

DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS

VERSION 6.8.0

TUTORIAL # 7

DEVELOPING A MODEL WITH CUSTOM STORM EVENTS



KVL Consultants, Inc.

DEVELOPING A MODEL WITH CUSTOM STORM EVENTS

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DEVELOPING A MODEL WITH CUSTOM STORM EVENT

DATE UPDATED: MAY 7, 2024

TUTORIAL TIME: 25 MINUTES

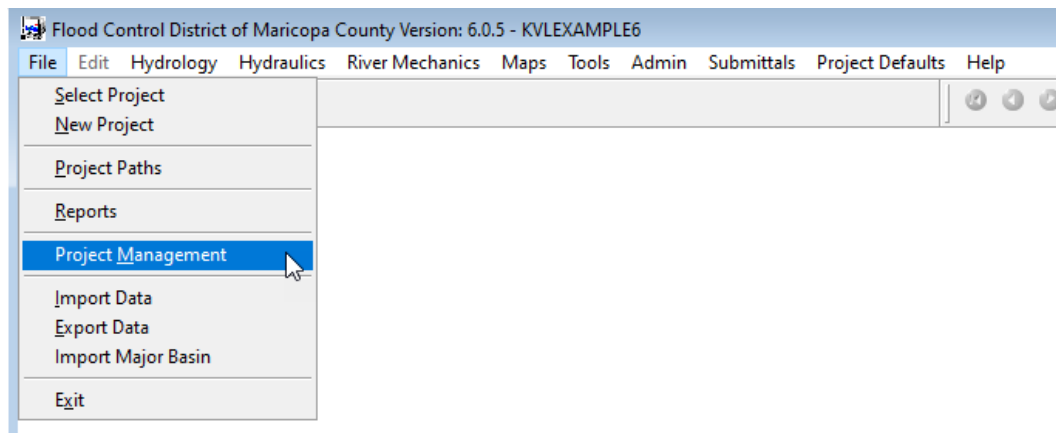
1.0 INTRODUCTION

This tutorial outlines the method for creating a Project with Custom Storm Event. At present, **all Custom Storm Events are limited to using S-Graph for the Unit Hydrograph**. The procedure for creating a Custom Storm Event project is basically the same as developing a HEC-1 project using S-Graph. The only difference is that the rainfall uses a custom distribution.

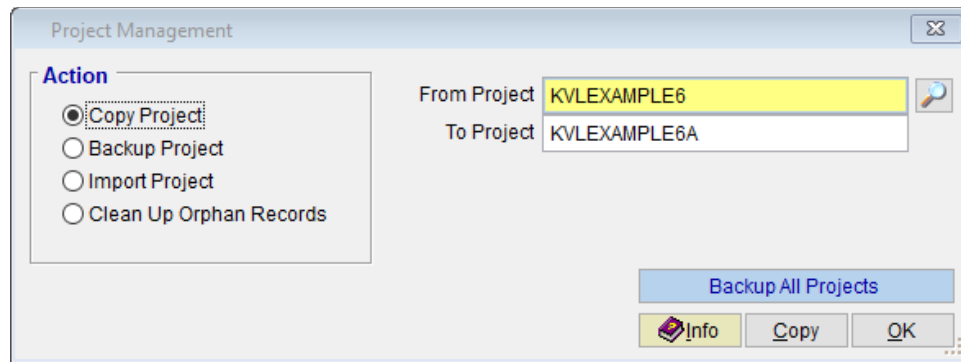
In this procedure, it is assumed that the base HEC-1 project had been developed using S-Graph as the Unit Hydrograph. If the Clark Unit Hydrograph had been used, then some modifications would have to be made to the Sub-Basin data.

2.0 CREATE A COPY OF AN EXISTING PROJECT

Copy an Existing Project ('File → Project Management') to be used for this tutorial. For this example, create a copy of **KVLEXAMPLE6**, which is a project that used the S-Graph Unit Hydrograph.



