HEC-GEORAS WORKSHOP

March 9, 2010

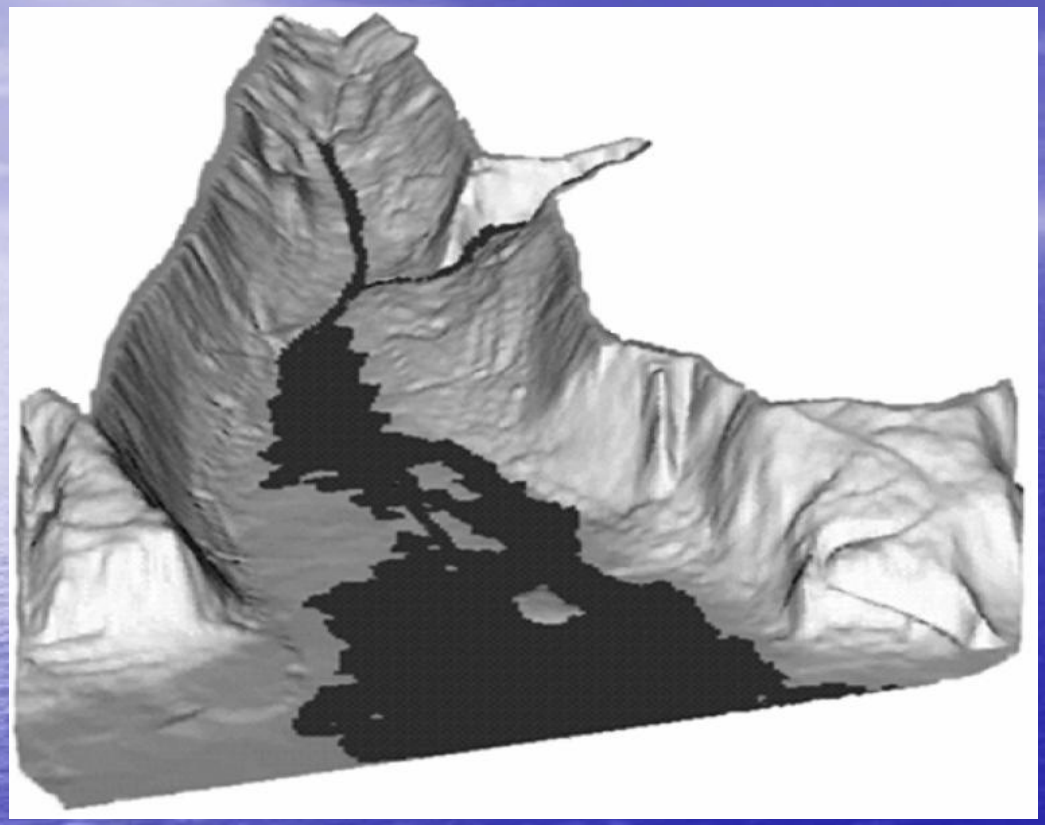
Presented by:
Luke Sherry, EI, CFM
Jeana Gowin, PE, CFM

Christopher B. Burke Engineering, Ltd.

Presentation Outline

- Basic Overview of HEC-GeoRAS
- Data Requirements for HEC-GeoRAS
- Creating Hydraulic Model Geometry Data
- Importing GIS Data into HEC-RAS
- Floodplain Mapping Using GIS

HEC-GeoRAS Overview



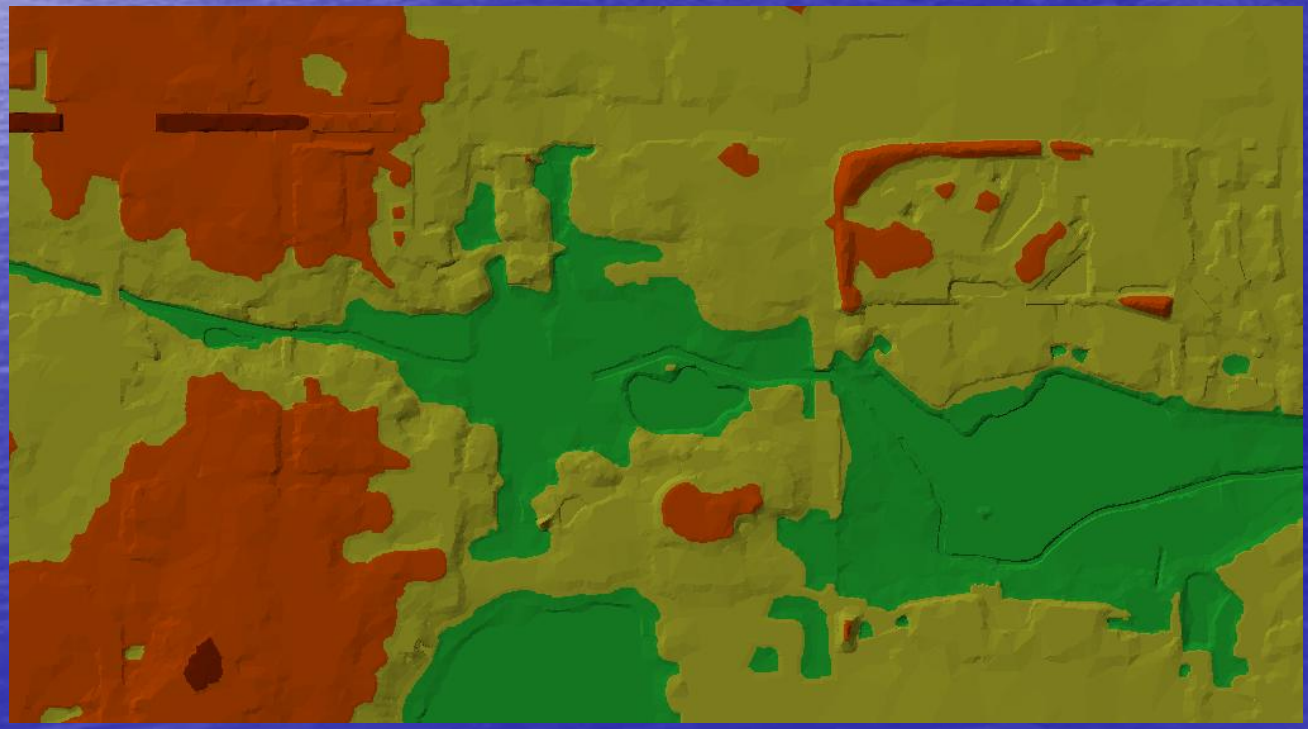
- Geospatial hydraulics toolkit for engineers with limited GIS experience

- Develop stream network, cross-sections, storage areas, Manning's n values, etc.
- HEC-RAS model input
- Floodplain mapping

- Requires ESRI ArcGIS 9.2 or 9.3 with 3-D Analyst and Spatial Analyst

HEC-GeoRAS - Data Requirements

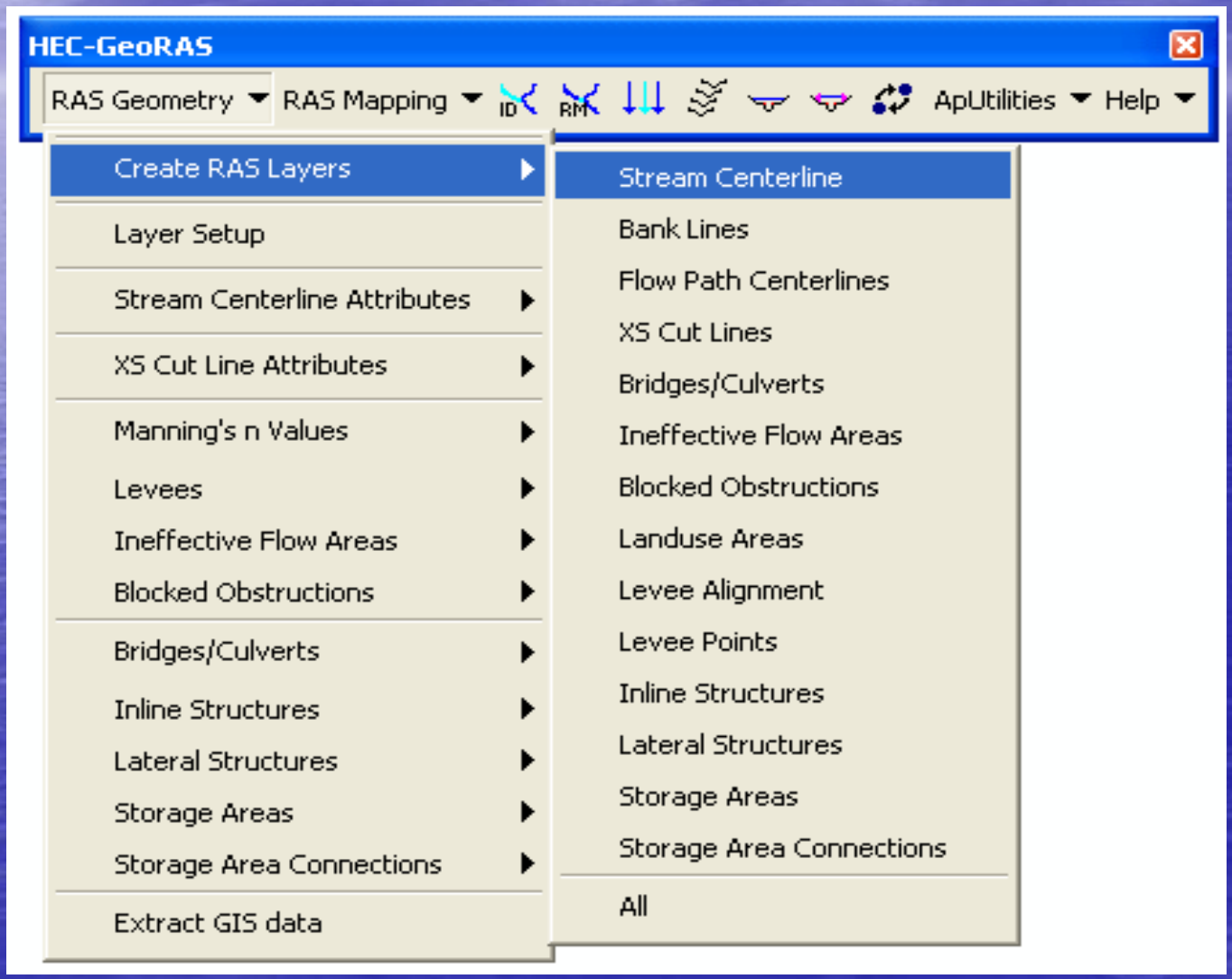
- Digital Terrain Model (DTM)
  - TIN or GRID
  - Created from LIDAR or contours
  - Backbone of HEC-GeoRAS Analysis



HEC-GeoRAS - Data Requirements

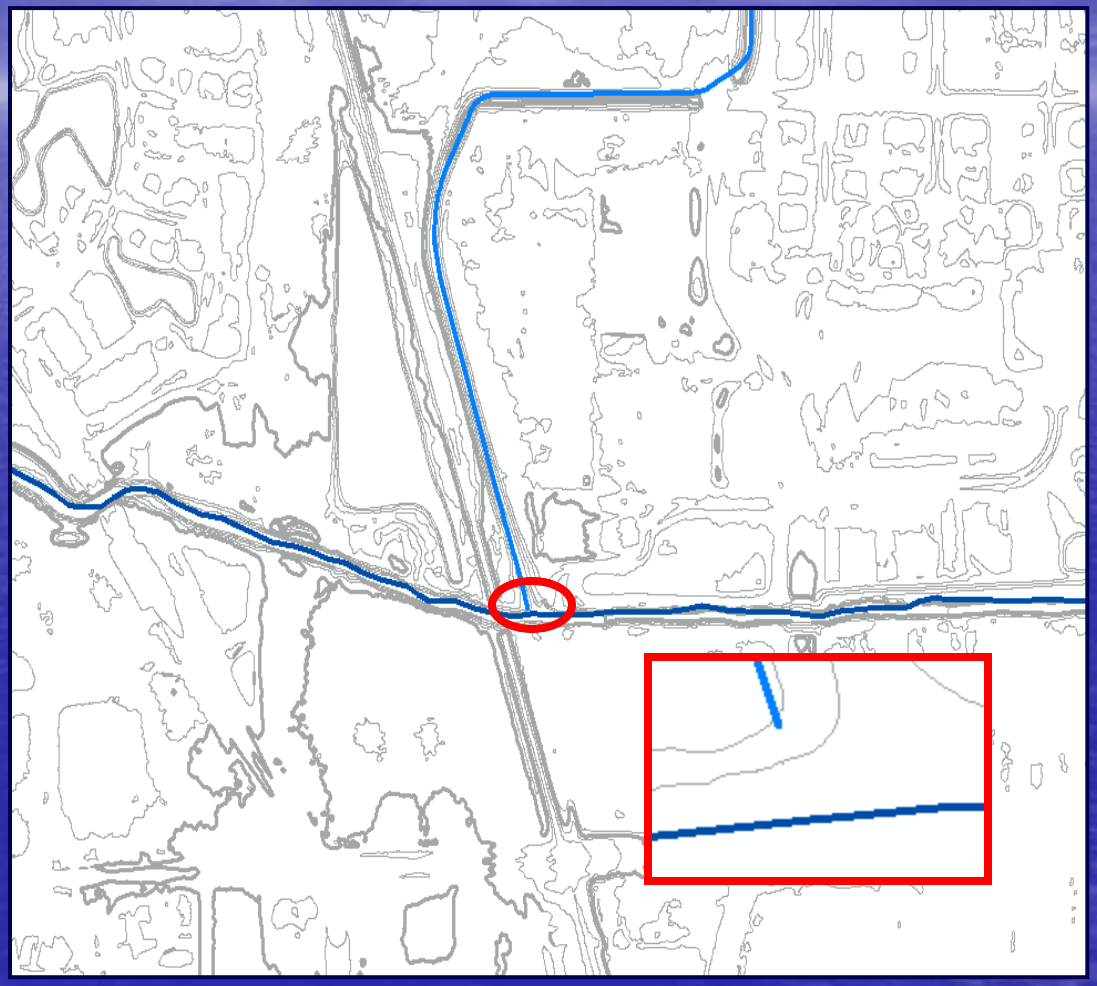
- Create the following using the HEC-GeoRAS/GIS editor:
  - Stream centerline
  - Flowpath line (left, channel & right reach length lines)
  - Cross-section cut lines (cross-section locations)
  - Optional layers
    - Bank Lines, storage areas, levees, Manning's n values, ineffective flow areas, etc.

