

## DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS VERSION 5.3.0

# TUTORIAL # 9 CREATING A PROJECT TO EVALUATE THE IMPACT OF LAND USE CHANGES



**KVL Consultants, Inc.** 

### **CREATING A PROJECT TO EVALUATE THE IMPACT OF LAND USE CHANGES**

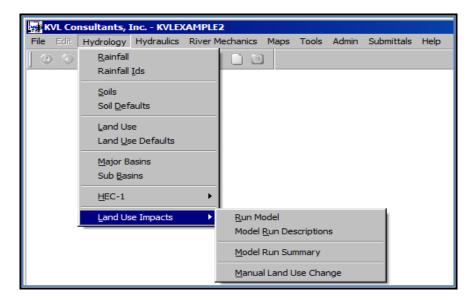
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## CREATING A PROJECT TO EVALUATE THE IMPACT OF LAND USE CHANGES DATE UPDATED: May 24, 2016

#### **1.0** INTRODUCTION

This tutorial provides a working example to determine the impact of changes in land use data. There are two methods that can be used. The first method is to have a second Land Use GIS map and the second method is to modify the Land Use manually for a particular sub basin. For this tutorial, the **KVLEXAMPLE2** project will be used. The development of the basic HEC-1 model has been described in other tutorials. This tutorial is to showcase the use of the Land Use Impacts feature of the program (*Hydrology*  $\rightarrow$  Land Use Impacts). The menu items for the Land Use Impacts are as follows:



#### 2.0 CREATE A MODEL RUN DESCRIPTION

Open the LAND USE IMPACT MODEL RUN DESCRIPTION form (Hydrology → Land Use Impacts → Model Run Descriptions), to create a Model Run Description.

🙀 Land Use Impa	ct Model Ru	n Descriptions - I	MB: 01	Add					
Model Run ID 🔺	Land Use				Descrip	tion			
▼ Model Run Major Basin Model Run	ID 🛛								
Land Use Opti	on			<u>S</u> ave	<u>C</u> ancel	P <u>rint</u>	<u>D</u> elete	Add	<u>o</u> k

For each model run it is necessary to create a **Model Run ID**. In this tutorial, there will be two (2) model runs to be made. One run involves the use of a GIS shape file and the second is one that involves the manual modification of the same land use data.

Enter a unique **Model Run ID** and select from the dropdown list which **Land Use Data Option** is used (*GIS File* or *Manual*). If a model run uses the *GIS File*, it is necessary to develop the **Sub Basin** and **Land Use** shape files. The change in **Land Use** dataset from existing condition to future developed conditions should effect a change in the hydrologic model results such as the magnitude of flows.

On the LAND USE IMPACT MODEL RUN DESCRIPTION form (*Hydrology* **→** Land Use Impacts **→** Model Run Descriptions), enter the following data:

No.	DATA FIELD	ENTRIES
	Model Run ID	TEST01
	Land Use Option	GIS File
1	Land Use Description	Changed Existing Land Use Code 150 (Residential) to Land Use Code 310 (Industrial)
	Sub Basin GIS Files	C:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\ SUBBASINS.SHP
	Land Use GIS Files	C:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\ LANDUSE.SHP

Model Run ID		
Model Run ID	Land Use	Description
TEST01	GIS File	Changed Existing Residential Land Use Code 150 (Residential) to Land Use Code 310 (Ir
TEST02	Manual	Same data as GIS except values are entered manually.
4		
Model Run —		
Land Use Opti		
Major Basin Model Run Land Use Opti	ID TEST01	Land Use Code 310 (Industrial).
Major Basin Model Run Land Use Opti	ID TEST01	Land Use Code 310 (Industrial).
Major Basin Model Run Land Use Opti GIS Files Sub Basin	ID TEST01 ion GIS File	Land Use Code 310 (Industrial).

No.	DATA FIELD	ENTRIES
	Model Run ID	TEST02
2	Land Use Option	Manual
	Land Use Description	Same data as GIS except values are entered manually.

Land Use Impa	ct Model Ru	n Descriptions - MB: 01	_ 🗆
Model Run ID 🔺	Land Use	Description	<b></b>
EST01	GIS File	Changed Existing Residential Land Use Code 150 (Residential) to Land Use Code 31	0 (Ir
EST02	Manual	Same data as GIS except values are entered manually.	
			_
			_
			_
			-1
Major Basin Model Run Land Use Opt		Same data as GIS except values are entered manually.	×
			OK
		🤣 P <u>r</u> int <u>D</u> elete <u>A</u> dd	<u>0</u> K

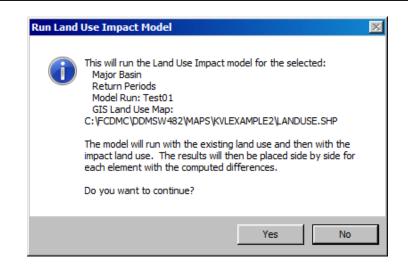
After entering the data, click the '**OK**' button to close the form.