Enter a short alphanumeric name with no spaces to the **"To Project"** textbox field. (For this tutorial, enter **KVLEXAMPLE6A**). The **"To Project"** field can hold as much 20 characters. Press the **'Save'** button to save the data and then press the **'Copy'** button to copy the project. Then press **'OK'** to close the form.



3.0 MODIFY PROJECT DEFAULTS

On the **SELECT PROJECT** form (**'File → Select Project'**), select the new project (**KVLEXAMPLE6A**). Click the **Details** tab to make changes on the **Title**, **Location**, and **Agency** information. Check the **'Custom Storm Event'** checkbox. You will notice that when **'Custom Storm Event'** is checked, the **Rainfall** textbox field changes to **CUSTOM** and cannot be edited. In addition, the **Unit Hydrograph** is set to **S-Graph** and **Storms** are set to **Single**. Neither of these fields can be edited. Finally the **Return Periods** to model disappeared from the form as they are not relevant for this project. When complete, press **'Save'** and **'OK'** to close the **SELECT PROJECT** form.

The screenshot shows the 'Select Project' dialog box. It has two tabs: 'List' and 'Details'. The 'List' tab is active, showing a 'Project Reference' section with the following fields: 'Project ID' (00182), 'Reference' (KVLEXAMPLE6A), 'Title' (Custom Storm Event Project), 'Location' (Maricopa County), and 'Agency' (Flood Control District of Maricopa County). Below these are two checkboxes: 'Hydrology and Hydraulics Only' (unchecked) and 'River Mechanics Only' (unchecked), and two checked checkboxes: 'Custom Storm Event' and 'Imported HEC-1 File'. The 'Details' tab is also visible, showing 'Project Defaults' (Model: HEC1, Soils: FCDMC, Land Use: FCDMC, Rainfall: CUSTOM, Roads: MCDOT) and 'HEC-1 Defaults' (Unit Hydrograph: S-Graph, Loss Method: Green-Ampt, Storms: Single). At the bottom, there is a 'Date' field (04/13/2018) and several buttons: 'Update Defaults', 'Default Versions', 'Info', 'Print...', 'Delete', 'Add', and 'OK'.

4.0 DEFINE / ESTABLISH RAINFALL DISTRIBUTION IDS

On the **CUSTOM STORM EVENT DISTRIBUTION IDS** form (*'Hydrology → Custom Storm Event → Distribution Ids'*), define the Rainfall **Distribution ID**. Up to 6 distributions can be set up at any one time. Enter '15' as input to the **Time Interval (min)** textbox field. For **Type**, select 'PC' from the drop down list. Enter '10' for the **Number of Distribution Records**. These values will be the same for all the distributions. Modeling more than one rainfall using the Default distribution can be done by entering a precipitation depth value on the **Rainfall** column and checking the corresponding **Use Default Distribution** checkbox. For this tutorial, enter the other data as presented below. Press '**Save**' and '**OK**' to close the form.