Creating Hydraulic Model Geometry Data

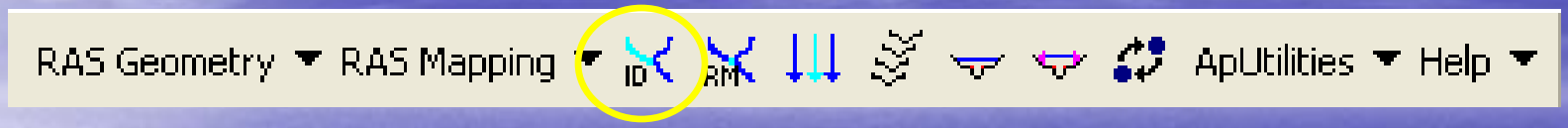


Stream Centerline

- Draw centerline from upstream to downstream
- Centerlines for each tributary should not intersect
- Main channel centerline should be continuous (junction created in HEC-RAS)
- Each stream centerline needs a unique river and reach name just like HEC-RAS



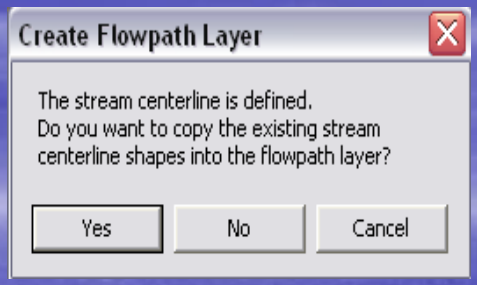
Creating Hydraulic Model Geometry Data

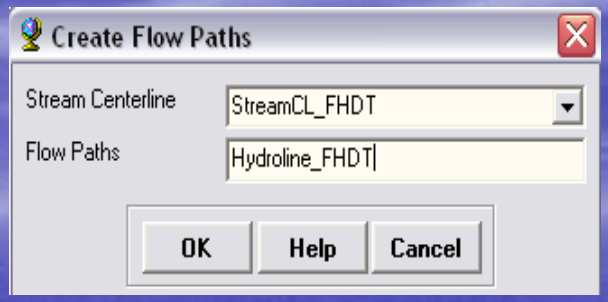


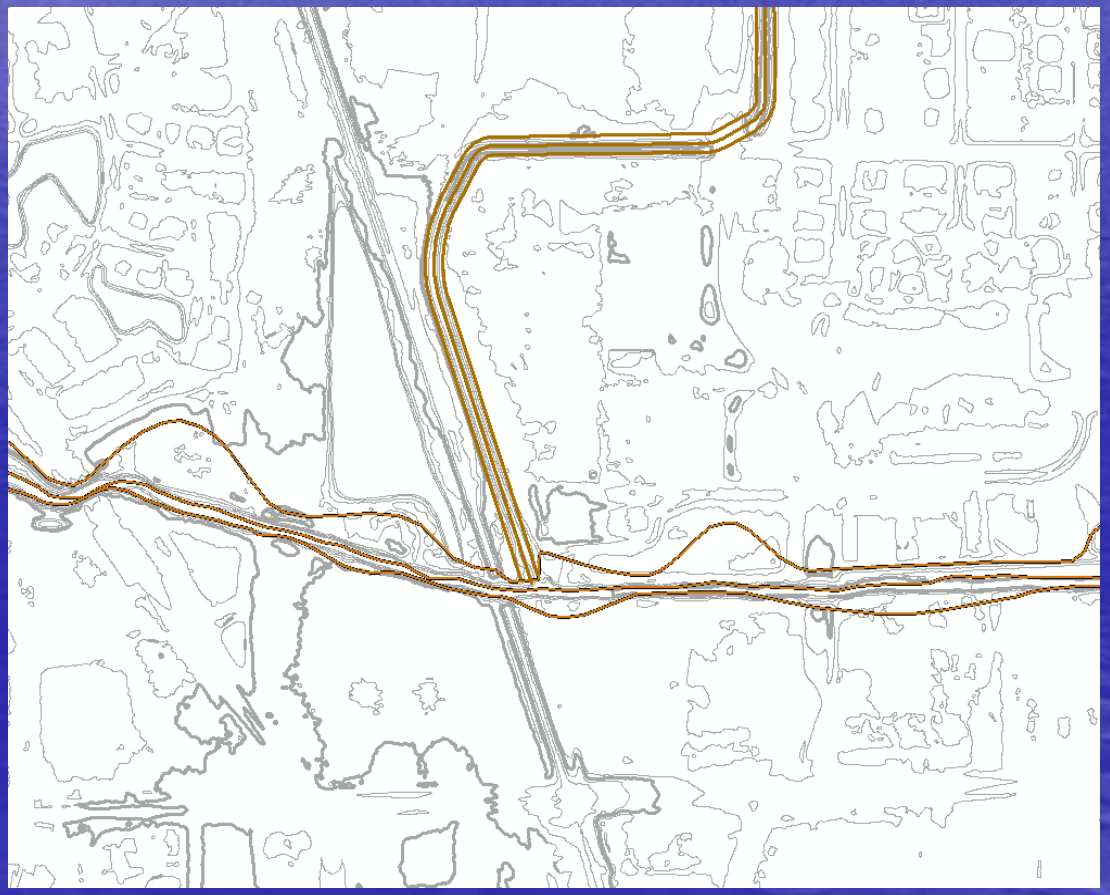
- Assign River and Reach Names
  - Assign River Code/Reach Code Tool and click on each streamline to assign a unique name

Flow Path Lines

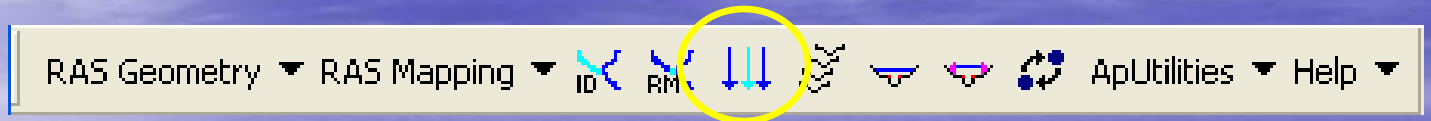
- Represent channel and overbank paths used by HEC-GeoRAS to calculate reach lengths between cross-sections
- Draw flow path lines from upstream to downstream
- Each stream reach has their own set of channel, left and right flow path lines