#### **3.0 MODEL RUN USING GIS DATA**

On the RUN LAND USE IMPACT MODEL form (*Hydrology* → Land Use Impacts → Run Model), select 'TEST01' for the Model Run and check all the checkboxes for return periods (2 Year, 5 Year, 10 Year, 25 Year, 50 Year, and 100 Year) to be modeled. When 'TEST01' is selected for the Model Run, the Land Use Option and Description textbox fields are automatically populated with the data entered earlier (i.e., 'GIS File', and 'Changed Existing Land Use Code 150 (Residential) to Land Use Code 310 (Industrial)').

If it is preferred to have the model runs saved in a folder (other than the folder established in *'File → Project Paths'*), then check *'Select Custom Folder'* check box. Before running the Land Use Impact Model, it is assumed that the original model has been run for the same selected return periods. Finally, click the *'Run Model'* button to execute the program for the dataset. Click *'Yes'* to continue.

Return Period       Øptions         2 Year       Major Basin       01         5 Year       Model Run       TEST01         10 Year       Land Use Option       GIS File         50 Year       Select Custom Folder       Image: Custom Folder         61 00 Year       Select Custom Folder       Image: Custom Folder         Sub Basin       H:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\SUBBASINS.SHP       Image: Custom Folder         Land Use       H:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\LANDUSE_TEST01.SHP       Image: Custom Folder	🛃 Run Land Use In	npact Model - MB: 01	
Sub Basin       H:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\SUBBASINS.SHP         Land Use       H:\FCDMC\DDMSW482\MAPS\KVLEXAMPLE2\LANDUSE_TEST01.SHP	<ul> <li>✓ 2 Year</li> <li>✓ 5 Year</li> <li>✓ 10 Year</li> <li>✓ 25 Year</li> <li>✓ 25 Year</li> <li>✓ 50 Year</li> <li>✓ 100 Year</li> </ul>	Major Basin 01	(Residential) to Land Use Code 310
		DMCIDDMSVV482IMAPSIKVLEXAMPLE2ILANDUS	Image: SE_TESTOT.SHP       Image: SE_TESTOT.SHP



If the 'Select Custom Folder' checkbox is checked, you need to create a folder (click 'Make New Folder' button) for storing model run results or if a folder already exists, to navigate to the folder.

Select Directory	×
Model Runs	
	_
E bDMSW464D	<b>_</b>
🕀 📕 DDMSW479E	
🕀 📗 DDMSW480	
🖂 📙 DDMSW482	
🕀 📔 Backup	
🕀 📙 Backup_01	
🕒 Data	
📙 ddmsw480_May29_2014FullInstall	
ddmsw482_Sep16_2014_Patch	
📗 Help	
THE Maps	-
1	•
Make New Folder OK Cano	:el
	111

After the first land use dataset is successfully run and model run results were saved at a preferred folder location, click the **'OK'** button to close the **Run Land Use IMPACT MODEL** form.

#### 4.0 MODEL RUN USING MANUAL DATA

On the LAND USE IMPACTS form (*Hydrology* → Land Use Impacts → Manual Land Use Change), select the Details tab.

List				De <u>t</u> ails	
ID Major Basin ID 01 P Sub Basin ID 010005 P Include IV	Redevelopi	ng residential ti	o an industri	al center	×
Existing Land Use Code 150 Description Small Lot Residential - Sir Area 0.0241 Modified	ngle Family (4-(	) du per acre)			
Land Use Code 310 Description Warehouse/Distribution C Area 0.0241	Centers				

- (a) Select the **Sub Basin** (start with Sub Basin ID '010005') to have the land use modified.
- (b) Check the 'Include' checkbox to include this record in the analysis
- (c) Select the Existing Land Use Code to be modified (select '150')
- (d) Select the Modified Land Use Code (select '310')
- (e) Enter the Area for this land use that you want to change. In this case the entire area is used (Enter '0.0241')
- (f) Enter a **Description** for the change (*'Redeveloping residential to an industrial center*).
- (g) Repeat steps (a) to (f) for all Sub Basins where Land Use Code '150' are modified to Land Use Code '310'.
- (h) After going through all the Sub Basins, click 'OK' to exit the LAND USE IMPACTS form.

List				Details					
Look for		Inclu	ide 🔽 📃						
Sub Basin	Existing Code	Available Area	Modified Code	Modified Area	Include	Comments			
010005	150	0.0241	310	0.0241	Т	Redeveloping residential to an industrial cer			
010010	150	0.1166	310	0.1166	Т	Redeveloping residential to an industrial cen			
010105	150	0.0236	310	0.0236	Т	Redeveloping residential to an industrial cen			
010110	150	0.0004	310	0.0004	Т	Redeveloping residential to an industrial cen			
						-			
•	1	1							

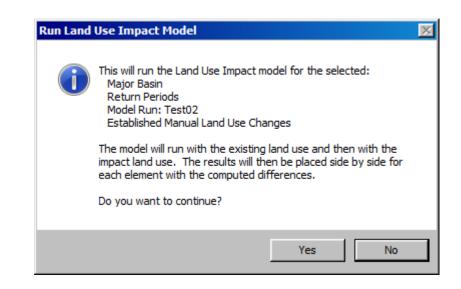
To run the model ('TEST02'), use the same steps that were used for running 'TEST01'.

