in the Configuration Parameters dialog. Use PITLOSS to reduce instability in pipes casued by a sudden change in downstream condtions.

This configuration has been added on 4/6/1994 to minimize the spikes in simulation resulting from significantly higher local loss (entrance/exit loss) contribution to momentum equation. How it works:

1. Default always uses full local loss contribution when PITLOSS is not used.
2. Local loss contribution can be maximum of 10 times of friction loss contribution when PITLOSS is used. This was the default setting in versions Pre- 4/6/1994.

ON for 1994 correction to minor loss calculations. **OFF** for 1993 and post 1994 calculations of minor losses.

> ⓘ PITLOSS option would underestimate total loss when friction slope is very small compared to local losses. For model versions 10.6 and later this configuration parameter is not recommended.

PL-x

Number of plugs in a storage treatment unit in transport layer. Feature added on 12/16/95. For example PL=1000. Default is 1000 plugs. Enter any number of plugs between 1 and 20000.

PLUGINIT

Initialize initial storage in plug units with a particle size distribution as defined in the nodal ST/Plant data dialog. Default is no initialization.

POLLUTANT_EVAP

If the configuration parameter POLLUTANT_EVAP is used then all pollutants in the simulation can be lost proportionally through evaporation. Since the 2012 version the pollutants are no longer lost through evaporation and the use of the parameter allows backwards compatibility.

POWER

Option added in 6/16/94. On use old power function area calculations. Off use the default correct area calculations for power function conduits.

PRECISE-x

Change the output table precision in some Extran tables. Precision based on the integer value of precise= line. For example PRECISE=3.

PUMP3_MAXQ

This parameter allows for a maximum flow rate for dynamic head pump (type3) at zero or negative head difference (d/s-u/s). This parameter serves the same function as MAXQ_PUMP3.

PUMP4

Options added in 11/28/94 Off do not use new pump 4 options from CH2MHILL. On use new pump 4 options from CH2MHILL.

PUMP_OFF

If this option is used then when the pump flow is below the value of PQ_LIM the pump will be turned off. This option should be used with option PQ_LIM or the pump flow limitation can be entered in the pump discharge dialog in the fourth row, first column of the special pump dialog box

PUMPBEG

Whenever a pump turns on it must first estimate what the new pumping rate should be based on the data in the user defined pump curve table. If the option used is PUMPBEG then the first value in the user defined pump curve table is the pump flow for the first iteration after the pump turns on.

PUMPEND

Whenever a pump turns on it must first estimate what the new pumping rate should be based on the data in the user defined pump curve table. If the option used is PUMPEND then the last value in the user defined pump curve table is the pump flow for the first iteration after the pump turns on.

PUMPHEAD

If the AUTO_PUMP feature or option is used and the option PUMPHEAD is used then the downstream node and downstream conduit flow from the pump is automatically calculated by the program.

PUMPIQ-x

Is the guess for the flow in the pump for the situations in which the pump starts out dry and wants to pump some flow. The value of PUMPIQ is multiplied by the maximum flow the pump can pump as the first estimate of the pump flow.

PUMPITER-x

Is the number of iterations the pump is allowed to use to reach convergence between the predicted and actual pump curve point. If the number of iterations is not specified at the pump special conduit level then the value of PUMPITER will used for that pump. The default number of iterations is 10.

PUMPMEAN

Same as PBS_FILE. In older versions it meant make the the .pbs and .pbt files only. Now it will create the .pbs, .pbt, .pbp and .riz files.

- .pbs is saved on nscrat(2)
- .pbt is saved on nscrat(8)
- .riz is saved on nscrat(3)
- .pbp is saved on nscrat(10)

PUMPMID

Whenever a pump turns on it must first estimate what the new pumping rate should be based on the data in the user defined pump curve table. If the option used is PUMPMID then the midpoint value in the user defined pump curve table is the pump flow for the first iteration after the pump turns on.

PUMPOMEGA

If used then the pbsj or energy pipe solution is used for the first pipe downstream from a pump. This also activates the PUMPOMEGA option. If the FAST_PUMP option is used then the model will not restrict the pump flows to only change by 10 percent at each iteration. Allowing only the pumps to change by 10 percent at each time step is the default. An iterative solution is used to match the pump flow to the pump curve

PUMPTST

Run concurrent runs of the comparison between EXTRA and default solution.

