

Manning's n Values and Land Cover Data

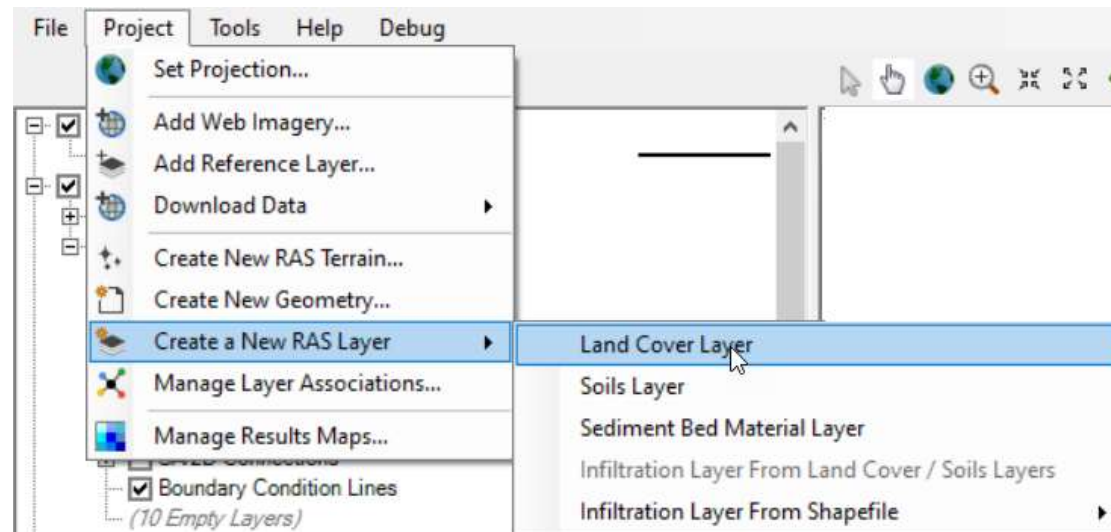
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USACE, Institute for Water Resources, Hydrologic Engineering Center



Overview

- Creating Land Cover layer for Manning's n using the Land Classification layer





Land Cover Data Sources

- Support use of Land Cover data for estimating Manning's n values
 - Raster datasets
 - Shapefile polygon datasets
- NLCD 2021
 - <http://www.mrlc.gov>
(30-m raster)
- USGS LULC
 - <http://water.usgs.gov/GIS/dsdl/ds240/index.html>
(vector or raster)

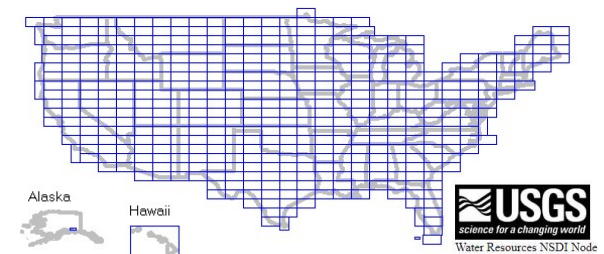
MRLC Celebrating 20+ years of Partnership
Multi-Resolution Land Characteristics
Consortium



Multi-Resolution Land Characteristics (MRLC)
Consortium

Download land use and land cover data sets using clickable image map

Click on the blue polygons on the image to download data sets.





New Land Cover Layer

- Set Extents
- Add Files
- Reclassify
 - Important for further classification
- Set Cell Size
- Provide Filename
- Create

Create a New Land Cover Layer

Input Files: Geometries Terrains Geometries and Terrains Current View Entire Input File(s)

Import Ext: NLCD 2016 Add Field...

Filename	Projection	Info	Naming Std.	Name Field
NLCD_2016_Land_Co...	PROJCS["Albers_...	Cell Size: 30 meters	NLCD 2016	N/A

Unique Classification Names for Selected File

Name Field	Classification
0	NoData
11	Open Water
21	Developed, Open Space
22	Developed, Low Intensity
23	Developed, Medium Intens...
24	Developed, High Intensity
41	Deciduous Forest
43	Mixed Forest
52	Shrub/Scrub
71	Grassland/Herbaceous
81	Pasture/Hay

Output File

RAS Classification	ID
NoData	0
Developed, Low Intensity	22
Developed, Medium Intensity	23
Developed, High Intensity	24
Developed, Open Space	21
Cultivated Crops	82
Pasture/Hay	81
Deciduous Forest	41
Shrub/Scrub	52
Grassland/Herbaceous	71
Open Water	11

