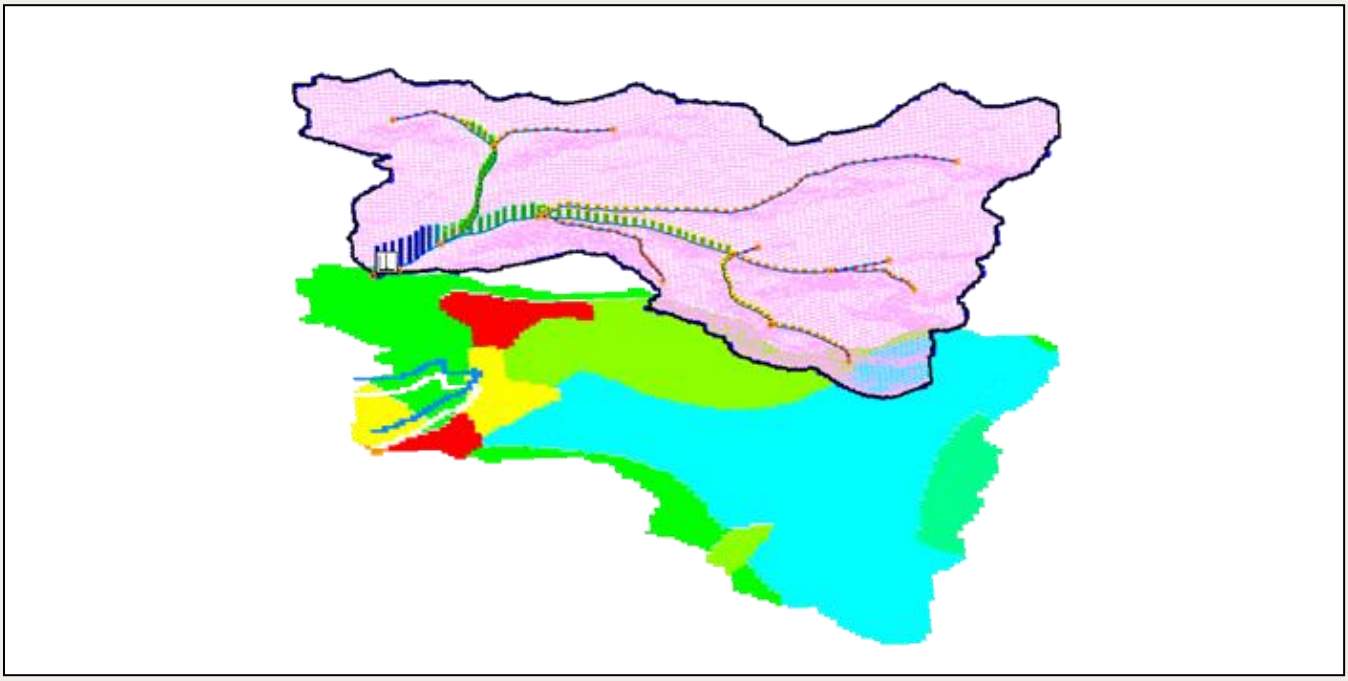
*WMS 11.2 Tutorial*

# *GSSHA Land Use Change – Buffer Strips*

Include the effects of buffer strip runoff abatement measures in GSSHA models



## Objectives

Learn to add the effects of buffer strips 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 buffer strip abatement measures to the project used in the "GSSHA Land Use Change – Industrial" tutorial. A buffer strip is generally characterized by very high surface roughness because it offers resistance to the overland flow.

## 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 "BufferStrips.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.