PUMPWT

On means do not use omega weighted pump dynamic head. Off means do use omega weighted pump slope. This affects the dynamic wave solution. On for 1993 version of XP. Off for post 1994 versions of the software. Only allow pump flows to change by 10 percent at each iteration. Default is to allow any change in flow during an iteration. The default and the option PUMPWT only use one iteration for the pump flow and one Q calculation per time step. The best method should have this feature activated.

PZERO

Initialize the value of RISAVE to prevent continuity error - 6/29/95 This is the default. The previous bug affected snowmelt calculations

Q

Q_TOL-x

Allows the simulation tolerance for flow to be relative rather than fixed. For example, Q_TOL=1 is a 1% tolerance and Q_TOL=0.5 is a 0.5% tolerance.

QCOMPARE

Printout the dynamic flow terms at intermediate time steps.

QNORM

On means use 0.5 for time weighting in qnorm calculations. Off means use theta weighted qnorm calculations. This affects the dynamic wave solution. On for 1993 version of XP. Off for post 1994 versions of the software.

QSMALL

Off means use 1.0e-5 as the smallest flow value. On use fudge or minimum depth as the smallest flow value.

R

RADISH

On means do not use omega weighted area and hydraulic radius. Off means do use omega weighted area and hydraulic radius.

RAFTS

Use non linear cascading reservoirs or laurenson method for all modeled watersheds. This was an earlier option, now the user can select the runoff method in the XP interface. The cascading reservoir method was taken from the RAFTS model (Goyen, 1990).

RCOUT

On use elevation in rating curve outfalls. Off for depth. Option added in 4/19/95. Off use depth in rating curve outfalls. This is now the default in XP.

RCTOL-x

Define the Rating Curve Tolerance for Culvert output file

Reach

The Reach element is a length of channel, drain, or natural river with a constant invert slope, flow rate, cross section and Manning's n-value. Element data for each Reach must be entered in the Element Data dialog. Link length must be entered in feet. Manning's "n" values must be entered. The program default is n=0.013.

Angle Point for closed channels is entered in degrees. If an angle point is used it is assumed to occur at the upstream end of the reach element. The maximum recommended angle point is 15 degrees.

Angle of Curvature for closed channels is entered in degrees. If an angle of curvature is input to represent a curve in the horizontal alignment of the reach, it is assumed for the entire length of the reach, from start to end.

Radius of Curvature for open channels is entered in feet and has similar restrictions as the Angle of Curvature.

Direction of curvature based on looking upstream in the system, positive (+) angles turn right and negative (-) angles turn left.

Number of manholes is used for the manhole loss calculations.

When Alameda mode is selected in the Job Control the fields 'Angle Point', 'Angle of Curvature' and 'Radius of Curvature' described above are replaced by the field 'Angle Loss Coefficient (K_b)'.

Angle Loss Coefficient (K_b) is entered when Alameda mode is selected. Enter the appropriate 'K' value for this loss.

RECT_SLOT_TRANS

Use this parameter to adjust the height of transition from the top a rectangular closed top conduit to the Preissmann Slot. This height is RECT_SLOT_TRANS × width of the conduit. Allowable values range from 0.01 to 0.25 with the default set to 0.01.

Versions 9.5 and earlier used a value of 0.25.

RESIDUAL

Always withdraw residual flow from storage/treatment. Off is the swmm default of waiting for no inflow or outflow.

ROADFLOW

Effects the assingn of conduit surface areas to nodes for nc. Off means always use subcritical assignment of conduit surface area to both the upstream and downstream nodes. On use critical upstream, critical downstream as well as subcritical. Default is always off.

REV_PUMP_PRESS

Changes the Review Results time series of HGL at adjacent nodes of a pump to be the pump pressure based on the pump curve.

S

SAMOMEGA

Always use the same omega during the simulations - no reduction.

SANQMULT

This configuration parameter allows all flows in the Sanitary layer to be multiplied by the factor following this confiduration parameter. For example, SANQMULT=2 will double all of the constant and user-defined hydrograph inflows in the Sanitary layer.

SBUH

These options added in 9/30/94. Off regular SCS Curvilinear Hydrograph. On Santa Barbara Urban Hydrograph. This was an earlier option, now the user can select this runoff method in the XP interface.

