



DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS VERSION 6.8.0

TUTORIAL # 8 CREATING A PROJECT FILE TO EVALUATE THE IMPACT OF LAND USE CHANGES



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CREATING A PROJECT TO EVALUATE THE IMPACT OF LAND USE CHANGES

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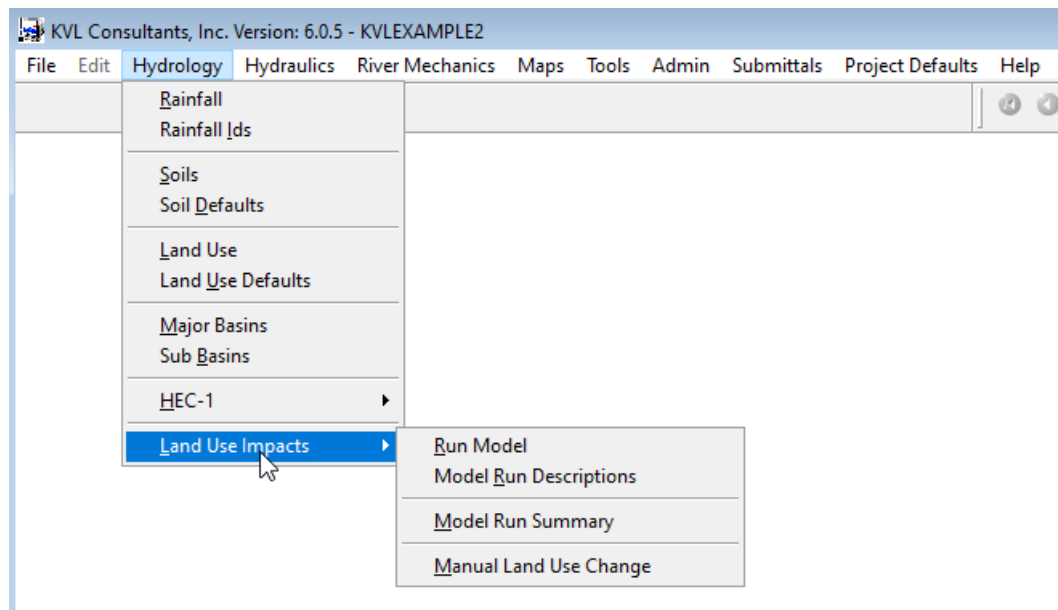
CREATING A PROJECT TO EVALUATE THE IMPACT OF LAND USE CHANGES

DATE UPDATED: MAY 7, 2024

TUTORIAL TIME: 30 MINUTES

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 → 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 Impact Model Run Descriptions - MB: 01

Model Run ID	Land Use	Description

Model Run

Major Basin ID: 01

Model Run ID:

Land Use Option:

Print... Delete Add OK

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
1	Model Run ID	TEST01
	Land Use Option	GIS File
	Land Use Description	Changed Existing Land Use Code 150 (Residential) to Land Use Code 310 (Industrial)
	Sub Basin GIS Files	C:\...\SUBBASINS.SHP
	Land Use GIS Files	C:\...\LANDUSE.SHP

Land Use Impact Model Run Descriptions - MB: 01

Model Run ID	Land Use	Description
TEST01	GIS File	Changed residential land use 150 (residential) to land use 310 (industrial)
TEST02	Manual	Same data as GIS except values are entered manually.

Model Run

Major Basin ID: 01

Model Run ID: TEST01

Land Use Option: GIS File

Changed residential land use 150 (residential) to land use 310 (industrial)

GIS Files

Sub Basin: C:\TEMP\TUTORIAL#9_605DATA\SUBBASINS.SHP

Land Use: C:\TEMP\TUTORIAL#9_605DATA\LANDUSE.SHP

Info Instructions Print... Delete Add OK

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

Land Use Impact Model Run Descriptions - MB: 01

Model Run ID	Land Use	Description
TEST01	GIS File	Changed residential land use 150 (residential) to land use 310 (industrial)
TEST02	Manual	Same data as GIS except values are entered manually.

Model Run

Major Basin ID: 01

Model Run ID: TEST02

Land Use Option: Manual

Same data as GIS except values are entered manually.

Info Instructions Print... Delete Add OK

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.

