

Hydrological Delineation Custom Script Tool User Manual and Tool Documentation

Custom Script Tools

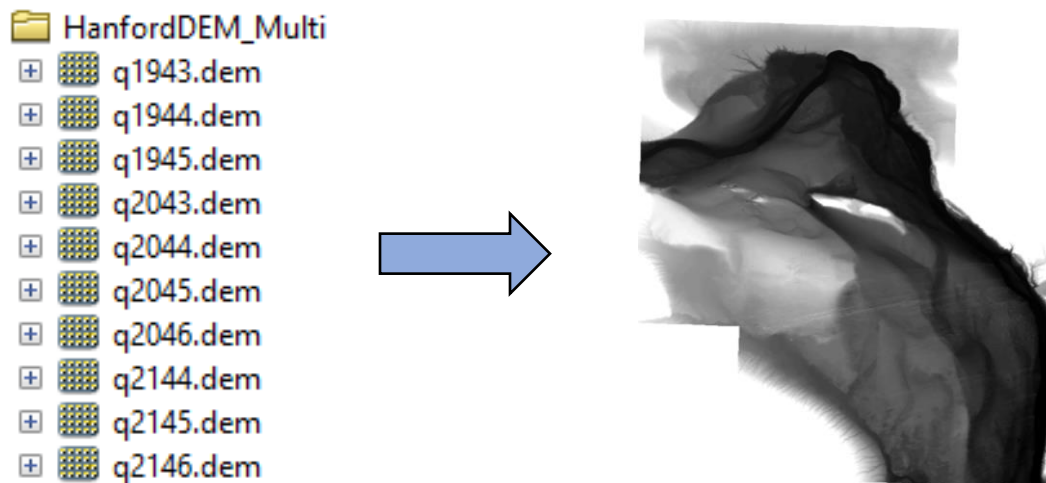
1) Raster Stitching Tool (Mosaic)

The raster stitching tool was built as a complimentary scrip to the hydrological delineation script tool. This script is designed to take in multiple digital elevation models (DEM) or imagery data then stitch them into a single raster layer for analysis with the hydrological delineation tool.

Tool Parameters

- 1) **Workspace Location** – Workspace directory for storing output
- 2) **Geodatabase Name** – GDB name for a new file GDB if necessary
- 3) **Output DEM Name** – Output name for mosaic dataset
- 4) **Number of Bands** – Analysis parameter for tool function, value based on input file-type
- 5) **Input Files** – Multi-input parameter for selecting files to process and combine

Tool Workflow



Tool Output

A single raster layer will be stored into a file geodatabase environment in ESRI grid format that can be visualized directly in ArcMap for local elevation or for HydroAnalysis delineation tool.

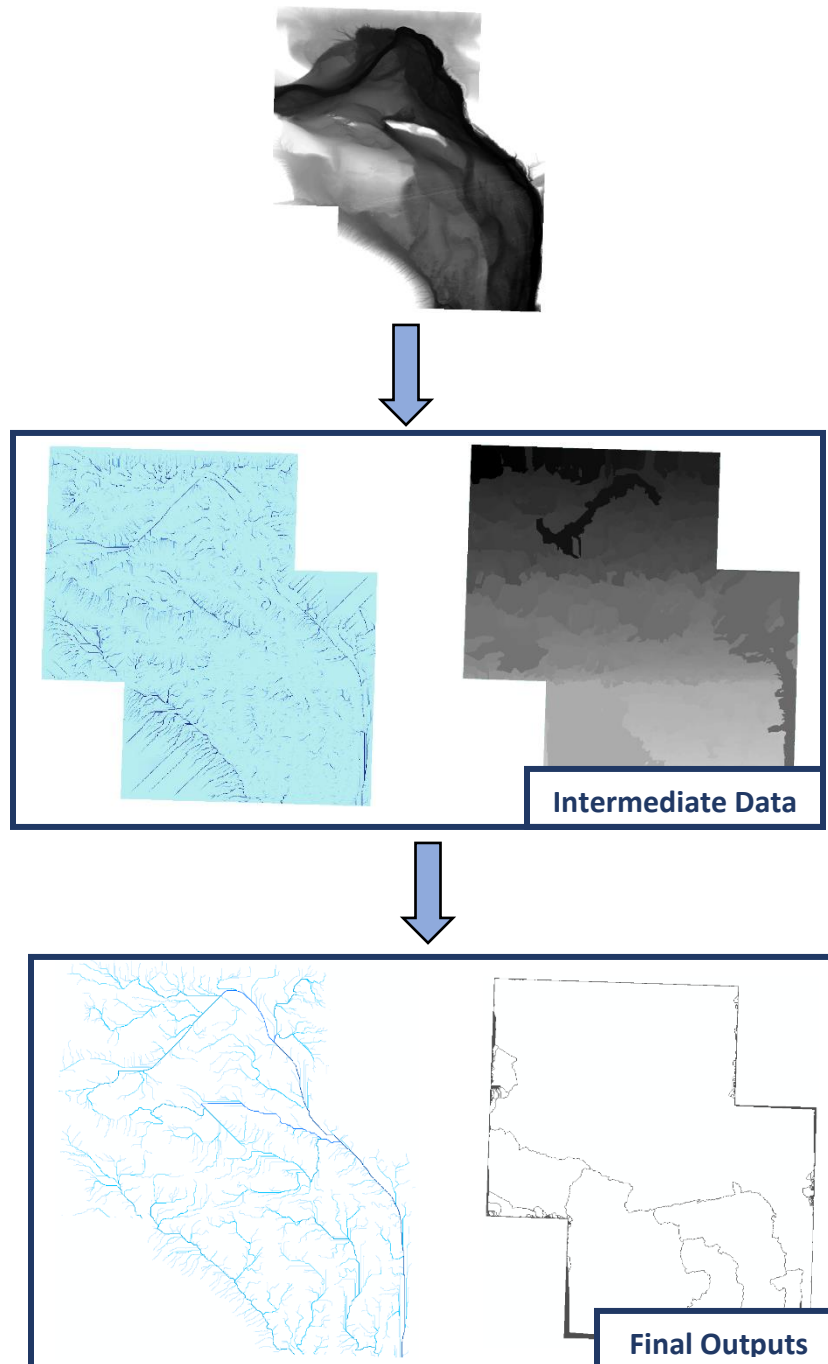
2) Hydrological Delineation Tool (HydroAnalysis)

