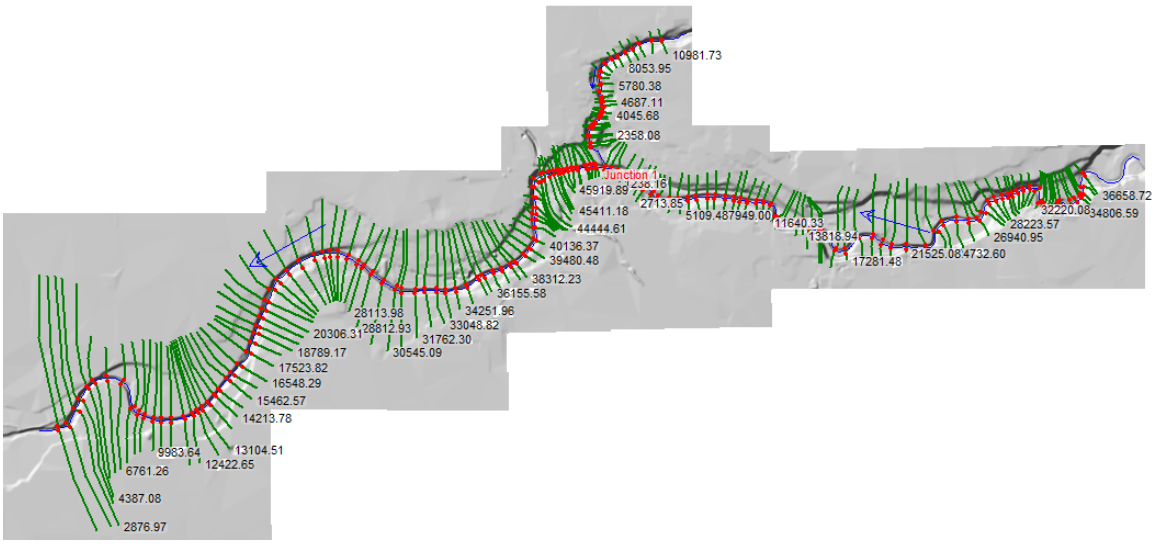
1 Objective

In this workshop, you will use HEC-RAS to create a steady flow river hydraulics model. The workshop requires importing a terrain model, creating geometry data, entering flow data and plan data, running the steady-flow simulation, and viewing results.

2 Background

The workshop requires you to create a river hydraulics model from scratch. The terrain model for the workshop is provided. You will be working with the Baxter dataset to create a 3 reach model similar to that shown below.



3 Geometry Development

You will be starting from scratch with a new HEC-RAS project.

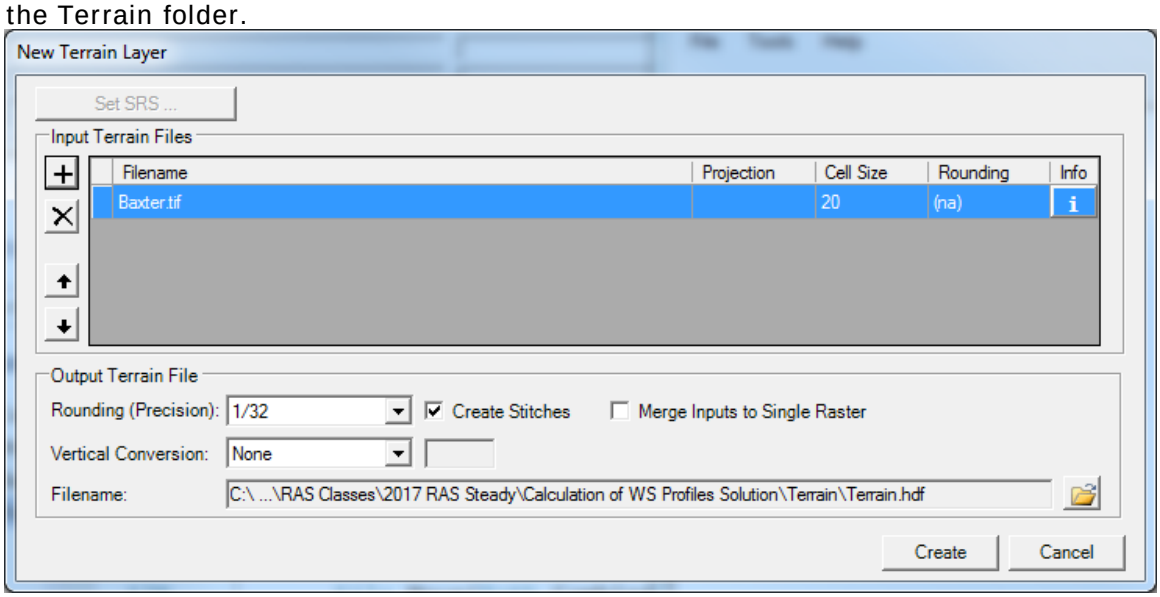
3.1 Create a new HEC-RAS Project

1. Create a **NEW** HEC-RAS project and give it a Name.
2. Open **RAS Mapper** and set the Projection for the project, using the **Tools | Set Projection for Project** menu item. Browse to the "**GIS Data**" folder in the workshop folder.

