

DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS VERSION 6.0.5

TUTORIAL # 5 IMPORTING HEC-1 STAND-ALONE INPUT FILE



KVL Consultants, Inc.

IMPORTING AND RUNNING HEC-1 STAND ALONE INPUT FILE

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IMPORTING AND RUNNING HEC-1 STAND ALONE INPUT FILE <u>Date Updated</u>: April 20, 2022 <u>Tutorial Time</u>: 30 minutes

1.0 INTRODUCTION

This tutorial outlines the approach for importing an existing **HEC-1** model input file with the goal to use the reporting and graphing features of the **DDMSW** program without the supporting land use, soils, sub-basin and network datasets. What is needed in this tutorial is the **HEC-1** model input data file in ASCII format. This tutorial was developed using **DDMSW 6.0.5**.

2.0 CREATE A NEW PROJECT

After launching the **DDMSW** program, create a new project (*File* \rightarrow *New Project*). Use a short name for the project in the '*Reference*' field. Please note that the '*Reference*' field can accept letters and numbers (no space) and can hold 20 characters.

New Project Options - MB: 01	
☑ Hydrology and Hydraulics	□ River Mechanics
O HEC-1 Standard	12
○ HEC-1 Custom Storm	
HEC-1 Import Model File	
○ Rational Method	
	<u>C</u> ancel <u>O</u> K

On the **SELECT PROJECT** form, enter '*IMPORTHEC1*' on the '*Reference*' textbox field and check the '*Imported HEC-1 File*' checkbox. Enter your notes or comments (Optional) in the provided Comment Box. Set your model creation date in the '*Modification Date*' textbox field using the current date.

Select Project	t				N
	<u>L</u> ist		De <u>t</u> ails		しず Default Table Versions
Project R	leference]
Project ID	00110 I	Reference	IMPORTHEC1		
Title	Importing HEC-1	Model Inpu	t File		
Location	Maricopa County,	AZ			
Agency	Flood Control Dis	strict of Mari	copa County		
	Hydrology and I	Hydraulics (Dnly Custom	Storm Event	
	Kiver Mechanic	s Only		THEC-1 File	
					1
This tutoria HEC-1 mod features of	I project is used to del input file, run th DDMSW program.	o demonstra ne model ar	ate the process of impor Id use the reporting and	ting ^ I graphing ~	
Modification	Date 04/13/2018		Jpdate Project Defaults		P <u>r</u> int <u>D</u> elete <u>A</u> dd <u>O</u> K

Press the **'Save'** button to save the new project information. Press the **'OK'** button to close the **SELECT PROJECT** form.

3.0 DEFINE THE MODEL RUNS PATH

On the **PROJECT PATHS** form (*File* → *Project Paths*), set the '*Model Runs Path*' by clicking the ellipse (...) button on the right side of the '*Model Runs Path*' textbox field.

On the **BROWSE FOR FOLDER** form, select the folder location to store and run your project models. If the preferred folder is not found, press the '*Make New Folder'* to create a new folder. Rename the new folder to '*IMPORTHEC1*'.

browse for folder			2	
			-0	
~	DDMS	W605		^
· ·	st			
	>	Backup		
	>	BackupOri		
		Data		
		Help		
	>	Maps		
		Models		
	~	ModIruns		
		EXAMPLE1		
		EXAMPLE2		
		EXAMPLE3		
		EXAMPLE4		
		FcdExample21		
		ImportHEC1		
		KVLExample1		
		KVLExample2		
		KVLEXAMPLE3		~
	_	_		

Press 'OK' when it is done.

Project Paths		×
Machine ID	FCD000039W # ROBERTO.MARIVELA	
Agency	Flood Control District of Maricopa County	
Project	Importing HEC-1 Model Input File	
GIS Files Path		
Model Runs Path	C:\FCDMC\DDMSW605\ST\MODLRUNS\IMPORTHEC1\	

Press **'Save'** to accept the folder settings identified for **'Model Runs Path'**. Press **'OK'** to close the **PROJECT PATHS** form.

4.0 IMPORT THE MODEL INPUT FILE

On the **IMPORT HEC1 MODEL FILE** form ('*Hydrology* \rightarrow *HEC-1* \rightarrow *Import HEC-1 file*'), click the button on the right of the '*Import File*' textbox field to locate the location of the HEC-1 Model Input File to be used by the program. Find the HEC-1 model file <u>SMALL.dat</u>, select it, and press '*OK*'. Press the '*Import*' button to import the selected file.

