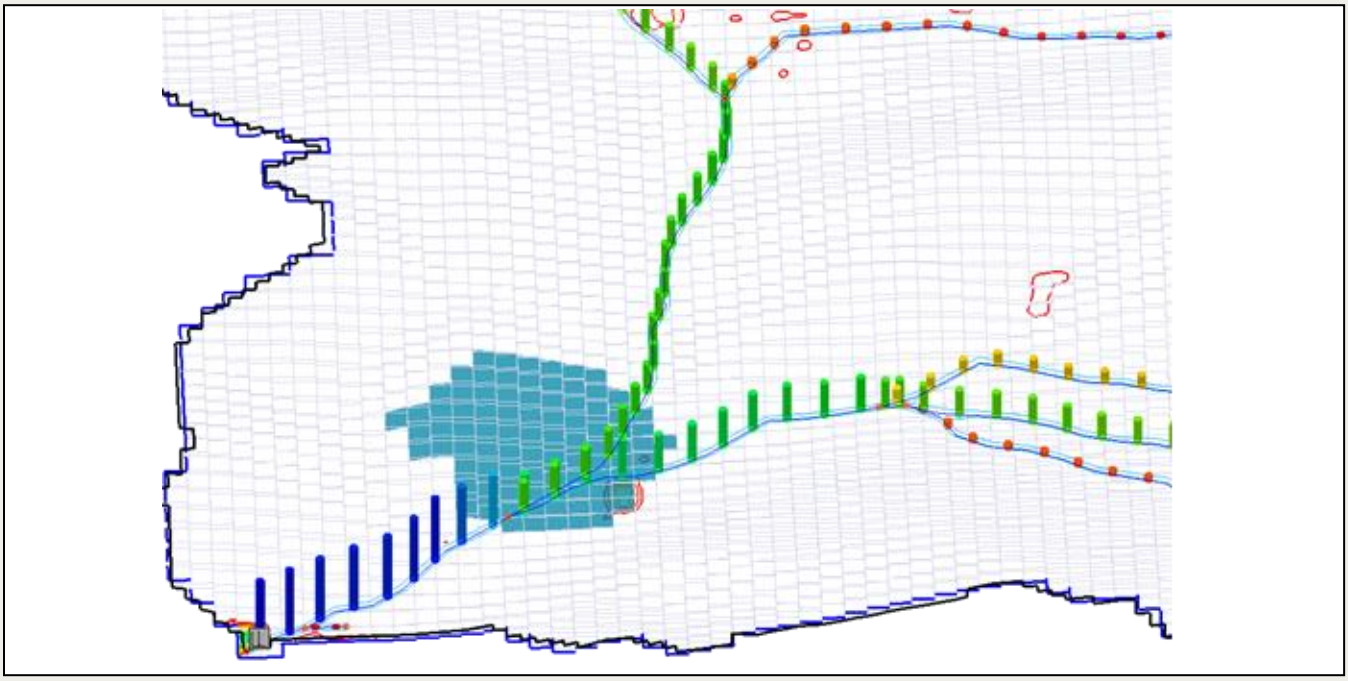
WMS 11.2 Tutorial

GSSHA Land Use Change – Wetlands

Include the effects of wetland runoff abatement measures in GSSHA models



Objectives

Learn to add the effects of wetlands as a runoff abatement measure in a GSSHA model.

Prerequisite Tutorials

- Developing a GSSHA Model Using the Hydrologic Modeling Wizard

Required Components

- WMS Core
- GSSHA Model

Time

- 10–20 minutes

1 Introduction

Changing the land use in a certain portion of the watershed can cause an increase in the peak flow at the watershed outlet. This situation is often undesirable as natural streams and various hydraulic structures—like culverts and channels downstream of the new development—become undersized.

This tutorial adds wetland abatement measures to the project used in the "GSSHA Land Use Change – Industrial" tutorial.

1.1 Getting Started

Begin by opening an existing GSSHA model:

1. Open WMS, or click **New** to reset to the default settings and clear any existing data.
2. Switch to the **2-D Grid** module.
3. Select *GSSHA* | **Open Project File…** to bring up the *Open* dialog.
4. Browse to the *data files* folder for this tutorial and select "Industrial.prj".
5. Click **Open** to import the project and exit the *Open* dialog.
6. Select *GSSHA* | **Save Project File…** to bring up the *Save GSSHA Project File* dialog.
7. Select "GSSHA Project File (*.prj)" from the *Save as type* drop-down.
8. Enter "Wetland.prj" as the *File name*.
9. Click **Save** to save the project under the new name and close the *Save GSSHA Project File* dialog.

