Refining an HEC-RAS Model for Dam Breach Analysis

Workshop

Objective

This workshop will guide students on using HEC-RAS to:

- Reinforce the modeling process of analyze, refine, run
- Learn how to use the NLD download tool
- Understand using Terrain Modifications

Background

The town of Lock Haven is situated on the north bank of Bald Eagle Creek in central Pennsylvania. Lock Haven sits behind a levee system that was designed to provide protection. You will simulating a Sunny Day failure event. Will the Levee System protect Lock Haven?





1 Open the HEC-RAS Project

- 1. Open RAS
- 2. **Open** the "**BreachRefinementWorkshop**.prj" RAS project file.
- 3. Open the **Unsteady Flow Analysis** window and press **Compute** the existing plan.
- 4. Open RAS Mapper
- 5. Investigate the results

Question: When does the town of Lock Have get inundated?

2 Download NLD data

6. Zoom to Lock Haven

- 7. Download NLD data
- 8. Select Project | Download Data | National Levee Database Features (NLD) menu item

Pre	oject Tools Help						
te 🌑	Set Projection		k 🖑 🌒 🕀				
	Add Web Imagery Add Reference Layer						
1	Download Data	•	USGS Terrain				
*·	Create New RAS Terrain Create New Geometry		GRiD Terrain National Leves Database Features (NLD)				

9. Press the **Query Products** button (using your Current Zoom Extents)

10. Press the **Download** button

Source Data from NLD	- 🗆 ×		
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The NLD data will be added to RAS Mapper in the Map Layers group

11. Press Close

12. **Turn On** the **NLD** group layer and the **RAS Merged Alignments** layer to verify the data were downloaded.

3 Use NLD with new Terrain

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13. Right-click on the Terrain and choose Clone Terrain



- 15. Turn Off the old terrainn and **Turn On** the new Terrain
- 16. Right-click on the new Terrain and choose Add New Modification Layer | Lines | High Ground

	Image Display Properties							ľ
G	Clone Terrain (Virtual)							
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- 17. Provide a name the Levees modification
- 18. Right-click on the Levees modification and choose Import Features
- 19. Navigate to the "./Downloads/NLD" folder and select the **RAS Merged Alignments** shapefile
- 20. Select the Levees of interest (by default they are all selected)



21. Press the **Import** button

W – Refining a Dam Breach Model with HEC-RAS

- 22. **Verify** that the Terrain was updated with the Levee Elevations.
- 23. Stop Editing the Terrain Modifications

4 Modify Geometry with Breaklines

- 24. Right-click on the Geometry and choose Save As
- 25. Provide a new Name ("Refined) this will the Geometry you edit
- 26. **Associate** the **Refined** Geometry with the **Terrain.NLD** (cloned terrain) and press the **Close** button
- 27. Start Editing the Refined Geometry
- 28. Select the Breaklines layer and Import the Levee Alignment
- 29. Improve (and clean up) the levee lines to that they smoothly transition
- 30. Right-click on the Breaklines layer and Enforce All Breaklines
- 31. Inspect
- 32. Refine
- 33. **Stop Editing** when "happy" with your geometry (or you run out of time)
- 34. Close RAS Mapper

5 Create a new Plan and Simulate

- 35. Open the Unsteady Flow Analysis window
- 36. Save Plan As a new plan named Refined
- 37. Select the Refined Geometry
- 38. Compute

6 Review Results

- 39. Open the Unsteady Flow Analysis window
- 40. Save Plan As a new plan named Refined
- 41. Select the Refined Geometry

7 Review Results

After running both plans, review the output and answer some questions (for both plans).

Question: How long does it take for the floodwave to reach Lock Haven?

Question: When does the town of Lock Haven get wet?

Question: How deep is the water in Lock Haven?

Question: How much water goes over the levee?