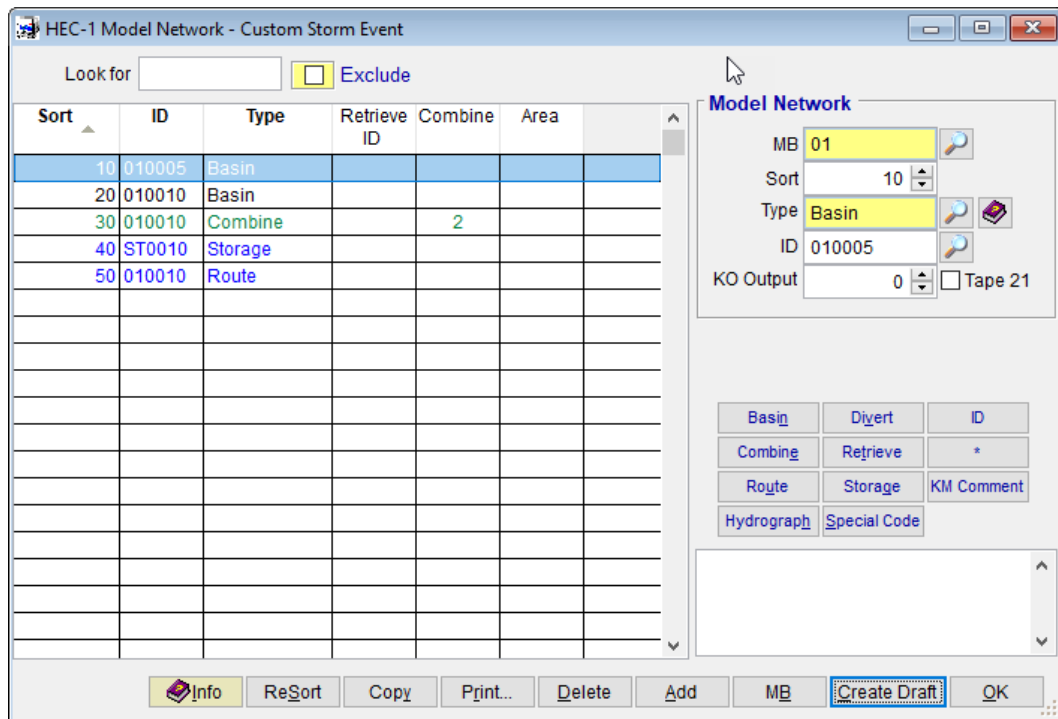
Distribution ID	Use Default Distribution	Rainfall (in)	Description
1. DEFAULT		4.00	Default Custom Storm Distribution ID
2. DISTID2	<input checked="" type="checkbox"/>	12.00	Default Distribution No. 2
3. DISTID3	<input type="checkbox"/>		
4. DISTID4	<input type="checkbox"/>		
5. DISTID5	<input type="checkbox"/>		
6. DISTID6	<input type="checkbox"/>		

5.0 DEFINE / ESTABLISH RAINFALL DISTRIBUTION DATA

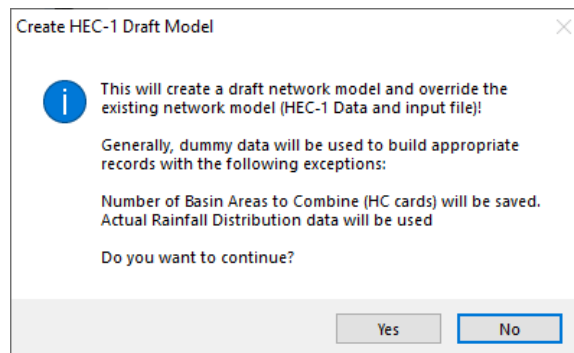
On the **CUSTOM STORM EVENT DISTRIBUTION** form (*'Hydrology → Custom Storm Event → Distribution Data'*), the **DEFAULT** distribution data must be entered in manually. The number of PC or PI records must be the same as established on the **CUSTOM STORM EVENT DISTRIBUTION ID** form. If more than one rainfall has been entered on the **CUSTOM STORM EVENT DISTRIBUTION ID** form, and the **Use Default Distribution** check box is NOT checked, then it is necessary to enter additional distribution data for the ID. The **Distribution ID** can be selected by clicking the '**Distribution**' button and selecting the ID. Press "**OK**" to close the form.

6.0 CREATE A DRAFT MODEL

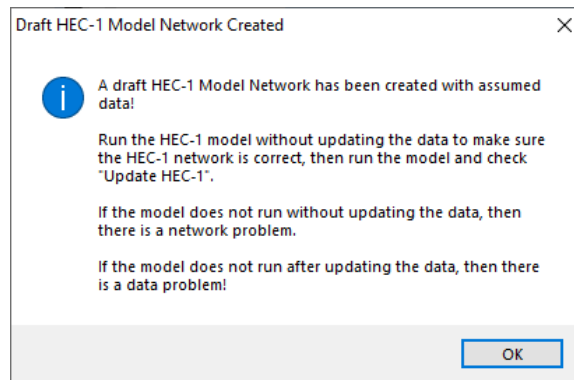
Before running the model, it is necessary to create a Draft Model (‘**Hydrology → Custom Storm Event → Network**’). Click “**Create Draft**” to create the draft model with the new PC/PI records. Note: the working directory has to be established in ‘File Project → Management’.