SCSCONT

SCS continuous hyetograph enhancement - September, 1995. On turn off reinitializing of unit hydrographs in scs hydrology. Off reinitialize after 175000 seconds of no rainfall.

SCSDUR=# OF DAYS

Using this configuration parameter will prevent a resetting of the SCS hydrology routing method initial abstraction for the give time durration (number of days)

SCSFIX

Always sets the evaporation to zero when you are running SCS hydrology. The default is to activate the evaporation for all hydrology methods.

SCSIADEPTH

Pre XPSWMM 2009SP3: Fixes a bug in the initial abstraction, but makes it optional. You must use this parameter to fix the bug for SCS initial abstraction with a constant depth. This does not apply to the situation in which the initial abstraction is a function of the soil storage (S). The fix is for those situations in which the total rainfall is less than the initial abstraction.

Post XPSWMM 2009SP3: This parameter is no longer recommended. The fix for initial abstraction has been made permanent without the use of the configuration parameter. In order to reproduce the old answer and reintroduce the bug after XPSWMM 2009SP3 you will need to add this configuration parameter.

SCSTB

Allow shape factors up to 950 in SCS hydrology. Option added in 4/12/95. Off use new method of calculating base time using SCS hydrology. This allows shape factor to extend to 950. On use old method of calculating base time using SCS hydrology.

SCSVAL-x

The maximum number of points in a SCS unit hydrograph. For example, if you were simulating a 24 hour storm with a 1 minute time step this value would be 1440.

SDTYPO

This was a bug fix on 1/30/96 regarding a calculation in the natural channels. The typo set variable SDIFF to 1.0e-4 whenever SDIFF was less than –3. It should have set SDIFF equal to 1.0E-4 whenever SDIFF was less than 1.0e-4

SEASON

Seasonal data file enhancement options added in 12/16/94. OFF = do not use new SEASON.DAT data file; ON = use new SEASON.DAT data file. Allows Runoff parameters to be changed by monthly factors.

SENSIMP1

Automatic sensitivity generation of the first infiltration parameter in runoff. (June, 1996).

SENSIMP2

Automatic sensitivity generation of the second infiltration parameter in runoff. (June, 1996).

SENSIMP3

Automatic sensitivity generation of the third infiltration parameter in runoff. (June, 1996).

SENSWIDE

Automatic sensitivity generation of the width parameter in runoff. (June, 1996).

SKIP_NO_Q

When using the **HYDRO** option, wait until there is no flow in any conduit before skipping the dry time periods in Hydraulics.

SKIP_NO_QIN

Skip Hydraulic Layer time steps in which there was no inflow from the interface file.

SLOWQO

Allow the iteration changes in conduit flows to be based solely on the nth time step flow. The default is the n+1st time step flows.

SMQMOD

Allow the flows in Hydraulics layer (Extran) to change by 5 percent in each iteration of the solution.

SNYDER

Options added in 10/12/94. Off regular SCS Curvilinear Hydrograph. On use the SNYDER hydrograph. This was an earlier option, now the user can select this runoff method in the XP interface.

SPATIAL

Change spatial conduit weighting to 0.50 upstream, 0.5 downstream. Default is 0.55 upstream, 0.45 downstream.

SPATIAL-x

Change the upstream weighting to an arbitray value (x). For example SPATIAL=0.55

SPATIAL1

Change spatial conduit weighting to 0.60 upstream, 0.4 downstream. Default is 0.55 upstream, 0.45 downstream.

SPATIAL2

Change spatial conduit weighting to 0.45 upstream, 0.55 downstream. Default is 0.55 upstream, 0.45 downstream.

SPATIAL3

Change spatial conduit weighting to 0.4 upstream, 0.6 downstream. Default is 0.55 upstream, 0.45 downstream.

ST-x

Number of storm events in rain and stats block - 12/16/95. For example ST=30000. Default is 5000 storms. Enter any number of storms using this parameter.

STATAREA

On means ask the user for a new tributary area in stats. Off means do not ask the user for a new tributary area in stats.