- (1) Open the RUN LAND USE IMPACT MODEL form (Hydrology → Land Use Impacts → Run Model)
- (2) Check all the checkboxes for the Return Period events (2 Year, 5 Year, 10 Year, 25 Year, 50 Year, and 100 Year)

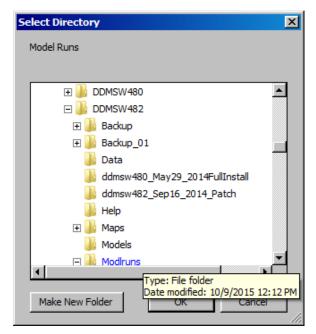
- (3) Make sure that 'TEST02' is selected for the Model Run
- (4) Check 'Select Custom Folder' check box to save results in a custom folder
- (5) Click the '*Run Model*' button.

Run Land Use Imp	oact Model - MB: 01		
Return Period ↓ 2 Year ↓ 5 Year ↓ 10 Year ↓ 25 Year ↓ 50 Year ↓ 100 Year	Options Major Basin 01 Model Run TEST02 Land Use Option Manual Select Custom Folder 🗹	Same data as GIS except values are entered manually.	A.
		Results Run Model	<u>0</u> K

(6) Click 'Yes' to run the Land Use Impact model.



(7) Select the folder where to save model run results.



(8) Click **'OK'** to continue the run. The **SELECT DIRECTORY** form closes when the execution is finished..

#### 5.0 LAND USE IMPACT MODEL RUN SUMMARY

Open the LAND USE IMPACT FLOW SUMMARY form (*Hydrology* → Land Use Impacts → Model Run Summary) to show the Land Use Change Impact.

	Sort	Model Run	Туре	Area (sq mi)	Base (cfs)	Impact (cfs)	Difference (cfs)	Percent Diff	
10005	10	TEST01	Hydrograph	0.0600	62	61	-1	-1.6	
10005	20	TEST01	Routed	0.0600	62	61	-1	-1.6	
010105	30	TEST01	Hydrograph	0.0200	16	15	-1	-6.3	
010105	40	TEST01	Routed	0.0200	15	15	0	0.0	
010110	50	TEST01	Hydrograph	0.0200	14	14	0	0.0	
010110	60	TEST01	Combined	0.0500	22	22	0	0.0	
010110	70	TEST01	Routed	0.0500	22	20	-2	-9.1	
010010	80	TEST01	Hydrograph	0.1400	79	76	-3	-3.8	
010010	90	TEST01	Combined	0.2500	142	140	-2	-1.4	
010010	100	TEST01	Routed	0.2500	139	138	-1	-0.7	
010015	110	TEST01	Hydrograph	0.1000	108	108	0	0.0	
010015	120	TEST01	Combined	0.3500	181	179	-2	-1.1	_
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Alternatively, the same summary results can be accessed from the Run LAND

**USE IMPACT MODEL** form clicking the '*Results*' button.

To check the summary results for other return periods, change the **Return Period** on the **MODEL VIEW** form (*Hydrology*  $\rightarrow$  *Land Use Impacts*  $\rightarrow$  *Model Run Summary* $\rightarrow$ *View*) using the Selector button. Click '*OK*' to close the form.

Land Use Impact Flo	w Summary View - MB: 01
View Option	
Model Run	TEST01
Return Period	25 🔎
View	Flows
Option	All
	<u>Info</u> <u>O</u> K

ID 🔺	Sort	Model Run	Туре	Area (sq mi)	Base (cfs)	Impact (cfs)	Difference (cfs)	Percent Diff	[
010005	10	TEST01	Hydrograph	0.0600	86	86	0	0.0	
010005	20	TEST01	Routed	0.0600	86	85	-1	-1.2	
010105	30	TEST01	Hydrograph	0.0200	26	25	-1	-3.8	
010105	40	TEST01	Routed	0.0200	25	25	0	0.0	
010110	50	TEST01	Hydrograph	0.0200	21	21	0	0.0	
010110	60	TEST01	Combined	0.0500	36	37	1	2.8	
010110	70	TEST01	Routed	0.0500	35	34	-1	-2.9	
010010	80	TEST01	Hydrograph	0.1400	118	117	-1	-0.8	
010010	90	TEST01	Combined	0.2500	212	209	-3	-1.4	
010010	100	TEST01	Routed	0.2500	208	205	-3	-1.4	
010015	110	TEST01	Hydrograph	0.1000	148	147	-1	-0.7	
010015	120	TEST01	Combined	0.3500	272	268	-4	-1.5	_
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									_

This concludes this tutorial.