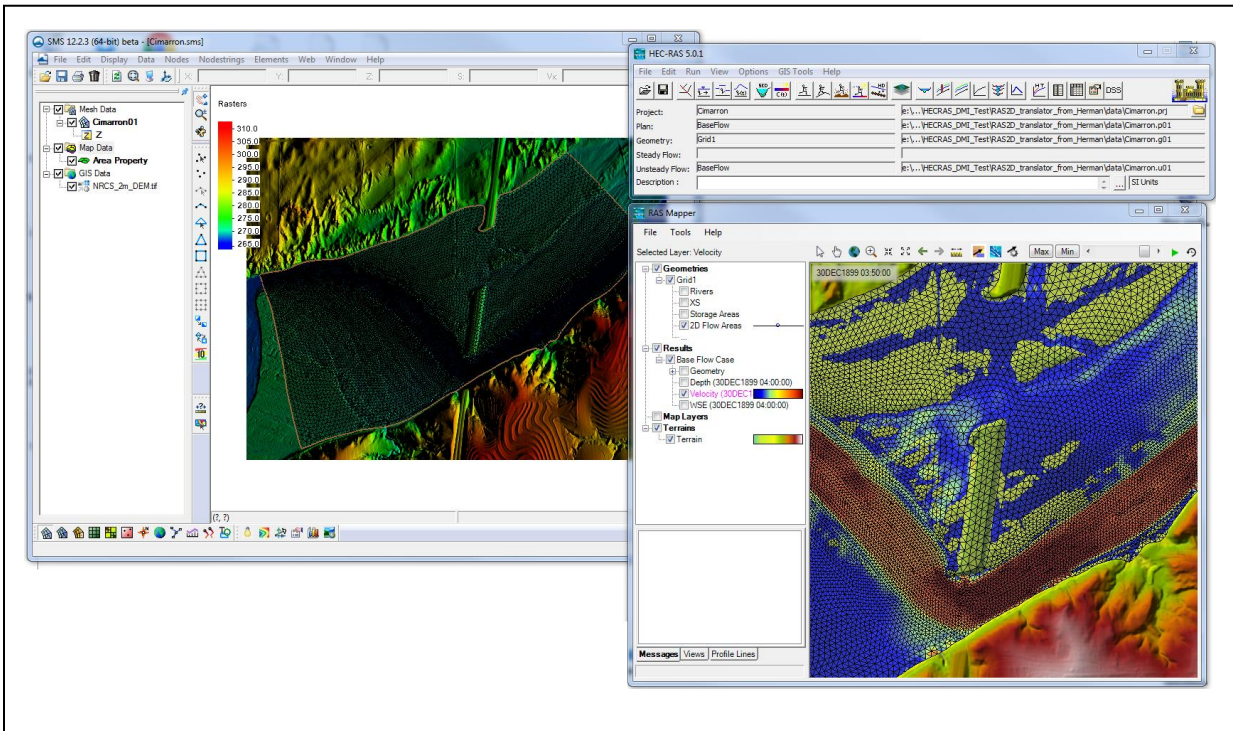


SMS 13.0 Tutorial HEC-RAS



Objectives

This tutorial introduces the HEC-RAS model and how it can be used to generate files for use with the HEC-RAS software.

Prerequisites

- Overview Tutorial
- Mesh Generation

Requirements

- HEC-RAS 5.0
- Mesh Module
- Map Module

Time

- 10–25 minutes

1	Introduction	2
1.1	Getting Started	2
2	Importing a Mesh.....	2
3	Setting Up a HEC-RAS Simulation in SMS.....	3
4	Saving the Project	5
5	Exporting the HEC-RAS Input Files.....	5
6	Conclusion	6

1 Introduction

The U.S. Army Corps of Engineers Institute for Water Resources Hydrologic Engineering Center's (CEIWR-HEC) River Analysis System (HEC-RAS) is a one- and two-dimensional model for computing water surface profiles for steady state or gradually varied flow. Two-dimensional capabilities were added to the program in version 5.0. HEC-RAS supports networks of channels and is capable of modeling subcritical, supercritical, and mixed flow regime profiles. HEC-RAS is able to model obstructions in the flow path.

SMS can be used to create geometric data (grids or meshes) for the HEC-RAS 2D software. This tutorial focuses creating and exporting HEC-RAS input data and files using the tools in SMS. The “Importing into HEC-RAS” tutorial discusses importing these files into HEC-RAS.

This tutorial uses a mesh generated from data gathered in a portion of the Cimarron River in Oklahoma.