Output ID Standards: NLCD 2016

Cell Size: 10 feet Expected Output Size: <1 MB

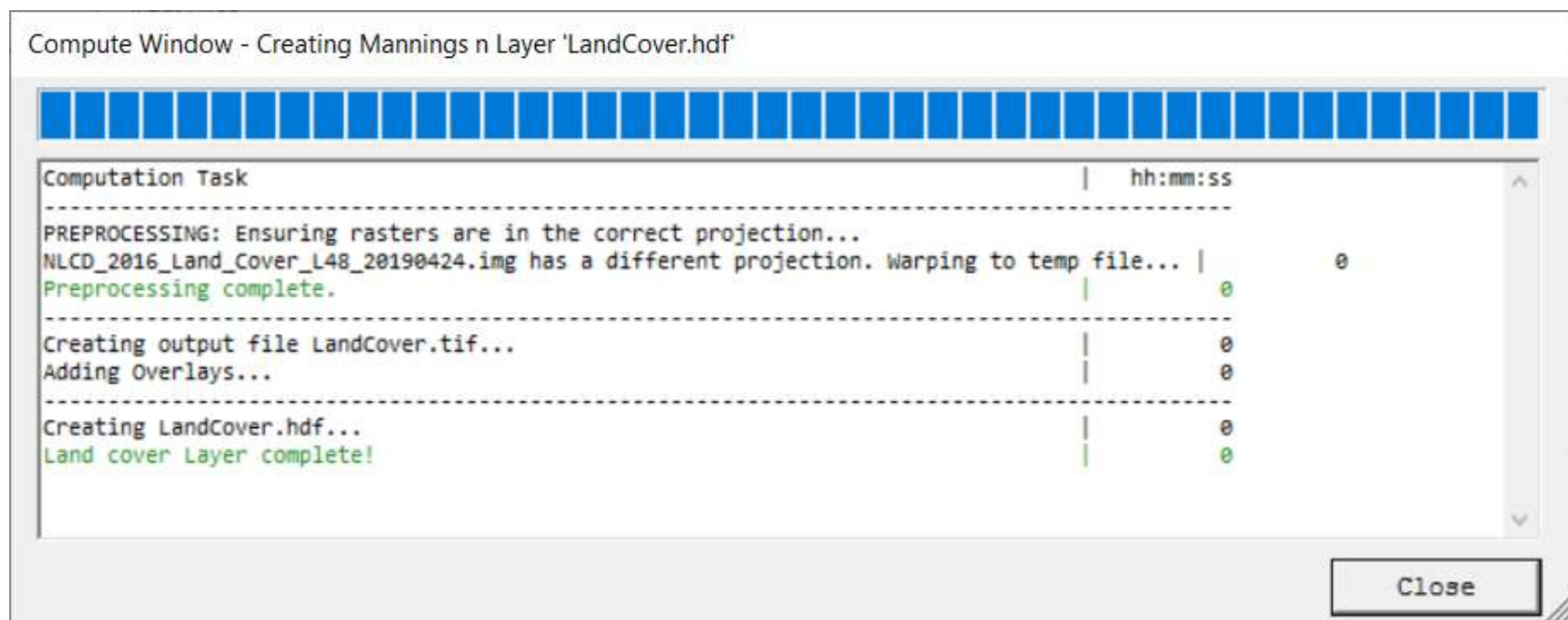
Filename: C:\...\Land Classification\LandCover.hdf