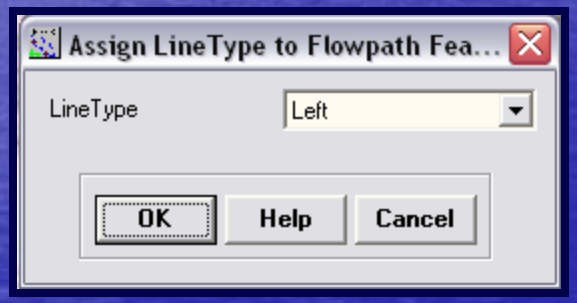


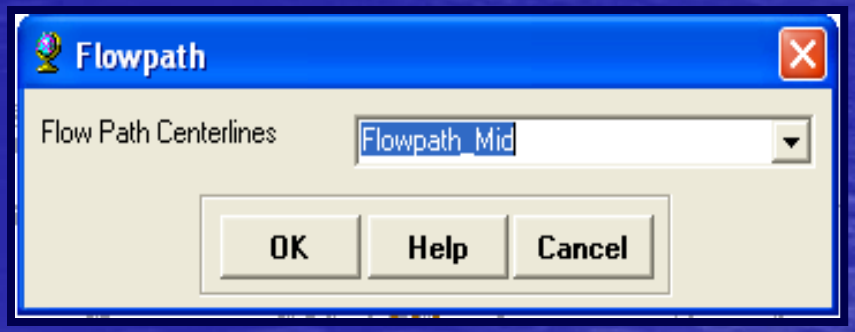


ASSIGN LINE TYPE



- Click Assign Line Type tool, click on a Flowpath Line and designate and ID

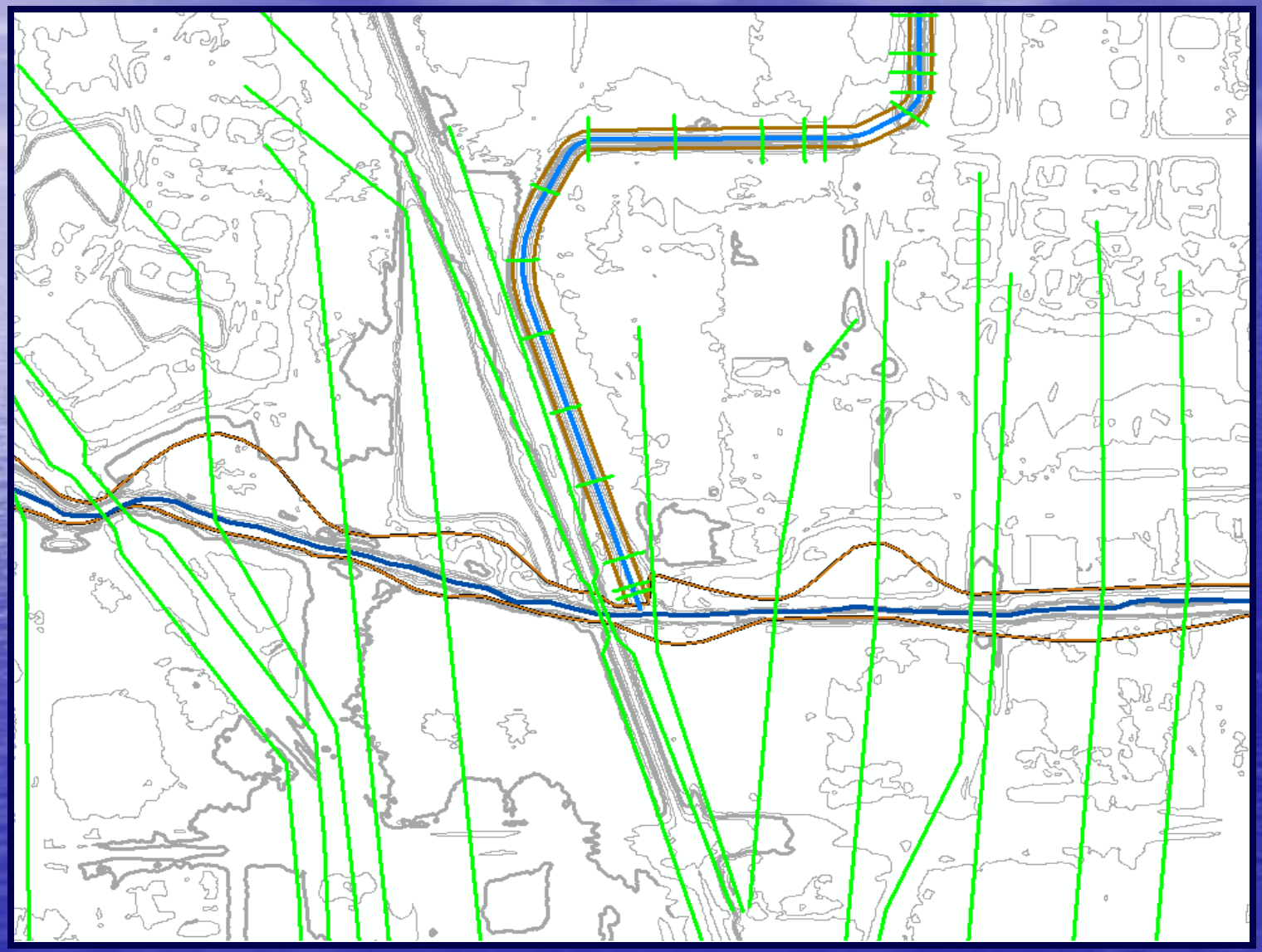




Cross-section Cut Lines

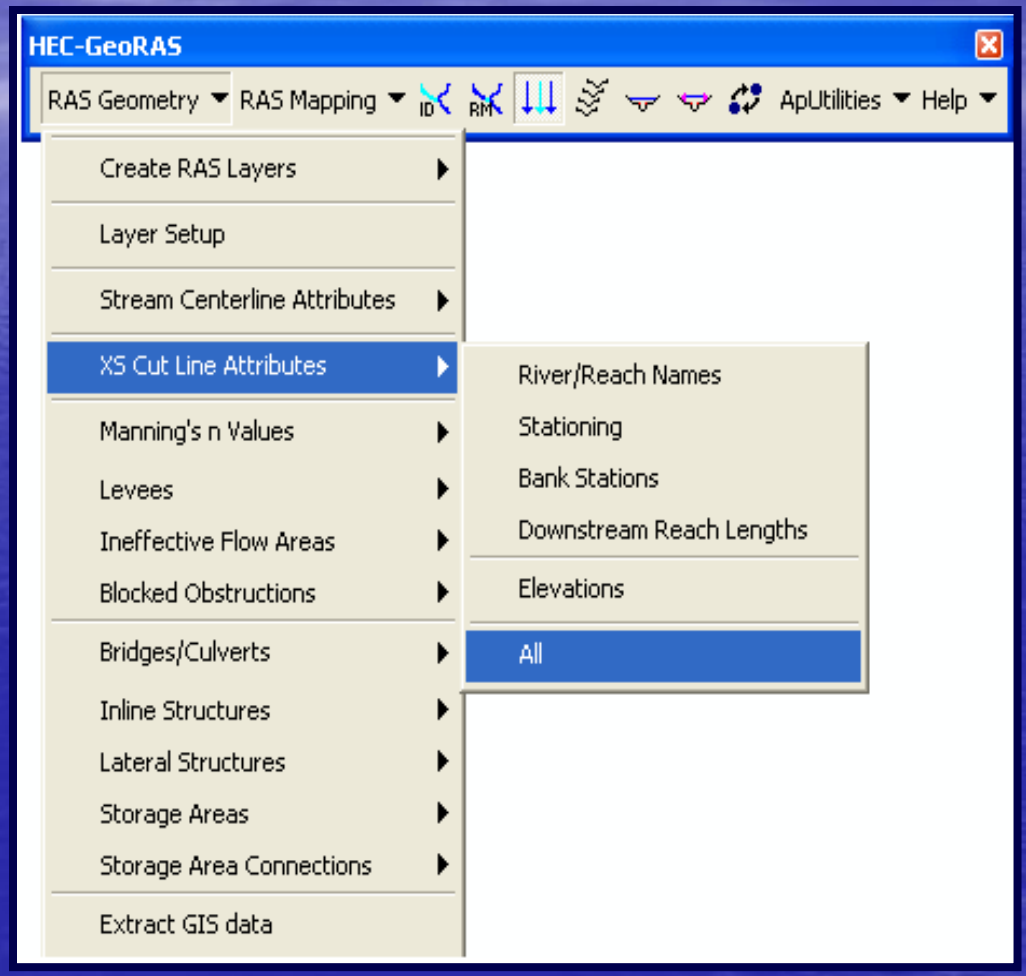
- Represent the cross-section locations where station and elevation data will be pulled from the TIN
- Drawn in order upstream to downstream, from left to right looking downstream
- No cross-section cut lines may intersect
- Must lay within the boundary of the TIN

Example of Cross-section Cut Lines

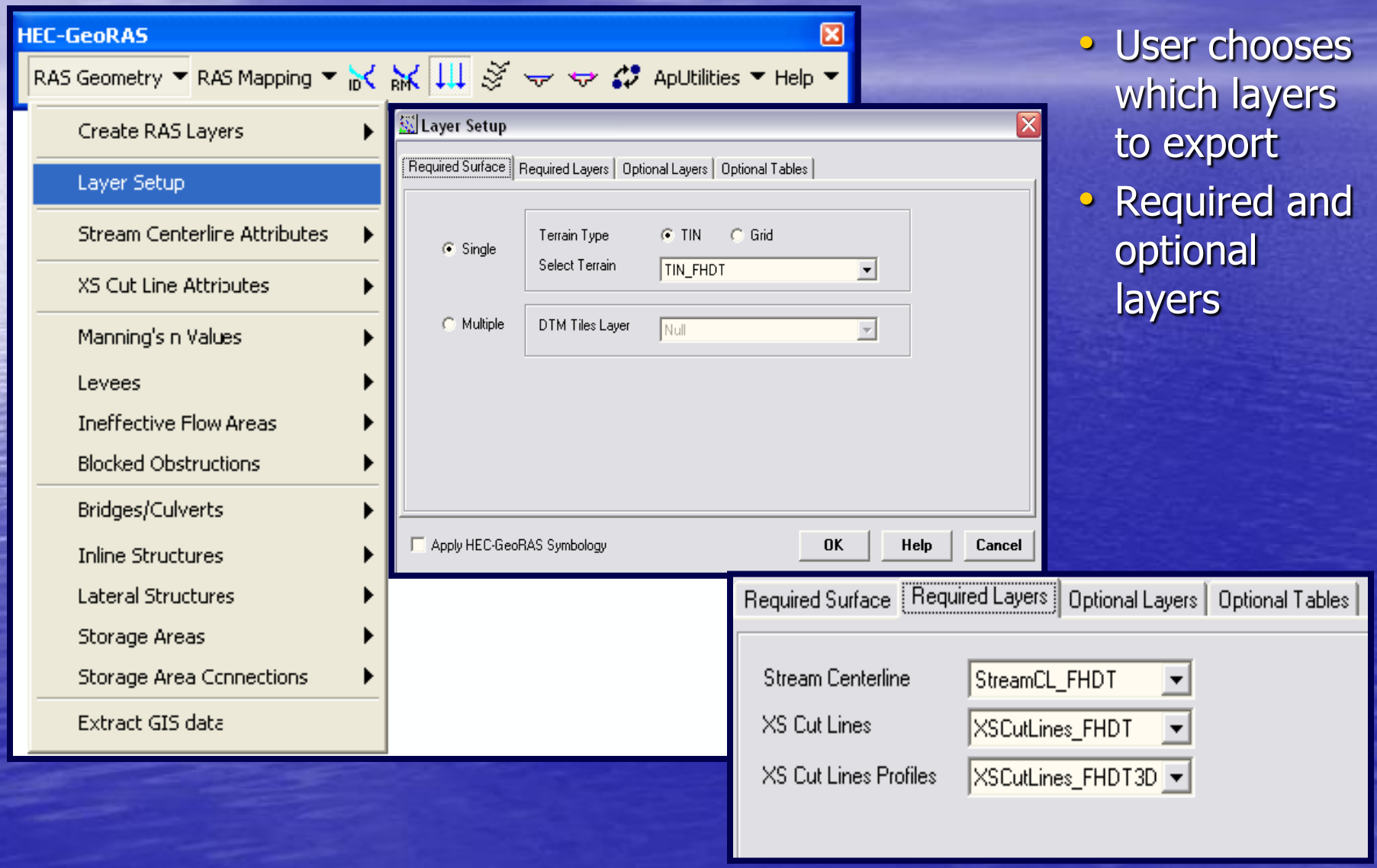


Analyzing HEC-GeoRAS Data

- Assigns stations, elevations, lengths, etc.
- If errors occur or the process does not complete, verify that the Stream Centerline and Terrain filenames are correct
- Check cross-sections using the HEC-GeoRAS cross-section viewer

