



DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS VERSION 6.0.5

TUTORIAL # 4 UPDATING NSTPS VALUES FOR CHANNEL ROUTING



KVL Consultants, Inc.

UPDATING NSTPS VALUES FOR CHANNEL ROUTING

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UPDATING NSTPS VALUES FOR CHANNEL ROUTING

DATE UPDATED: APRIL 20, 2022

TUTORIAL TIME: 30 MINUTES

1.0 INTRODUCTION

This tutorial document is developed to guide users in evaluating the NSTPS parameter (HEC-1 RS card's first field) for channel flow routing in HEC-1 using DDMSW. The input data file is an existing HEC-1 input file where normal-depth storage routing methodology is used. The implemented tool within the DDMSW program creates an updated HEC-1 input file that includes a refined set of NSTPS values updated from two successive model runs.

NSTPS is normally evaluated from flow and reach characteristics of the project area. It is usually estimated by the following relation (HEC, 1998).

$$NSTPS = [Channel Reach Length / Average Flow Velocity] / Time Interval \dots (1)$$

It can also be estimated by:

$$NSTPS = [Difference in Time-to-Peak between Channel Inflow and Outflow Hydrographs for Routed Flows] / Time Interval \dots (2)$$

Normally, the determination of the refined values of NSTPS can be made from several runs of the HEC-1 model, until the values converge. There are rare occasions, however, when NSTPS do not converge (i.e., values swing back and forth between iterations). In these cases, the modeler should look into the matter and use engineering judgment to select appropriate values of NSTPS adequate for his/her modeling purposes. One possible solution is to manually use Manning's equation to estimate the channel flow velocity and then estimate NSTPS by Equation (1) above. The manually estimated NSTPS can then be entered into an HEC-1 input file for the channel routings whose NSTPS values do not converge. To detect if there are any channel routings whose NSTPS values do not converge, users can execute the tool within DDMSW twice (i.e., three (3) model iterative runs in each execution). Here, the second-time model execution (i.e., three more iterative model runs) provides refined NSTPS values for the HEC-1 input file. This process of executing the model twice will shed light if there is any instability in the NSTPS values.

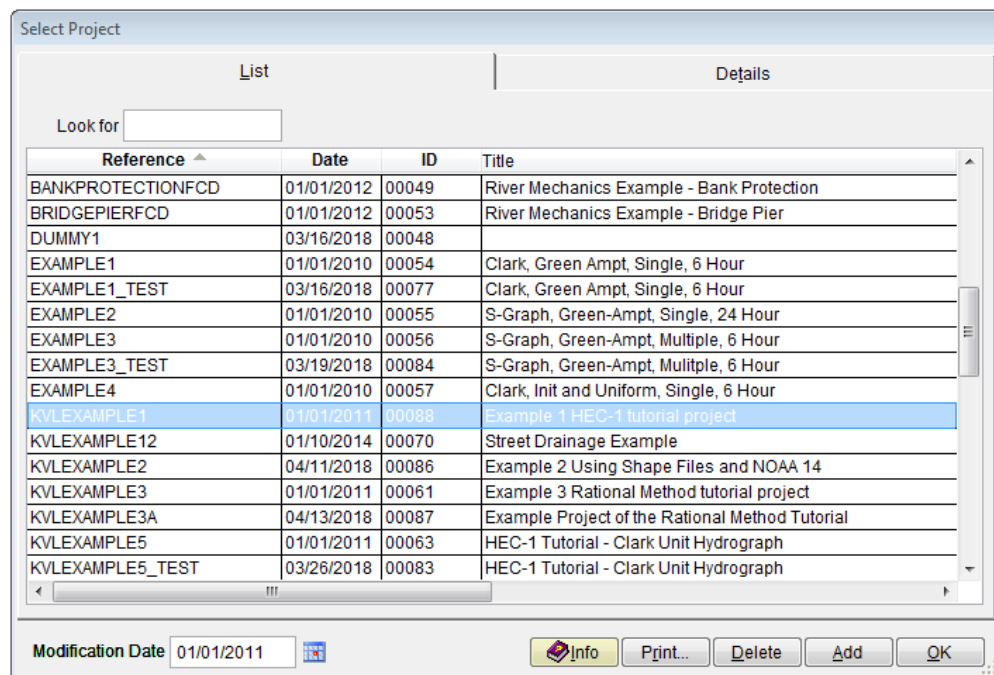
The program is based on two assumptions. The first assumption is that normal-depth channel routings are defined by RS cards with FLOW as a keyword in Field 2. It should be mentioned that there might be some exceptions to this assumption due to many combinations of routing parameters though this assumption is valid