The project should appear similar to Figure 1 depending on the Display Options currently set up in WMS.

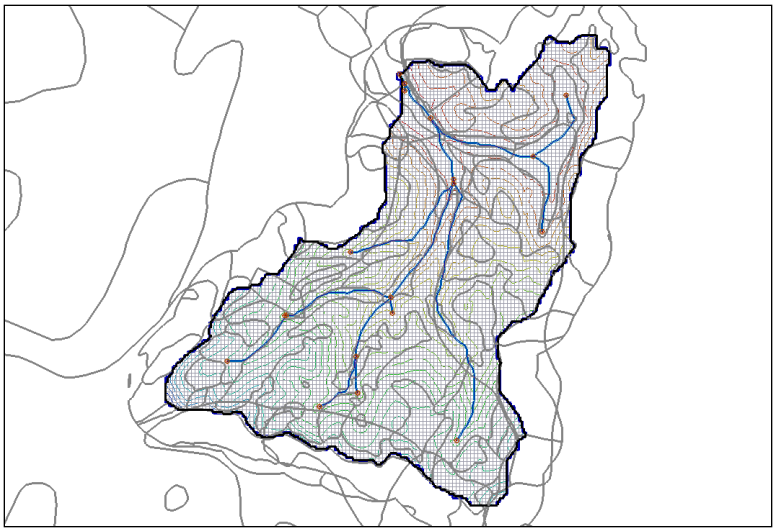


Figure 1 Initial project

2 Creating a Coverage for the Wetland

A detention basin, infiltration basin, or buffer strip might not always be the best flood mitigation method. As an alternative, add a wetland in the watershed and compare how it reduces the flood. Restoring a wetland helps maintain an ecological balance in the watershed and this type of solution could be preferable over structural solutions.

To mitigate the problems of flooding, introduce a wetland in the watershed. Because the existing "GSSHAIndus" coverage already has most of the needed parameters set, duplicate it to create a new coverage to use for the wetland.

1. Right-click on "GSSHAIndus" and select **Duplicate** to create a new "Copy of GSSHAIndus" coverage.
2. Right-click on "Copy of GSSHAIndus" and select **Rename**.
3. Enter "GSSHAWetland" and press *Enter* to set the new name.

Now assign the "Wetland" project to use the new "GSSHAWetland" coverage by doing the following:

4. Right-click on the "GSSHAIndus" link under "Wetland" and select *Assign Coverage* | **GSSHAWetland**.

3 Defining the Wetland

A background image has been prepared that indicates the location of the wetland. Import the image by doing the following:

1. Click **Open** to bring up the *Open* dialog.
2. Browse to the *data files* folder for this tutorial.
3. Select "Wetland_1.jpg" and click **Open** to exit the *Open* dialog and import the image.
4. **Zoom** in to the downstream area (Figure 2).

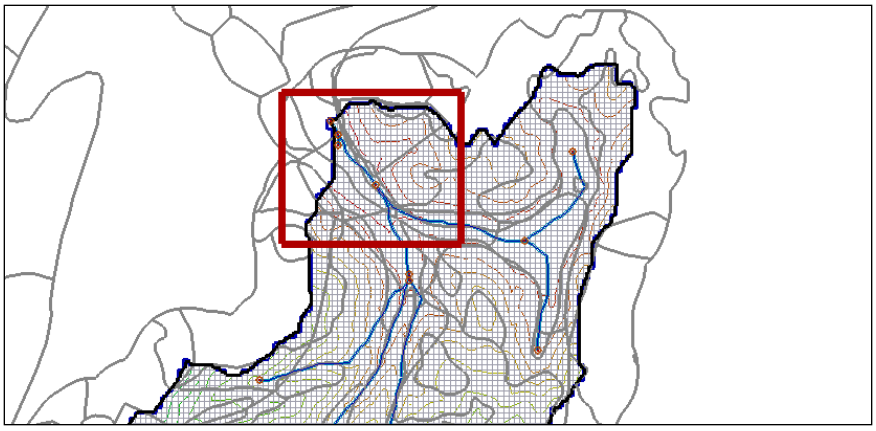


Figure 2 Zoom into the area in the square

A polygon template for the wetland should become visible (Figure 3).