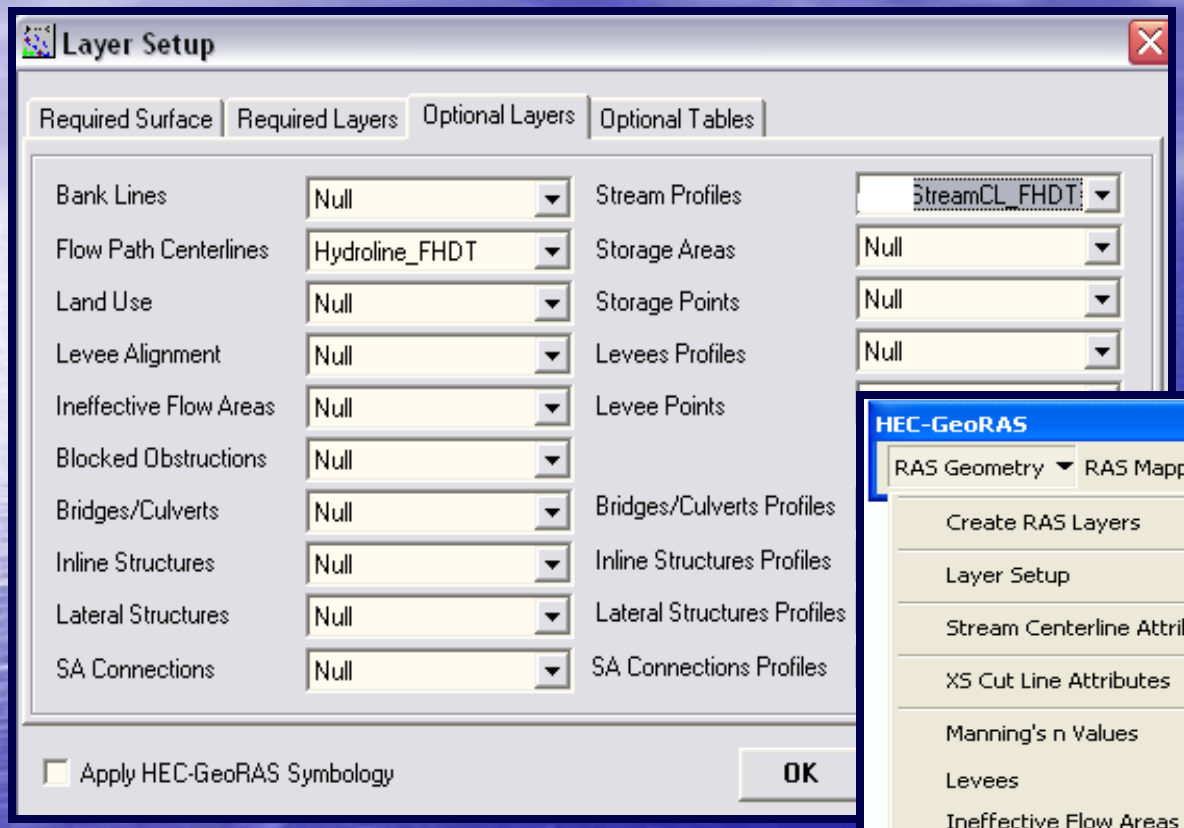


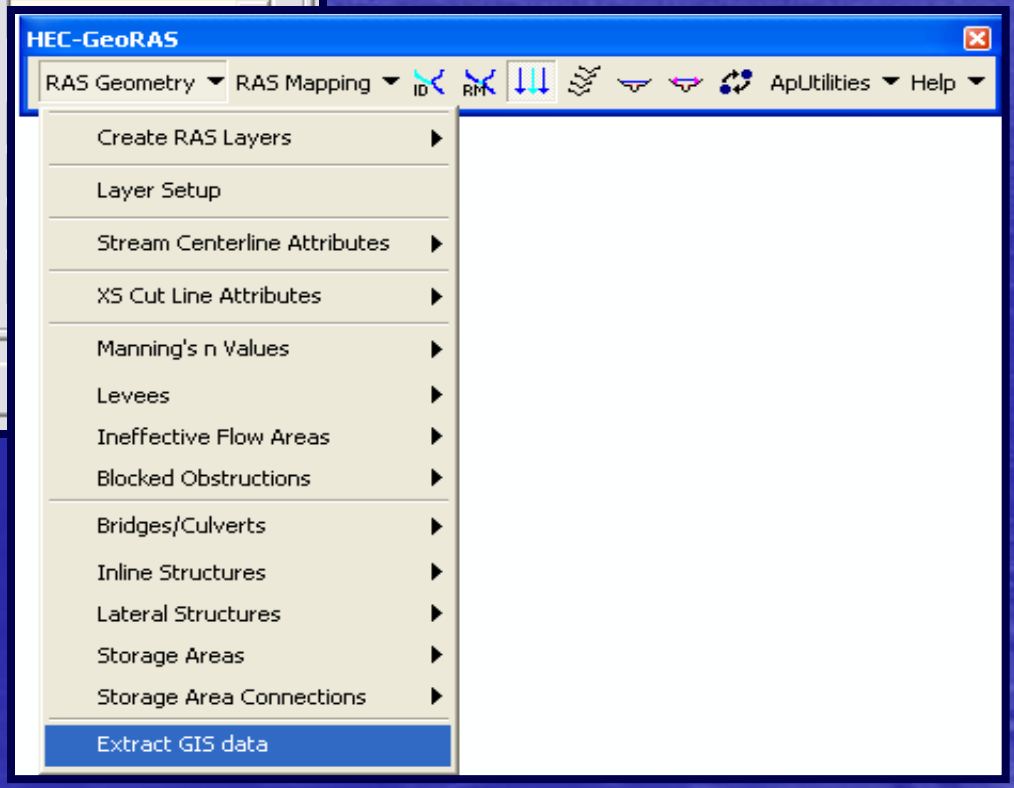
Exporting HEC-GeoRAS Data



- User chooses which layers to export
- Required and optional layers

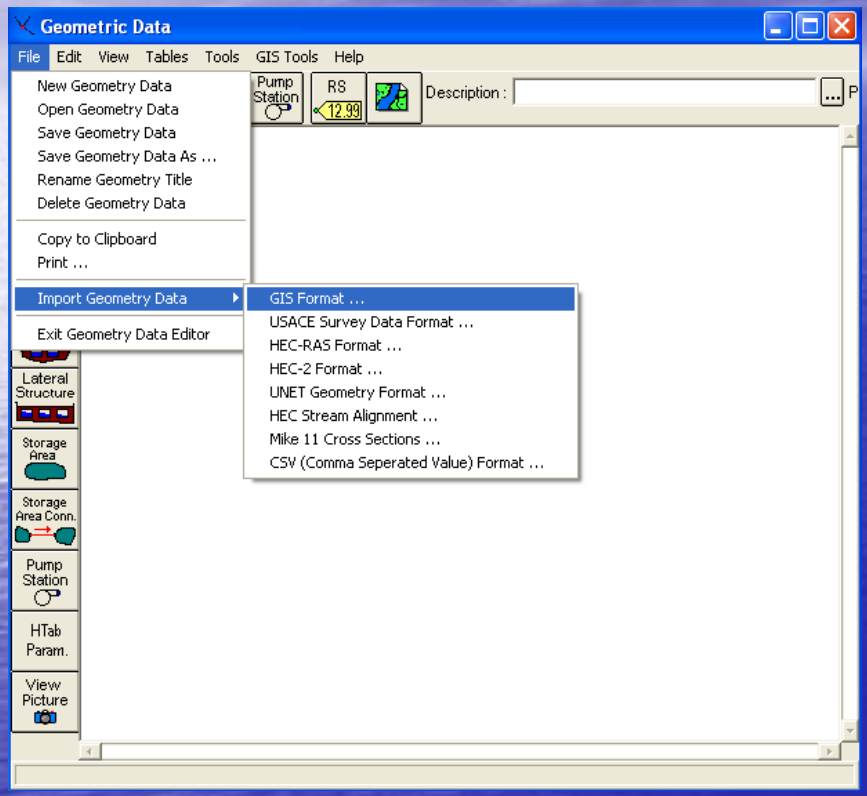
Exporting HEC-GeoRAS Data

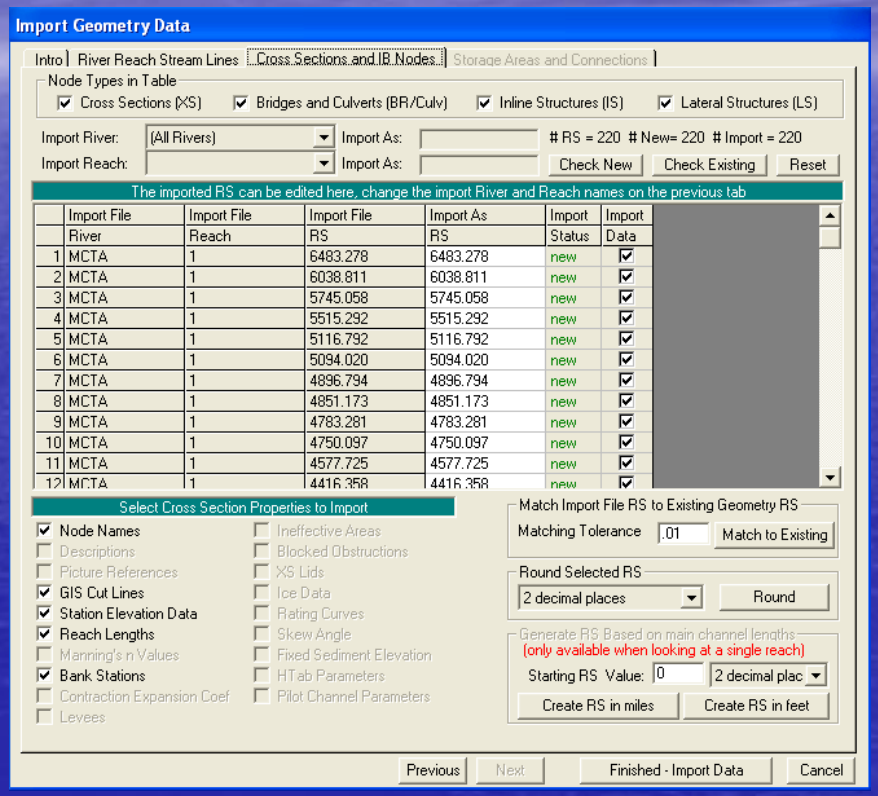




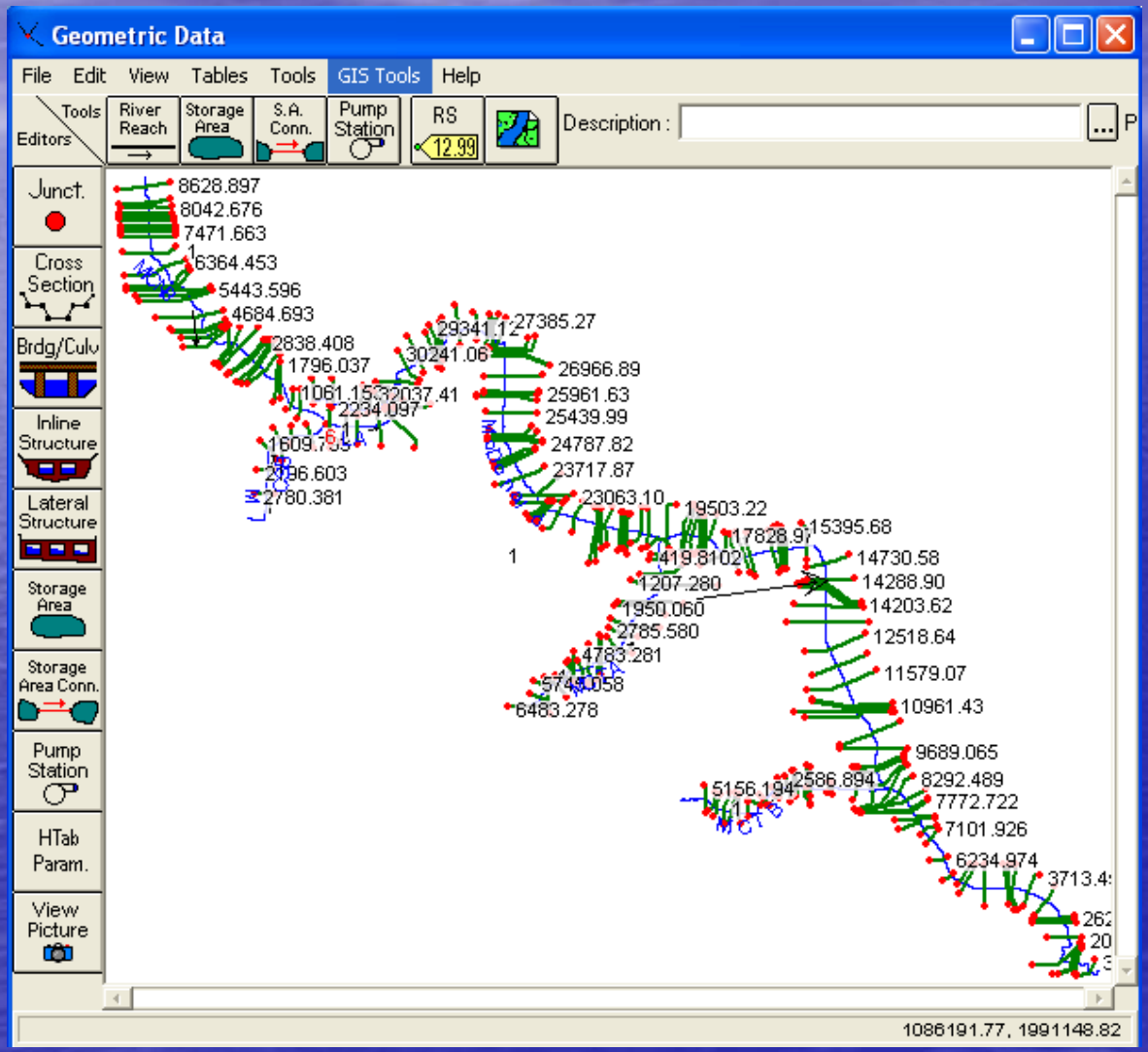
- Exported data contained in sdf file