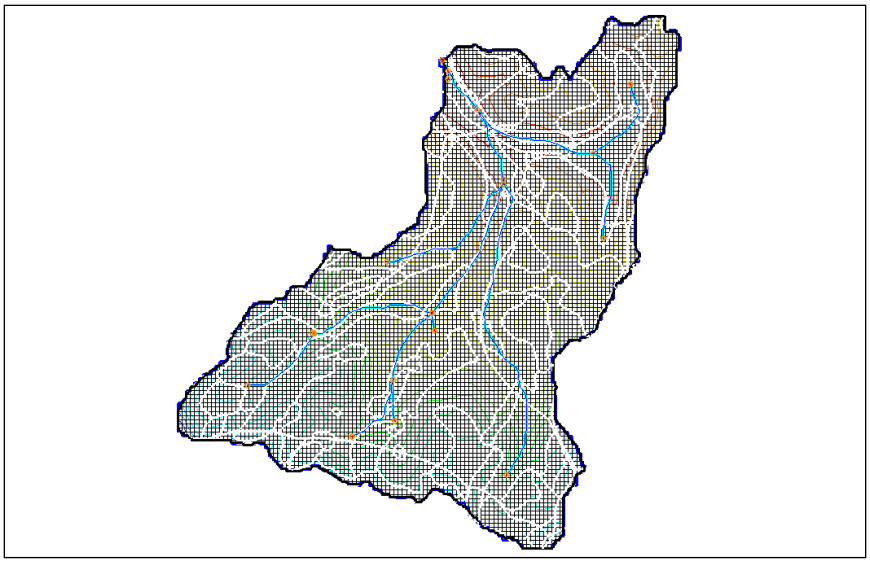


*Figure 1 Initial project*

## 2 Creating a Coverage

To mitigate the problems of flooding, introduce a buffer strip into 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 buffer strip.

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 "GSSHABuff" and press *Enter* to set the new name.

Now assign the "BufferStrips" project to use the new "GSSHABuff" coverage by doing the following:

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

## 3 Renaming the Index Map

In a WMS instance with multiple GSSHA models, it is preferred to modify a copy of the specific index map to add the infiltration basin. This prevents changes happening to existing models. In this case, there is only the one project, so a copy does not need to be made.

1. Right-click on "LUIndustrial" in the "Index Maps" folder under "new grid" and select **Rename**.
2. Enter "LUBufferStrip" and press *Enter* to set the new name.

# 4 Defining the Buffer Strip Parameters

Creating a buffer strip is another abatement measure that can be used as a flood control measure. A buffer strip is generally characterized by very high surface roughness because it offers resistance to the overland flow.

## 4.1 Adjusting the Display Options

First, change the display options by doing the following:

1. Click **Display Options** to bring up the *Display Options* dialog.
2. Select "2D Grid Data" from the list on the left.
3. On the *2D Grid* tab, turn off *Contours*.
4. Click **OK** to close the *Display Options* dialog.

## 4.2 Import the Background Guide Image

Now import an image with a guide showing where to create the buffer strip.

1. Click **Open** to bring up the *Open* dialog.
2. Browse to the *data files* folder for this tutorial.
3. Select "BufferStrip.jpg" and click **Open** to import the image and exit the *Open* dialog.

A background image will load into the project.

4. Right-click on "BufferStrip.jpg" and select **Zoom To Extents**.

The project should appear similar to Figure 2.

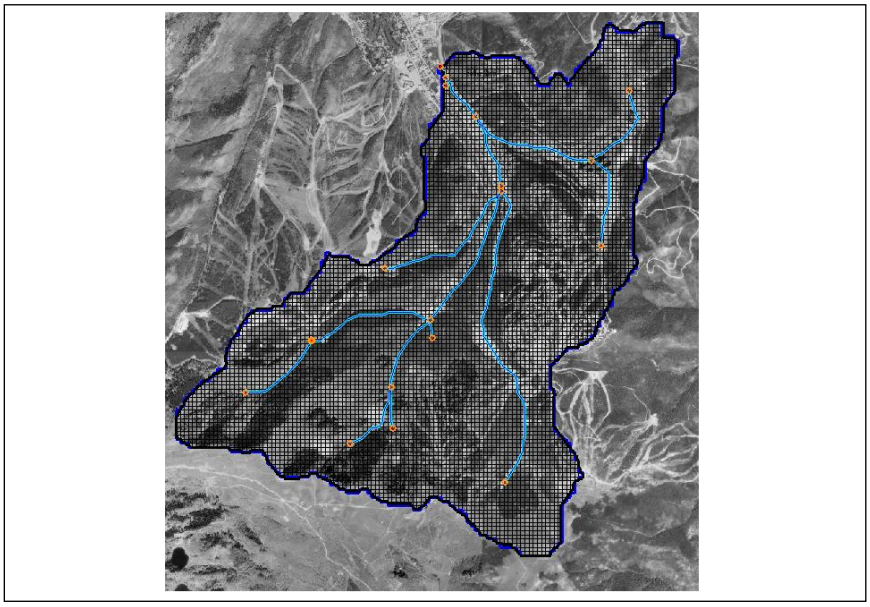


*Figure 2 Project with background guide image*

## 4.3 Changing the Index Map ID

Now change the index map IDs for the cells overlapping the buffer strip by doing the following:

1. **Zoom** in to the area as shown in Figure 3.

