

Overview of 2D Unsteady Flow Modeling with HEC-RAS

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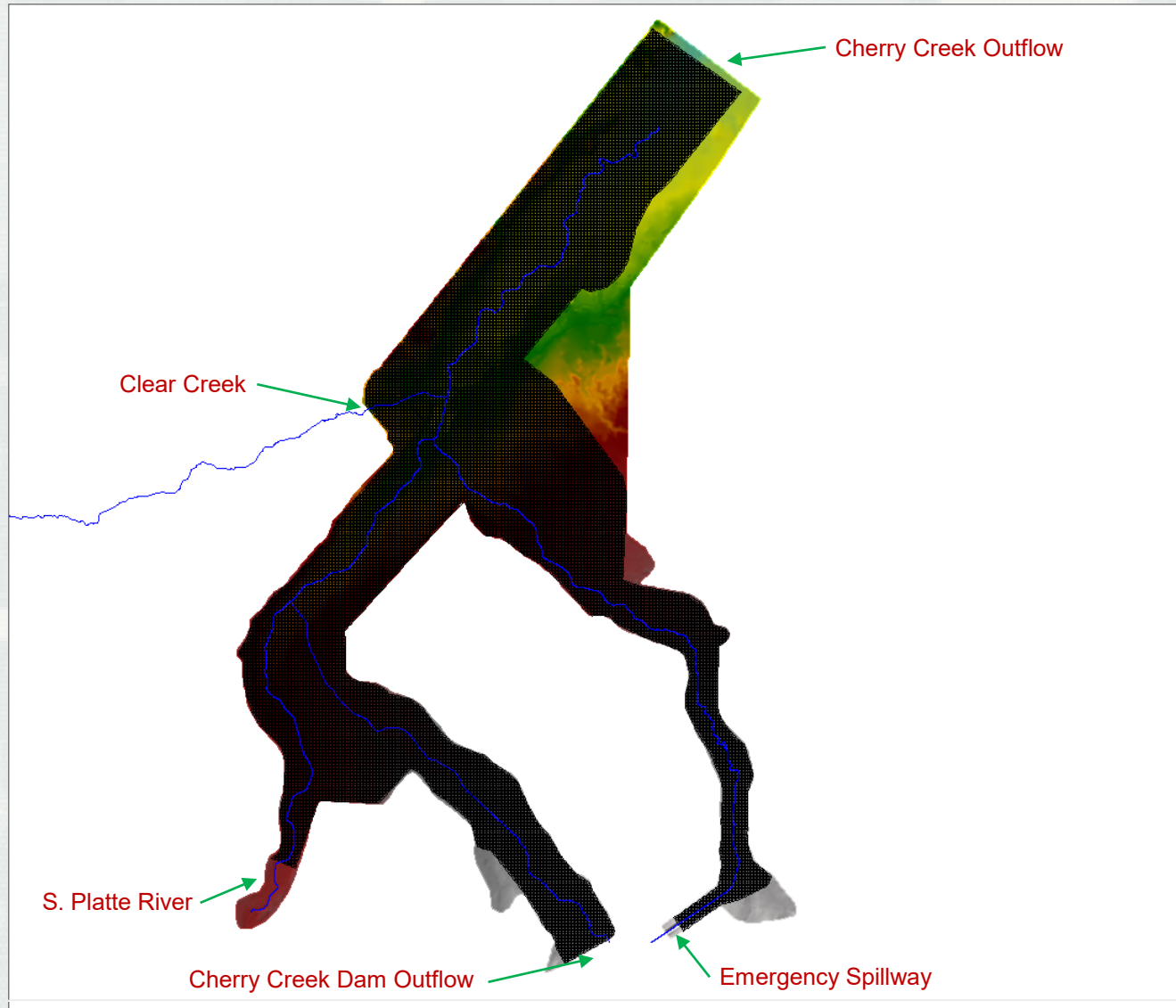
US Army Corps
of Engineers



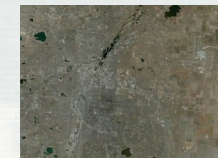
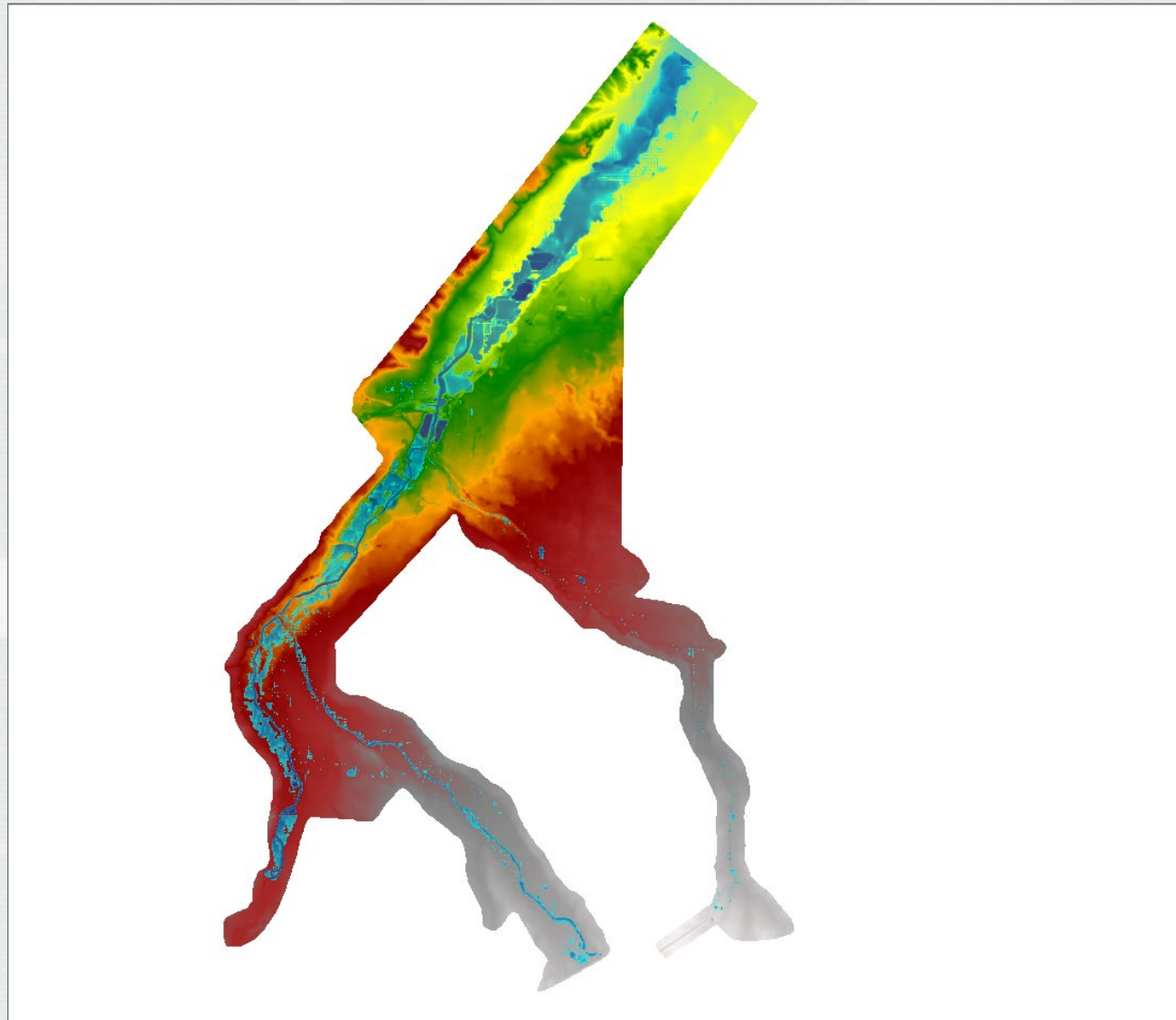
Objectives

- Overview of HEC-RAS Capabilities through Examples.
- Provide basic understanding of the types of 2D models that can be developed with HEC-RAS.
- Provide an understanding of the types of projects that HEC-RAS 2D models can be used for.

