

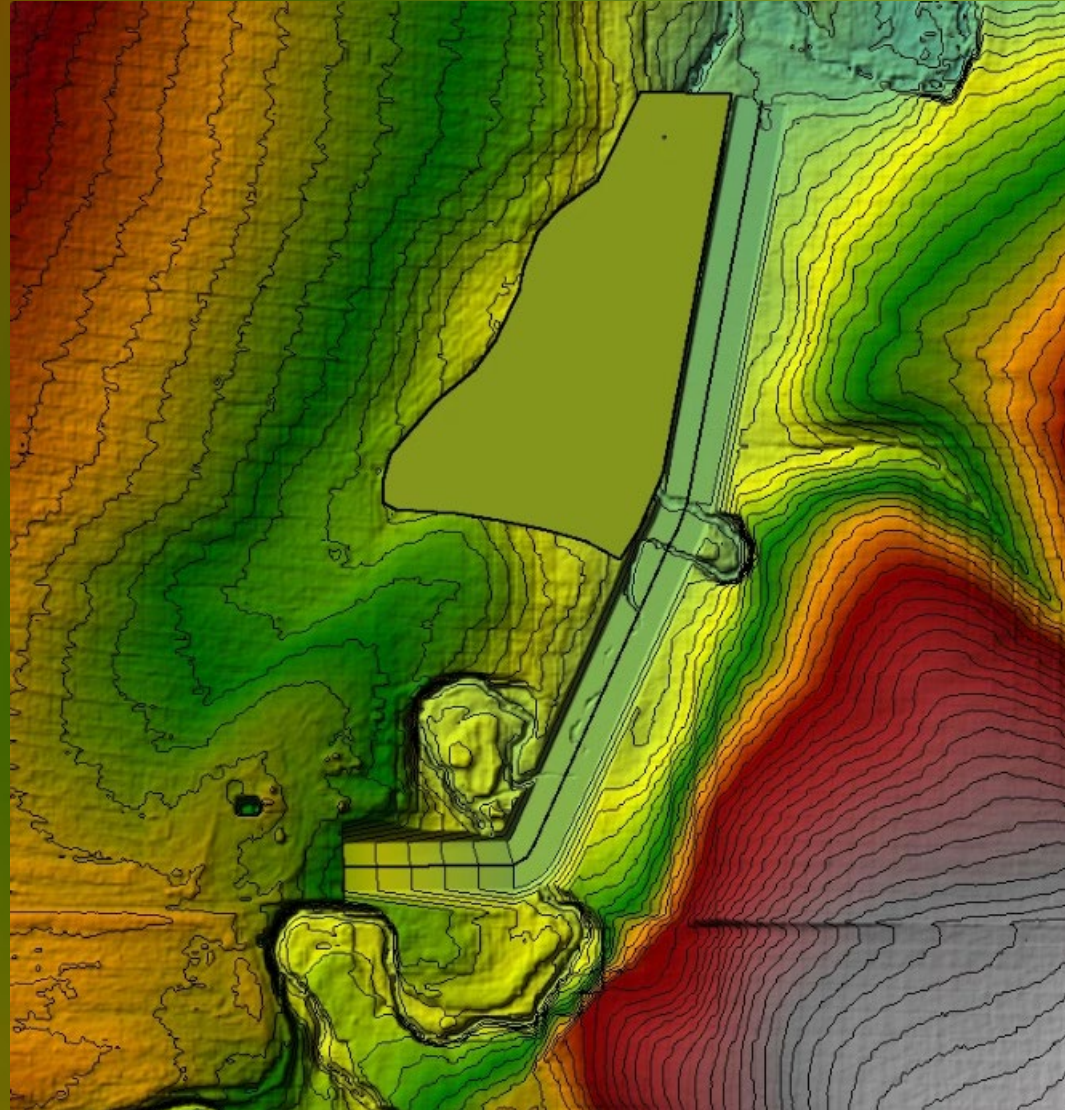


Extending HEC-RAS Capabilities with AI-Generated Python Code

AI-generated Python code can be leveraged to interact with HEC-RAS model data files and GIS data used in developing HEC-RAS models.

- Utilize ChatGPT's file upload and code execution capabilities to write and test code on sample datasets
- Using libraries such as h5py, Python can read, modify, and extract data from HDF5 files
- Built-in file handling capabilities allow manipulation of text-based files.
- Automate multi-step GIS tasks used in developing HEC-RAS model data using libraries such as Geopandas, Rasterio, etc.