🛃 Import HEC1 M	odel File - MB: 01
Options	μ <u>ζ</u>
Assumed RP	100 🔊
Import File	

DDMSW will warn you that the program will replace all existing data with the current project data. Press '**Yes**' to continue.

Warning		×
\otimes	You have selected to import data from \\FCDSENG01\ENGSHARE01\ENGAPPDEVRIVERMECH\BRANCH\ DDMSW\DDMSW_TUTORIALS\\605_TUTORIAL_DOCS\TUTORIA L#5 - IMPORTING HEC-1 INPUT FILE\\605\TUTORIAL#5_605DATA\SMALL.DAT	
	This will replace all existing data for: Project Ref: IMPORTHEC1 Basin ID: 01	
	WARNING The following existing data will be replaced for this Project and Major Basin: Custom Rainfall Distribution Hec1 Data Hec1 Diversions Hec1 Diversions Hec1 Storage Basins Hec1 Storage Basins Hec1 Hydrographs Hec1 Special Code Sub Basin Data	
	Do you want to continue?	
	Yes No	

After the Import process is complete, press **'OK'** to continue. On the **IMPORT HEC-1 MODEL FILE** form, press **'OK'** to close the form.

5.0 VALIDATE THE IMPORTED MODEL FILE

On the **HEC-1 DATA** form (*'Hydrology* \rightarrow *HEC-1* \rightarrow *Data'*), review / validate the imported model to ensure that it is the right model. Make necessary modifications if necessary. Press the 'OK' button to close the **HEC-1 DATA** form.

🛃 н	HEC-1 Data - MB: 01												
			<u>L</u> ist						D	e <u>t</u> ails			
Find Next													
F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Sort	Special Code ID	^
ID		Flood Co	ntrol Di	strict o	f Marico	pa Count	у				10		
ID		XAMPLE2	- S-Gra	ph, Gree	n-Ampt,	Single,	24 Hour				20		
ID		100 YEAR									30		
ID		24 Hour	Storm								40		
ID		Unit Hyd	rograph:	S-Graph							50		
ID		04/09/20	13								60		
IT	3	1JAN99	1200	2000							70		
IN	15										80		
10	1										90		
*D	IAGRAM										100		
*											110		
*											120		
KK	1A	BASIN									130		
BA	6.690										140		
PB	3.831										150		
PC	0.000	0.002	0.005	0.008	0.011	0.014	0.017	0.020	0.023	0.026	160		\sim
<												>	
			9	Info <u>E</u> x	port R	e <u>S</u> ort I	P <u>r</u> int	<u>D</u> elete	<u>A</u> dd	MB	<u>U</u> pdate	<u>0</u> K	

6.0 RUN THE MODEL

After the model file has been imported into a new project in **DDMSW**, the model can now be run. On the **Run HEC-1 MoDEL** form ('*Hydrology* → *HEC-1* → *Model*'), check the '*Delete Prior Results*' check box and uncheck the '*Select Custom Folder*' and '*Update Conveyance Flows*' check boxes. Execute the model by pressing the '*Run Model*' button.

Run HEC-1 Model - Imported Hec-1 File	
	Options
	Major Basin 01
	Delete Prior Results Select Custom Folder Update Conveyance Flows
Info Schematic Output Storage	ge <u>R</u> esults Run <u>M</u> odel <u>O</u> K

Click 'Yes' to continue.



If the model run is successful, **DDMSW** will display the message, 'Model run complete!'.

7.0 VIEW MODEL RESULTS

After the model is successfully executed by the program, model results can be viewed by clicking on the *'Results'* button on the **RUN HEC-1 MODEL** form.

Run HEC-1 Model - Imported Hec-1 File	
	Options
	Major Basin 01
	 Delete Prior Results Select Custom Folder Update Conveyance Flows
Storag	e <u>R</u> esults Run <u>M</u> odel <u>O</u> K

On the **HEC-1 FLOW SUMMARY** form, model results in tabulated format can be viewed.

ID	Sort 🔺	Туре	Area	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	
1A	10	Hydrograph	6.69						10681	
R1-2	20	Routed	6.69						7080	
1B	30	Hydrograph	5.70						8510	
C2	40	Combined	12.39						13430	
R2-4	50	Routed	12.39						9178	
1C	60	Hydrograph	0.81						1504	
R3-4	70	Routed	0.81						512	
1D	80	Hydrograph	3.27						5592	
C4	90	Combined	16.47						11471	
R4-7	100	Routed	16.47						10275	
1E	110	Hydrograph	1.11						2183	
R5-7	120	Routed	1.11						1461	
1F	130	Hydrograph	3.08						3870	
R6-7	140	Routed	3.08						3142	
1G	150	Hydrograph	2.58						4955	
C7	160	Combined	23.24						14837	
ST1	170	Routed	23.24						2162	
DIV1	180	Diversion	23.24						499	
<										>

To view model results other than the peak flows, click the **'More Results'** button on the form and on the **MODEL VIEW** form, users can select from 'Volumes (IN)', 'Volumes (AF)', and 'Attenuation/Velocity'.