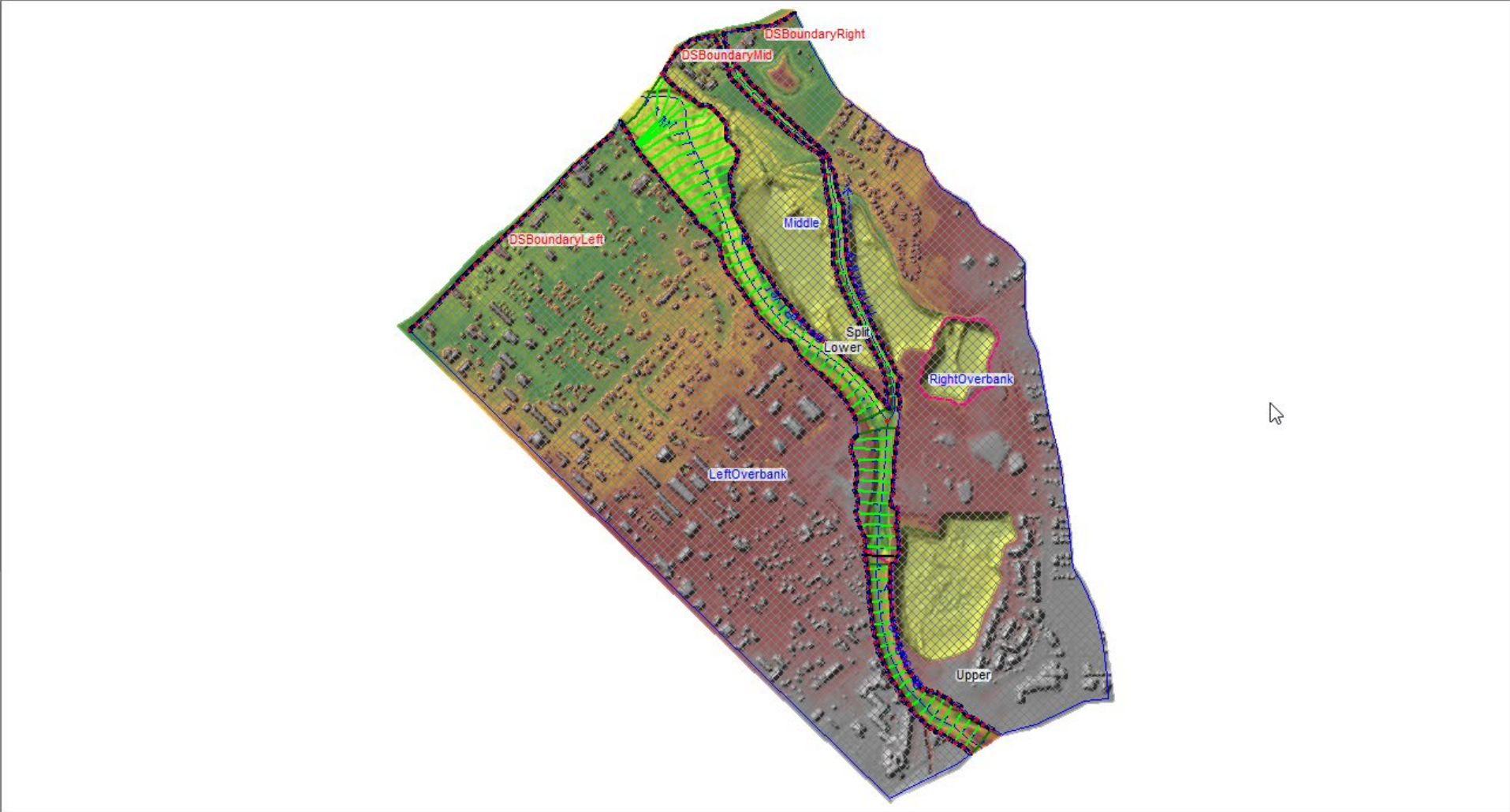
Single 2D Area with Boundary Conditions



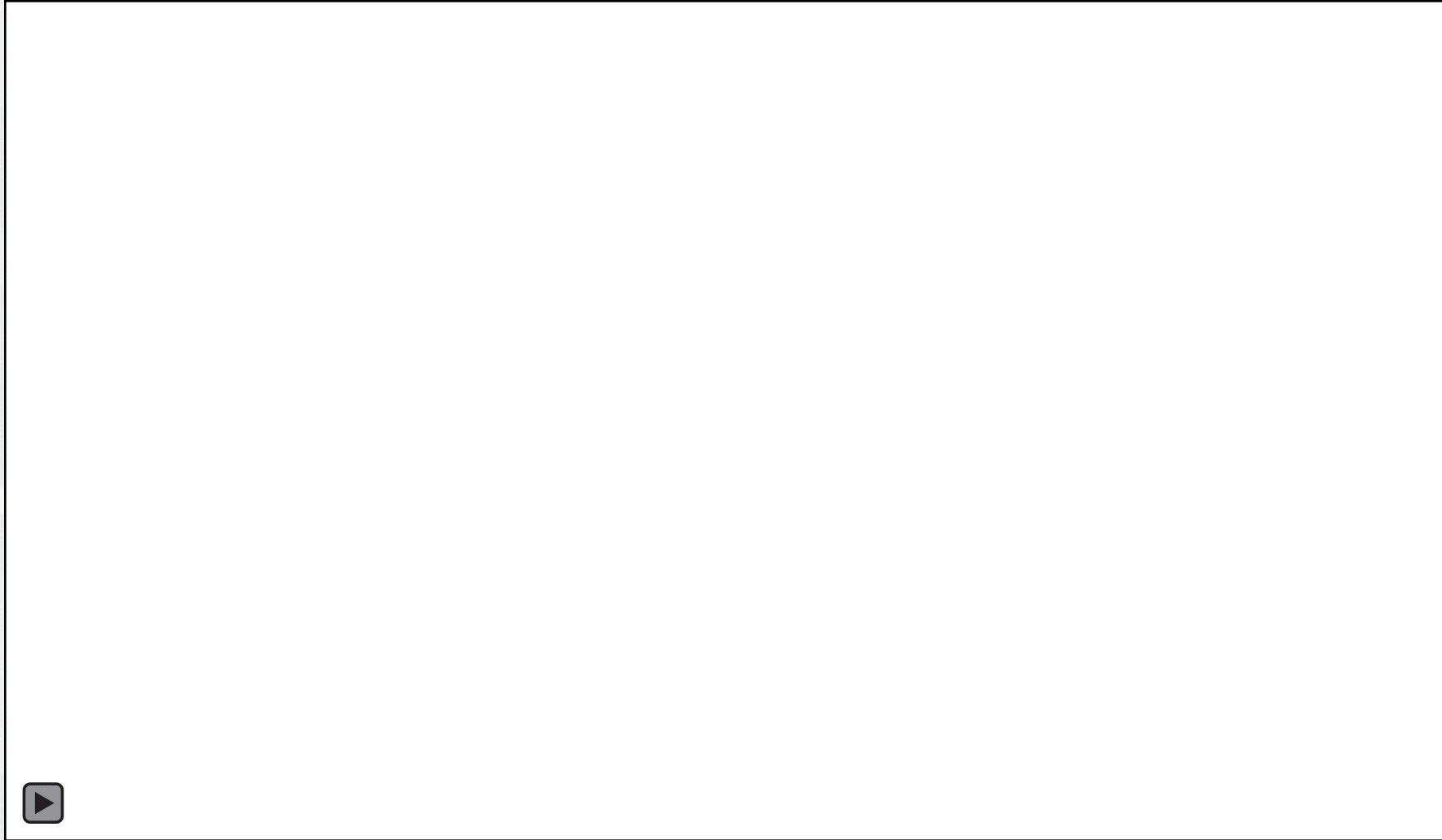
Cherry Creek Example Animation



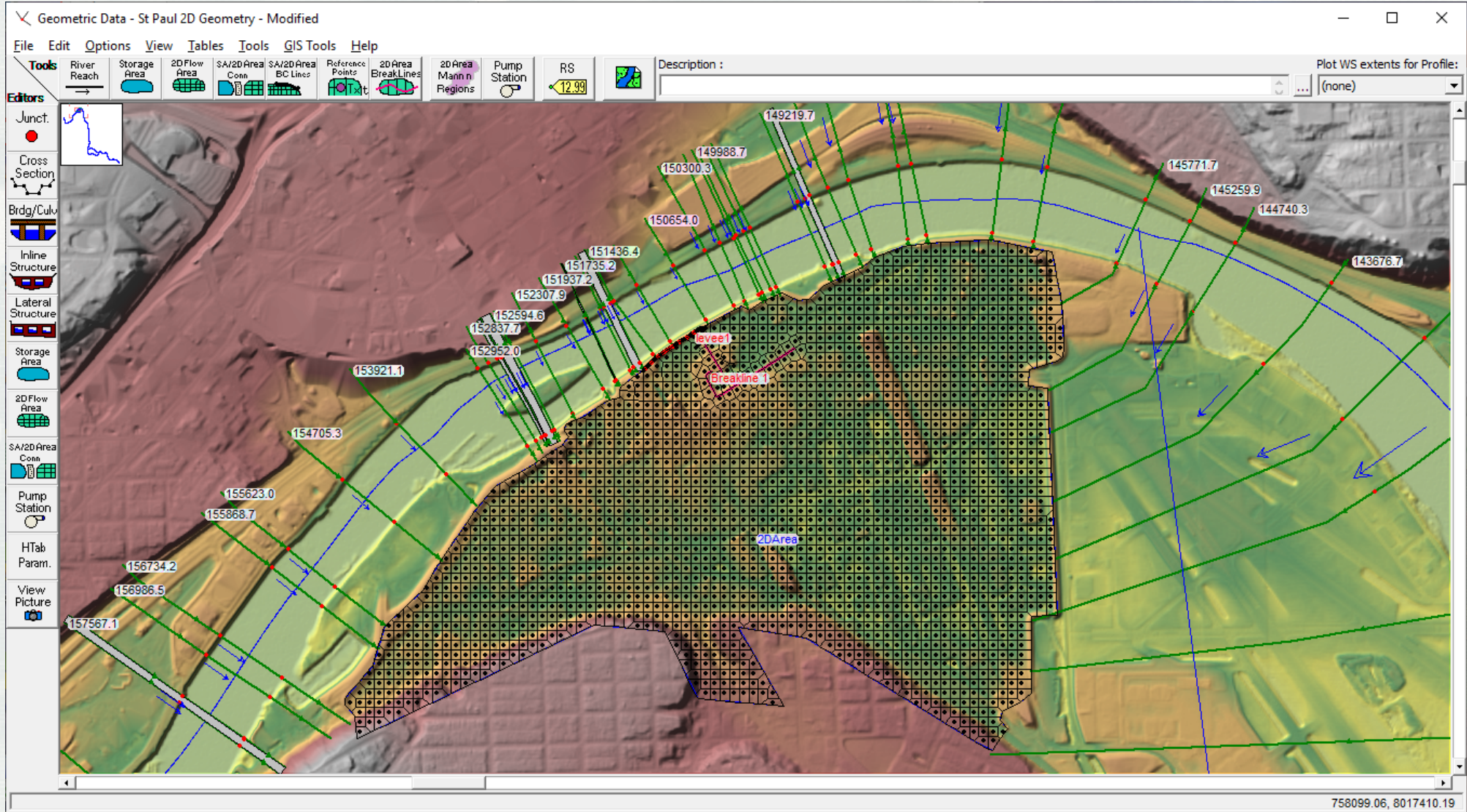
1D Main Channel with 2D Overbanks



1D Channel with 2D Overbanks - Animation