Example 1 - Cut and Fill Volumes from Terrains



1

Upload Sample Data to ChatGPT

Utilize ChatGPT's code interpreter feature to write and test the code on existing and proposed DEMs.

2

Provide Specific Instructions

Explain what you want as an output from ChatGPT and the code it generates.

3

Verify Results

Verify ChatGPT's results against known results.

4

Save Code for Reuse

Save the python script, install necessary libraries and reuse script locally.

```
# Extracting culvert group attributes
culvert_group_attributes = f['/Geometry/Structures/Culvert Groups/Attributes'][:]
# Extracting culvert barrel attributes
culvert_barrel_attributes = f['/Geometry/Structures/Culvert Groups/Barrels/Attributes'][:]
```

Example 2 - Custom HEC-RAS Data Exports (Culvert Shapefile w/ Attributes)

1

Extend HEC-RAS Exports

Use Python and h5py to enhance HEC-RAS export capabilities beyond default options.

2

Utilize HDF Viewer

Familiarize yourself with file structure and contents using an HDF viewer.

[myHDF5 · Explore & Visualize HDF5 Files \(hdfgroup.org\)](https://myhdf5.com/)

3

Instruct ChatGPT

Guide ChatGPT to collect specific data from HDF5 geometry files for custom exports and the expected output format (shapefile format with data in attribute table).

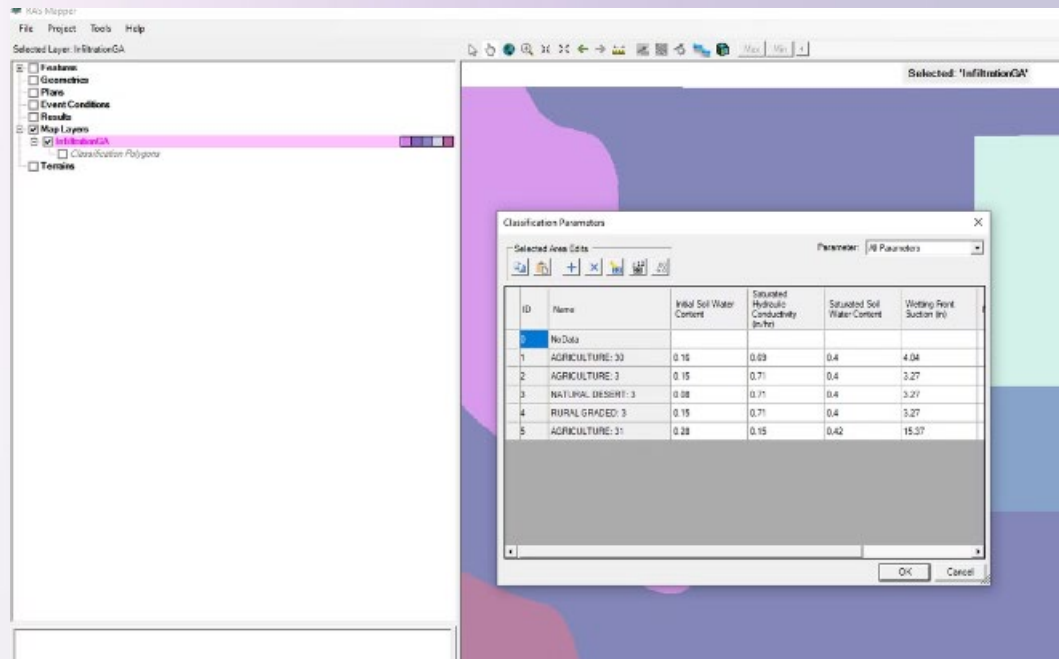
4

Verify Results and Save Script for Reuse

Perform spot checks of data, save script and install necessary libraries if you plan to reuse the workflow.

Chat Link - <https://chatgpt.com/c/ae353232-d57f-49f2-88ac-89a836f7d1d2>

Example 3 - GIS Script for G&A Infiltration Layer



1

Upload Land Use and Soils Shapefiles

Utilize ChatGPT's code interpreter feature to write and test the code on sample land use and soils datasets

2

Provide Specific Instructions

You will need to be able to clearly explain the steps and calculations for accurate results

3

Verify Results

Verify ChatGPT's results against known results. Ensure resulting shapefile has required attributes for import into RAS Mapper.

4

Save Code for Reuse

Save the python script, install necessary libraries and reuse script locally.