Model View	
View O	ption
View	Flows
Option	All
	<u></u>

L	ook for										
ID	Sort 🛎	Туре	Area	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr		^
1A	10	Hydrograph	6.69						814.41		
R1-2	20	Routed	6.69						814.41		
1B	30	Hydrograph	5.70						854.79		
C2	40	Combined	12.39						1669.19		
R2-4	50	Routed	12.39						1669.19		
1C	60	Hydrograph	0.81						109.37		
R3-4	70	Routed	0.81						109.37		
1D	80	Hydrograph	3.27						530.45		
C4	90	Combined	16.47						2309.01		
R4-7	100	Routed	16.47						2309.01		
1E	110	Hydrograph	1.11						151.17		
R5-7	120	Routed	1.11						151.17		
1F	130	Hydrograph	3.08						273.86		
R6-7	140	Routed	3.08						273.86		
1G	150	Hydrograph	2.58						418.77		
C7	160	Combined	23.24						3152.81		
ST1	170	Routed	23.24						3150.24		
DIV1	180	Diversion	23.24						2020.07		Υ.
<										>	
					fo <u>E</u> xpo	rt P <u>r</u> int	. <u>M</u> ore R	esults	MB	<u>0</u> K	

Also, users can select which model elements ('All', 'Hydrograph', 'Routed', 'Combined', and 'Storage') to view by pressing the Selector button on the right of the '**Option'** textbox field.

After exploring all possible options in viewing model results, click 'OK' to close the Run HEC-1 MODEL form

Alternatively, model results can be viewed by selecting '*Hydrology* → *HEC-1* → *Flow Summary*'.



8.0 VIEW THE HYDROGRAPHS

To be able to view the hydrograph plot of any hydrologic element in the model, it is essential that model output levels ('IO') be specified at either '1' or '2' to instruct the program to print detailed results of the model. Using output levels of '3', '4', or '5' will not print the hydrographs in the model output and thus, the graphing tool will not be able to plot any hydrographs. To determine the 'IO' parameter used by the model, the model data settings needs

to be checked. This could be done by accessing the 'List' tab of the HEC-1 DATA form ('Hydrology \rightarrow HEC-1 \rightarrow Data').

📑 н	EC-1 Data	a - MB: 01								13			x	
List							Details							
Fin	d Nex	t												
F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Sort	Special Code ID	^	
ID		Elood Co	ntrol Di	strict o	f Marico	na Count	v				10	Code ID		
ID		XAMPLE2	- S-Gra	ph Gree	n-Ampt	Single	24 Hour				20		4	
ID		100 YEAR	0 0.0	p., 0.00	in a nipe,	enigie,	2				30		†	
ID		24 Hour	Storm								40		t I	
ID		Unit Hyd	rograph:	S-Graph							50		t I	
ID		04/09/20	13								60		t I	
IT	3	1JAN99	1200	2000							70		T I	
IN	15										80			
10	1										90		II	
*D	IAGRAM										100			
*											110			
*											120			
KK	1A	BASIN									130			
BA	6.690										140		1	
PB	3.831										150		1	
PC	0.000	0.002	0.005	0.008	0.011	0.014	0.017	0.020	0.023	0.026	160		×	
×												,		
				1			1						_	
			1	<u>Info E</u> x	port R	e <u>S</u> ort I	P <u>r</u> int	<u>D</u> elete	<u>A</u> dd	MB	<u>U</u> pdate	<u>0</u> K		

After selecting the **'IO'** card on the **'List'** tab of the **HEC-1 DATA** form, press the **'Details'** tab. On the **'F1'** textbox field, replace any values greater than '2' (e.g., '3', '4', or '5') with either '1' or '2'.

HEC-1 Data - MB: 01	
List	De <u>t</u> ails
Major Basin ID Sort 90 ÷ Special Code ID F1 F2 F3 F4 F5 F6 F7 F8 F9 F10	
Info Export R	ort P <u>r</u> int <u>D</u> elete <u>A</u> dd MB <u>Update OK</u>

Press 'Save' to save the entered data and select the 'List' tab to verify if the entered 'IO' value is reflected on the modified form. Press 'OK' to close the HEC-1 DATA form.