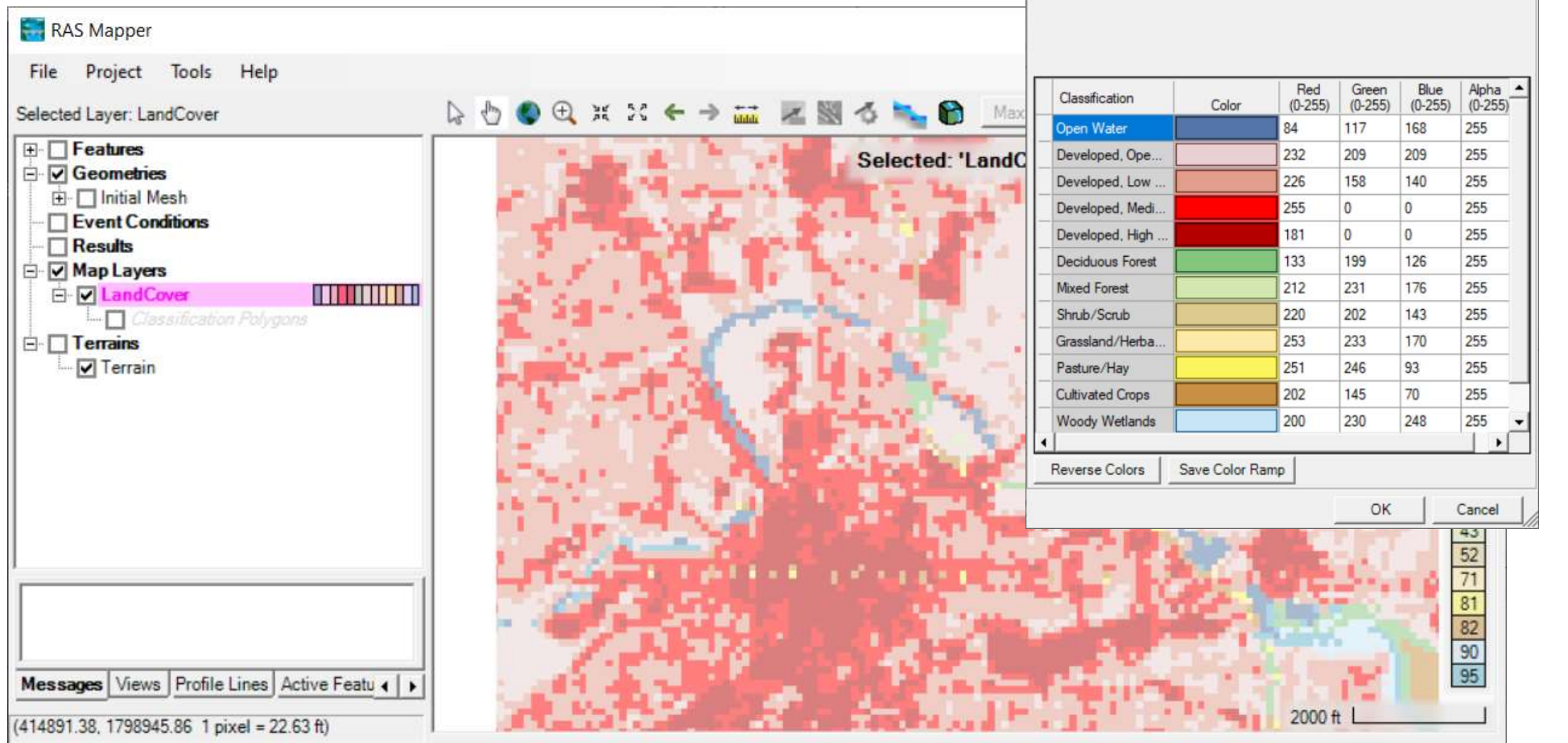
Create Cancel



Land Cover Import

- Mapper creates a New Raster (LandCover.tif and LandCover.hdf)
- Reprojected into coordinate system

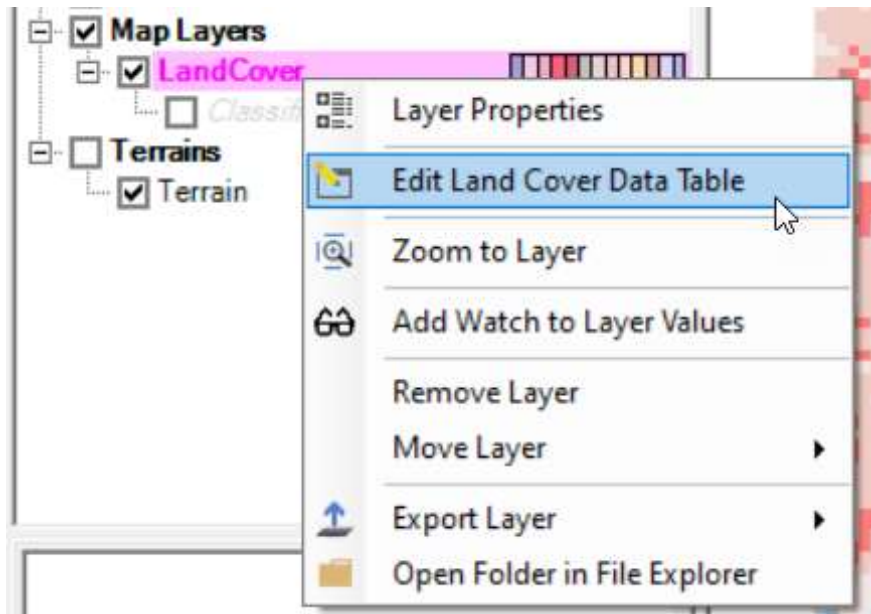






Manning's n Values

- Provide base Manning's n values



This is the first time you will actually see “Manning n”