STORAGE_97

This is now the default storage node option in Hydraulics. Quadruple the number of stage area points

STORAGE

Automatically add interpolated data points to storage nodes. Date implemeted -> 9/8/94. Off is for the old treatment of storage nodes. On is for the new treatment of storage nodes. Automatically add more data points to eliminate or minimize any continuity errors

STORAGE1

Automatically add interpolated data points to storage nodes. Date implemeted -> 9/8/94. Off is for the old treatment of storage nodes. On is for the new treatment of storage nodes. Automatically add more data points to eliminate or minimize any continuity errors. The number of data points is quadrupled or a factor of 4

STORAGE2

Automatically add interpolated data points to storage nodes. Date implemeted -> 9/8/94. Off is for the old treatment of storage nodes. On is for the new treatment of storage nodes. Automatically add more data points to eliminate or minimize any continuity errors. The number of data points is increased by a factor of 8.

STORAGE_LINEAR_DIM

This configuration parameter will roll the volume computation methodology for stepwise linear storage basins back to the methodology used before version 2012.

Storage node Area

Options added in 9/30/94.

Four options for entering storage node data in Extran: AS , VS , AE , VE

STORETOP

Allow old bug for top of storage nodes below ground elev. Fixed on 11/03/95.

STREF

Intermediate negative natural channel fix on 9/23/95. Superseded by fix on 12/12/95.

SUBCATCHMENT_RES

This parameter is now on by default since 2010 SP3. In older versions in order to have separate results for each sub-catchment in the XP-Tables, you will need to add the Configuration Parameter SUBCATCHMENT_RES and rerun the model. Otherwise, the information will be a composite of the sub-catchments. Use the Catchment section and add Catchment Total Surface Runoff to see the results you are looking for in the tables.

SUBNORM

Always use subcritical head calculations with non-linear flag. On means use subcritical head calculations for conduits with always use non-linear flow term even under critical flow conditions. This flag is found in the conduit factors. Off means use normal head calculations as described in the SWMM documentation. **ON** for 1993 version of XP. **OFF** for post 1994 version of the software.

SUM_ZERO

The stopping criteria for a node is not the change in water surface elevation between iterations but the change in the sum of flow through the node. The default Extran solution says that the iterations will stop during a time step when the difference between successive water surface elevations is less than the head tolerance. If this option is used then the time step iterations will stop when the sum of the flow through the node in successive iterations is less than the value of the head tolerance. If this option is used and the head tolerance is 0.01 then the iterations will stop when the change between successive iterations is less than 0.01 cfs.

Superseded runoff options

These options are now available in the RUNOFF layer interface: **SBUH, NASH, SNYDER, LINEAR, KWAVE, LRRM**

SURJUN-x

Command line argument to change the junction tolerance in Extran.. For example SURJUN=0.01

SURTOL-x

Command line argument to change the conduit tolerance in Extran.. For example SURTOL=0.01

SVAP

This option comes from WCH (CDM, Chuck Moore), 10/5/93. If this option is used then the model will use zero evaporation during any time step with precipitation. Evaporation from the subcatchment that will be set to zero if it is raining or snowing. Evaporation from channel surfaces will be set to zero if there is rain or snow over any subcatchment in the model.

SWMM "bug" fixes or enhancements

NEWROUTE, FUZZYQ, QSMALL,
FASNH, DEPTH, DEPTHX, OLDHEAD, NEWSUB, LASTOM, OLDOMEGA, FLAT, NOFLAT, SUBNORM, ROADFLOW, PITLOSS, OLDLOSS, BADRECT, BADHRAD

SWMM esoterica
Mainly for XP software.

RADISH, NOQEL, NODOUBLE, HFRIC, HSLOPE, HCONT, JLOOP, MAXPTS-x, HALFEC. ADVNL, ADJUSTNL, NEWNL, HALFNL, SLOWQO, LOOPTEST

SWMM output enhancements
NORES, NOSYF, ENERGY, EXOUT, EXTERNAL_XLS, LASTCUL, NOKEYS, KEYS, MIN/SEC, NOQUOTE, VCOMPARE, QCOMPARE, WOBBLE

SWMM SCS enhancements
PERV, COMP, SCSIADEPTH, SCSCONT, SCSTB, OLDSCS

SYF_INT

This is now controlled in the interface through the Hydraulics Job Control. Allows the Hydraulics Review results to be at a specified interval of time. For example:

SYF_INT=1H is a 1 hour interval.

SYF_INT=30S is a 30 second interval.

SYF_INT=15M is a 15 minute interval.

The interval selected must be equal to or greater than the time step and if larger be an integer multiple of the time step.