for most cases. Users should check to make sure that the intended channel routings are defined by RS card with FLOW as a keyword in Field 2. The second assumption is that all ID's in KK cards are unique. Users should check to make sure that there are no duplicate (**ID's in**) KK cards. It is the users' responsibility to check and accept the final results.

For purposes of illustration, this tutorial will use KVLEXAMPLE1.DAT. After completing the tutorial, the user should test the tool using his or her project data.

2.0 OPEN THE PROJECT

After launching the DDMSW program, open an existing project (**'File => Select Project'**). Select **KVLEXAMPLE1** from the project list. Press **'OK'** to close the **SELECT PROJECT** form. [**Note:** Please use the DDMSW project file **'KVLEExample1.zip'** that is bundled along with the tutorial document for this tutorial. To use the attached project data, delete first the **'KVLEExample1'** project in DDMSW and once it is deleted, to import the **'KVLEExample1.zip'** into DDMSW (**File → Project Management → Import**).



4.0 UPDATE THE MODEL

On the **HEC-1 DATA** form (*'Hydrology → HEC-1 → Data'*), press the **'Update'** button.

The screenshot shows the 'HEC-1 Data - MB: 01' window. It features a 'List' tab and a 'Details' tab. Below the tabs are 'Find' and 'Next' buttons. A table with 12 columns (F0-F10, Sort, Special Code ID) and 16 rows is displayed. The 'Update' button in the bottom toolbar is highlighted with a red box.

F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Sort	Special Code ID
ID		KVL Cons	ultants	Inc.								10
ID		VLEXAMP	LE1 - Ex	ample 1	HEC-1 tu	torial p	roject					20
ID		2 YEAR										30
ID		6 Hour	Storm									40
ID		Unit Hyd	rograph:	Clark								50
ID		Storm: M	ultiple									60
ID		04/25/20	18									70
*D	IAGRAM											80
IT	5	1JAN99	0	2000								90
IO	5											100
IN	15											110
*												120
JD	1.180	0.0001										130
PC	0.000	0.008	0.016	0.025	0.033	0.041	0.050	0.058	0.066	0.074		140
PC	0.087	0.099	0.118	0.138	0.216	0.377	0.834	0.911	0.931	0.950		150
PC	0.962	0.972	0.983	0.991	1.000							160

On the **UPDATE HEC-1 DATA** form, press **'Yes'** to continue.

The screenshot shows the 'Update HEC-1 Data' dialog box. It contains an information icon and text explaining that the update will affect the current Major Basin and lists the following items to be updated: Sub Basin, Rainfall, Diversion, Routing, Storage, Hydrographs, and Special Code. It asks 'Do you want to continue?' and has 'Yes' and 'No' buttons at the bottom.

Update HEC-1 Data

i This will update the HEC-1 model data for the current Major Basin.

Initially select a Return Period for the Rainfall then the program will update the following:

- Sub Basin
- Rainfall
- Diversion
- Routing
- Storage
- Hydrographs
- Special Code

Do you want to continue?

Yes No

Select a return period. Press the **'OK'** button for DDMSW to update the HEC-1 model with the latest parameters from the data entry menus, including the initial routing NSTPS values. Press **'OK'** to close the **HEC-1 DATA** form.