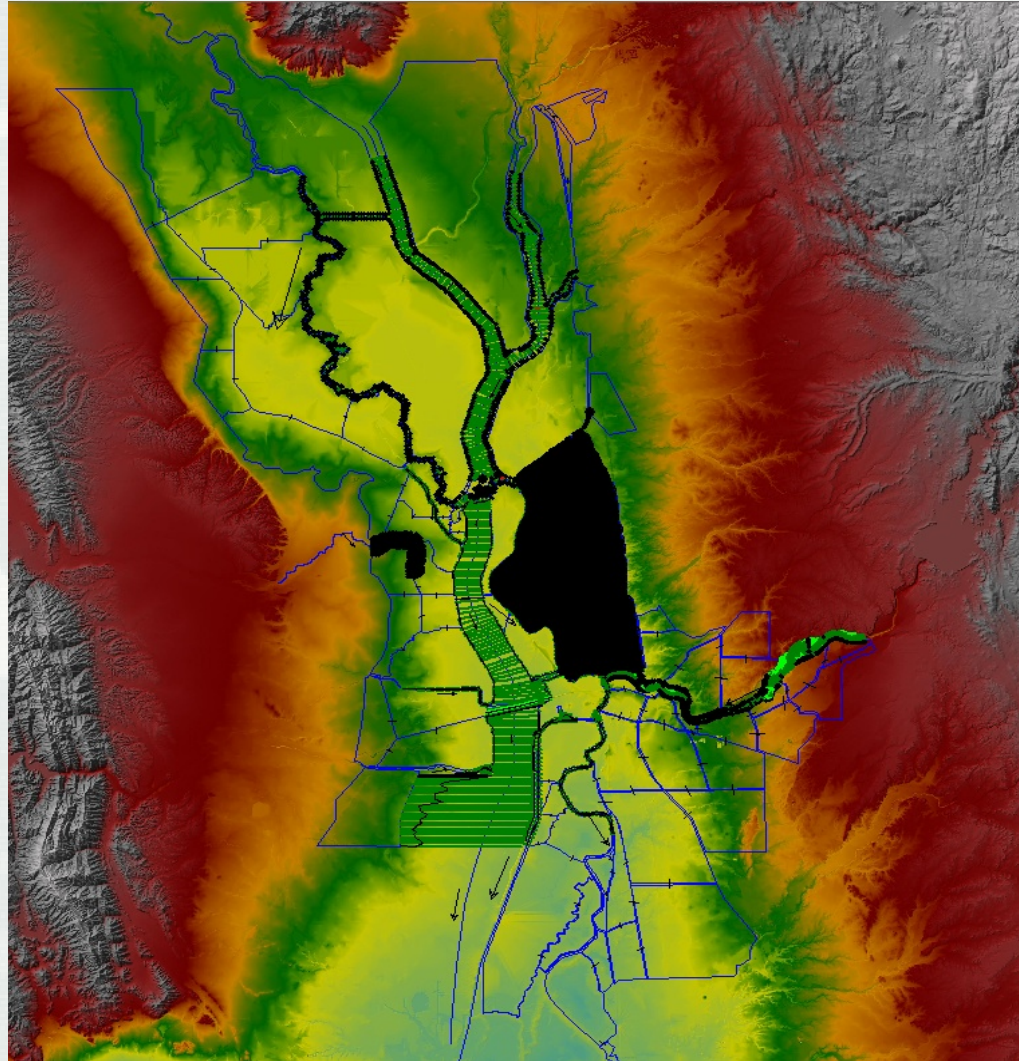
1D Model with a 2D Levee Area



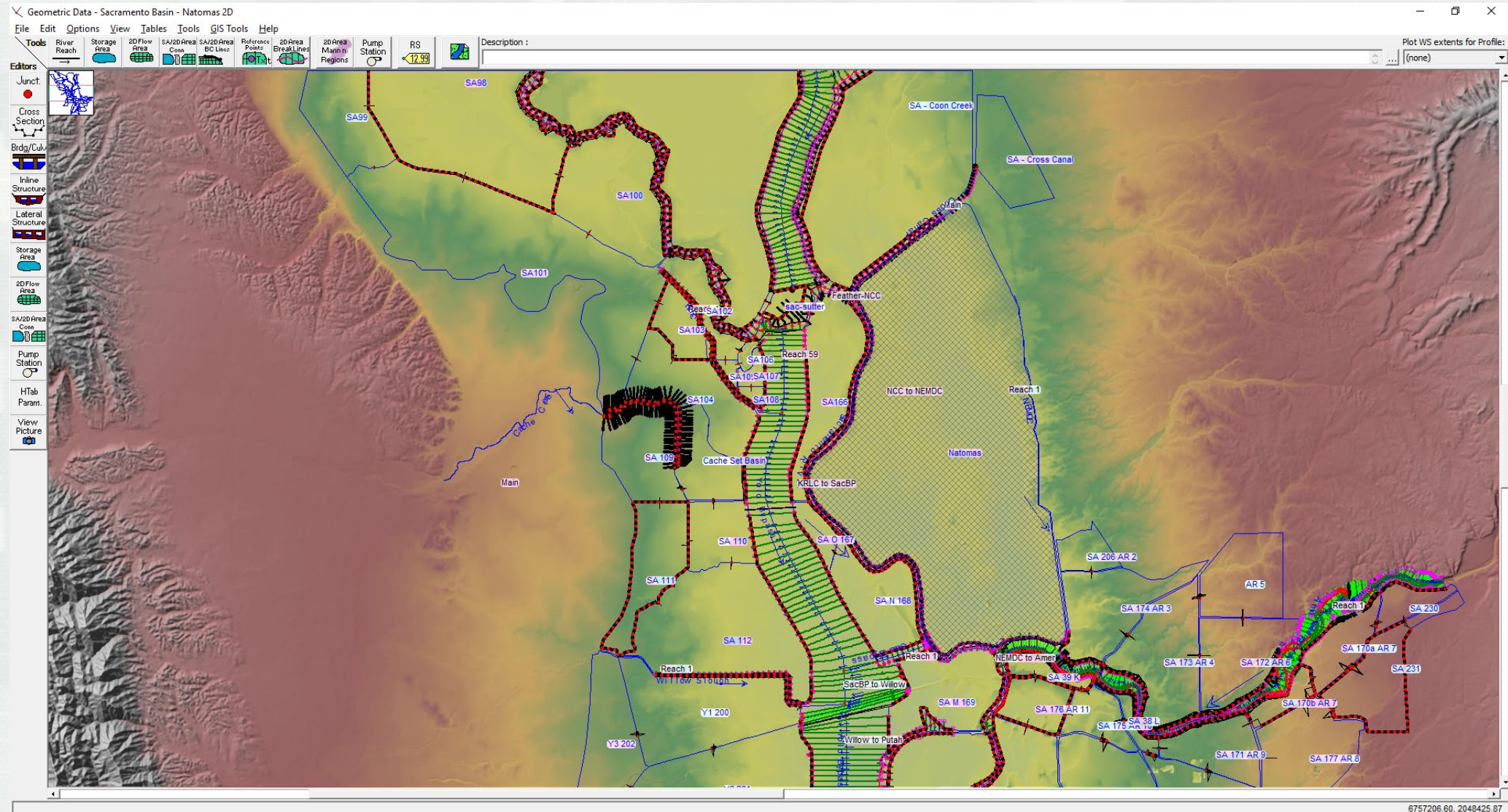
Saint Paul 1D/2D Levee - Animation



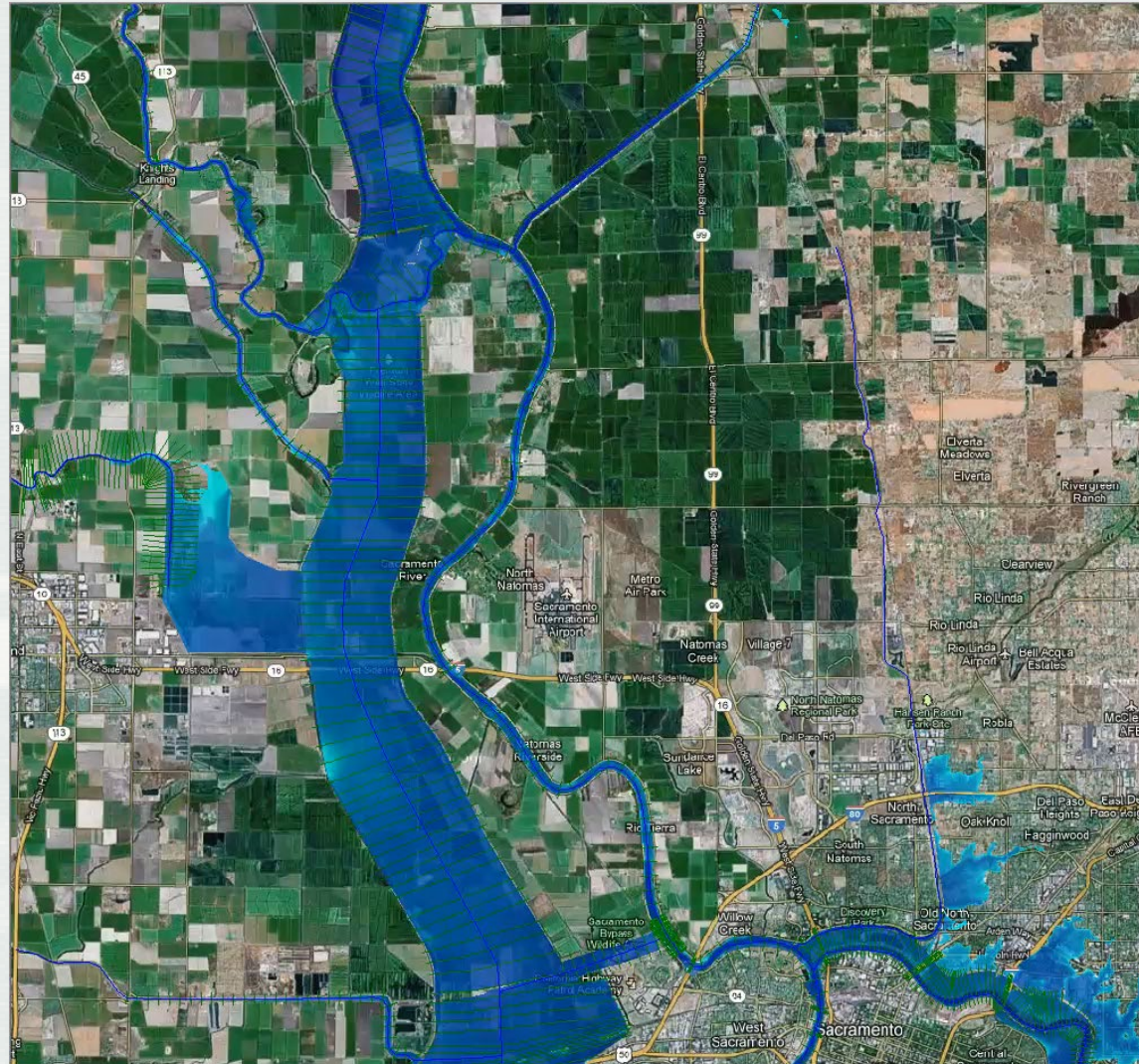
Detailed 1D/2D Model Sacramento River System Model