SYT_INT
Allows the Sanitary Review results to be at a specified interval of time. For example:

SYT_INT=1H is a 1 hour interval.

SYT_INT=30S is a 30 second interval.

SYT_INT=15M is a 15 minute interval.

The interval selected must be equal to or greater than the time step and if larger be an integer multiple of the time step.

T

TABLE_E?_CSV

This parameter grouping includes all Extran tables in the output file from 1 to 22. Usage is as follows:

TABLE_E1_CSV

TABLE_E2_CSV

TABLE_E22_CSV

Each Table listed will be sent to a comma-delimited file with a .CSV extension. This parameter will create a comma-delimited file of the tables in the Hydraulics portion of the output file.

THETA

Off old theta defaults for ISOL=2. On new theta weighting for ISOL=2. Options added in 1/28/95.

TC_NO_RESTRICTION

If the configuration parameter TC_NO_RESTRICTION is present then TC values less than 5 minutes will be permitted. The default while not using this parameter forces calculated TC of less than 5 minutes to be 5 minutes in the simulation.

THETA-x

Command line argument to change the time weighting factor in Extran.. For example THETA=0.65

TIDEGATE

Allow old bug for tidal gate boundary condition - fixed on 11/12/95.

TIMOLD

Eliminate duplicate call stime and time + rdelt - 7/22/96 in Hydraulics (Extran). The default is just to call stime once

TRAPEZOD

Switch for correct y norm in trapezoidal channels. Option added in 5/27/95. On use old equation for ynorm in subroutine depthx for trapezoidal channels. Off use improved equation for ynorm in depthx for trapezoidal channels.

TROMEGA

This option allows the user of the Sanitary Layer to control the internal underrelaxation parameter in the Sanitary Layer flow routing. The default value of the underrelaxation parameter is 0.5 in Transport. If you adjust this for models with instabilities or continuity errors then by using a value greater than 0.5 you may eliminate the instability or continuity error

TRSPACE-x

This option allows the user of the Sanitary layer (Transport) to control the internal spatial weighting parameter in the Sanitary Layer flow routing. The default value of the spatial weighting parameter is 0.5 in Transport. If you adjust this for models with instabilities or continuity errors then by using a value greater than 0.5 or lower than 0.5 you may eliminate the instability or continuity error

TRTHETA

This option allows the user of the Sanitary Layer to control the internal time weighting parameter in the Sanitary Layer flow routing. The default value of the time weighting parameter is 0.6 in Transport. If you adjust this for models with instabilities or continuity errors then by using a value greater than 0.6 you may eliminate the instability or continuity error.

TWO_DIGIT_YEAR

Delete 1900 from the Year used in creation of the Rainfall interface fall (.RIN file) created by the Rainfall Utility

U

USE_DS_RC

Use the depth in the downstream node as the control for the Rating Curve. The default is to use the difference in elevations at the upstream and downstream nodes.

USE_ORF_CL

Instead of using the equivalent pipe for the orifice flow to route the flow through the orifice the actual orifice equation is used by the model. The total head at the upstream nodes of the orifice is calculated at each time step and this total head is used to calculate the orifice flow. Only positive orifice flow is calculated by the model.

USE_ORF_EQN

Instead of using the equivalent pipe for the orifice flow to route the flow through the orifice the actual orifice equation is used by the model. The head difference between the upstream and downstream nodes of the orifice is calculated at each time step and this head difference is used to calculate

the orifice flow. Only positive orifice flow is calculated by the model. Negative head differences or zero head differences results in zero flow through the orifice.

USE_OUT_RC_DEPTH

Allows the rating curve outfall to be a flow and depth rating as opposed to the default, which is a flow and elevation rating. The depth is measured from the node invert.

USE_US_RC

Use the depth in the upstream node as the control for the Rating Curve. The default is to use the difference in elevations at the upstream and downstream nodes.

USE_XYINFO

Calculate the link lengths from the upstream node and downstream node x,y,z coordinates in the program. The new lengths will be printed in the output file, used during the course of the simulation but not changed in the interface database. Using the configuration parameter **MAKE_XPX** can allow these lengths to be imported. **Discontinued** in Version 10.

User defined closed conduit enhancements

USERINIT, USEROPEN

USERINIT

Option added on 7/7/95. Off use new initialization of variables for user defined closed conduits. On use old method of no variable initialization. Initialization is the default method.

