Tutorial 11 - Importing Rainfall from Templates

Rainfall is the starting point for almost all stormwater simulations. The terms "rainfall", "storms", and "precipitation events" all have the same meaning in this tutorial. Rainfall data consists of a two column table containing a time step (usually in hours) and either total precipitation (in or mm) or intensity (in/hr or mm/hr).

Stormwater models use two types of rainfall data:

- Design storms in which a total rainfall is assigned to a duration and temporal pattern. For a given location, duration, and total rainfall these storms are assigned a frequency, such as the 10-year and 24-hour rainfall.
- Historical storms that are obtained from data collected in precipitation gauges. These storms are used to calibrate a model with observations of flow and water levels and assess the performance of collection system improvements.

The user interface can utilize storms of any duration. A single data file can contain multiple storm events. These files consist of dry periods (rows with zero precipitation) between wet periods (rows with nonzero precipitation).

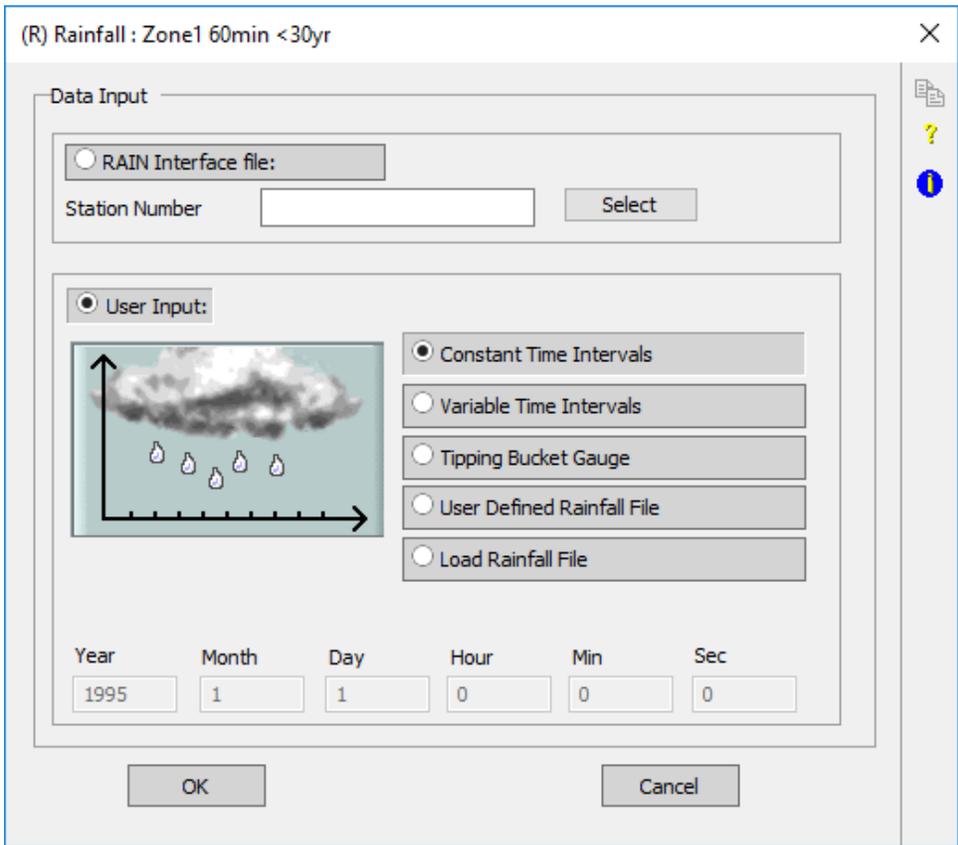There are four methods of adding rainfall data to a model:

- Starting a new file with a template
- Merging global data from an existing model
- Importing a rainfall data file
- Manually adding data into a dialog

In this tutorial, the first method will be presented.

Level	Novice
Objectives	Create a design storm from a template
Time	0.25 hour
Data files	**ARR.xpt** **SydneyStorm.xp**

Each installation of the application contains template files (*.xpt) with standard data used to build models. This example demonstrates an application of the dimensionless storm temporal pattern for Sydney. As per the Australian Rainfall and Runoff manual, Sydney is in Zone 1.