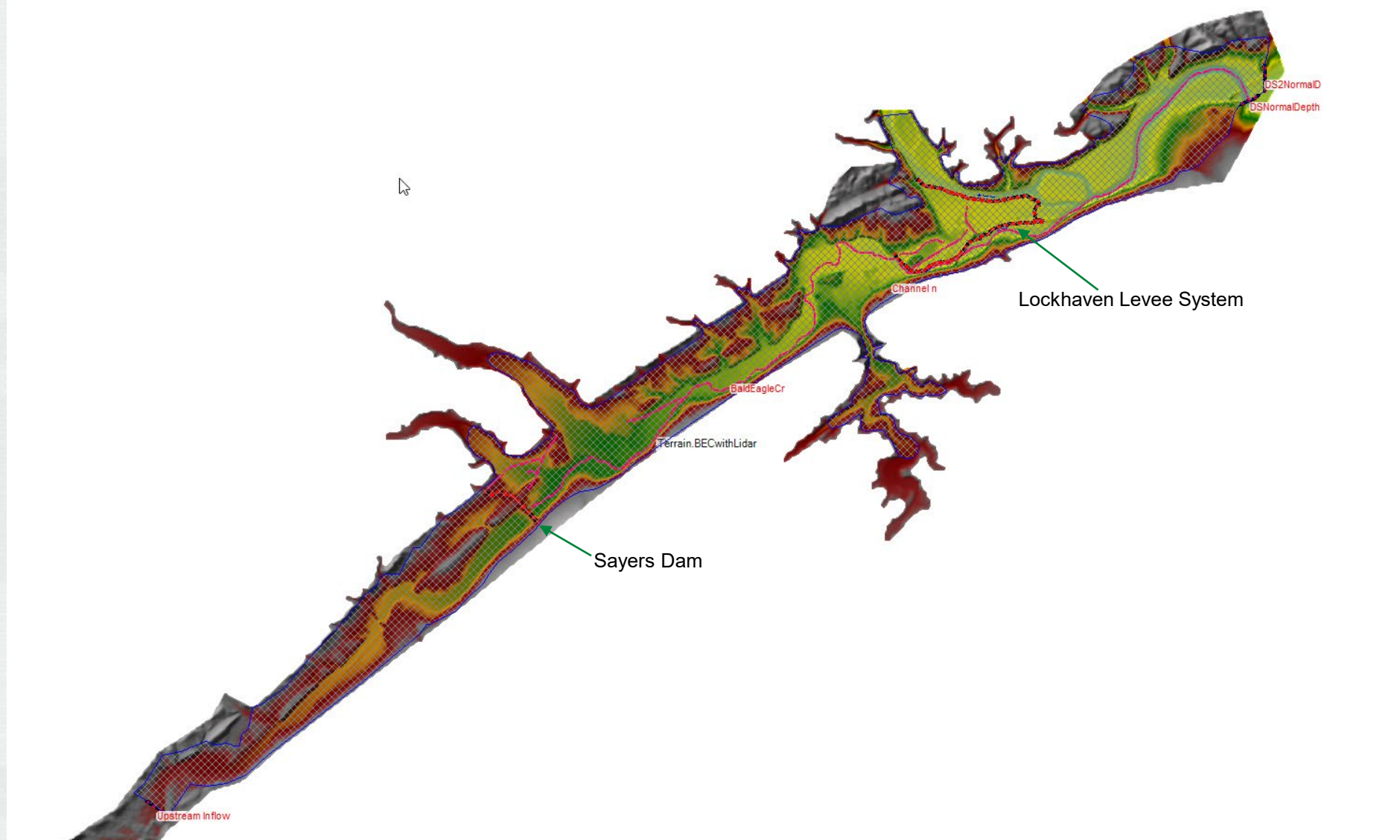
Sacramento River System Model



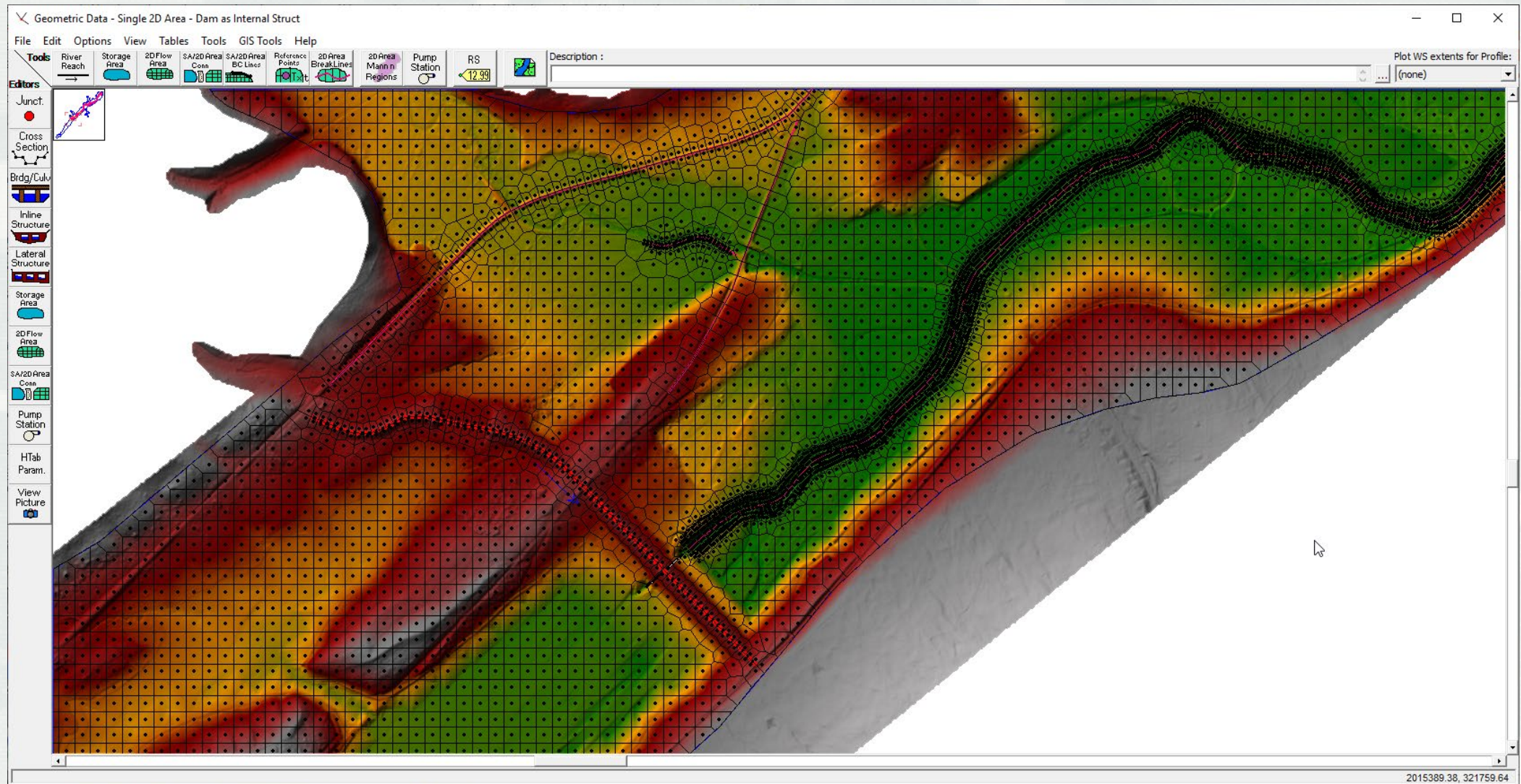
Natomas, California



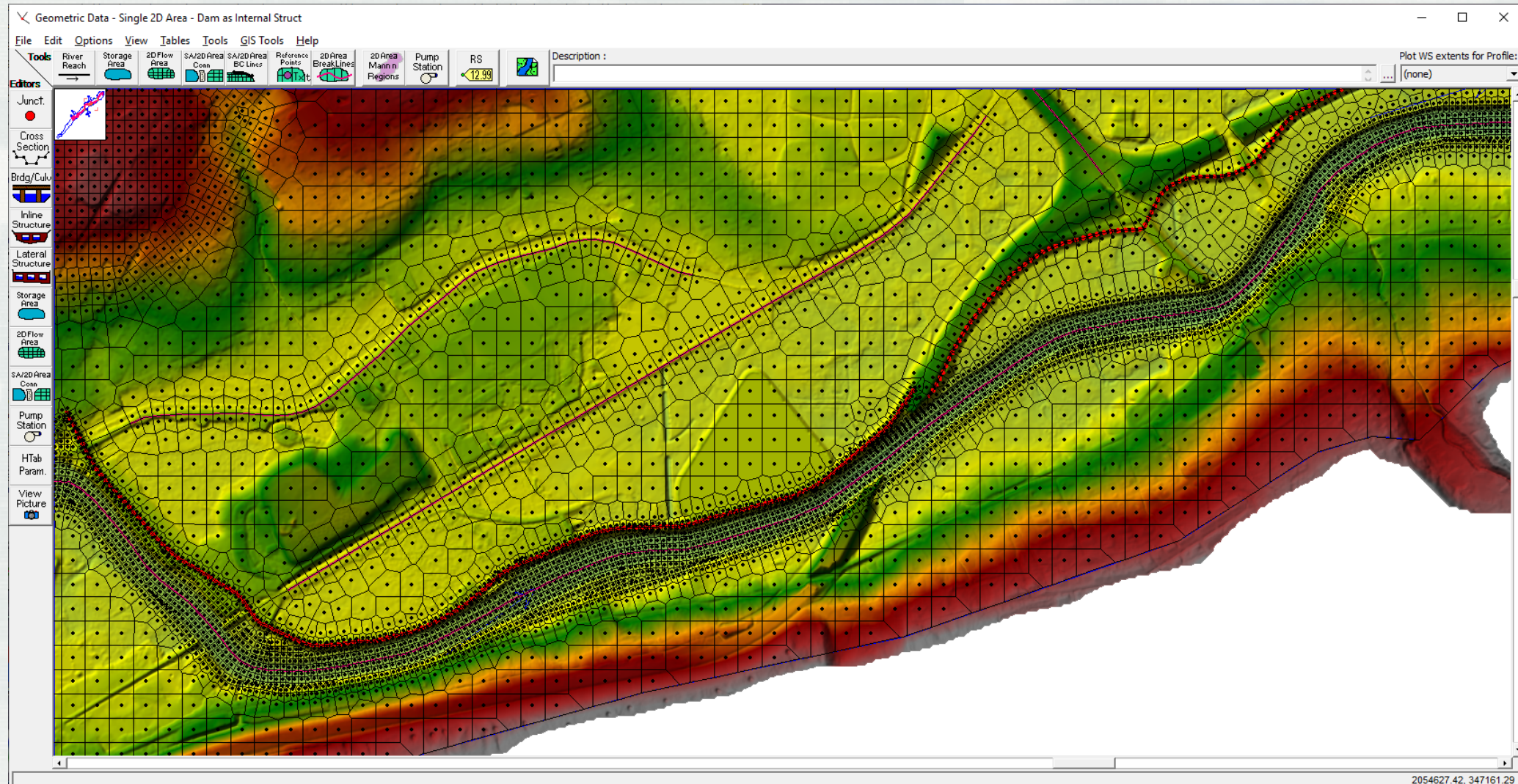
Detailed Model – Single 2D Area