1.1 Getting Started

Before starting this tutorial, do the following:

1. Start SMS.
2. If SMS is already open, select *File* | **New**.
3. Click **Yes** to clear all data in SMS.

2 Importing a Mesh

To save time, the mesh has been already been generated and saved as part of an SMS project file. The process used to generate this mesh is shown in the “Mesh Generation” and “SRH-2D” tutorials. Refer to these tutorials for more information about mesh generation.

Import the mesh by doing the following:

1. Select *File* | **Open...** to bring up the *Open* dialog.
2. Select “Project Files (*.sms)” from the *Files of type* drop-down.

3. Browse to the *HEC-RAS\datafiles* folder and select “input.sms”.
4. Click **Open** to import the project and exit the *Open* dialog.

A mesh similar to Figure 1 will appear in the Graphics Window.

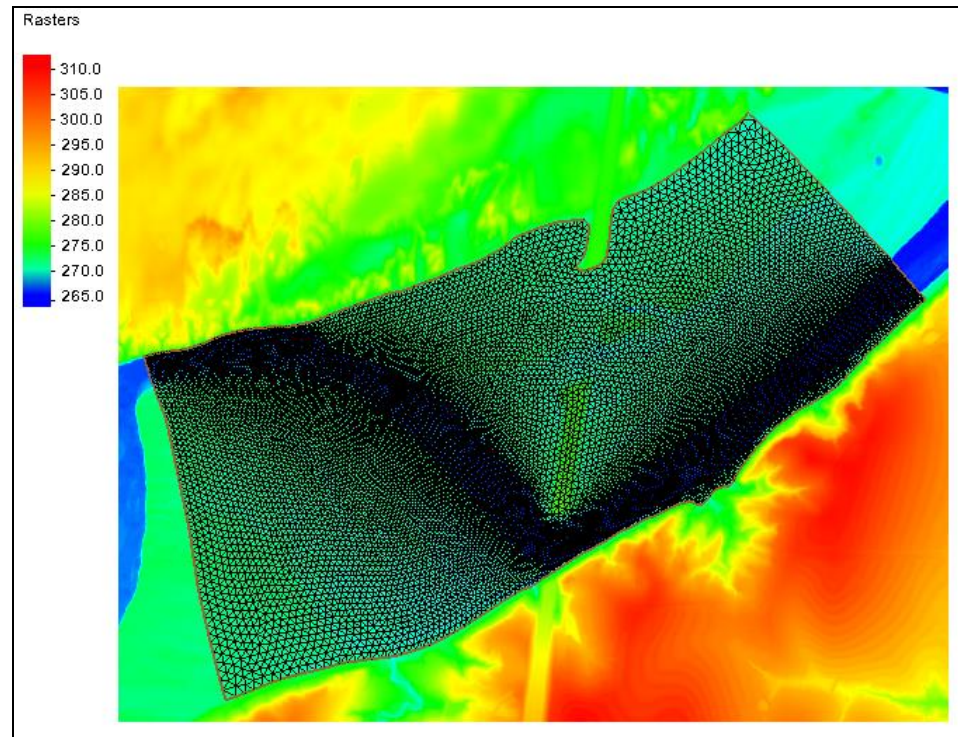




Figure 1 The imported mesh


5. Use the **Rotate**  tool to review the elevation data applied to the mesh.
6. When done reviewing the mesh, switch to **Plan View** .


3 Setting Up a HEC-RAS Simulation in SMS

The HEC-RAS interface in SMS makes use of simulation based modeling. This allows creation of multiple scenarios in one SMS project. This project only uses one mesh, but multiple meshes could be used create multiple simulations/scenarios.

With the mesh available, the HEC-RAS simulation needs to be created.

1. Right-click on an empty space in the Project Explorer and select *New Simulation* | **HEC-RAS** (Figure 2).

A new simulation titled “ Sim” should appear in the Project Explorer.