Importing HEC-GeoRAS Data to HEC-RAS

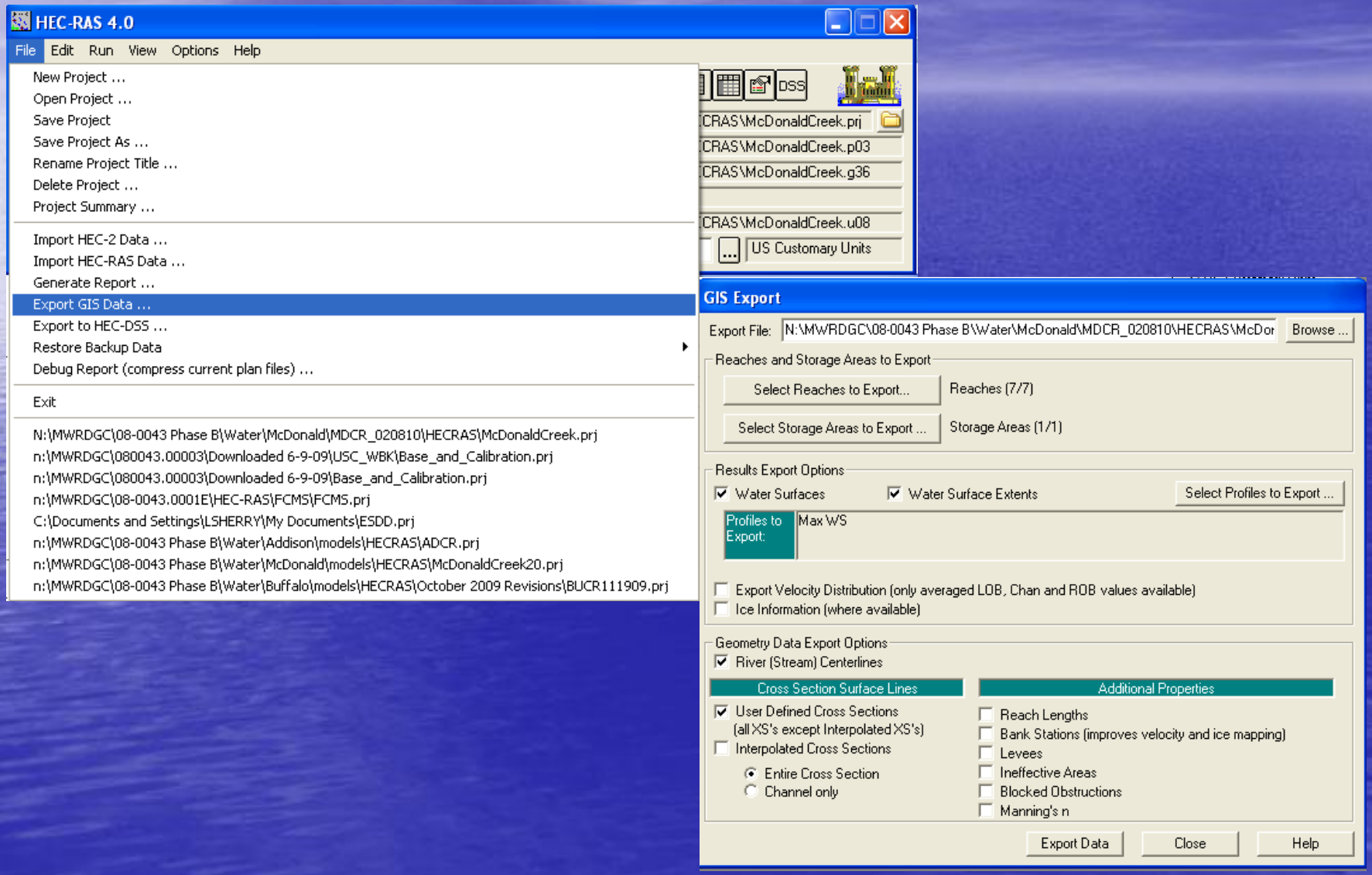




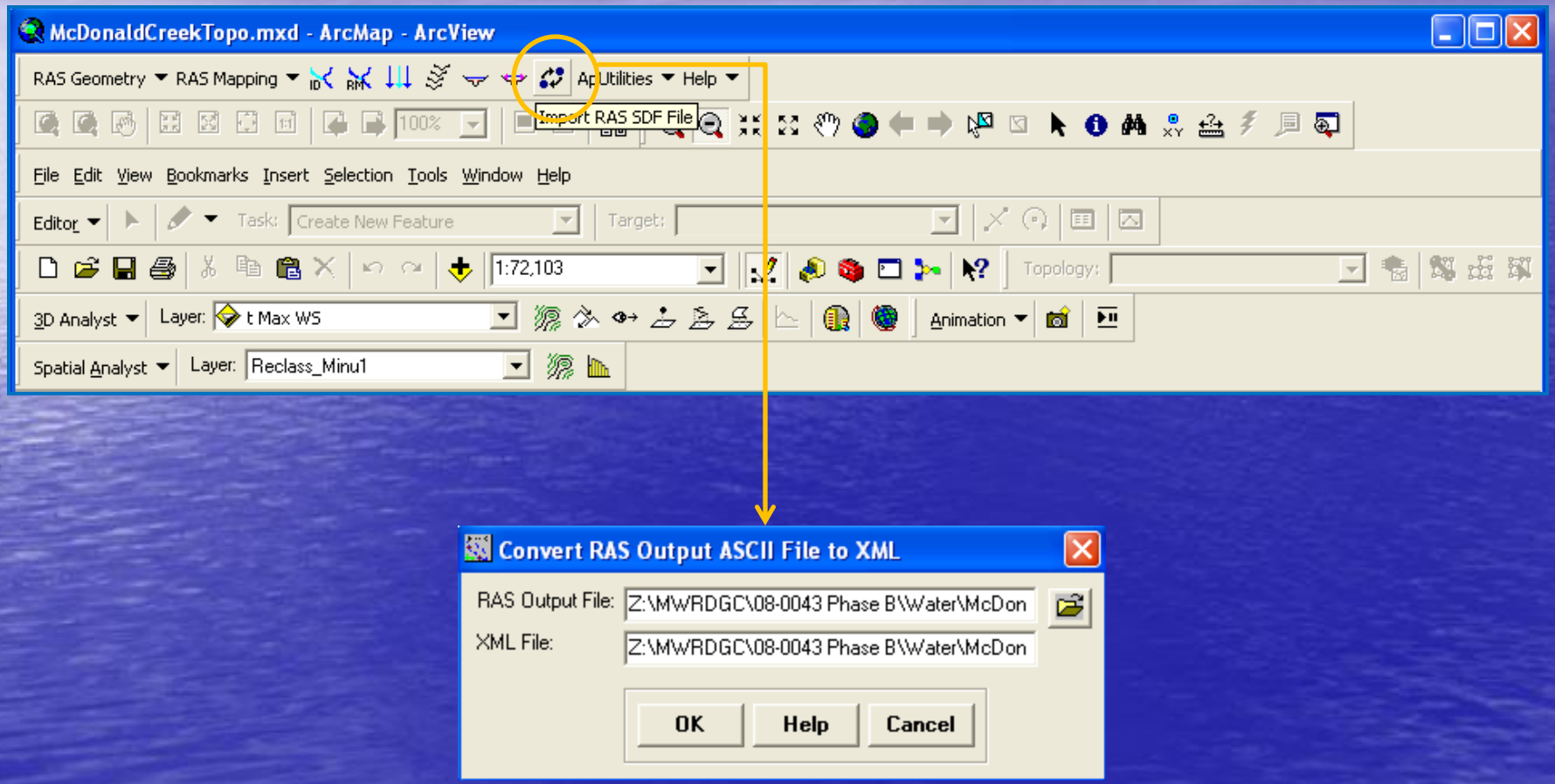
Importing HEC-GeoRAS Data to HEC-RAS



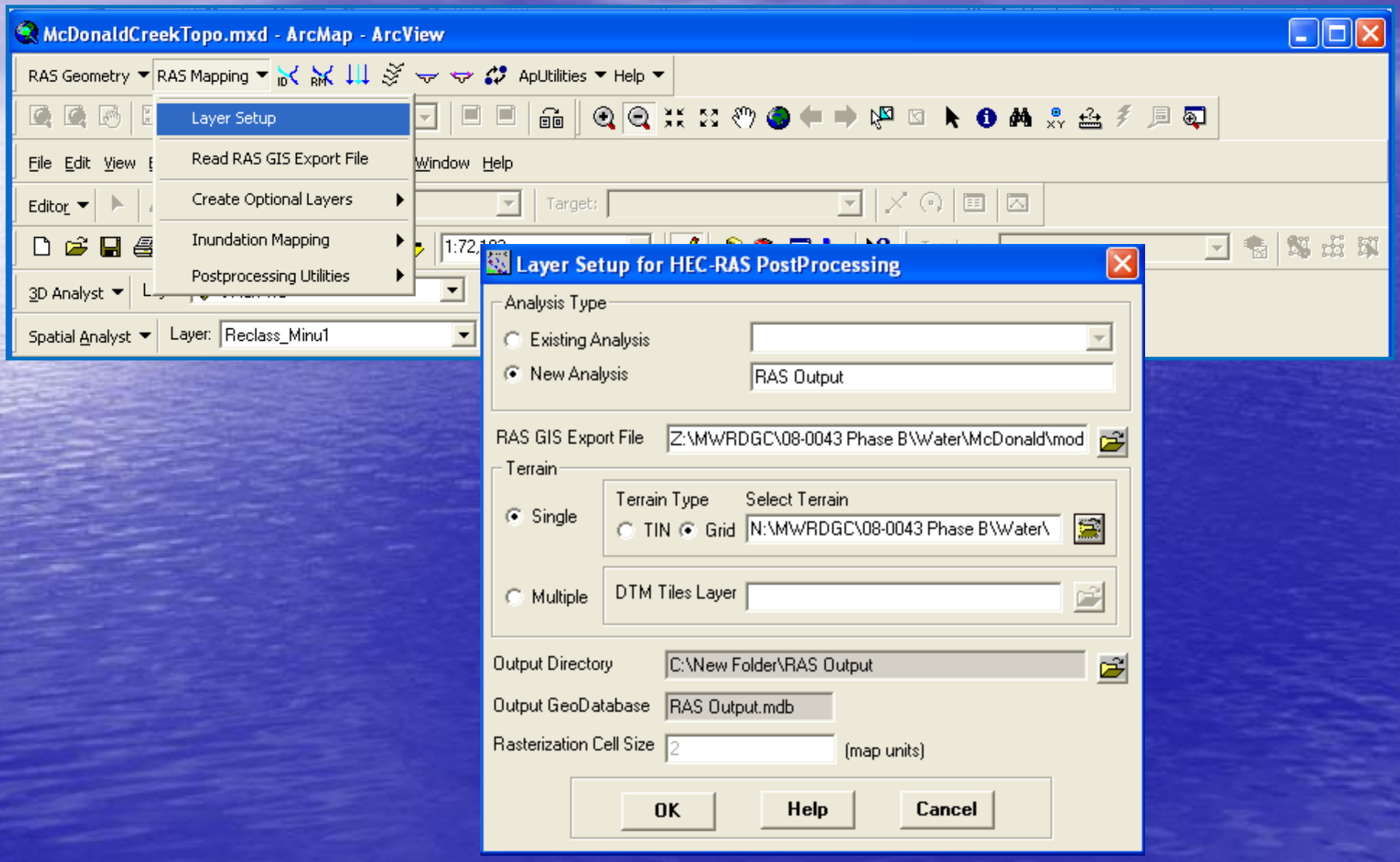
FLOODPLAIN MAPPING USING GIS
Step 1: Export HEC-RAS Results



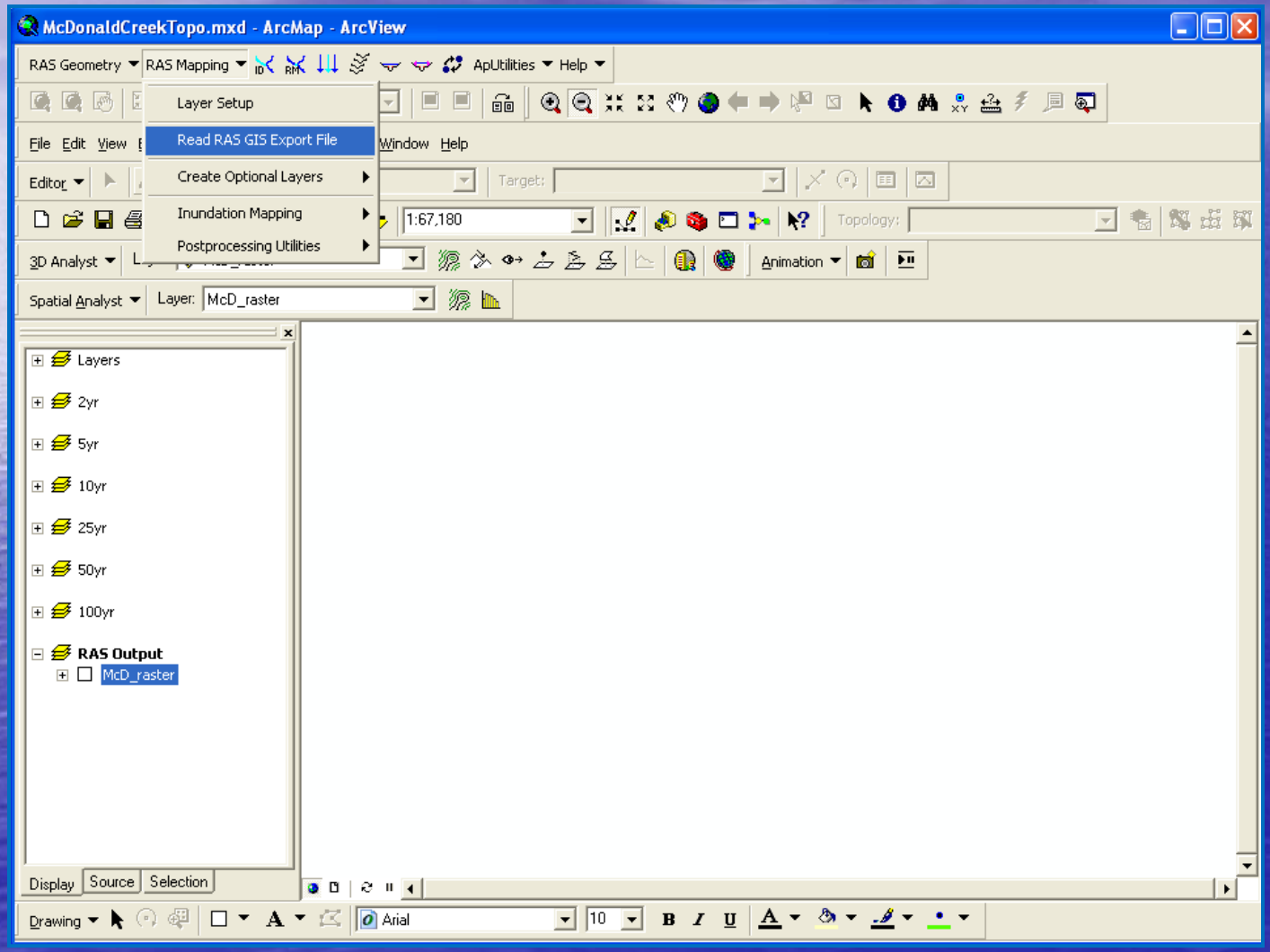
FLOODPLAIN MAPPING USING GIS
Step 2: Convert sdf file to xml file