The hydrological delineation tool was built with multiple raster analysis functions to derive the local hydrology through accumulation of water flow and drainage basins. The tool takes in a single digital elevation model (DEM) to process. Flow direction and accumulation was determined from the DEM and stream features are then derived from “True” streams (flow accumulation) through the con tool. The stream features are then queried to filter out primary streamflow in the area. Basin polygons are derived from flow direction raster data to delineate drainage basins in the study location.

Tool Parameters

- 1) **Workspace** – Workspace directory for storing outputs from the script tool
- 2) **Geodatabase Name** – GDB name for a new file GDB if necessary
- 3) **Study Location** – Name of study site, inherit by all output file names
- 4) **Keep Intermediate Data** – True/False option for storing intermediate analysis outputs
- 5) **Digital Elevation Model (DEM)** – Single file input of DEM for analysis

Tool Workflow



Tool Output

Two outputs will be stored into a file geodatabase environment:

- 1 – Filtered Streams (StudyLocation_streamfilt)
- 2 – Drainage Basin Polygons (StudyLocation_basinpoly)

These two outputs are both in vector format transformed from raster data. If intermediate data is selected to be kept, they will be stored in the same geodatabase as the two final outputs. A symbology stylesheet is provided for the filtered stream vector output within the “Stylesheets” folder named “Stream Hierarchy”. Simply import the symbology for the stream output and accept the “grid_code” value field to visualize the expected symbology as illustrated above in ArcMap.

Project Tool Assessment

In order to assess impact of hazardous material on local hydrological system, custom script tools were made to accomplish this goal. The tools were designed for the ArcMap Toolbox environment to automate process of generating local streamflow and drainage basins for further analysis. This tool does not provide an impact assessment as the project aims to accomplish, but instead provides the necessary dataset for impact analysis. With the local hydrological dataset derived from a digital elevation model of the study area, this provides the user with vector datasets to work with quantifying permeation of hazardous waste into local environment through local streams and surfaces that retain fluid. With the datasets provided from this tool, the user can expect to isolate stream systems that will carry the hazardous waste downstream as well as isolate drainage basins that harbors such streams. As a result, a user can estimate impacted area and streams in the study location.

Future Tool Improvements

The current state of the script tool is designed for the general audience to use and provide them with knowledge of the local hydrological system as defined by user input of digital elevation model. This tool can be expanded to also provide more technical user with more customizable parameters for analysis. A very important addition to the tool would be a class module for tool validation, this will provide the script tool with more user-friendly UI options and mitigate the need to keep default values within tool parameter to generate an expected output. The classic example in the above script tools would be the necessity to keep the “Geodatabase Name” parameter as “NULL” if the user does not wish to output into a file GDB. With a class designated for tool validation, the option to input a “Geodatabase Name” would be bypassed, and only have the option show up if the user selects to create a new geodatabase. The ability to incorporate if/else conditions for tool parameters on the script tool UI through a tool validation class is highly desired for improving the user-friendliness of the script tool.

In addition to the mentioned improvement of incorporating a tool validation class, an additional tool for automation of impact assessment would also be desired for future improvements to the script tools designed for quantifying impact of hazardous waste materials on local hydrological systems. An expected output of MS Excel tables will be desirable for presenting the user with information about the exact drainage basins that will be affected as well as the length/area of stream and surfaces that will be contaminated by toxic waste.