Classification Parameters

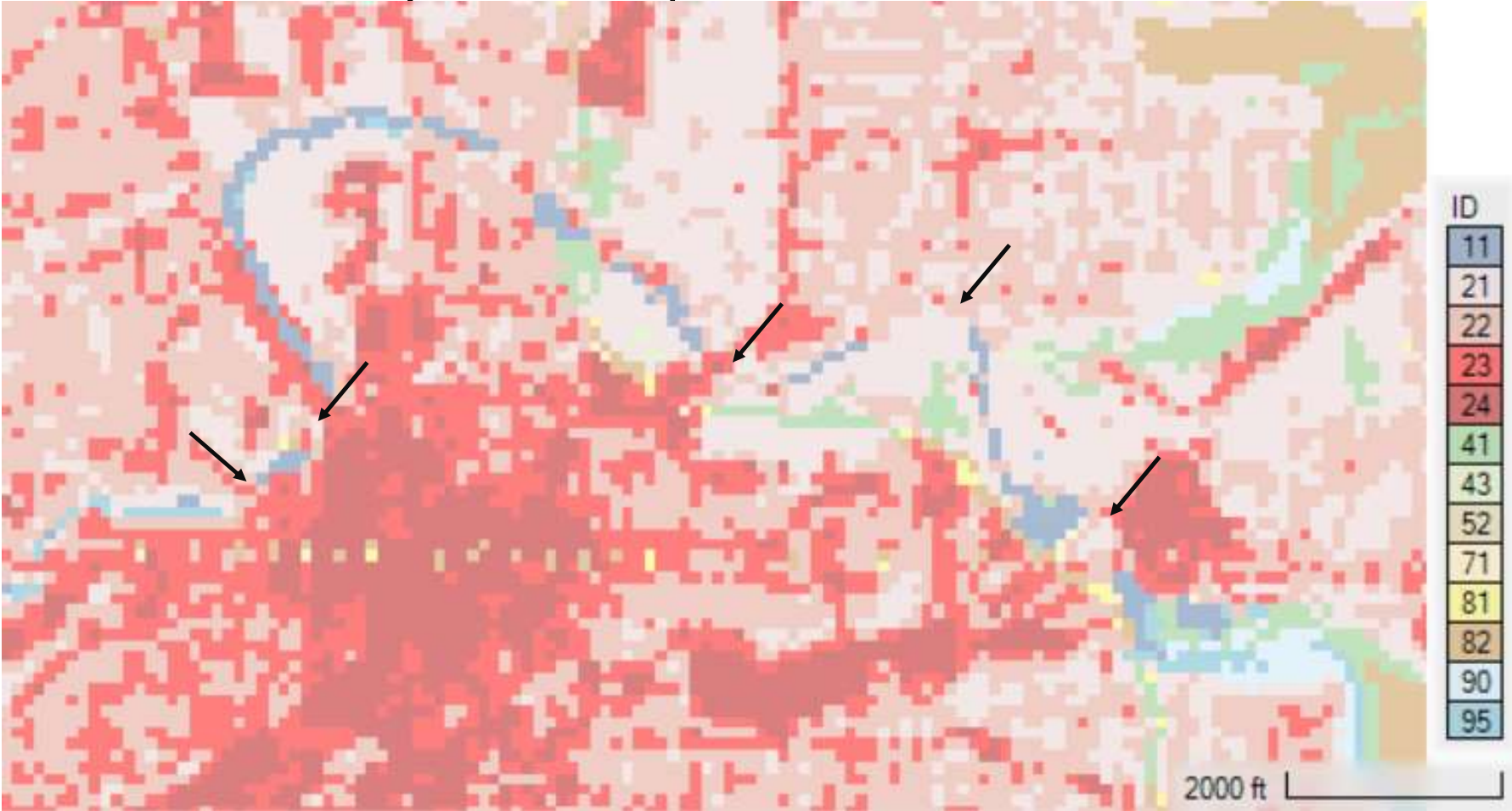
Parameter: **ManningsN**

ID	Name	ManningsN
0	NoData	0.066
11	Open Water	0.035
21	Developed, Open Space	0.04
22	Developed, Low Intensity	0.06
23	Developed, Medium Intensity	0.08
24	Developed, High Intensity	0.1
41	Deciduous Forest	0.16
43	Mixed Forest	0.14
52	Shrub/Scrub	0.04
71	Grassland/Herbaceous	0.055
81	Pasture/Hay	0.04
82	Cultivated Crops	0.05
90	Woody Wetlands	0.09
95	Emergent Herbaceous Wetlan...	0.65

OK Cancel



Land Cover Layer – Imperfect Data





Land Cover Classification

RAS Mapper

File Project Tools Help

Selected Layer: Classification Polygons

☐ Features

☒ Geometries

☐ Initial Mesh

☐ Event Conditions

☐ Results

☒ Map Layers

☒ LandCover

☒ Classification Polygons

☐ Terrains

☒ Terrain

Editing: 'Class'

Classifications

Classification Name: Channel

	ManningsN	Percent Impervious
	0.03	

OK Cancel

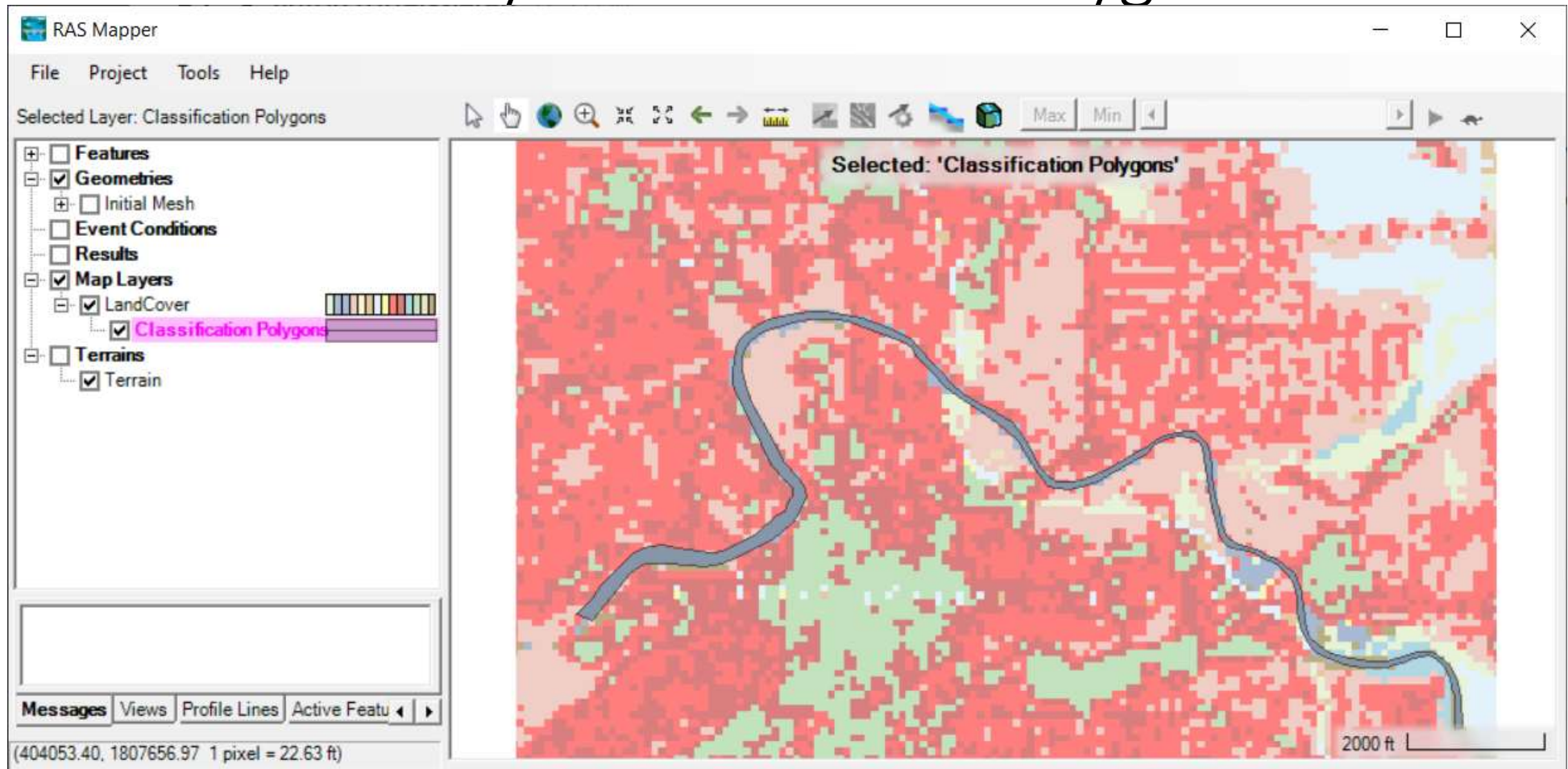
Messages Views Profile Lines Active Featu