FLOODPLAIN MAPPING USING GIS
Step 3: Layer Setup



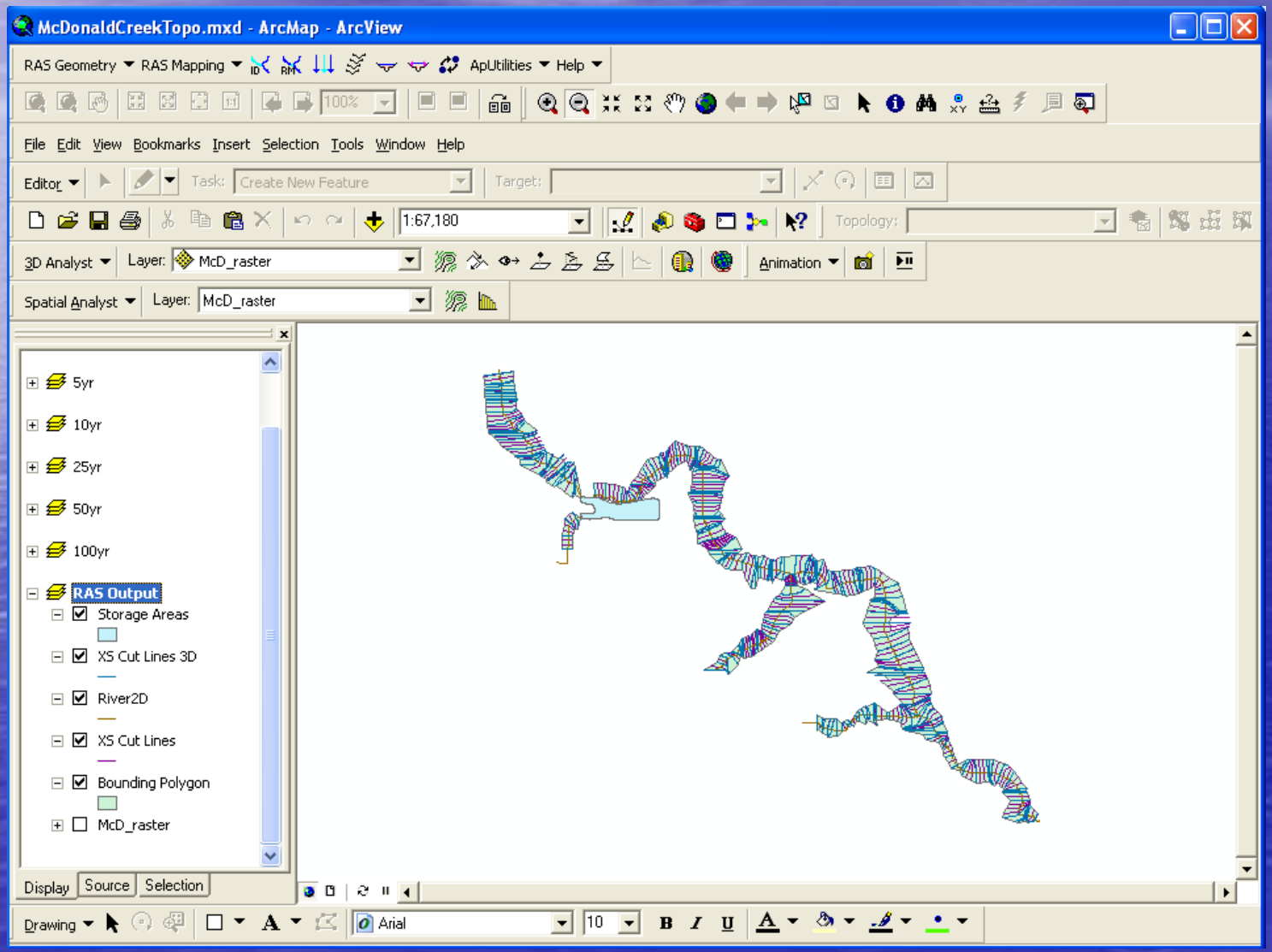
FLOODPLAIN MAPPING USING GIS
Step 4: Read RAS GIS File



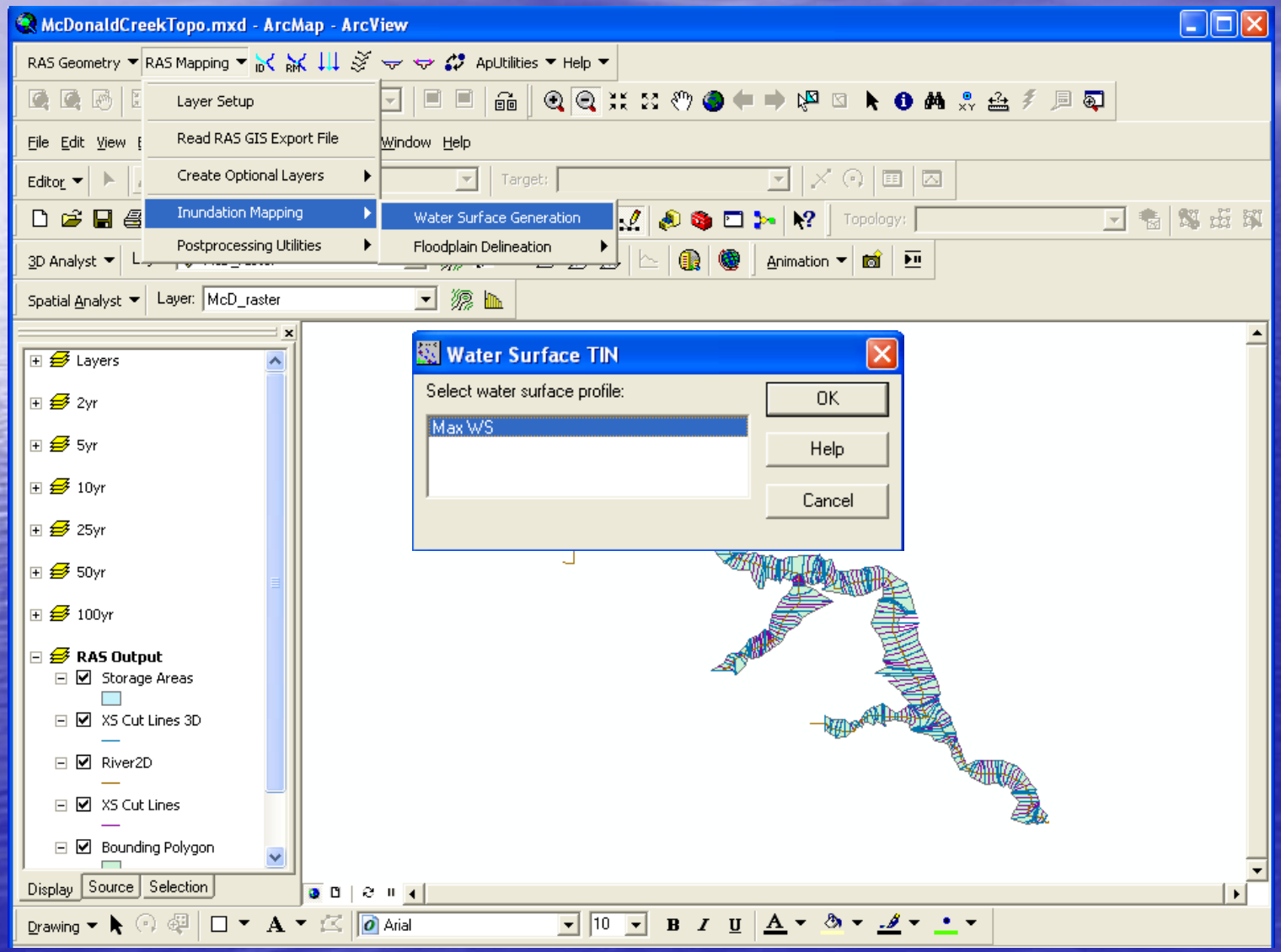
-New layer created from "Output Directory" name specified during Layer Setup (Step 3)

-Terrain (either TIN or Raster) automatically carried over to new layer

FLOODPLAIN MAPPING USING GIS
Step 4: Read RAS GIS File, cont.