HEC-RAS 2D Flow Area Detailed Computational Mesh



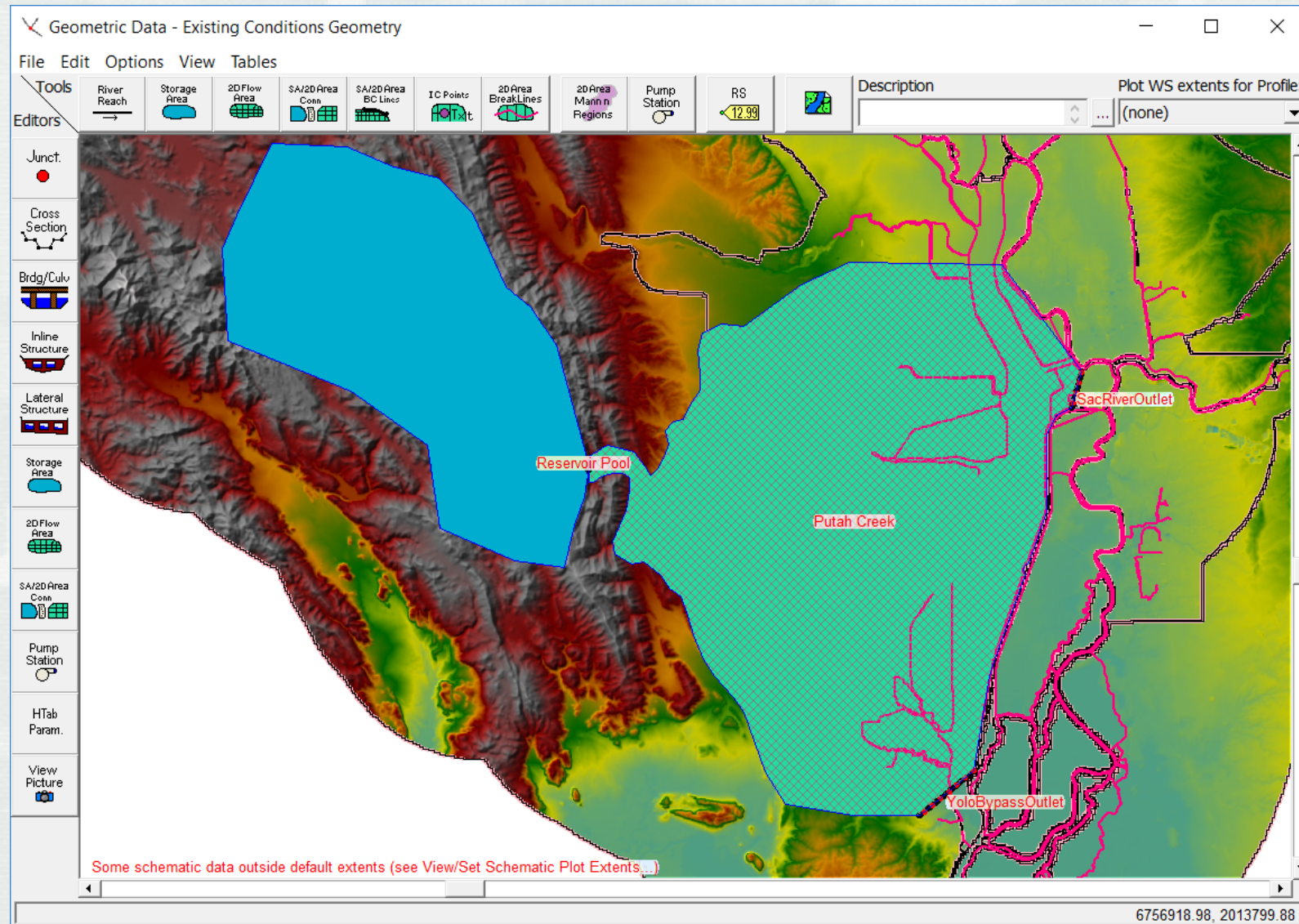
HEC-RAS 2D Flow Area Detailed Computational Mesh



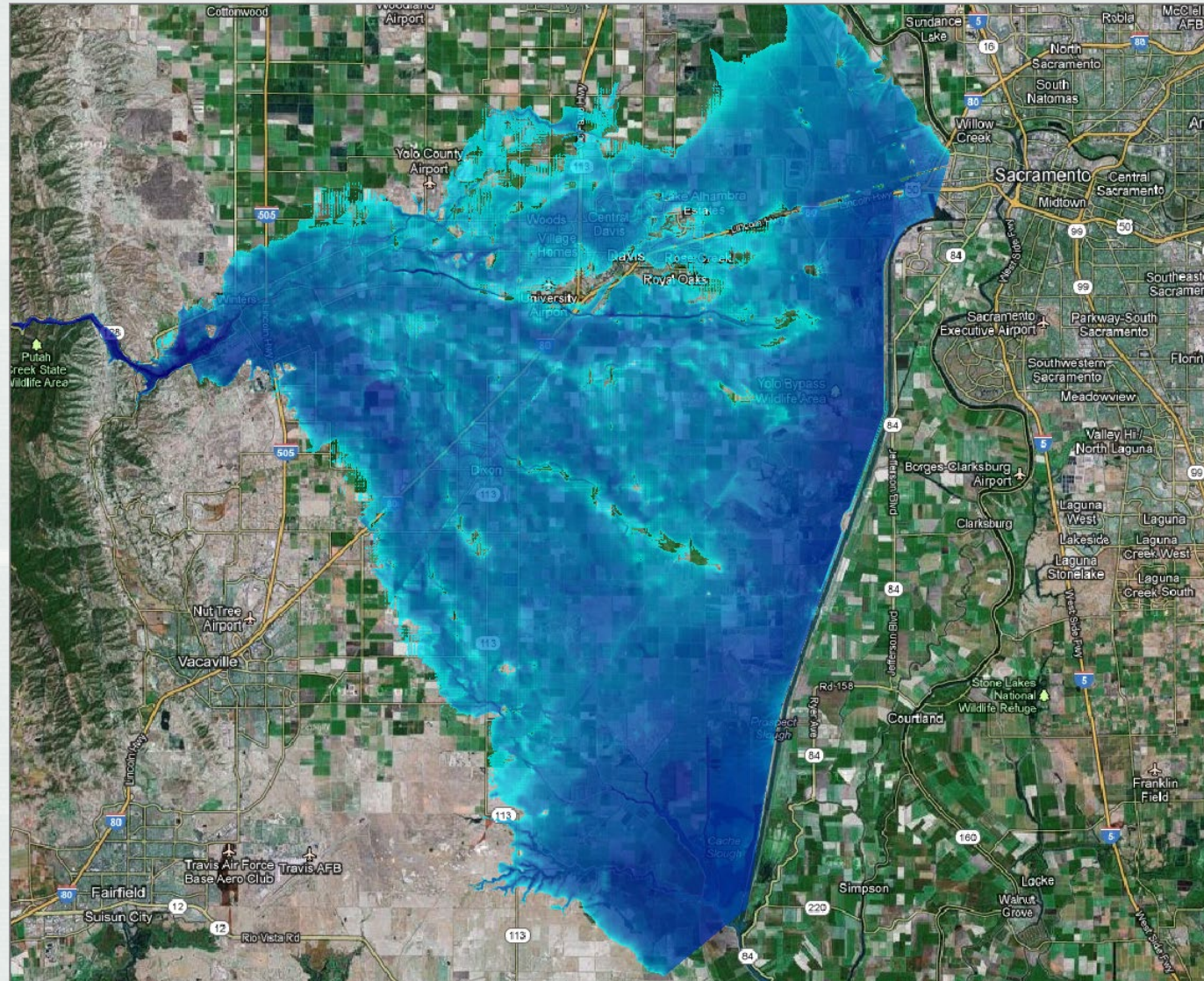
Detailed Model – Single 2D Area - Animation