3.2 Import the Terrain Model

3. Create a new terrain model using the **Tools | New Terrain** menu item.

4. Click to **+** button to add the terrain file. Use the "**Baxter.tif**" file located in the Terrain folder.



5. Press the **Create** button to import the terrain data.

6. After the data has imported, **Turn On** the geometry and use **Zoom to Layer** option to center on the terrain model.

3.3 Create RAS Geometry File and Layers

7. In RAS Mapper, right-click on the **Geometries** node and choose **Add New Geometry**. Enter a name for the geometry and hit OK.

8. Expand the Geometries node and right-click on the new geometry and choose "**Edit Geometry**".

3.4 Create the River Network

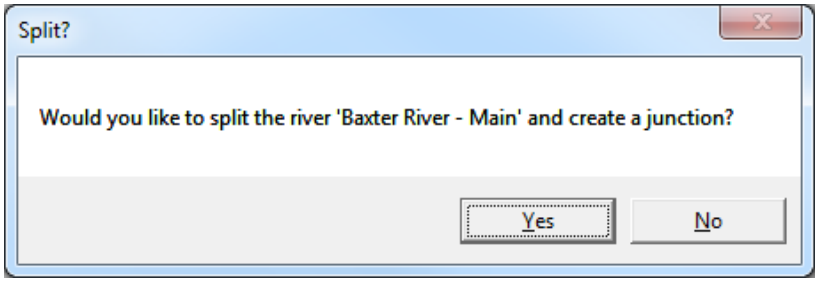
9. Click on the **Rivers** node.

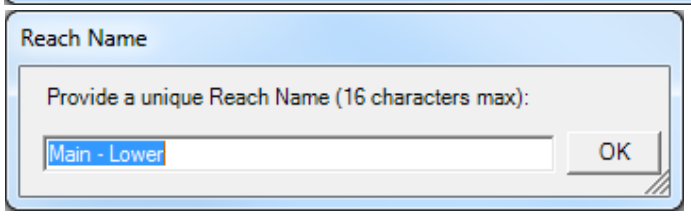
10. Draw the river network (as shown above) with the Baxter River and Tule River coming together. Draw the Baxter River first, then draw Tule Creek and end it "on top" of the Baxter River – a junction will be formed.

    a. Left-click to add a point to a line, double-click to end a line.

    b. Use the Shift key to Pan, use the Mouse Wheel to Zoom in and out.

11. A junction will be formed when you end a river reach segment on an existing river reach. Multiple dialogs will prompt you to (a) split the river reach, (b) rename the lower reach.

a) 

b) 

3.5 Creak Bank Lines

12. Click on the **Bank Lines** node.

13. Create a line for the Left Bank and Right Bank for each River.

3.6 Optional – Create Flow Path Lines

14. Click on the **Flow Path Lines** node.

15. Create a line in the Left Overbank and Right Overbank for the center-of-mass of flow for each River. The lines should be created in the downstream direction.

3.7 Layout Cross Sections

16. Click on the **XS** node.

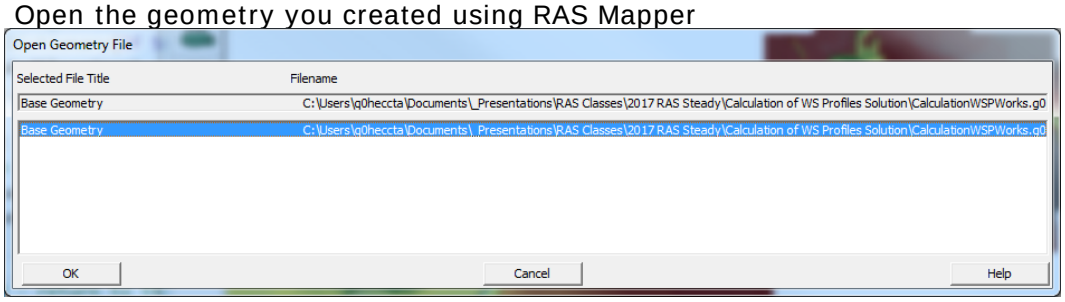
17. Create cross sections to resonably represent 1D river/floodplain flow. Cross sections should be created left to right when looking downstream.

18. When **FINISHED** created features, select the **Geometries Node | Stop Editing** menu item.

4 Finish Entering Geometric Data

If you haven't already, close RAS Mapper and open the Geometric Schematic. Your geometry will not be loaded automatically.

19. Open the geometry you created using RAS Mapper



20. Open the Cross Section editor and verify the data.

    How do the cross sections look? What data are missing? What can be improved?

21. Use the Tables in RAS to verify and enter missing data:

    a. Manning's n values (use 0.035 for the main channel and 0.06 for the overbanks).

    b. Verify Reach Lengths.

    c. Verify Contraction/Expansion Coefficients.