Click ‘**Yes**’ to continue.



Click '**OK**' to close the **DRAFT HEC-1 MODEL NETWORK CREATED** form.



After viewing the Draft Model file, exit or close the Editor.

```

01-DEFAULT.Dat
ID Flood Control District of Maricopa County
ID KVLXAMPLE6A - HEC-1 Tutorial - S-Graph Unit Hydrograph
ID Custom Storm Event
ID Distribution ID: DEFAULT - Default Custom Storm Distribution ID
ID Unit Hydrograph: S-Graph
ID Storm: Single
ID 03/21/2022
*DIAGRAM
IT 5 0 2000
IO 5
IN 15
*
*
KK010005 BASIN
BA 1.0
PB 4.00
PC 0 0.002 0.005 0.008 0.11 0.014 0.017 0.20 0.023 0.026
PC 0.029 0.032 0.035 0.038 0.041 0.044 0.048 0.052 0.056 0.06
PC 0.064 0.068 0.082 0.086 0.08 0.085 0.09 0.095 0.1 0.105
PC 0.11 0.115 0.12 0.126 0.133 0.14 0.147 0.155 0.163 0.172
PC 0.181 0.191 0.203 0.218 0.36 0.257 0.283 0.387 0.663 0.707
PC 0.735 0.758 0.776 0.791 0.804 0.815 0.825 0.834 0.842 0.849
PC 0.856 0.863 0.869 0.875 0.881 0.887 0.893 0.898 0.903 0.908
PC 0.913 0.918 0.922 0.926 0.93 0.934 0.938 0.942 0.946 0.95
PC 0.953 0.956 0.959 0.962 0.965 0.968 0.971 0.974 0.977 0.98
PC0.9810 0.986 0.989 0.992 0.995 0.998 1
LG 0.15 0.25 4.50 0.50 50
UI 0 50 100 150 200 250 300 350 400 450
UI 500 550 600 650 700 750 800 850 900 950
UI 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450
UI 1500 1450 1400 1350 1300 1250 1100 1000 900 800
UI 700 600 500 400 300 200 100 0 0 0
*
KK010010 BASIN
BA 1.0
LG 0.15 0.25 4.50 0.50 50
UI 0 50 100 150 200 250 300 350 400 450
UI 500 550 600 650 700 750 800 850 900 950
UI 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450
UI 1500 1450 1400 1350 1300 1250 1100 1000 900 800
UI 700 600 500 400 300 200 100 0 0 0
*
KK010010 COMBINE
HC 2
*
KKST0010 STORAGE
KO
RS 1 STOR
SU 0.0 10.0 100 1000 10000
SE 85.0 90.0 95.0 100.0 105.0
SS 95.0 50.00 3.10 1.50
ST 100.0 150.00 3.00 1.50
*
KK010010 ROUTE
RK 1000 0.005 0.025 TRAP 100 8
*
ZZ

```

7.0 RUN THE MODEL

On the **RUN HEC-1 MODEL – CUSTOM STORM EVENT** form (**‘Hydrology → Custom Storm Event → Model’**), check the **Distribution 2** and **Delete Prior Results** check boxes. Click the **‘Run Model’** button to execute the program.

Run HEC-1 Model - Custom Storm Event

Distribution ID

- ☐ Default
- ☒ Distribution 2

Options

Major Basin

- ☐ Update HEC-1
- ☒ Delete Prior Results
- ☐ Select Custom Folder
- ☐ Update Conveyance Flows

Info Output Storage Results Run Model OK

[illegible]

Distributions will be available to model for all IDs that have a rainfall in the **CUSTOM STORM EVENT DISTRIBUTION ID** form. The process is exactly the same as modeling a HEC-1 model.

This ends the tutorial.