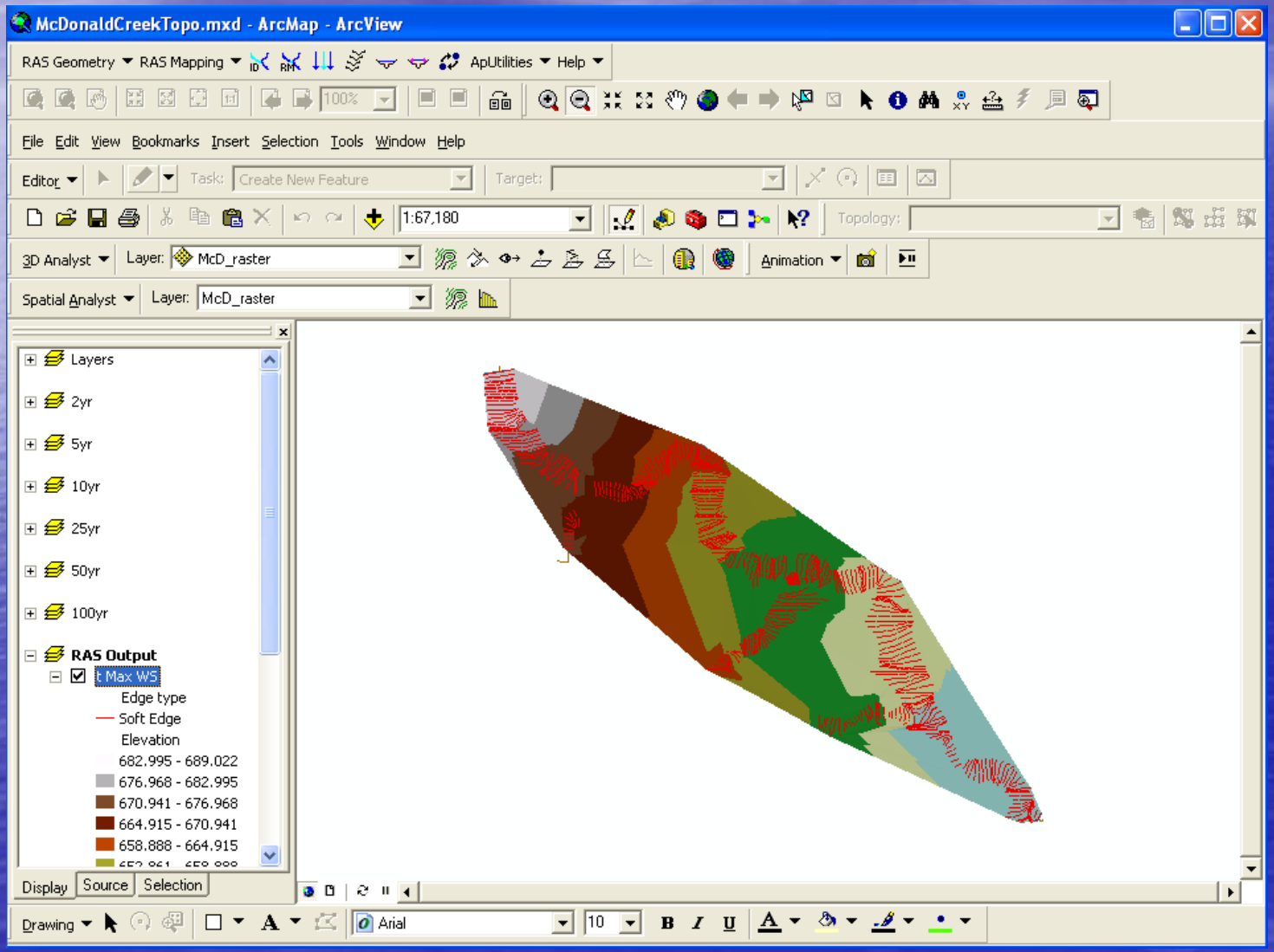


FLOODPLAIN MAPPING USING GIS
Step 5: Generate Water Surface TIN

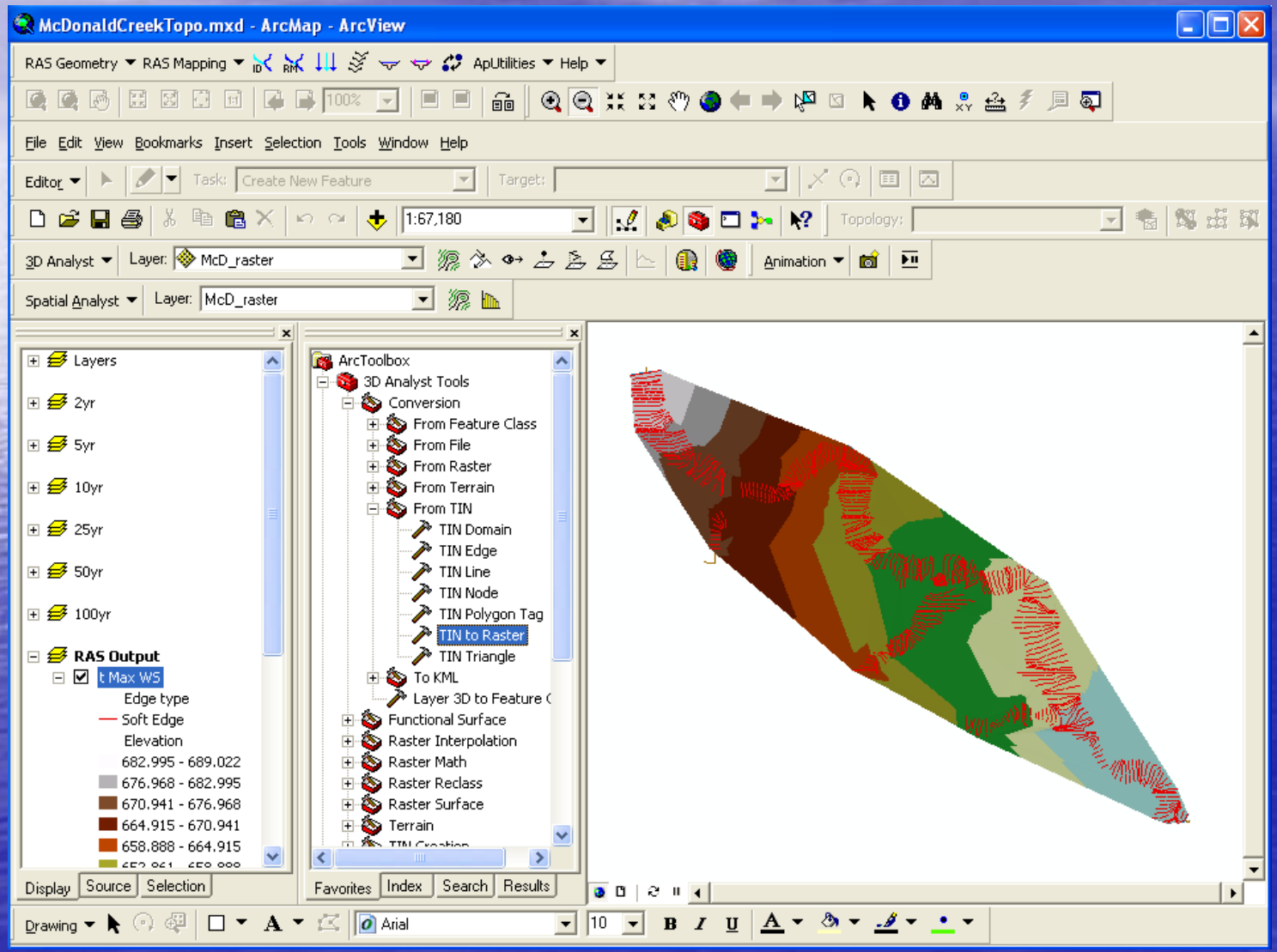


-Profile(s) selected during the HEC-RAS export of results

FLOODPLAIN MAPPING USING GIS
Step 5: Generate Water Surface TIN, cont.



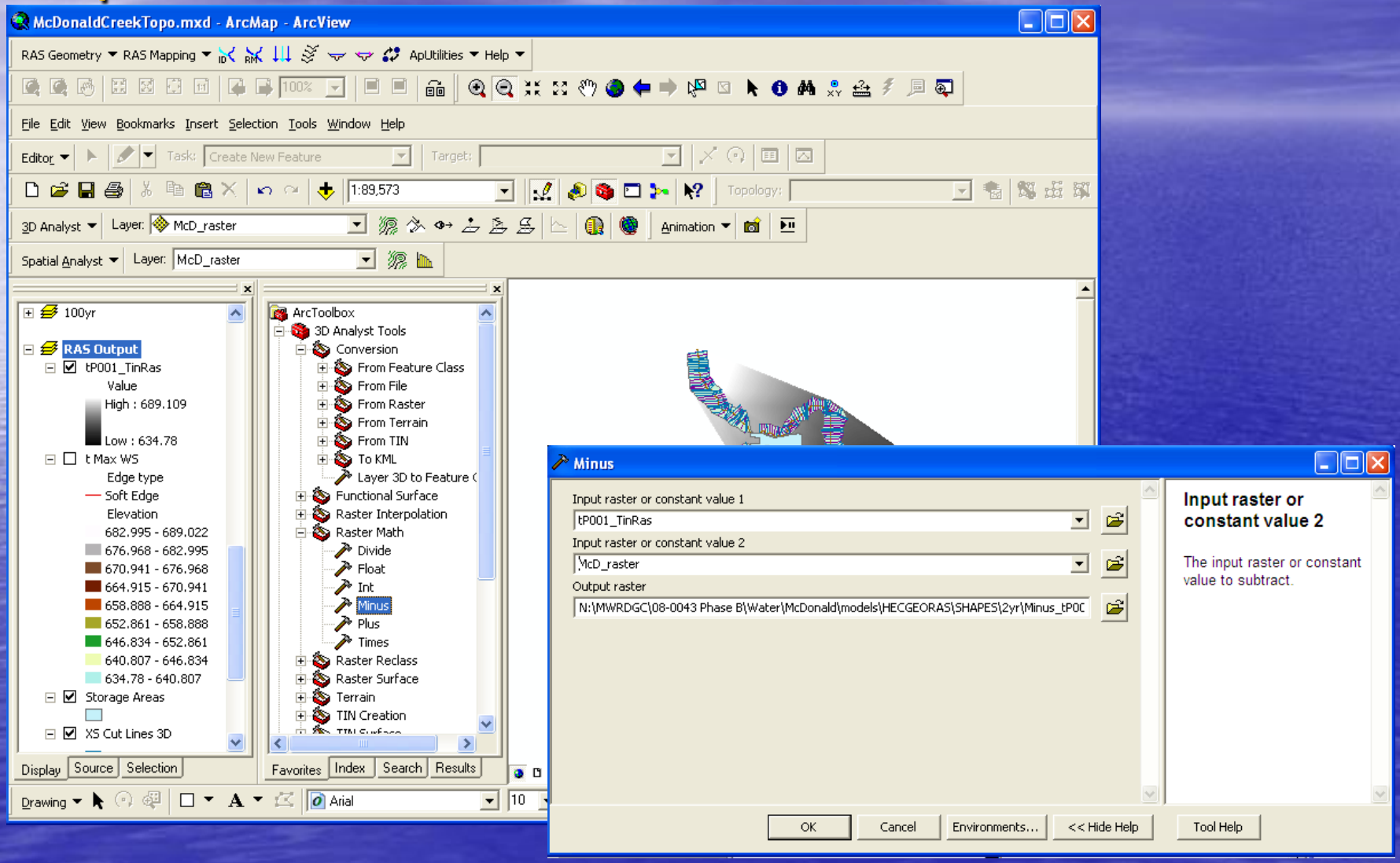
FLOODPLAIN MAPPING USING GIS
Step 6: Convert MaxWS TIN to Raster