(408171.38, 1798855.36 1 pixel = 22.63 ft)

2000 ft

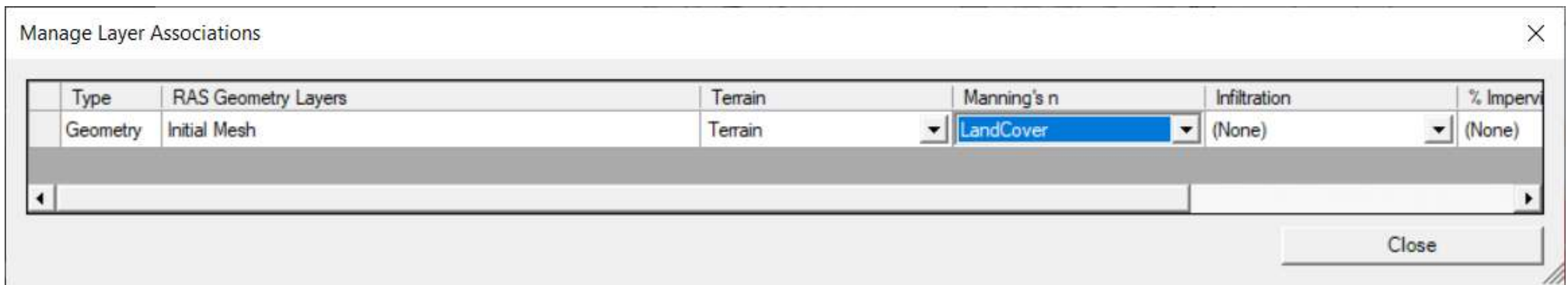
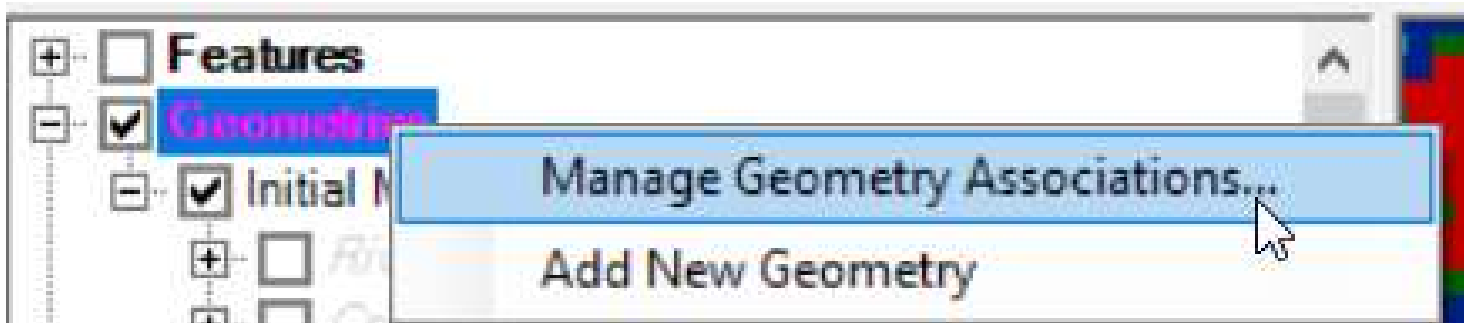