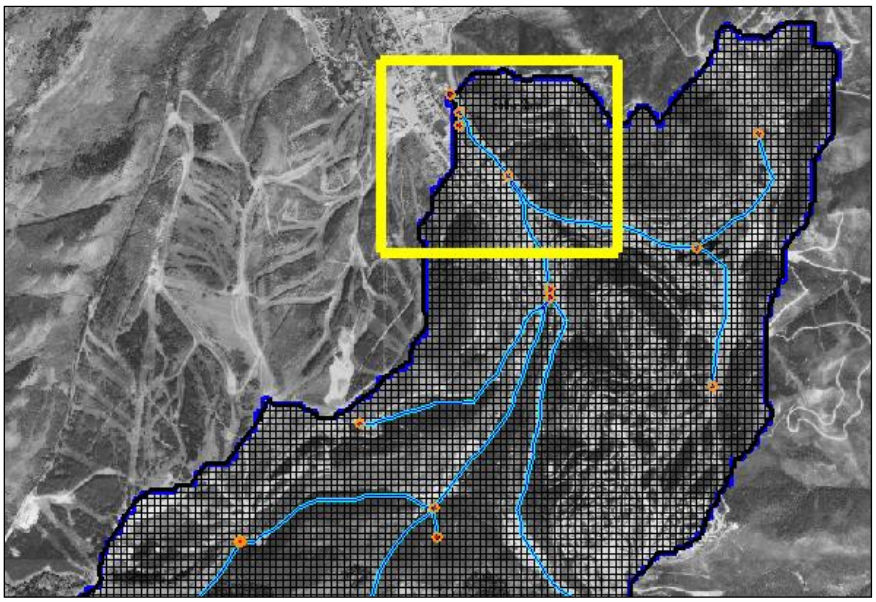


*Figure 3 Zoom into the area indicated by the box*

Notice an arc embedded in the background image that shows the location of the proposed buffer strip. Because a buffer strip has a high roughness value, the Land Use index map should be modified.

2. Select "Buffer Strips" to make it active.
3. Select "LUBufferStrip" under "Index Maps" under "new grid" to make it active.
4. Using the **Select grid cell** tool while pressing *Shift*, select the grid cells that overlay the buffer strip guide arc in the background image.
5. In the Properties section of the WMS window, enter "200" in the *Value* column on the *Index Map ID* row, then press *Enter* to set the new value.
6. Click **Display Options** to bring up the *Display Options* dialog.
7. Select "2D Grid Data" from the list on the left.
8. On the *2D Grid* tab, turn on *Cells* and *Contours*.
9. Click **OK** to close the *Display Options* dialog.

The project should appear similar to Figure 4. Notice how the select cells are a different color than that of the surrounding cells.

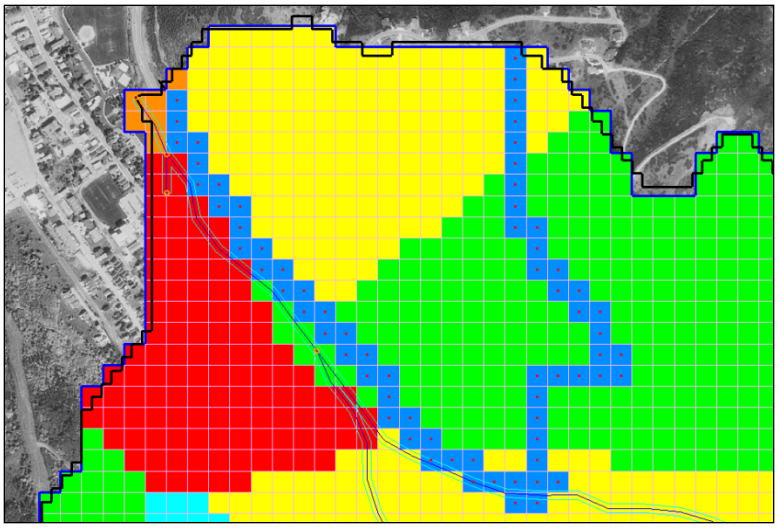


*Figure 4 Contours showing the buffer strip*

10. Right-click on "Buffer Strips" and select **Map Tables…** to bring up the *GSSHA Map Table Editor* dialog.
11. On the *Roughness* tab, select "LUBufferStrip" from the *Using index map* drop-down.
12. Click **Generate IDs**, clicking **No** when asked to delete existing IDs.

A new column for "200" will appear at the far right in the spreadsheet (scroll to the right if needed).

13. Enter "2.0" in the *200* column on the *Surface roughness* row.
14. Click **Done** to exit the *GSSHA Map Table Editor* dialog.
15. Turn off "BufferStrip.jpg".

The buffer strip is now created and GSSHA can be run.

# 5 Saving and Running GSSHA

Before proceeding, it is recommended to save the project.

1. Right-click on "BufferStrips" 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 "BufferStrips_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 "BufferStrips_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.

8. If one or more warnings appear regarding the number of points on the arc, click **OK**.

# 6 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.

# 7 Conclusion

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