-Starting here, use built-in GIS functions to carry out floodplain mapping

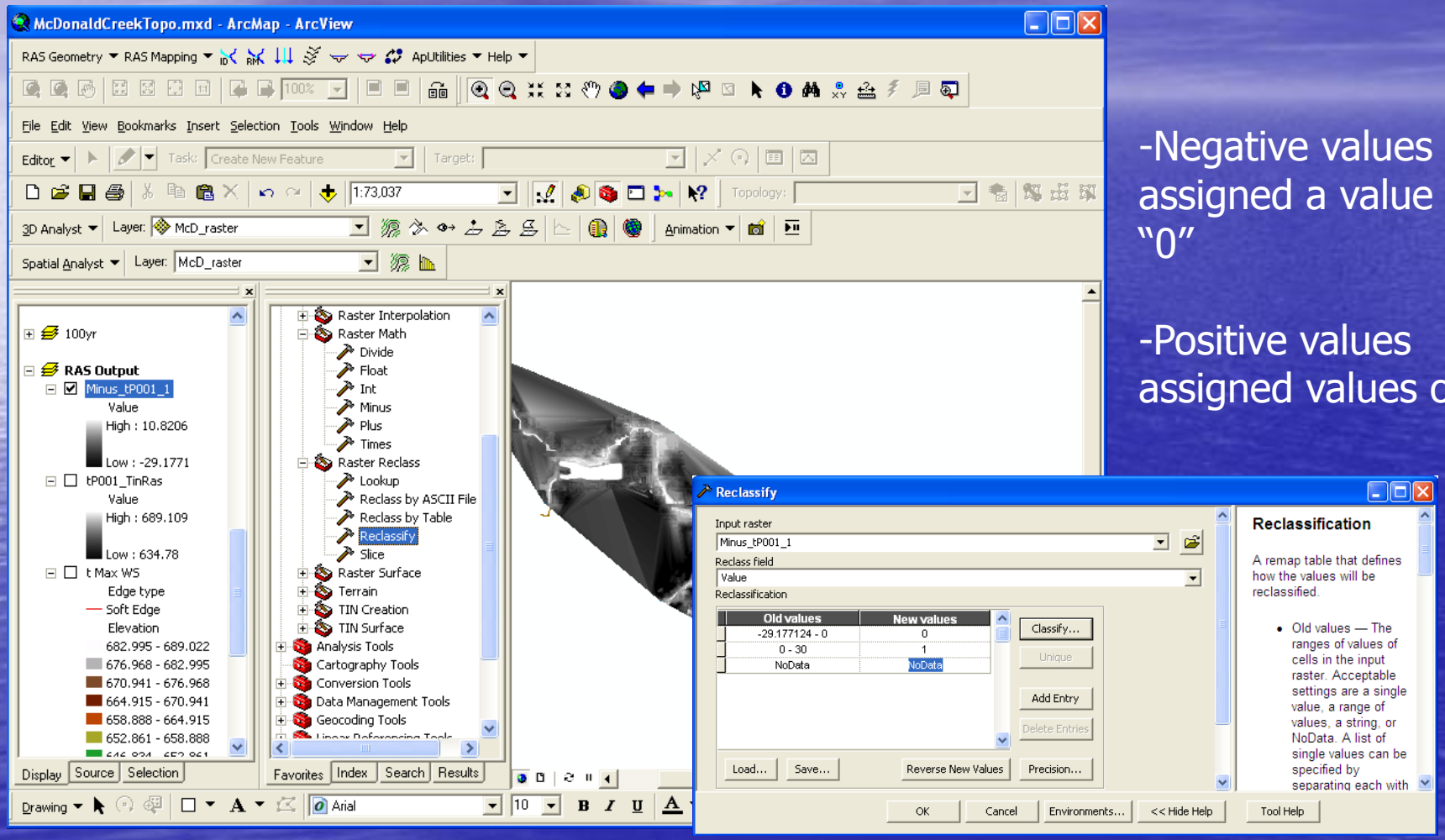
FLOODPLAIN MAPPING USING GIS

Step 7: Subtract MaxWS Raster from Ground Raster



FLOODPLAIN MAPPING USING GIS

Step 8: Reclassify Raster

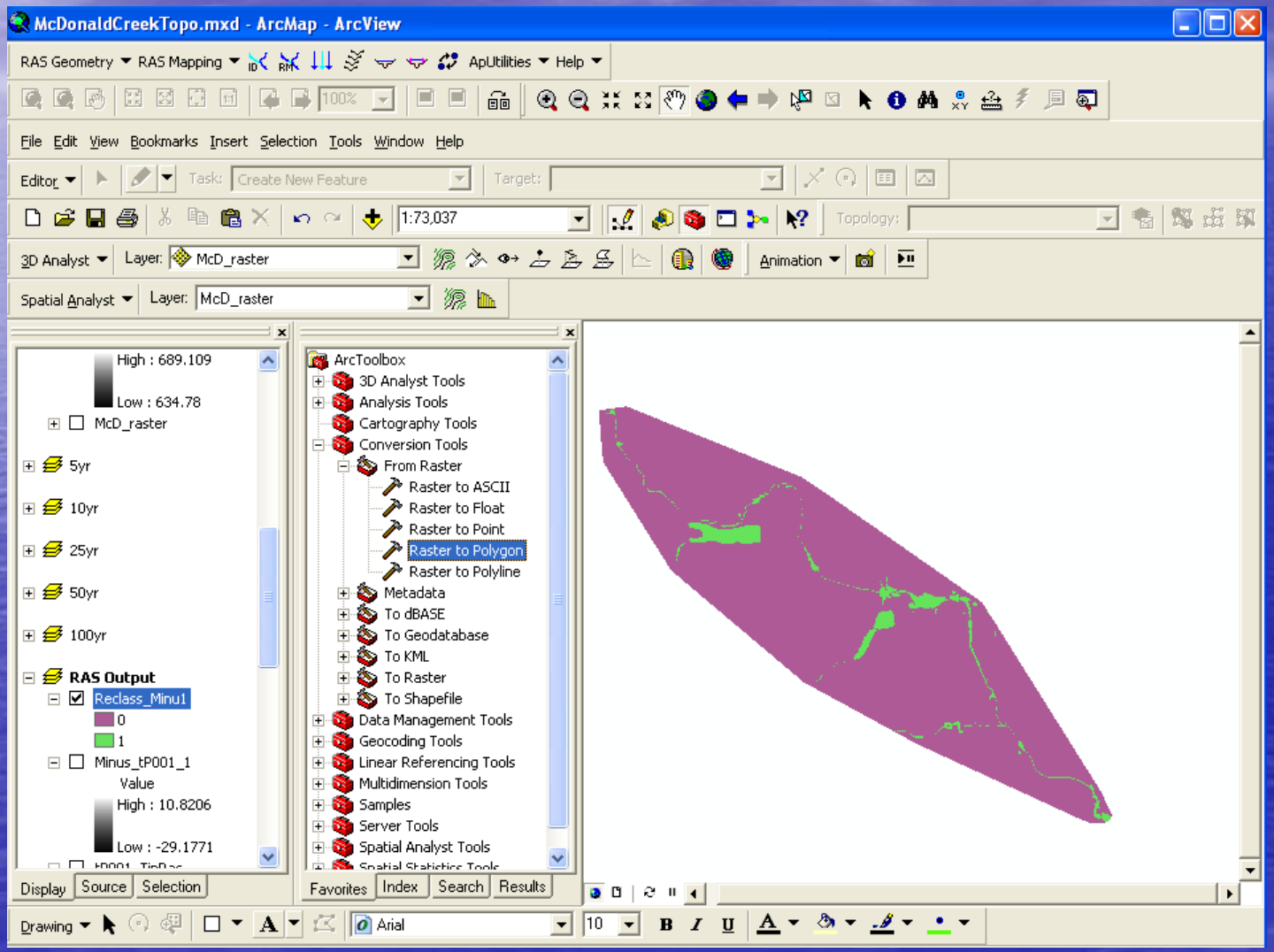


-Negative values assigned a value of "0"

-Positive values assigned values of "1"

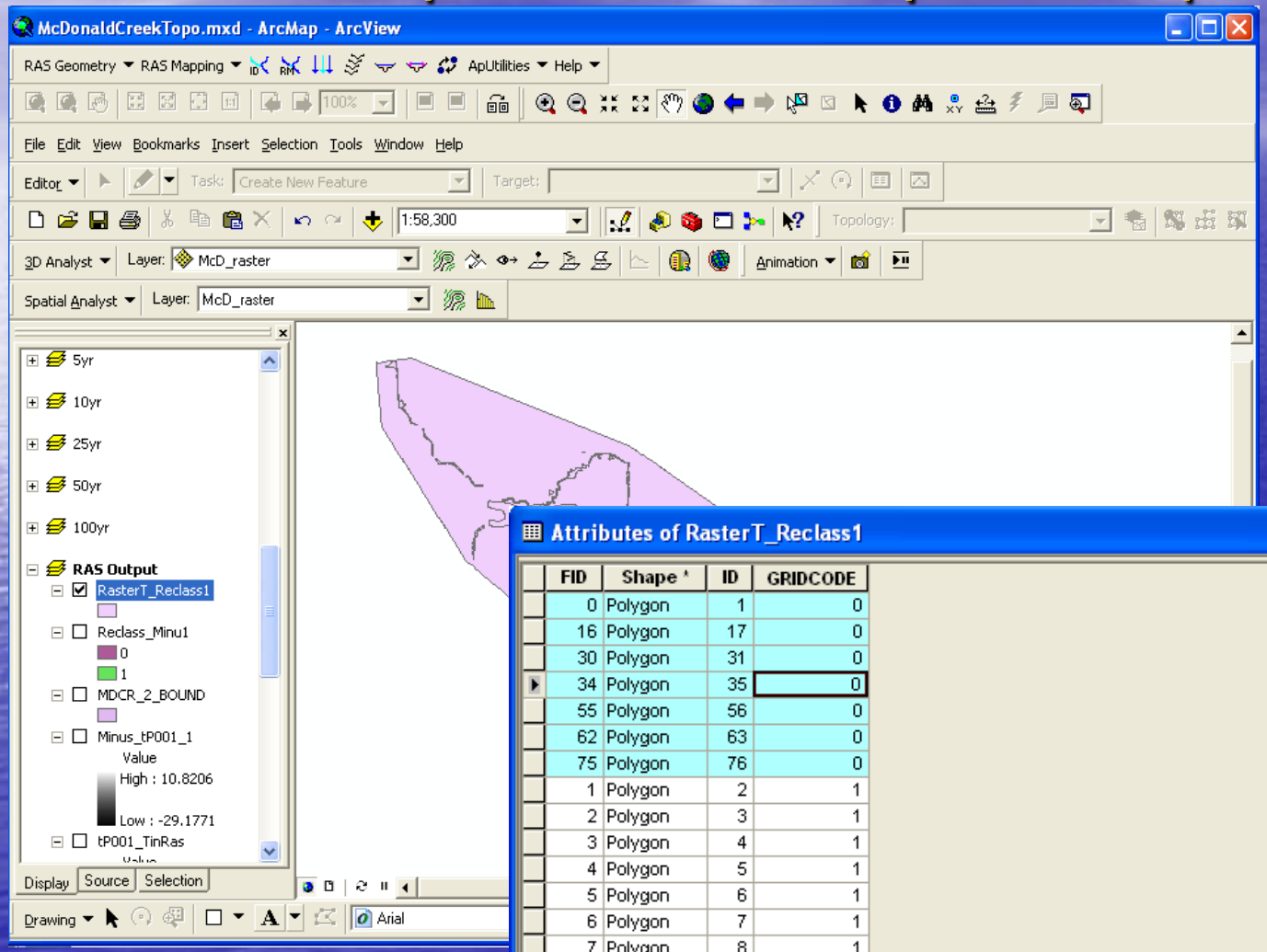
FLOODPLAIN MAPPING USING GIS

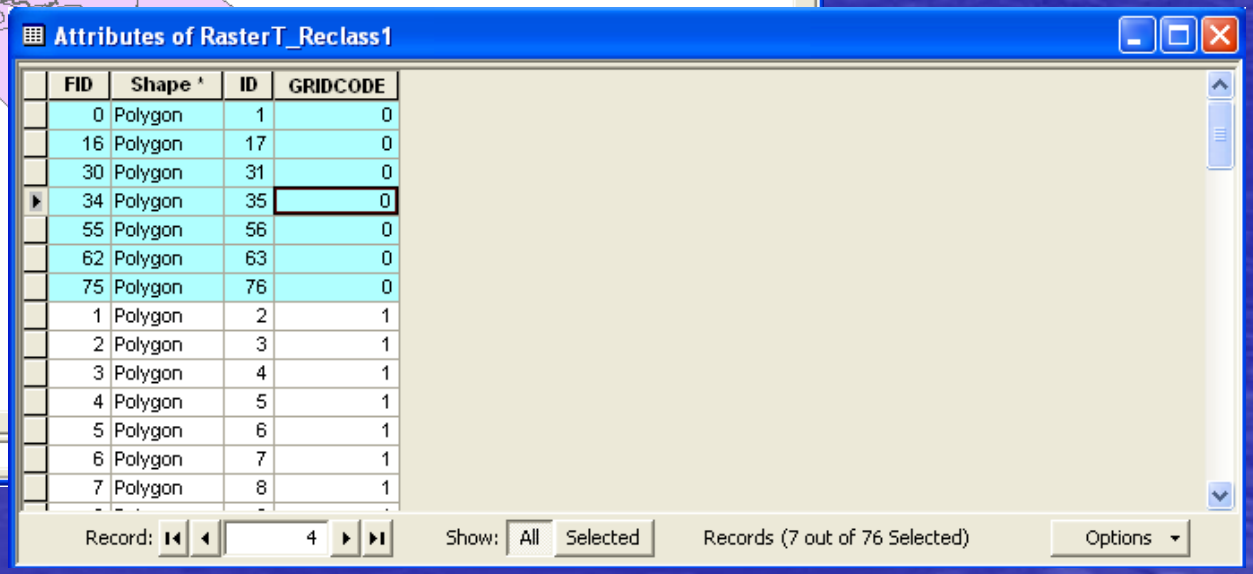
Step 9: Export Raster as Shapefile



FLOODPLAIN MAPPING USING GIS

Step 10: Edit Floodplain Shapefile

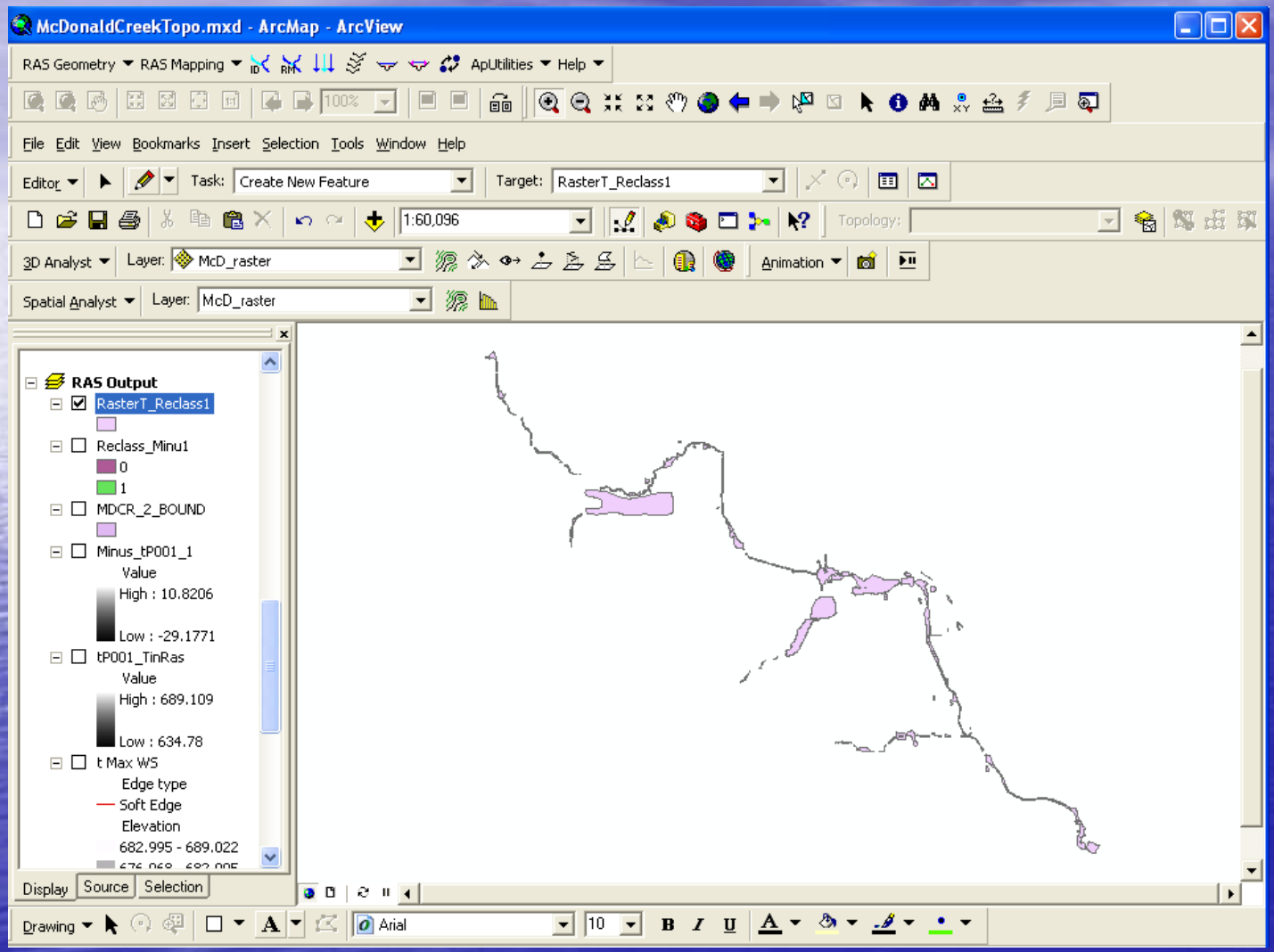




-Use attribute table to sort features by value

-Delete all features with negative values

FLOODPLAIN MAPPING USING GIS



-Delete any outlying floodplain areas

-Clean up floodplain to required scale

Questions/Comments?

Luke Sherry
Jeana Gowin

Christopher B. Burke Engineering, Ltd.