Run Land Use Impact Model - MB: 01

Return Period

- ☒ 2 Year
- ☒ 5 Year
- ☒ 10 Year
- ☒ 25 Year
- ☒ 50 Year
- ☒ 100 Year

Options

Major Basin: 01

Model Run: TEST01

Land Use Option: GIS File

Select Custom Folder: ☐

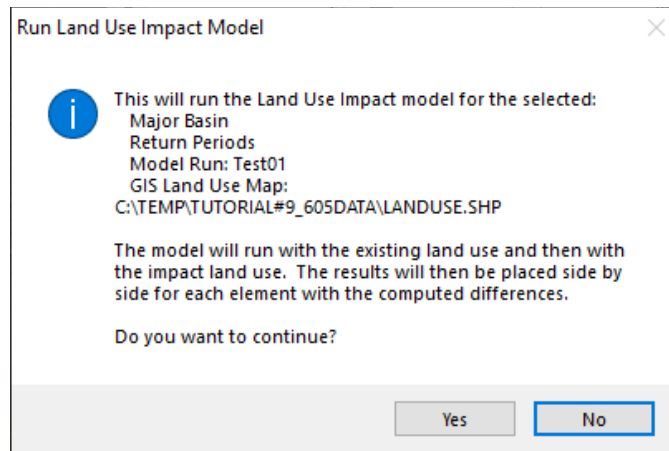
Changed residential land use 150 (residential) to land use 310 (industrial)

GIS Files

Sub Basin: C:\TEMP\TUTORIAL#9_605DATA\SUBBASINS.SHP

Land Use: C:\TEMP\TUTORIAL#9_605DATA\LANDUSE.SHP

Info Instructions Results Run Model OK



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 navigate to the folder.

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.

The "Land Use Impacts - MB: 01" form has two tabs: "List" and "Details". The "Details" tab is active, showing the following fields:

ID

- Major Basin ID: 01
- Sub Basin ID: 010005
- Include: ☒

Existing

- Land Use Code: 150
- Description: Small Lot Residential - Single Family (4-6 du per acre)
- Area: 0.0241

Modified

- Land Use Code: 310
- Description: Warehouse/Distribution Centers
- Area: 0.0241

At the bottom, there are buttons: Info, Instructions, Print..., Delete, Add, MB, and OK.

- (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.

[illegible]

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.

- (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.

Land Use Impact Flow Summary - MB: 01 - 10 Year Return Period

Look for

ID ^	Sort	Model Run	Type	Area (sq mi)	Base (cfs)	Impact (cfs)	Difference (cfs)	Percent Diff	
010005	10	TEST01	Hydrograph	0.0600	62	61	-1	-1.6	
010005	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	

Info Instructions Export Print... View MB OK

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 → Land Use Impacts → Model Run Summary → View**) using the Selector button. Click **'OK'** to close the form.

Land Use Impact Flow Summary View - MB: 01

View Option

Model Run TEST01

Return Period 25

View Flows

Option All

Info OK

Land Use Impact Flow Summary - MB: 01 - 25 Year Return Period

Look for

Sort ▲	ID	Model Run	Type	Area (sq mi)	Base (cfs)	Impact (cfs)	Difference (cfs)	Percent Diff
10	010005	TEST01	Hydrograph	0.0600	129.0	86.0	-43.0	-33.3
20	010005	TEST01	Routed	0.0600	126.0	85.0	-41.0	-32.5
30	010105	TEST01	Hydrograph	0.0200	42.0	25.0	-17.0	-40.5
40	010105	TEST01	Routed	0.0200	39.0	25.0	-14.0	-35.9
50	010110	TEST01	Hydrograph	0.0200	34.0	21.0	-13.0	-38.2
60	010110	TEST01	Combined	0.0500	60.0	37.0	-23.0	-38.3
70	010110	TEST01	Routed	0.0500	58.0	34.0	-24.0	-41.4
80	010010	TEST01	Hydrograph	0.1400	187.0	117.0	-70.0	-37.4
90	010010	TEST01	Combined	0.2500	326.0	209.0	-117.0	-35.9
100	010010	TEST01	Routed	0.2500	325.0	205.0	-120.0	-36.9
110	010015	TEST01	Hydrograph	0.1000	209.0	147.0	-62.0	-29.7
120	010015	TEST01	Combined	0.3500	431.0	268.0	-163.0	-37.8

This concludes this tutorial.