Land Cover Layer with Vector Polygons





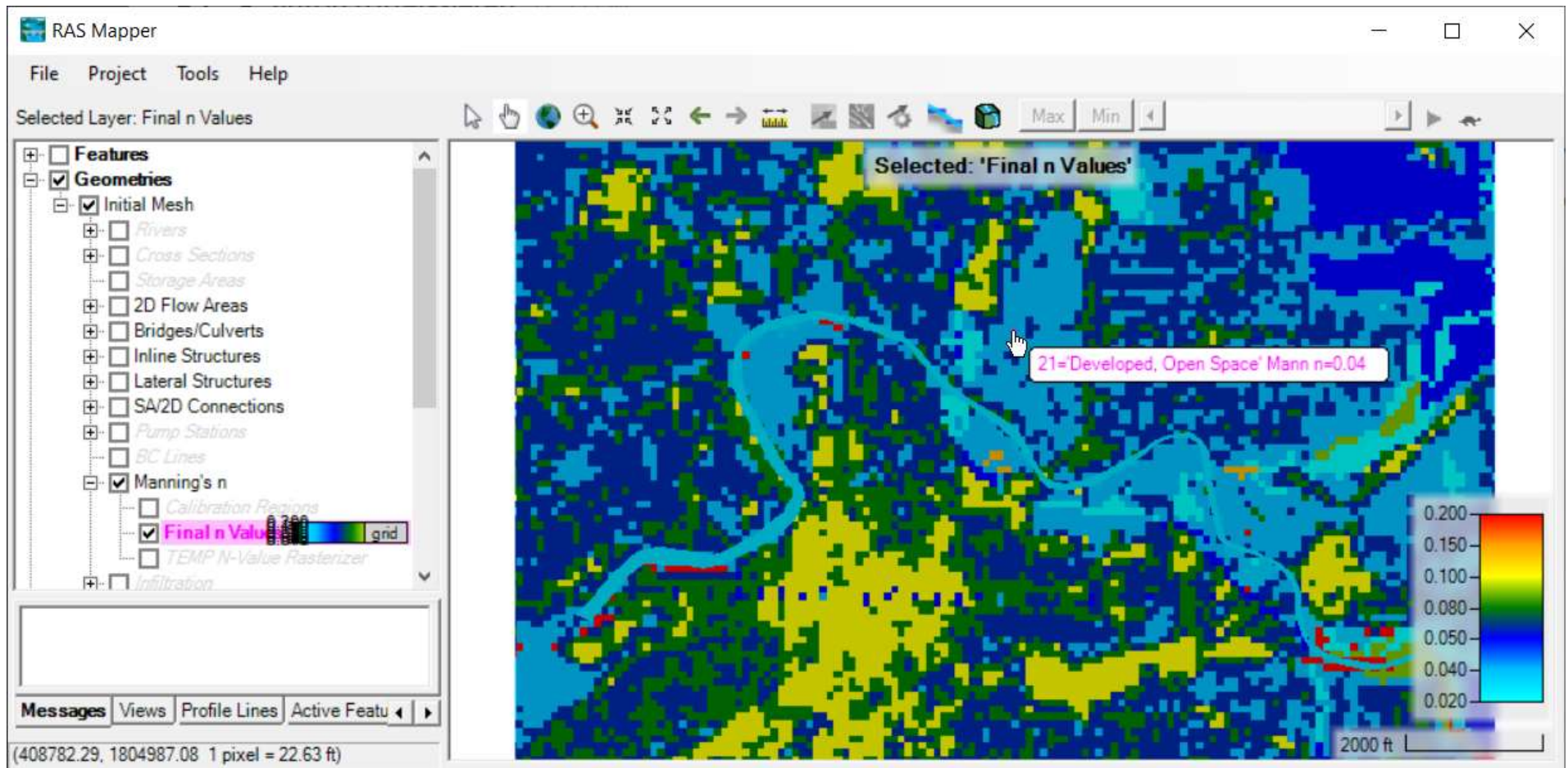
Associate Land Cover with Geometry



This is a commonly overlooked step for new users.