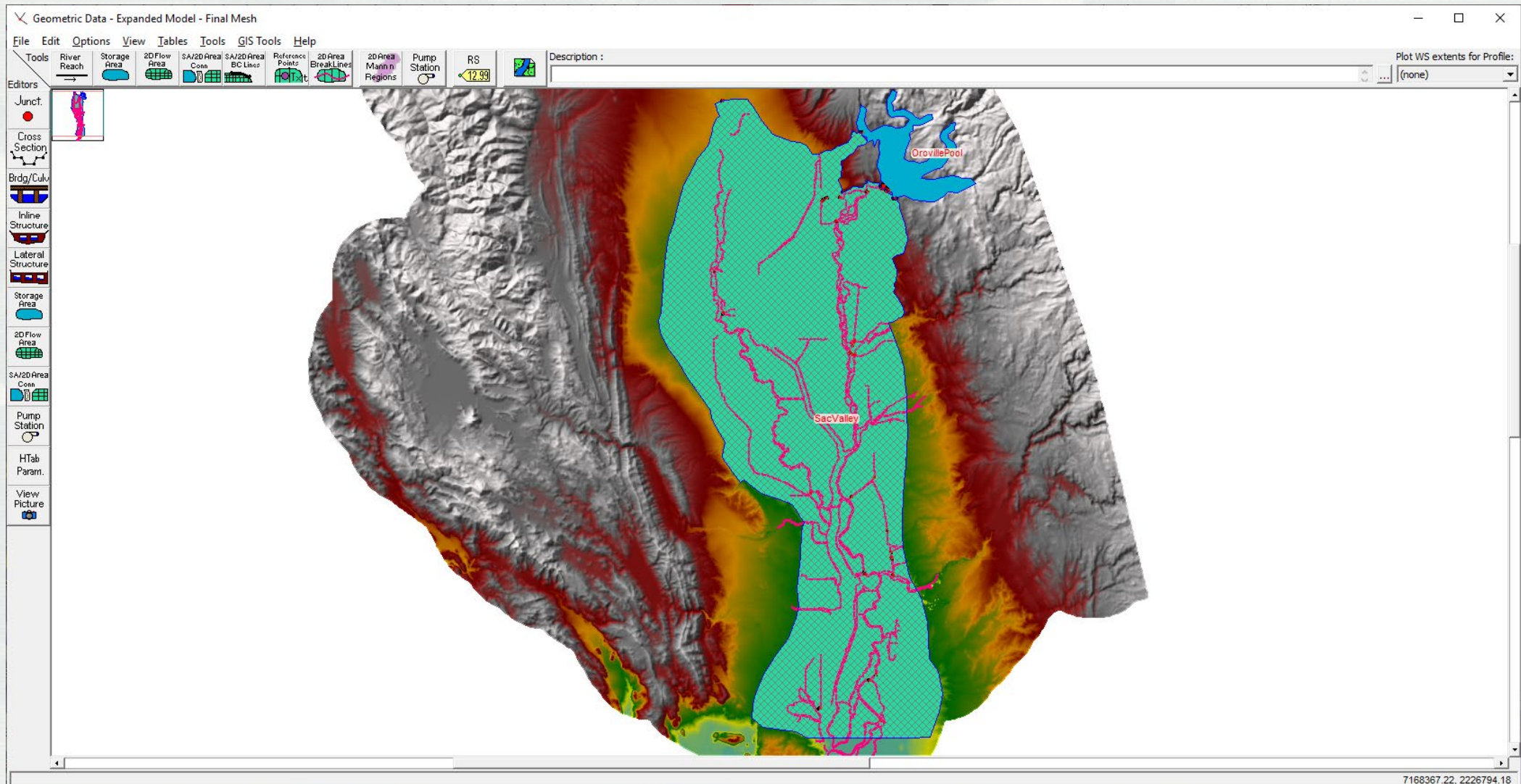
Monticello Dam Breach Example



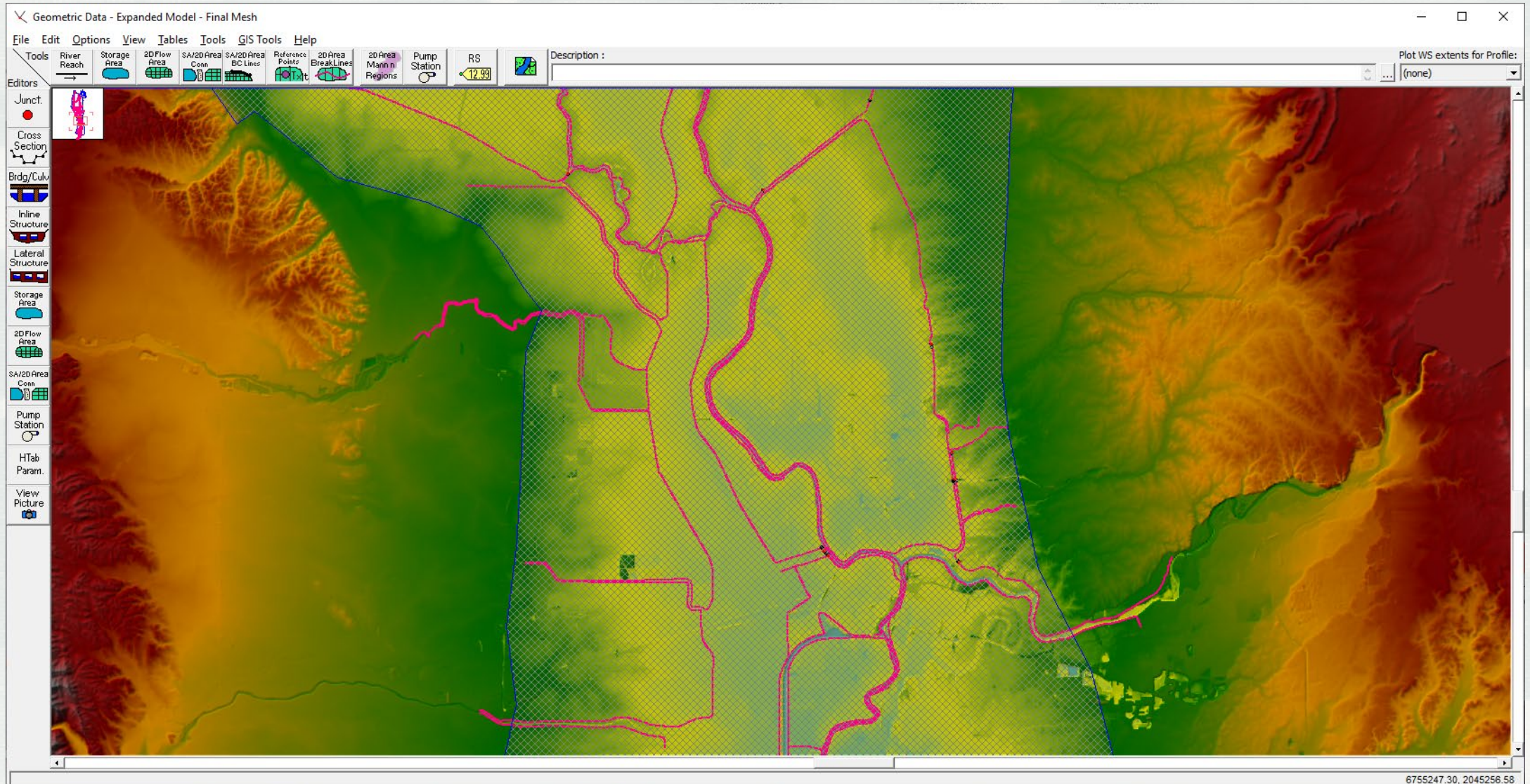
Monticello Dam Breach Example



Oroville Dam – Failure Analysis



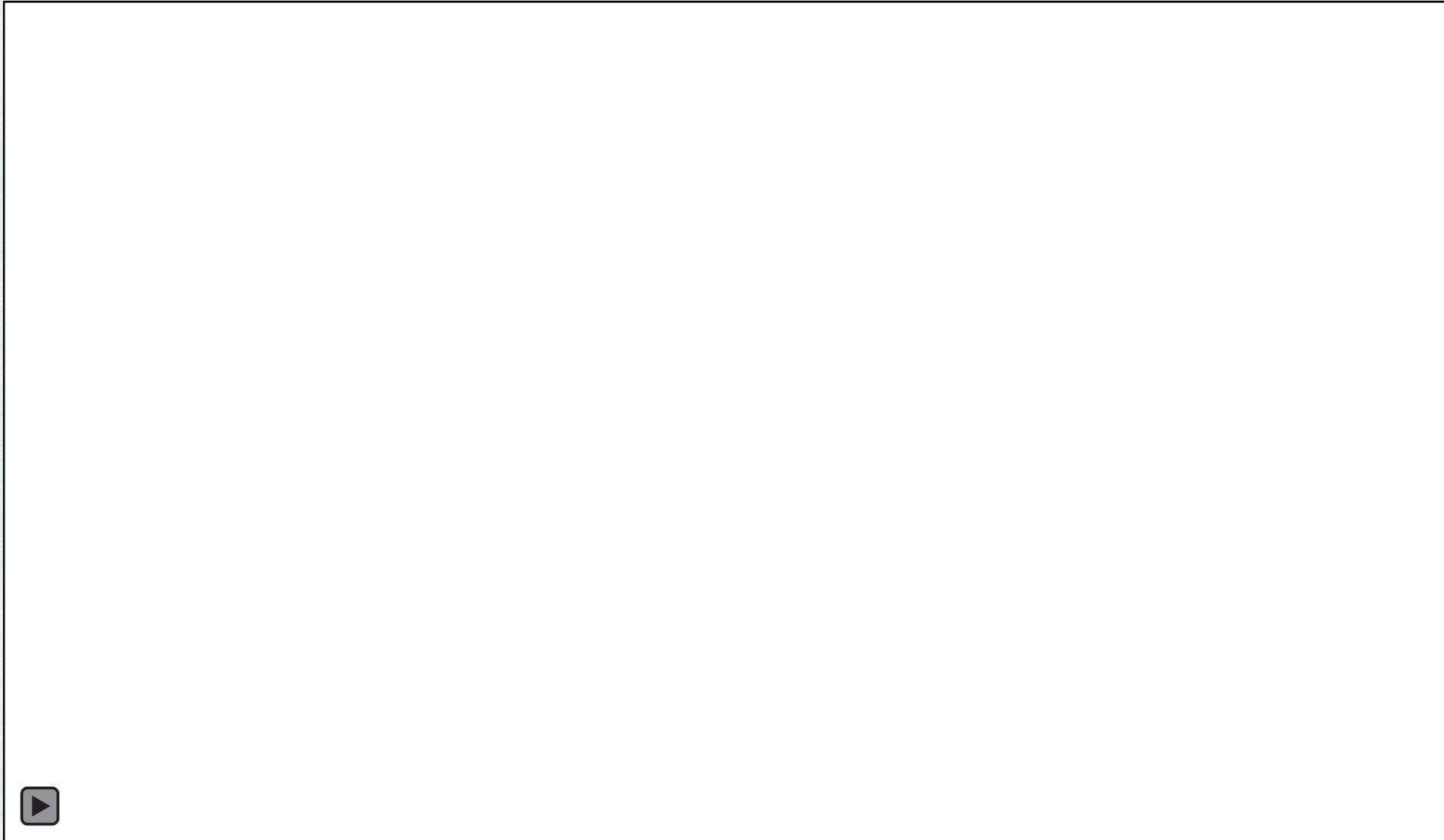