F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Sort	Special Code ID
ID		KVL Cons	ultants	Inc.								10
ID		KVLEXAMP	LE1 - Ex	ample 1	HEC-1 tu	torial p	roject					20
ID		2 YEAR										30
ID		6 Hour	Storm									40
ID		Unit Hyd	rograph:	Clark								50
ID		Storm: M	ultiple									60
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IT	5	1JAN99	0	2000								90
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*												120
JD	1.180	0.0001										130
PC	0.000	0.008	0.016	0.025	0.033	0.041	0.050	0.058	0.066	0.074		140
PC	0.087	0.099	0.118	0.138	0.216	0.377	0.834	0.911	0.931	0.950		150
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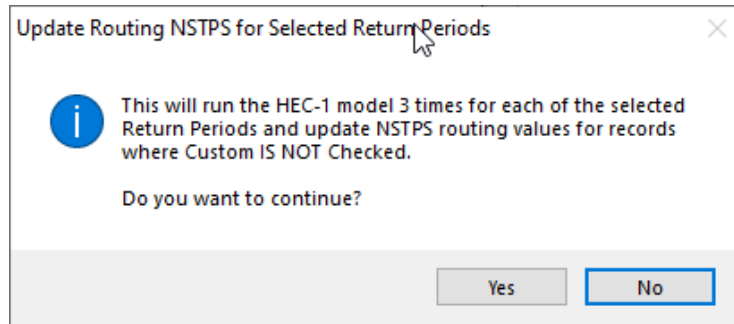
5.0 EXECUTE PROGRAM TO EVALUATE NSTPS VALUES

On the **HEC-1 ROUTING DATA** form (*'Hydrology → HEC-1 → Routing'*), click the **"Update NSTPS from HEC-1"** button.

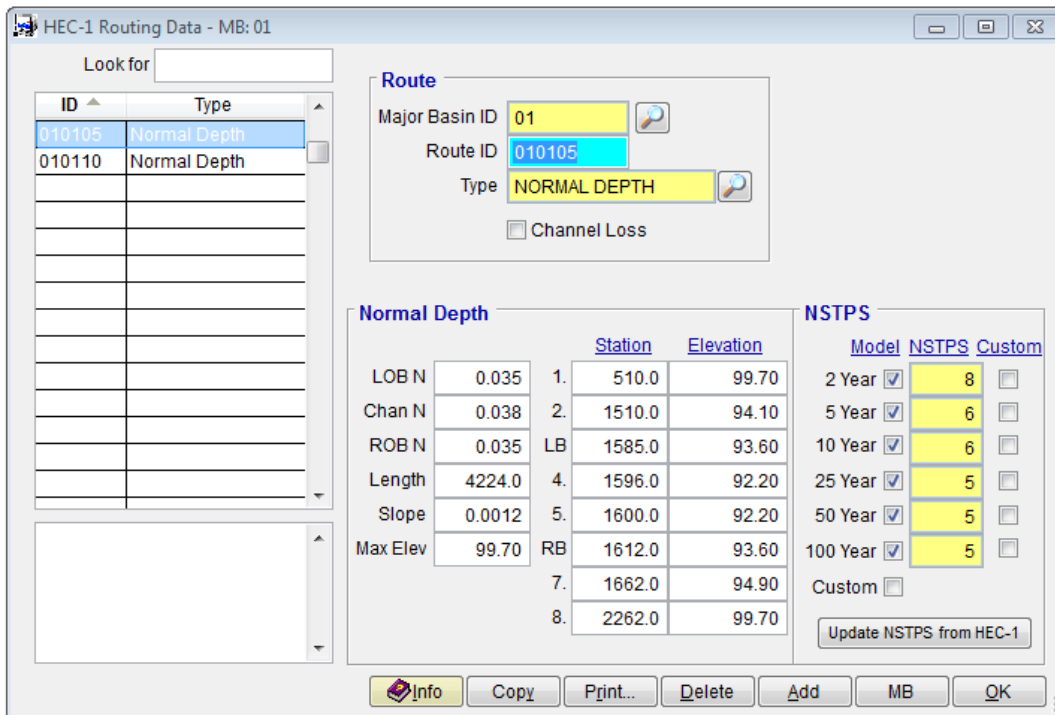
Normal Depth		Station	Elevation	NSTPS	
LOB N	0.035	1.	510.0	2 Year	8
Chan N	0.038	2.	1510.0	5 Year	6
ROB N	0.035	LB	1585.0	10 Year	6
Length	4224.0	4.	1596.0	25 Year	5
Slope	0.0012	5.	1600.0	50 Year	5
Max Elev	99.70	RB	1612.0	100 Year	5
		7.	1662.0	Custom	
		8.	2262.0		

A pop-up message will appear stating that HEC-1 will run 3 times for each of the

selected return periods. This will update the NSTPS routing values, only if the custom checkbox is unchecked. Press **'Yes'** to continue.