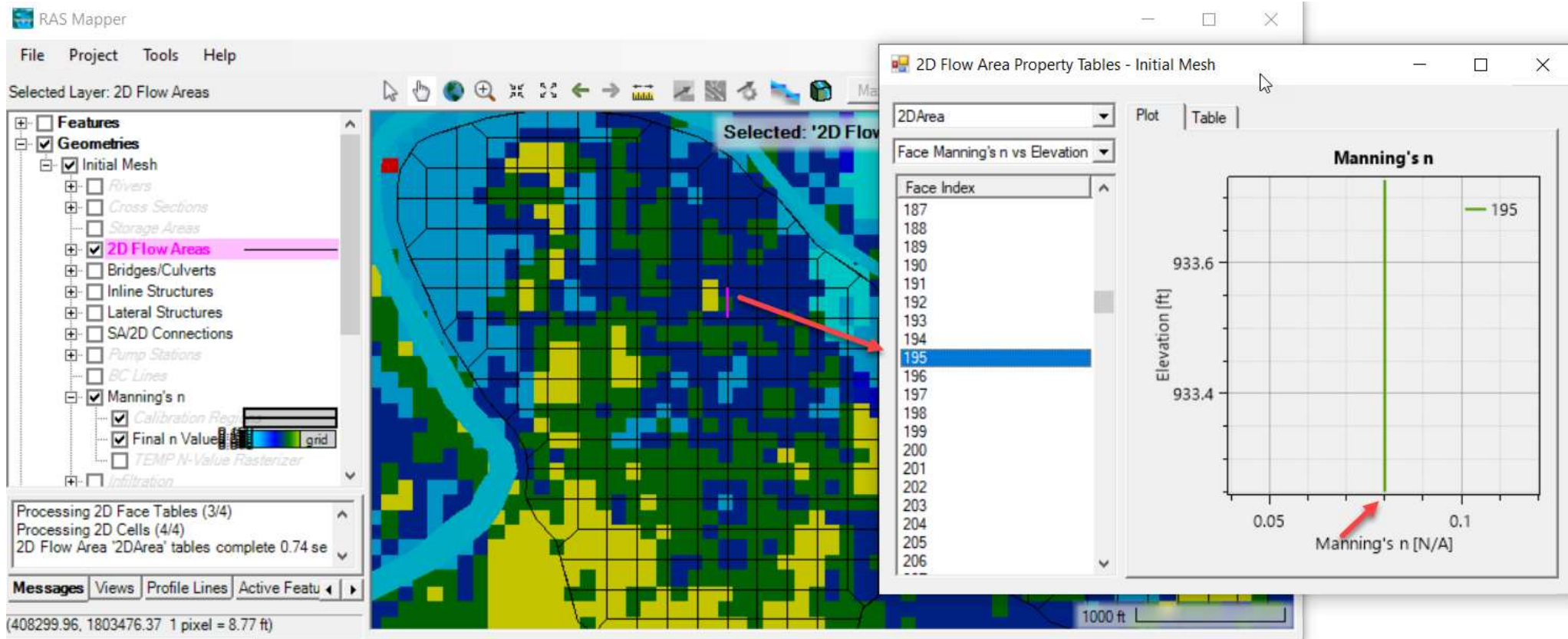


Final Manning's n Values



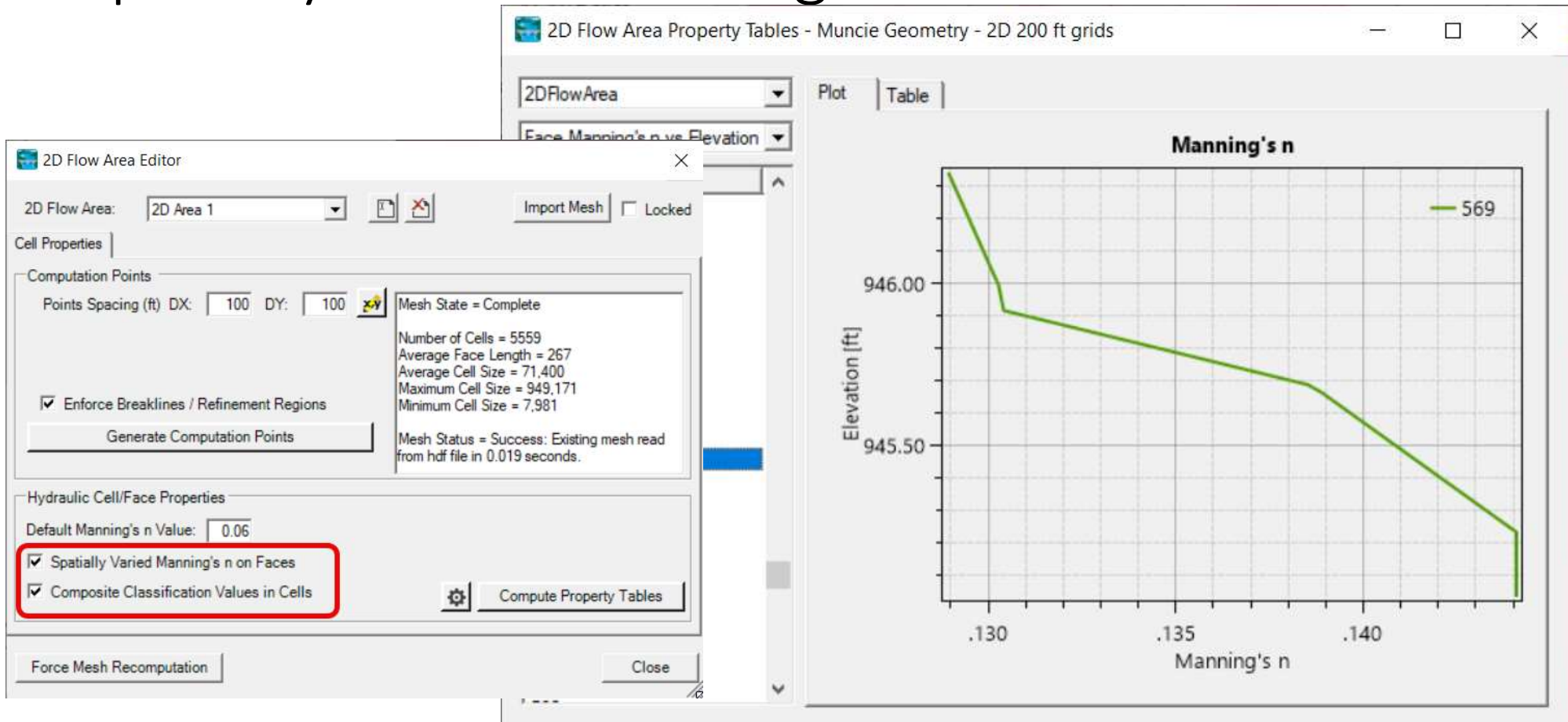


Inspection of Hydraulic Properties





Spatially Varied Manning's n













Base Overrides

- Global replacement of values from the Land Cover Layer

Layer Parameter Values

Selected Area Edits			
			
			
<input checked="" type="checkbox"/> Show Base Overrides			
ID	Name	ManningsN	Base Override - ManningsN
0	NoData		
11	Open Water	0.03	0.035
21	Developed, Open Space	0.04	
22	Developed, Low Intensity	0.08	
23	Developed, Medium Intensity	0.12	
24	Developed, High Intensity	0.16	
31	Barren Land Rock-Sand-Clay	0.026	
41	Deciduous Forest	0.15	0.12
42	Evergreen Forest	0.12	0.12
43	Mixed Forest	0.14	0.12
52	Shrub-Scrub	0.12	
71	Grassland-Herbaceous	0.04	
81	Pasture-Hay	0.04	
82	Cultivated Crops	0.036	
90	Woody Wetlands	0.1	
95	Emergent Herbaceous Wetlan...	0.07	



Calibration Regions

RAS Mapper

FileProjectToolsHelp

Selected Layer: Calibration Regions

SA/2D Connections

Pump Stations

BC Lines

Manning's n

Calibration Regions

Final n Value

TEMP N-Value Rasterizer

Infiltration

Percent Impervious

Reference Points

Errors

Event Conditions

Results

Map Layers

LandCover

Classification Pol

Terrains

Terrain

Processing 2D Face Tables (3/4)