Oroville Dam – Failure Analysis



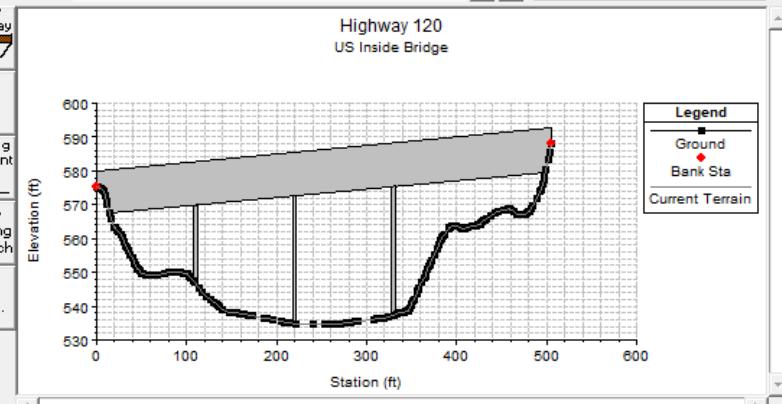
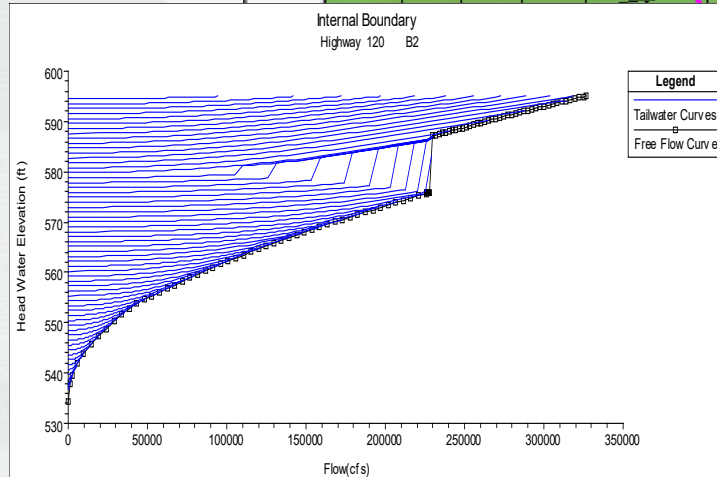
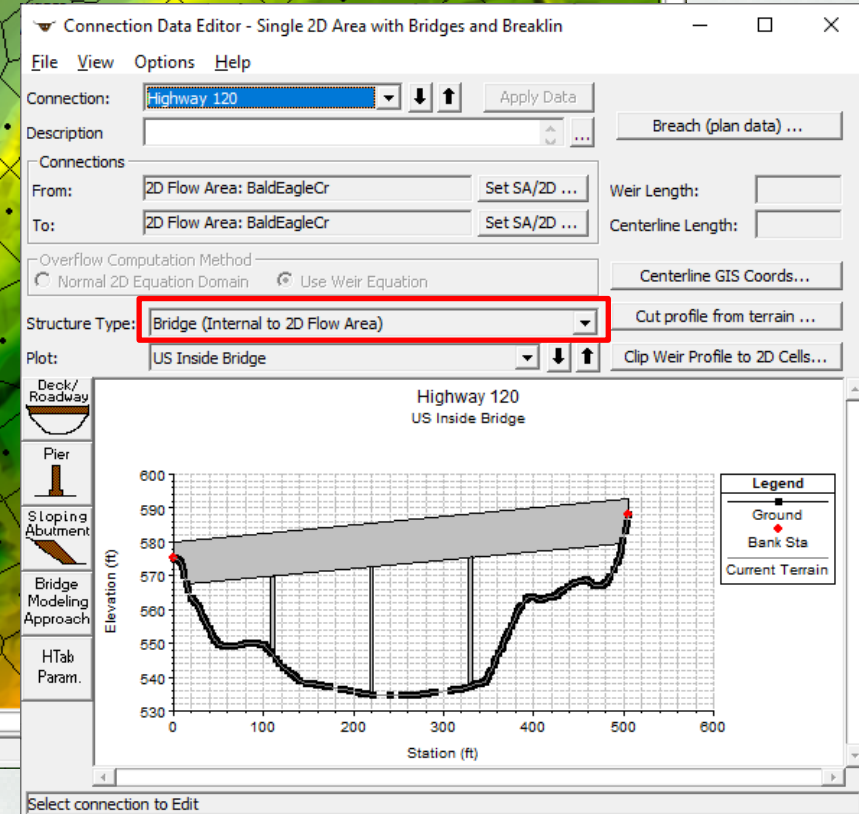
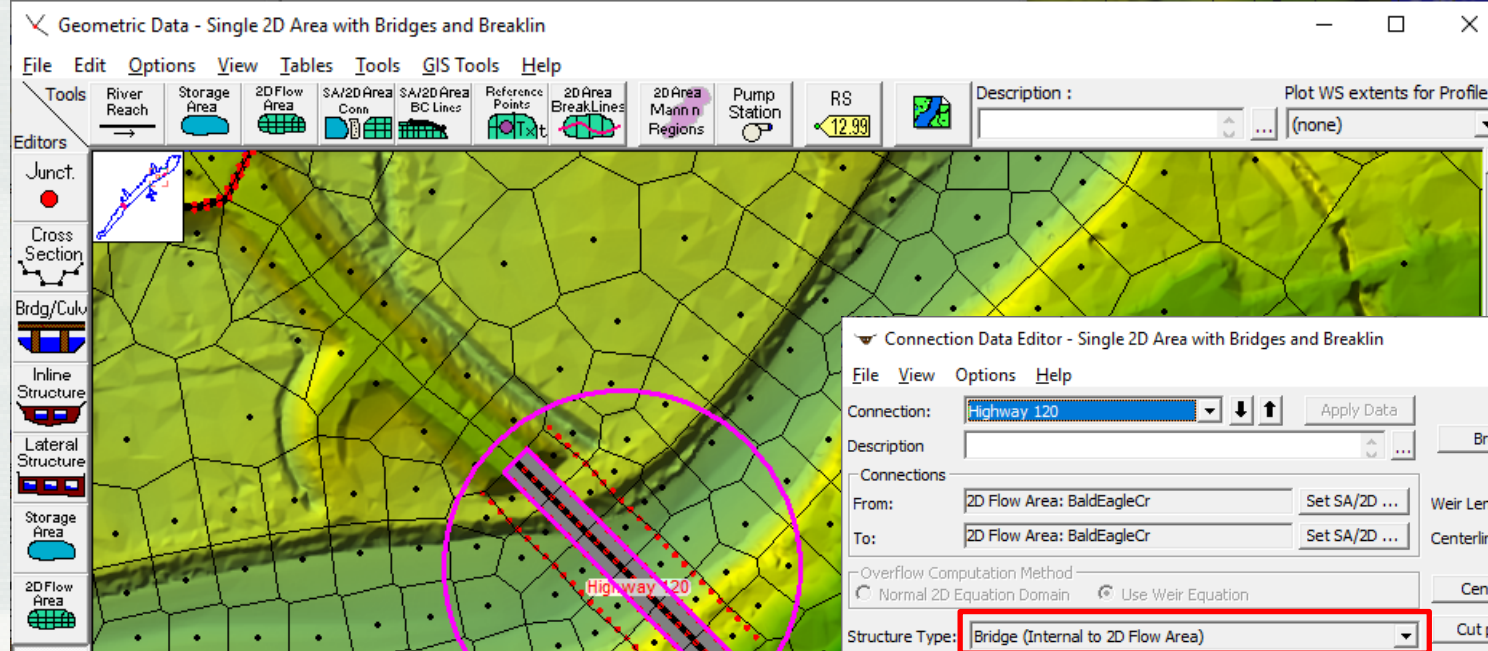
Oroville Dam – Failure Analysis