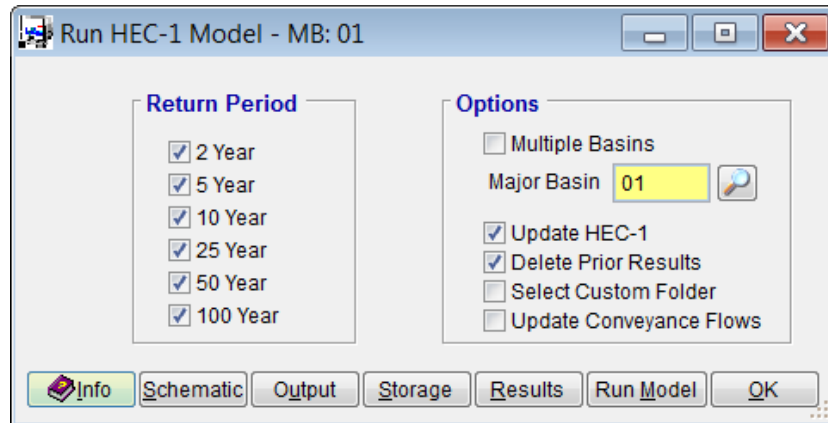
After the last HEC-1 run is completed, the NSTPS values for the routing cards will be updated. Press **'OK'** to close the **HEC-1 ROUTING DATA** form.



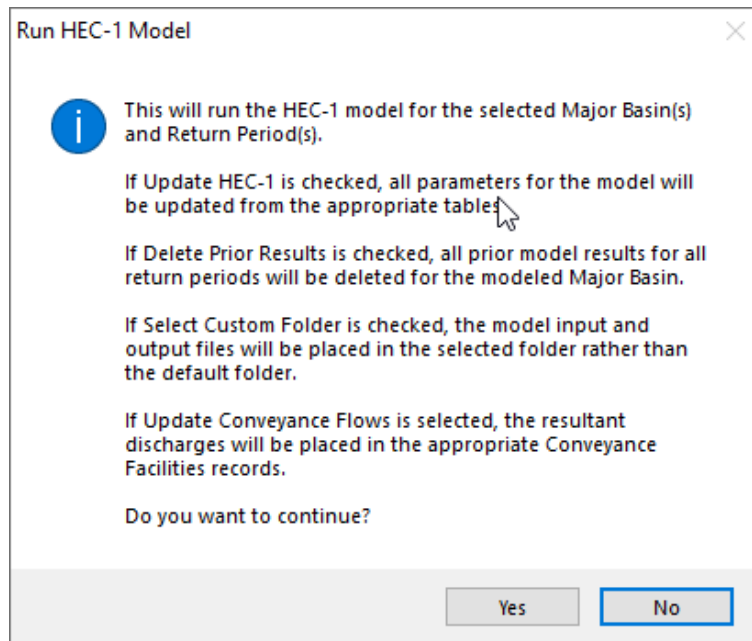
6.0 RUN THE MODEL

After all the NSTPS values have been determined and accepted, you can run the HEC-1 model to obtain your model results.

To run the model, open the **RUN HEC-1 MODEL** form (**'Hydrology → HEC-1 → Model'**) and check the following checkboxes: All the events in the **'Return Period'**, the **'Update HEC-1'** checkbox, and the **'Delete Prior Results'** checkbox. Finally, click the **'Run Model'** button to execute the program.



Click **'Yes'** twice to continue.



Afterwards, you can view the model results by clicking the **'Results'** button on the **RUN HEC-1 MODEL** form. Alternatively, you can also view the results from **'Hydrology → HEC-1 → Flow Summary'**.