Processing 2D Cells (4/4)

2D Flow Area '2DArea' tables complete 0.74 se

MessagesViewsProfile LinesActive Featu

(407300.95, 1804918.07 1 pixel = 16.49 ft)

Editing: 'Calibration'

Region Name

Provide a UNIQUE name for the region:

Steeper

OKCancel

2000 ft

Layer Parameter Values

Selected Area Edits

Show Base Overrides

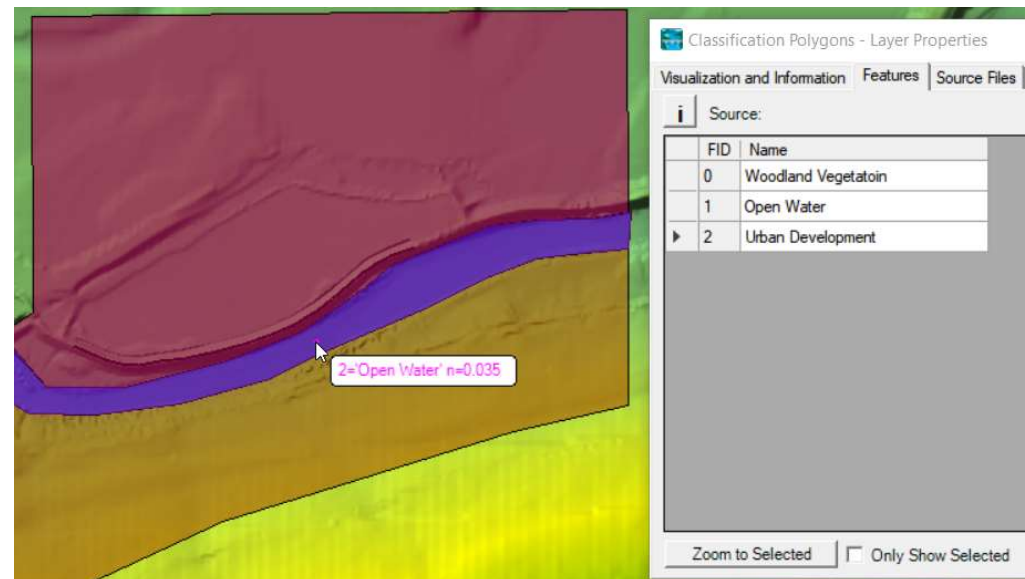
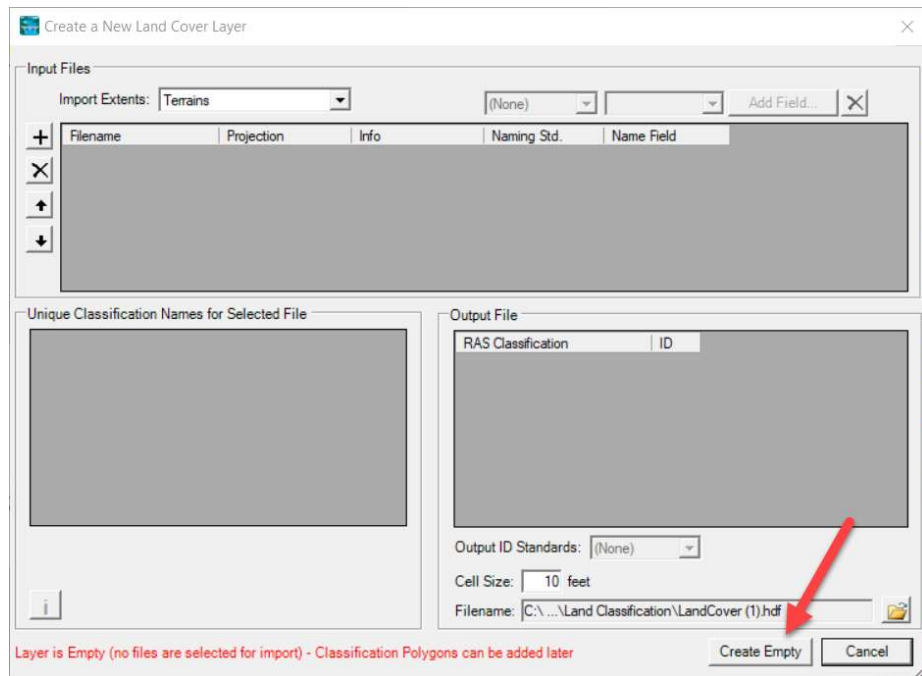
ID	Name	ManningsN	Base Override - ManningsN	Steeper - ManningsN
0	NoData	0.066		
22	Developed, Low Intensity	0.06		0.075
23	Developed, Medium Intensity	0.08		0.1
24	Developed, High Intensity	0.1	0.2	0.125
21	Developed, Open Space	0.04		0.05
82	Cultivated Crops	0.05		0.0625
81	Pasture/Hay	0.04		0.05
41	Deciduous Forest	0.16		0.2
52	Shrub/Scrub	0.04		0.05
71	Grassland/Herbaceous	0.055		0.06875
11	Open Water	0.035		0.04375
95	Emergent Herbaceous Wetlan...	0.65		0.8125
90	Woody Wetlands	0.09		0.1125
43	Mixed Forest	0.14		0.175
1	Channel	0.03		0.0375

OKCancel



No Land Cover Data – No Problem

- If you don't have land cover data, you can create an **Empty** LC dataset.
- Create Classification Polygons in RAS Mapper



Questions?

