Runoff Sub-Catchment Data

The majority of the subcatchment data is entered as global data and simply referenced from within this dialog. This makes data entry easier when a number of subcatchments share common data.

Routing Method

There are seven major types of Hydrograph Generation techniques available in Runoff. Visit the links below for details about each routing method:

- SWMM Runoff Non-linear Reservoir Method
- Kinematic Wave Method
- Laurenson Non-linear Method/Rafts
- SCS Unit Hydrograph Method
- Other Unit Hydrograph methods: Nash, Snyder (Alameda), Snyder, Rational Hydrograph, Time /area, and Santa Barbara Urban Hydrograph.
- Rational Formula
- UK Hydrology: New UK, Wallingford, ReFH, FEH, FSR

Depending on the routing method selected, some data fields may have different meanings or be ignored. For example, infiltration is integrated into the calculation for the Rational Formula and SCS Hydrology methods and the Infiltration button is disabled. An infiltration Global Database record must be specified when using the other routing methods.

Water Quality Data

This dialog allows the entry of subcatchment water quality data. The subcatchment may be broken up into several landuses. If no landuse data is entered for a subcatchment, all runoff from the subcatchment will be considered to be free of pollutants. Erosion data is also optionally entered from within the water quality dialog. If this button is greyed out it can be activated by selecting Water Quality from the Job Control dialog.

Landuse Reference (KL)

A reference to the Global Database of landuse data. The land use list defined in the ‘Water Quality’ dialog in Job Control is displayed and the appropriate landuse selected from this list.
**Percentage Area (PLAND)**

This item specifies the percentage of the subcatchment accounted for by a particular landuse. The total of these percentages must equal exactly 100% (unless no landuses are selected). The value must be greater than 0.0 for each line where a landuse has been selected.

**Curb (Kerb) Length (GQLEN)**

The total curb (kerb) length within a subcatchment land use, in hundreds of feet [km]. This parameter is required for a landuse if dust and dirt buildup for the landuse is dependant on curb length. This parameter is also required if any pollutant buildup for the particular landuse depends on curb length directly.

**Number of Catchbasins (BASINS)**

The number of catchbasins in the subcatchment. This parameter is only required if some catchbasin storage exists for the subcatchment land use. It allows catchbasins to contribute to the first flush of pollutants in significant high intensity storms. The number of catchbasins is used as a multiplying factor, i.e., entering 2.5 catchbasins will have the same effect as a single catchbasin with a total volume of 2.5 times the volume of the Typical Catchbasin defined in Job Control - Water Quality.

**Initial Loading Reference (PSHED)**

A reference to the Global Database of pollutant initial loadings. When this button is selected a list of available Initial Loading Global Data lists is displayed from which one is chosen. If an Initial Loading is not selected the initial concentration for each pollutant will default to zero.

**Erosion Data**

This flag controls the generation of erosion data for the subcatchment. If the flag is OFF, no erosion is generated. If erosion is selected the total number of pollutants available is reduced by one.

- **Erosion Reference**
  
  A reference to an Erosion Global Database. When this button is selected a list of available Initial Erosion Global Data is displayed, from which one is chosen.

- **Erosion Flow Distance (K1 - ERLEN)**
  
  Flow distance (feet or metres) from the point of origin of overland flow over erodible area to the point at which runoff enters the channel/pipe or inlet.

**Snowmelt Flag**

Flag indicating that snowmelt is to be simulated for this subcatchment. If this item is greyed out it can be activated by selecting Snow Melt from within Job Control.

When the associated Snow Melt Reference button is selected a list of available Snow Melt Global Data lists is displayed, from which one is chosen.

**Groundwater Flag**

Flag indicating ground water is to be simulated for the subcatchment. The state of this flag is used to verify whether the data in the entire Subcatchment dialog has been checked. It must be included (as off or on) in imported XPX files or missing data error messages will be generated on an attempt to solve.

When the associated Groundwater Reference button is selected a list of available Groundwater Global Data lists is displayed, from which one is chosen.

- **Conduit Name Where Groundwater Drains (H2 - NGWGW)**
  
  Two radio buttons control whether groundwater drains to another node or conduit, or whether flow is lost from the system.

- **Drain to node or conduit**
  
  Enter the name of the node or conduit to where groundwater from this subcatchment will drain. This node or conduit must be active in the Runoff layer. The drainage name may or may not be the current node name. If this name is left blank the groundwater outflow will be 'lost' from the simulation, although it will be accounted for in the continuity check.

- **Drain out of system**
Groundwater outflow will be 'lost' from the simulation, although it will be accounted for in the continuity check.

Rainfall Reference

A reference to the Rainfall Global Database. When this button is selected a list of available Rainfall Global Data lists is displayed, from which one is chosen. Rainfall records can be copied from one subcatchment and pasted to all other catchments with the same index (subcatchment number).

For copying and pasting see Copy a Single Item.

Infiltration Reference

A reference to the Infiltration Global Database. When this button is selected a list of available Infiltration Global Data records is displayed, from which one is selected. New infiltration records may be created and existing records may be edited.

Infiltration records can be copied from one subcatchment and pasted to all other catchments with the same index (subcatchment number). See: Copying and Pasting Data.

Flow Redirection

This option applies to the Runoff Routing Method only. It provides for directing runoff from one overland flow sub-area to another. Input of this data is optional and required only if redirection of overland flow is desired.

In the Runoff Routing Method, each subcatchment may be modeled with a percent impervious to create multiple surfaces of pervious and impervious area. To model a situation where the impervious area is not directly connected and runs on to the pervious and may be directed to another subcatchment the user may employ the Flow Redirection option.

This flow redirection requires that the subcatchments routed to and from are either 100% or 0% impervious. Flow redirection using mixed percent impervious catchment is not possible. Therefore to model impervious to pervious the catchment needs to be split to the pervious and impervious parts. Then the impervious subcatchment can be redirected to the pervious subcatchment in the same node.

Node Name

Enter the node name that will receive the redirected runoff hydrograph from this subcatchment.

Subcatchment Number

Enter the subcatchment number for the Node Name entered above to receive the directed flows.

RDII

In Runoff Mode, the Sub-Catchment dialog allows for selecting the Rainfall Derived Inflow and Infiltration (RDII) method for modeling wet weather flows in combined sewers. This method utilizes the Unit Hydrograph (UH). It is also referred to as the RTK method as the UH is defined by three parameters:

- \( R \) = the fraction of rainfall volume that enters the sewer network
- \( T \) = the time from the beginning of rainfall to the peak UH, hours
- \( K \) = the ratio of time to recession of the UH to time to peak

The UH is divided three components:

1. Short term or rapid
2. Intermediate
3. Long term

Each component is modeled as a triangular shaped hydrograph, all beginning at the same time and each having it’s with its own \( R \), \( T \) and \( K \) parameters. \( R \) values are defined such that:

\[ R = R_1 + R_2 + R_3 \]

where:

\( R \) = fraction of total rainfall entering the sewer network, and

\( R_1, R_2, R_3 \) = fraction of total rainfall entering sewer network in the short, intermediate and long term hydrographs
At any time, the total RDII is the sum of the three component UHs. The XPSWMM and XPStorm RDII method is based on the method used in EPA SWMM version 4.4.

The RDII dialog is used to set the hydrograph parameters.

Use the drop list to select an RDII record from the Global Database, and click the Edit button to open the dialog.

The area used for the calculating runoff may be set to the area of the subcatchment or a user defined area in ac (ha).