USEROPEN

On for elevation in user defined conduit data dialog. Option added in 5/27/95. Off use depth in user defined closed conduits. On use elevation in user defined closed conduits.

USERTOP

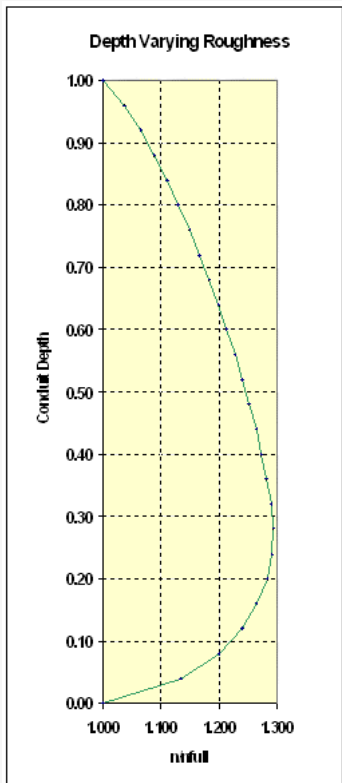Add a top to the wetted perimeter of a user defined closed section.

USESMDELT

Try using a variable time step in the ISOL=1 and ISOL=0 solutions of EPA SWMM.

V

VARIABLE_N

If OLD_VARIABLE_N is invoked then Manning's roughness, varying according to depth, will be calculated for all closed conduits using the method described by Zaghloul(1998). Implemented 1/23/98 1/24/98.

VARIABLE_N uses the graphs described in Open Channel Hydraulics – Ven Te Chow, and the City of Spokane Design Standards (Jan 2000) in versions later than 9.26 (Dec 2004).

VCOMPARE

Compare the dynamic flow velocity and manning's eqn vel.

VE

Volume/elevation in variable storage areas.

VILLEMONTE

Uses the Villemonte weir submergence coefficient instead of the default Rohbeck solution in Hydraulics (Extran) when a weir submerges.

VS

Volume/stage in variable storage areas.

W

WASP

Options added in 9/30/94 If this keyword is not used then there is no WASP linkage file. If it is used then the WASP linkage file is created in the transport interface file.

WEIRS_45

If this option is used then all of the modeled weirs in your network will have an exponent of 2.5. The default weir exponent is 1.5 for weir types 1 and 2 and 1.6667 for weir types 3 and 4.

WOBBLE

New wobble parameter for graphical encoding on 8/29/95. On for old wobble = sinuosity parameter.

WOBBLE4

These options activate different ways to estimate the wobble parameter – an estimate of conduit flow instability. The wobble equation for WOBBLE4 is

$$Wobble = |Q_n - (Q_{n+1} + Q_{n-1} + Q_n)/3|$$

WQEN

Modified rating curve coefficient and exponent for wq. For **ON,** a 1 is added to the exponent and the coeficient is multiplied by the appropriate coefficient. **OFF** means nothing is done.

WSLOT

Slot width in the Preissmann slot = 0.005 × conduit width.

> ⓘ Note: The WSLOT is set by default, so the slot defaults to a 0.5% width.

WSLOT1

Slot width in the Preissmann slot = 0.01 × conduit width.

WSLOT2

Slot width in the Preissmann slot = 0.001 × conduit width.

WSLOT3

Slot width in the Preissmann slot = 0.0001 × conduit width.

WSLOT4

Slot width in the Preissmann slot = 0.00001 × conduit width.

WSLOT5

Slot width in the Preissmann slot = 0.05 × conduit width.

WSLOT=xxx

Where xxx is the percentage of the pipe width you want the slot to be.

Y

YSMALL

Allow only changes of 0.001 feet or 0.001 m per iteration in solving for the nodal depth. 7/96

ZEROINV

Automatically calculate nodal inverts based on the lowest connecting conduit. Handy for missing XPX import data. 6/96

ZREF=

Enter the backwater elevation that will be used to caclulate the initial depth and volume at all the nodes and links in the network. If a fixed backwater boundary condition is used without the ZREF keyword and the network starts dry then at the first time step of the simulation there will be reverse flow while the network fills up through the outlet node.

For example: ZREF=120.5 will set the starting water surface elevation at all nodes to be 120.5