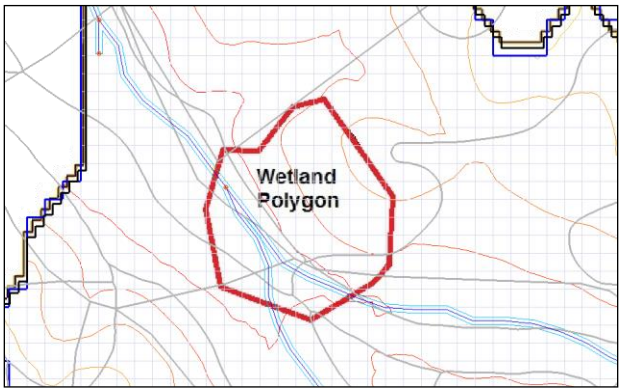


Figure 3 Wetland polygon template

3.1 Defining the Wetland Polygon

Define the wetland by drawing a polygon and defining it as a wetland. Wetlands in GSSHA can be located on the stream or away from the stream. In this tutorial, the wetland is located on the stream.

1. Select "GSSHAWetland" to make it active.
2. Switch to the **Map** module.
3. Using the **Create Feature Arc** tool, create the wetland polygon using the template as a guide.

Note: When making the polygon, be careful to not click on or near the stream arcs.

4. Turn off "Wetland_1.jpg".
5. Using the **Select Feature Arc** tool, select the newly-created wetland arc.
6. Select *Feature Objects* | **Build Polygon**.

This creates a polygon from the wetland arc.

7. Using the **Select Feature Polygon** tool, double-click inside the new polygon to bring up the *GSSHA Polygon Attributes* dialog.

8. Select “Wetland” from the *Polygon type* drop-down.
9. In the *Wetland Attributes* section, enter “1.0” as the *Initial storage depth*.
10. Enter “300.0” as the *Retention depth*.
11. Enter “0.01” as the *Retention depth hydraulic conductivity*.
12. Enter “900.0” as the *Vegetation height*.
13. Enter “3.0” as the *Vegetation height hydraulic conductivity*.
14. Enter “0.3” as the *Inundated Manning’s n value*.
15. Click **OK** to close the *GSSHA Polygon Attribute* dialog.
16. Select anywhere outside the watershed to deselect all polygons.

The wetland polygon should appear similar to Figure 4.

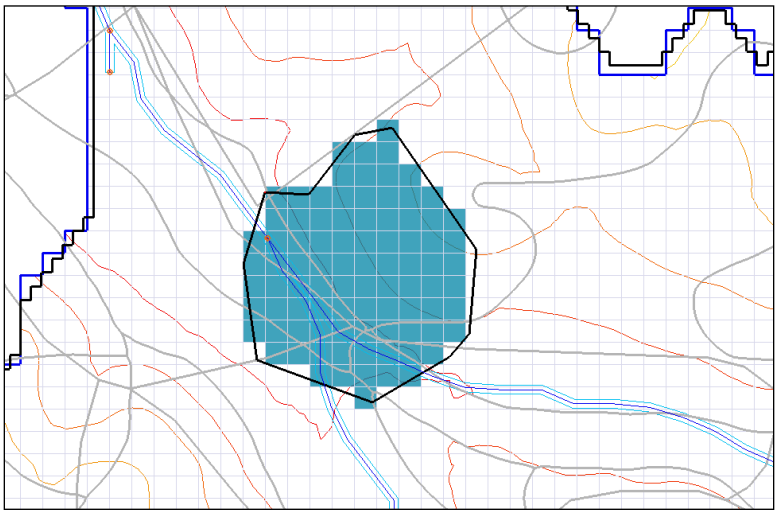


Figure 4 The wetland polygon

4 Saving and Running GSSHA

Before proceeding, it is recommended to save the project.

1. Right-click on “Wetland” and select **Save Project File…** to bring up the *Save GSSHA Project File* dialog.
2. Select “GSSHA Project File (*.prj)” from the *Save as type* drop-down.
3. Enter “Wetland_run.prj” as the *File name*.
4. Click **Save** to save the project under the new name and exit the *Save GSSHA Project File* dialog.
5. Right-click on “Wetland_run” and select **Run GSSHA** to bring up the *GSSHA Run Options* dialog.
6. Click **OK** to exit the *GSSHA Run Options* dialog and open the *Model Wrapper* dialog.
7. When GSSHA finishes, turn on *Read solution on exit* and click **Close** to exit the *Model Wrapper* dialog.

5 Visualizing the Solution

There are a variety of methods for visualizing the solution datasets. The “Post - Processing and Visualization of GSSHA Model Results” tutorial discusses various methods of visualization. Feel free to experiment with them.

6 Conclusion

This concludes the “GSSHA Land Use Change – Wetlands” tutorial for WMS. Feel free to continue to experiment, or exit the program.