22. **Save** the geometry.

5 Flow

After you have created the Geometry, add flow data to the RAS project.

23. **Open** the **Steady Flow** data editor

24. Add **3** profiles.

25. Enter a **Normal Depth** boundary condition.

    What value should you use for the Normal Depth boundary and could you figure out what value to use?

26. **Save** the flow data.

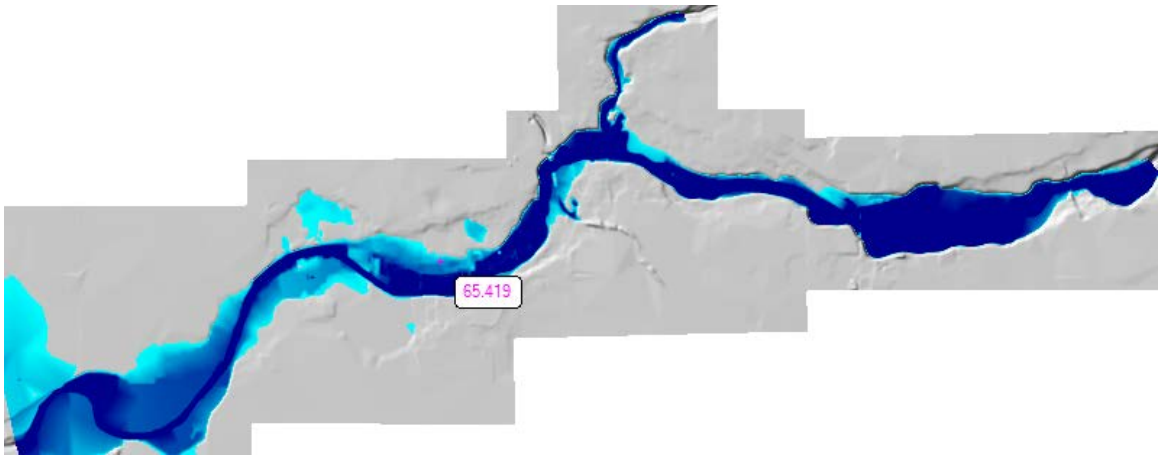
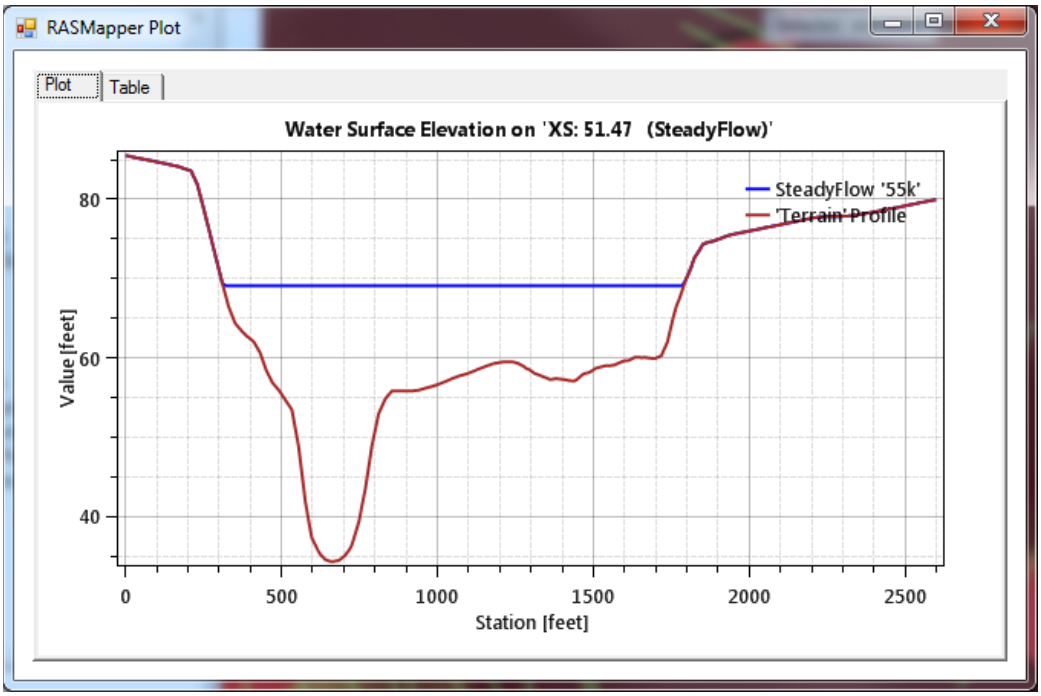
6 Simulate

Run the steady-flow simulation.

27. Open the **Steady Flow** simulation dialog.

28. Create a new **Plan** with a name ("Steady Flow") and Short ID.

29. Compute the water surface profiles for the flow data entered.

30. Evaluate the results and see how you can make the solution better. See if your ideas result in better results.

    What warnings are being generated by HEC-RAS?
    How would you fix these errors?