2. Right-click on “ Sim” and select **Rename**.
3. Enter “Q100” and press *Enter* to set the new name.

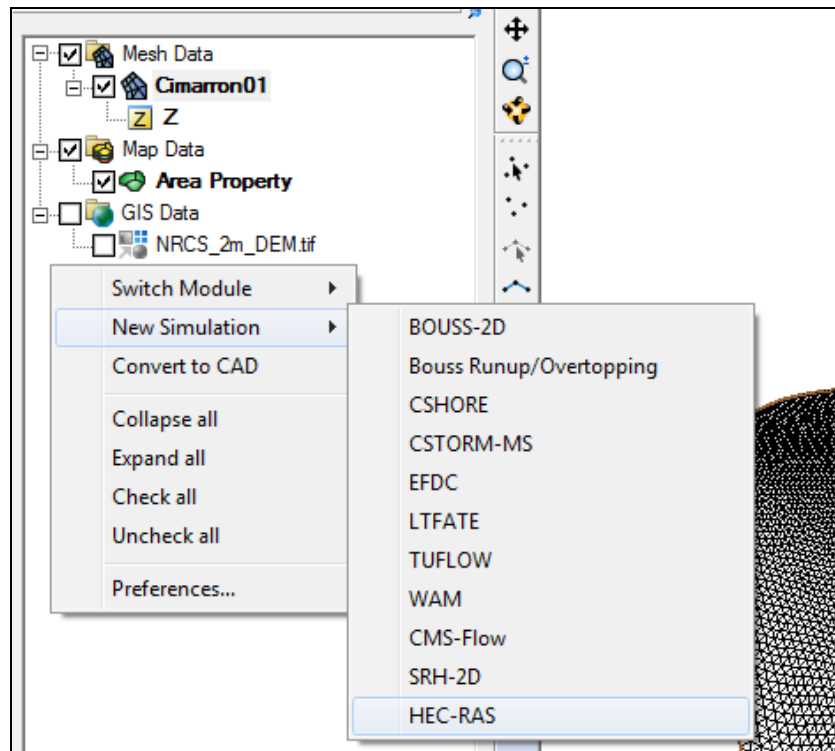


Figure 2 Creating a new HEC-RAS simulation

The “Q100” simulation currently contains no properties or data. Components need to be added to the simulation before the simulation can be launched. The same components can be added to multiple simulations. Changes made to a component will be automatically updated in all simulations where it is used. For a HEC-RAS simulation, the only component needed is a 2D mesh.

Add components by either clicking and dragging the components under the simulation item or using the right-click menu.

To link the mesh to the simulation, do the following:

4. Right-click on “Cimarron01” and select *Link To | HEC-RAS Simulations* → **Q100**.

The simulation should now appear similar to the one at the bottom of Figure 3.

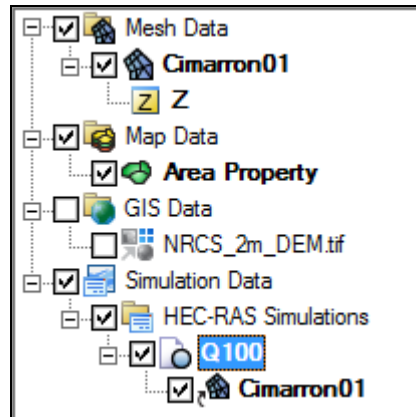


Figure 3 The HEC-RAS simulation in the Project Explorer

4 Saving the Project

This tutorial started with an SMS project. However, most projects start from background data. Before scenarios or simulations can be saved and evaluated, the SMS project must be saved. For this reason, this tutorial illustrates the step of saving a project. To do this:

1. Select *File* | **Save As...** to bring up the *Save As* dialog.
2. Select “Project Files (*.sms)” from the *Save as type* drop-down.
3. Enter “Cimarron.sms” as the *File name* and click **Save** to close the *Save As* dialog and save the project under the new name.

5 Exporting the HEC-RAS Input Files

SMS only generates the geometric grid or mesh. In future versions, the interface will include specification of boundary conditions, material zones with roughness values or land use rasters, background DEMs and model parameters.

To generate the input files needed for use in HEC-RAS:

1. Right-click on “Q100” simulation and select **Export HEC-RAS**.

This generates four files in the *HEC-RAS\datafiles\Cimarron\HEC-RAS\Q100* folder:

- “Cimarron.g01” – HEC-RAS geometry file
- “Cimarron.g01.hdf” – HEC-RAS 2D geometry file
- “Cimarron.prj” – HEC-RAS project file
- “Cimarron_projection.prj” – coordinate system projection file

The export time varies based on the speed of the computer and the size of the mesh. Note that both the HEC-RAS project file and the HEC-RAS projection filenames end with the “*.prj” extension. They are not the same type of file, however.

With the HEC-RAS files successfully exported from SMS, these files are now ready to be imported into the HEC-RAS application. This process is not discussed in this tutorial.

6 Conclusion

This concludes the “HEC-RAS” tutorial. The tutorial demonstrated and discussed the following:

- Creating the HEC-RAS simulation in SMS.
- Exporting a mesh file from SMS for use in HEC-RAS 2D.

If desired, experiment further with the HEC-RAS simulation in SMS. When done, exit the program.