Run the new model with the updated IO data card ('Hydrology \rightarrow HEC-1 \rightarrow Model \rightarrow Run Model').

To view the graphics, open the **GRAPH HEC-1 HYDROGRAPHS** form (*'Hydrology* →HEC-1→ Graph Hydrographs') and click the button on the right of the *'HEC-*1 Output File' textbox field to select the output file named "ImportHEC1file.out" created by DDMSW after "Run model" and located in the modruns directory.

Once the model output file is identified and selected, press the *'Import Station IDs'* button to list all the Stations in the program. As shown, a maximum of five (5) station plots can be drawn and viewed at any time.

C:\FCDMC	CIDDMSW605ISTIMC	DLRUNS	IMPORTHEC1\IMPORTHEC1FILE.	OUT	View File
Station	Туре	^	Stations to Graph	Select	7.00110
1A	BASIN			Station	
R1-2	ROUTE		Station 1	Õ	
1B	BASIN				
C2	COMBINE		Station 2		
R2-4	ROUTE		Station 3	\sim	
1C	BASIN		Station 4	Ď	
R3-4	ROUTE		Otation F	0	
1D	BASIN		Station 5		
C4	COMBINE				
R4-7	ROUTE				
1E	BASIN				
R5-7	ROUTE				
1F	BASIN				
R6-7	ROUTE				
1G	BASIN				
C7	COMBINE				
ST1	STORAGE	¥			

To select the Stations to be plotted, highlight any Station on the left and press the Selector buttons on the right. This action will list the selected stations to be plotted by the program.

HEC-1 Out	put File						13	
C:\ECDMC	CIDDMSW605ISTIMC			MPORTHEC				a la
O.I ODMC	7000101 mic	DEIXONG			ITIEE.001		10	
							<u>v</u> ie	while
Station	Tuno	•	Stations to	o Graph —				
31411011	Type	Select						
	BASIN	_				Station		
R1-2	ROUTE	_	Station 1	1A	BASIN			
18	BASIN	_	Station 2	1C	BASIN			
02	COMBINE	_	Station 2	C4	COMBINE	- Č		
R2-4	ROUTE	- 11	Station 3	-04	COMBINE			
10	BASIN	- 11	Station 4	R5-7	ROUTE			
R3-4	ROUTE	- 11	Station 5	1G	BASIN	\sim		
1D	BASIN	- 11						
C4	COMBINE	_						
R4-7	ROUTE							
1E	BASIN							
R5-7	ROUTE							
1F	BASIN	_						
R6-7	ROUTE	_						
1G	BASIN							
C7	COMBINE	_						
ST1	STORAGE	×						
			a la	nfo Imp	ort Station IDe	Crank	Hydrographe	OK

To show the hydrograph plots of the selected stations, press the '*Graph Hydrographs*' button. Press '*OK*' to continue.



Press 'OK' to close the CHART form. Press 'OK' to close the GRAPH HEC-1 HYDROGRAPHS form.

9.0 Notes

To perform modifications or changes on HEC-1 model, open the **HEC-1 DATA** form ('Hydrology \Rightarrow HEC-1 \Rightarrow Data'). Highlight the line to change by clicking on it. Use the 'Find' and 'Next' buttons to search for a specific line. Press the 'Find' button. A FIND VALUE pop-up window will appear. Since the 'Find' function looks only in the 'F1' column, only type in a value such as a basin name ('1A'), a routing channel name ('R1-2'), or a specific number like the IA value for a Green-Ampt Parameter ('0.28'). Press the 'Save' button and then 'OK' to perform the search. The 'Next' button looks for the next line that contains the same 'F1' content. When specific line to change is found, click the 'Details' tab (or double-click on the line). Edit the HEC-1 field(s) by typing into the appropriate column(s) labeled by 'F1' to 'F10'. Press the 'Save' button to save your changes. You can get back to the line-by-line view of the data by clicking the 'List' tab. When you are finished making changes, press the 'OK' button to exit or close the HEC-1 DATA form.

10.0 MODELING UPDATE OPTIONS

Because the imported HEC-1 Model Input File does not have other datasets (i.e., Network, Rainfall, Sub Basins, Routing, Storage, and Diversions) to recalculate model parameters, the model cannot be updated. The only dataset that can be updated without impacting the results of the HEC-1 model is the Major Basin data (*'Hydrology → Major Basin → Update'*).

If the user desires to update the HEC-1 Model, it would be necessary to develop the **DDMSW** data for the Sub Basins, Land Use, and Soils. Please refer to another Tutorial document for this process.