1. Launch the program. In the opening dialog, select **Create from Template**, and then click **Continue**.

2. In Windows Explorer, navigate to your data folder, type in your file name and click **Save**.

3. In Windows Explorer, navigate to the Getting Started folder and select the file *ARR.xpt*. Click **Open**. A message may be displayed that XPSWMM or XPStorm is converting from an earlier database format. Click **OK**.

4. Review the design storm in the **Global Data**.
    a. In the **Configuration** menu, select **Global Data**.
    b. In the **Data Base Type** column, select **(R) Rainfall**. In the **Record Name** column, select **Zone1 60min <30yr**.
    c. Click **Edit**.

5. In the next dialog, select **Constant Time Intervals**.

(R) Rainfall : Zone1 60min <30yr

Data Input

○ RAIN Interface file:

Station Number [ ] [Select]

◉ User Input:

◉ Constant Time Intervals
○ Variable Time Intervals
○ Tipping Bucket Gauge
○ User Defined Rainfall File
○ Load Rainfall File

Year	Month	Day	Hour	Min	Sec
1995	1	1	0	0	0

[OK] [Cancel]

6. In the **Rainfall** section of the next dialog, click the **Absolute Depth** radio button and enter **47.3** mm in the **Multiplier** field. This is the depth of rainfall for 5 year – 60 minutes storm for Sydney. This is calculated using the **IFD.exe** as you did for the previous tutorial.

7. In the **Time** section, click the **Time Interval** and **Minutes** radio buttons. Enter **5** in the box.

Constant Time Intervals　　　　　　　　　　　　✕

Rainfall
- ○ Cumulative Depth
- ◉ Absolute Depth
- ○ Intensity

Multiplier 47.3

	Rainfall Inputs
1	.039
2	.07
3	.168
4	.12
5	.232
6	.101
7	.089
8	.057
9	.048
10	.031
11	.026
12	.019

Time
- ◉ Time Interval ◉ Minutes
- ○ Total Time ○ Hours

5.

Insert　　Delete

OK　　Graph　　Cancel

8. Click **Graph** to display a graph of intensity vs. time.
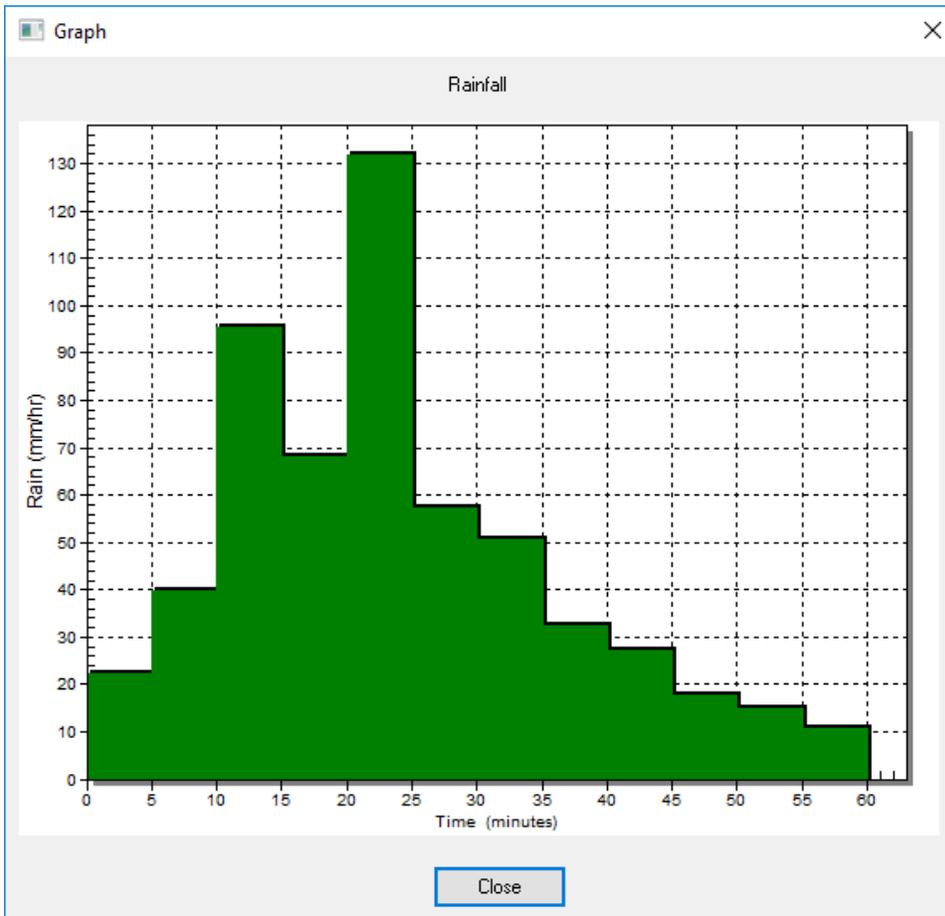
9. Click **Close**, and then click **OK** three times to return to the network view. The design storm is now available to assign to any subcatchment.

10. Add rainfall to runoff node:
    a. Set the active mode to Runoff (**Rnf**).
    b. Double-click node **N1** to open the **Runoff Node** dialog.
    c. Double-click the **Sub-Catchment 1** box.
    d. In the **Sub-Catchment** data dialog, select **Zone 1 60min <30yr** as the **Rainfall**.

Sub-Catchment : Node N1 ✕

Routing Method

- ⦿ RUNOFF
- ○ Kinematic Wave
- ○ Laurenson
- ○ SCS Hydrology
- ○ Unit Hydrograph
- ○ Rational Formula
- ○ UK Hydrology

Optional Data

- ☐ Water Quality Data
- ☐ Snow Melt [_____]
- ☐ Groundwater [_____]
- ⦿ Drain to node or conduit [_____]
- ○ Drain out of system
- ☐ BMP   ☐ RDII

Rainfall [Zone1 60min <30yr]   Infiltration [Horton]

☐ **Flow Redirection**

Node Name [_____]
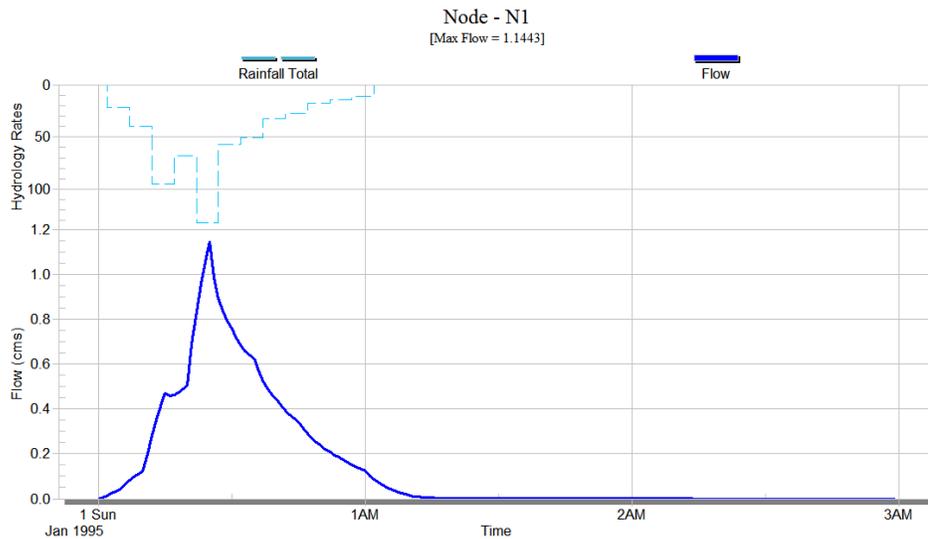
Subcatchment#
⦿ 1   ○ 2   ○ 3   ○ 4   ○ 5   ○ Outlet

[OK]   [Cancel]

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e. Click **OK** twice to return to the network view.
f. Save your model as *Sydney Storm.xp*.

11. Solve the model.
   a. In the **Analyze** menu, select **Solve**.
   b. Right-click node **N1** and select **Review Results** from the menu.
   c. Confirm that the rainfall at **N1** is the same as design storm specified in Step 6.

Node - N1
[Max Flow = 1.1443]

Questions

1. In the design storm, what is the:

   a. Duration?
   b. Average intensity?
   c. Time step?