Oroville Dam – Failure Analysis - Animation



2D Bridge Modeling

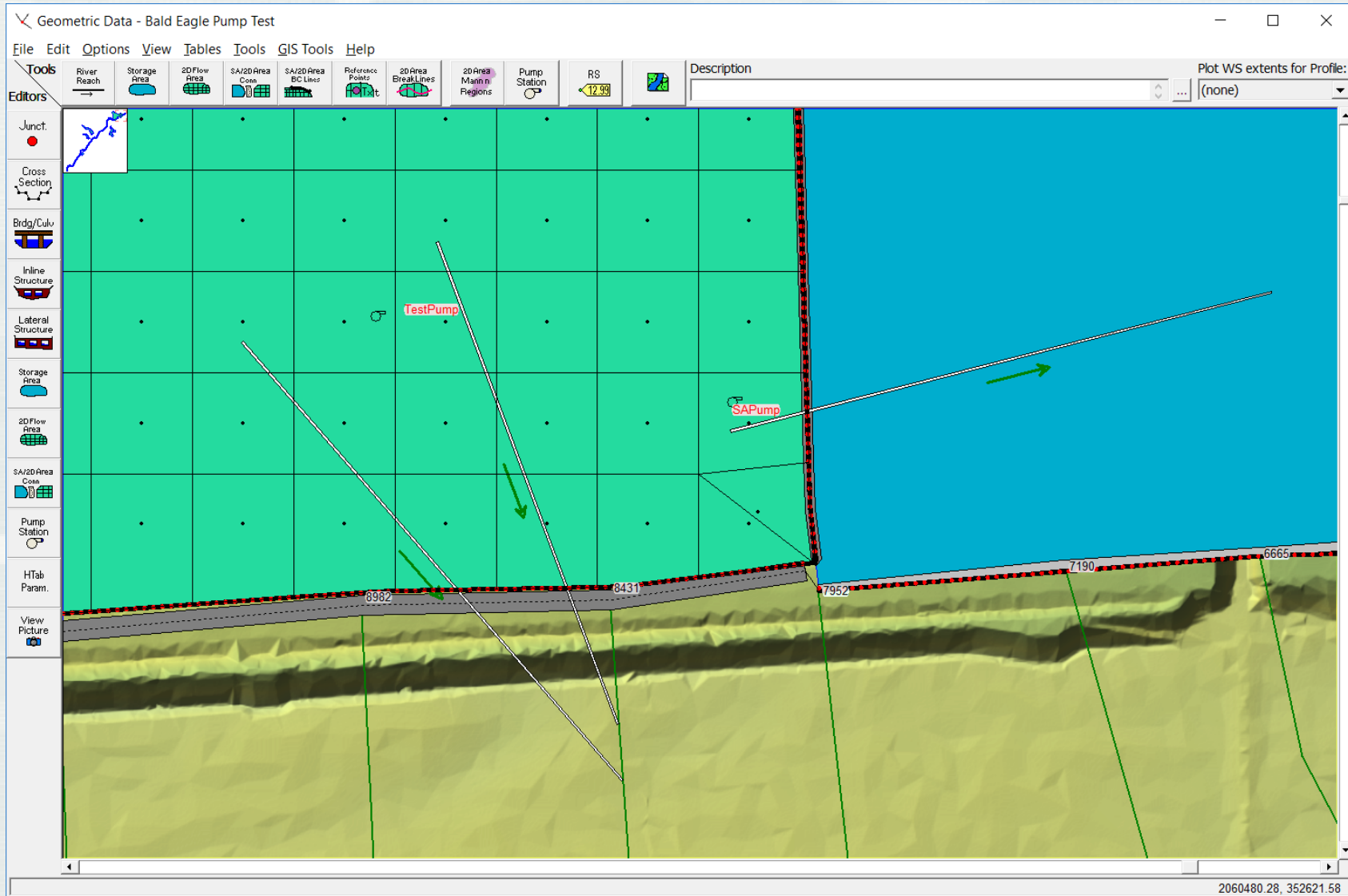


Multiple Bridges





Pump Stations Example



Pump Stations Example



RAS Mapper

File Tools Help

Selected Layer: Depth

Features

- Geometries
- Event Conditions
- Results
 - PMF Multi 2D
 - 1D-2D Refined Grid
 - 2D to 1D No Dam
 - 2D to 2D Run
 - SA to 2D Dam Break
 - Single 2D
 - 2D Levee Struc
 - Detailed 2D to 2D
 - MeshGenProb
 - 1D-2D ND Test
 - Culvert Test
 - PMF Multi 2D NC
 - SA2D Conn Tests
 - PolygonTool
 - PolygonTool V-DT
 - PMF Multi 2D V-DT
 - 1D-2D Vel at BC
 - 1D to 2D Conn
 - Precip Test
 - Pump Test
 - Event Conditions
 - Geometry
 - Depth (Max)**
 - Velocity (01JAN1999 12:00:00)
 - WSE (03JAN1999 20:30:00)
- Map Layers
 - LandUse
 - MainChannelBanks
 - USGS Imagery
 - Google Hybrid
 - street100k_1_pa027
 - street100k_1_pa035
 - NLCD_2016_Impervious_L48_20190
 - NLCD 2016 Land Cover L48 20190

Messages Views Profile Lines Active Featu

(2050014.46, 351039.80 1 pixel = 5.99 feet)

Selected: 'depth' Max

Pump Station Data Editor

Pump Station Name: UpTheHill

Pump Connection Data Pump Group Data Advanced Control Rules

Pump Group: Group #1

Bias group operations to On (at start of simulation)

Startup Time (min): 1

Shutdown Time (min): 1

Width: 5

Number of pumps in this group: 2

Pump Efficiency Curve		
	Head(ft)	Flow(cfs)
1	0	500
2	1	475
3	10	400
4	20	350
5	30	300
6	50	200
7	60	150

Pump Names and Base WSEL On/Off			
	Pump Name	WS Elev On (ft)	WS Elev Off (ft)
1	Pump #1	557	555
2	Pump #2	560	558

Pump GIS Data: Pump #2
Length: 6276.3

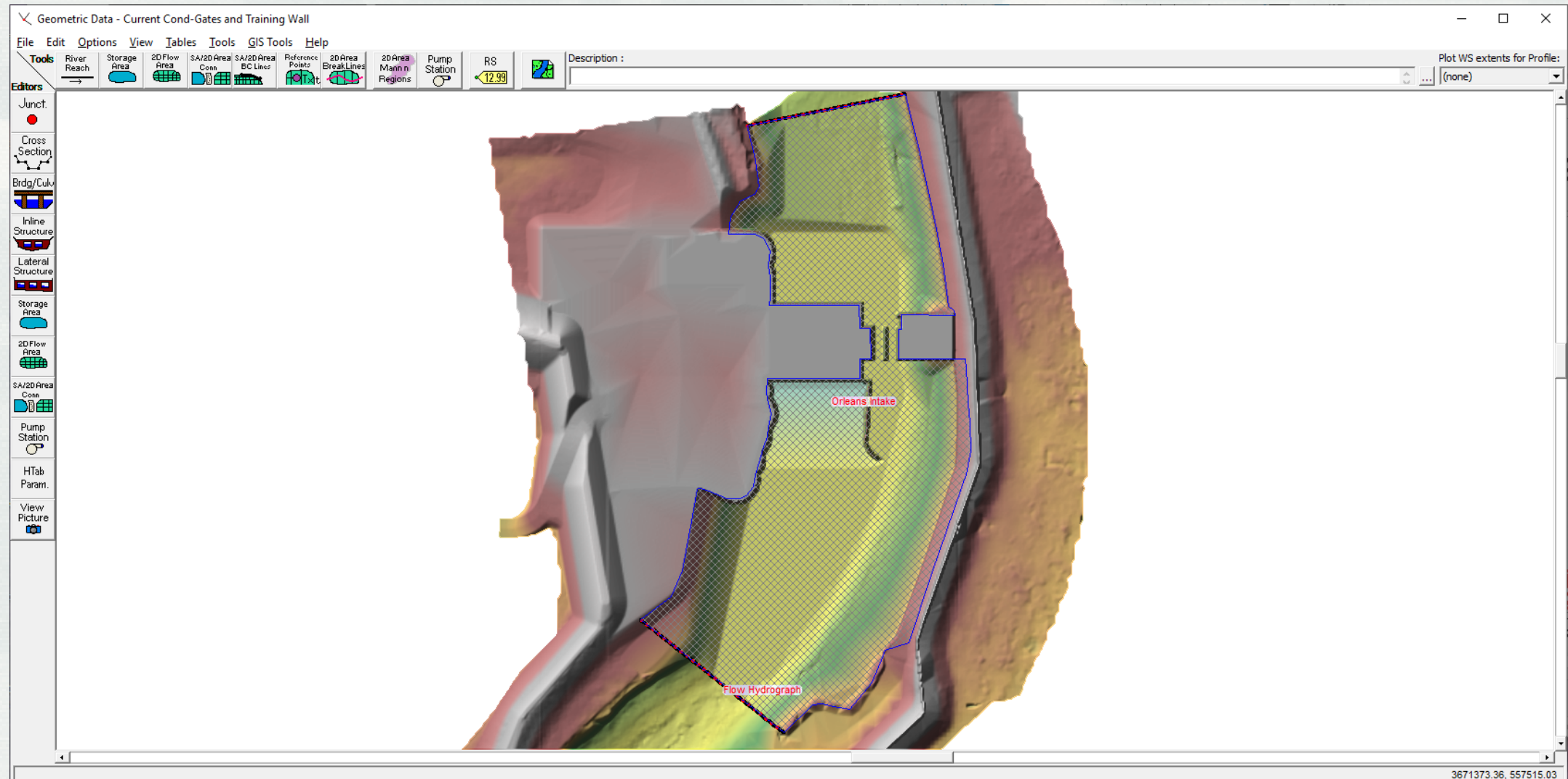
	X	Y
1	2053057.4	351219.88
2	2051849.49	350828.12
3	2050158.42	350971.76
4	2049048.46	350913
5	2048193.13	351167.64
6	2046972.16	350958.71
7	2046050.11	350802.41

Plot Pump Efficiency Curves ...

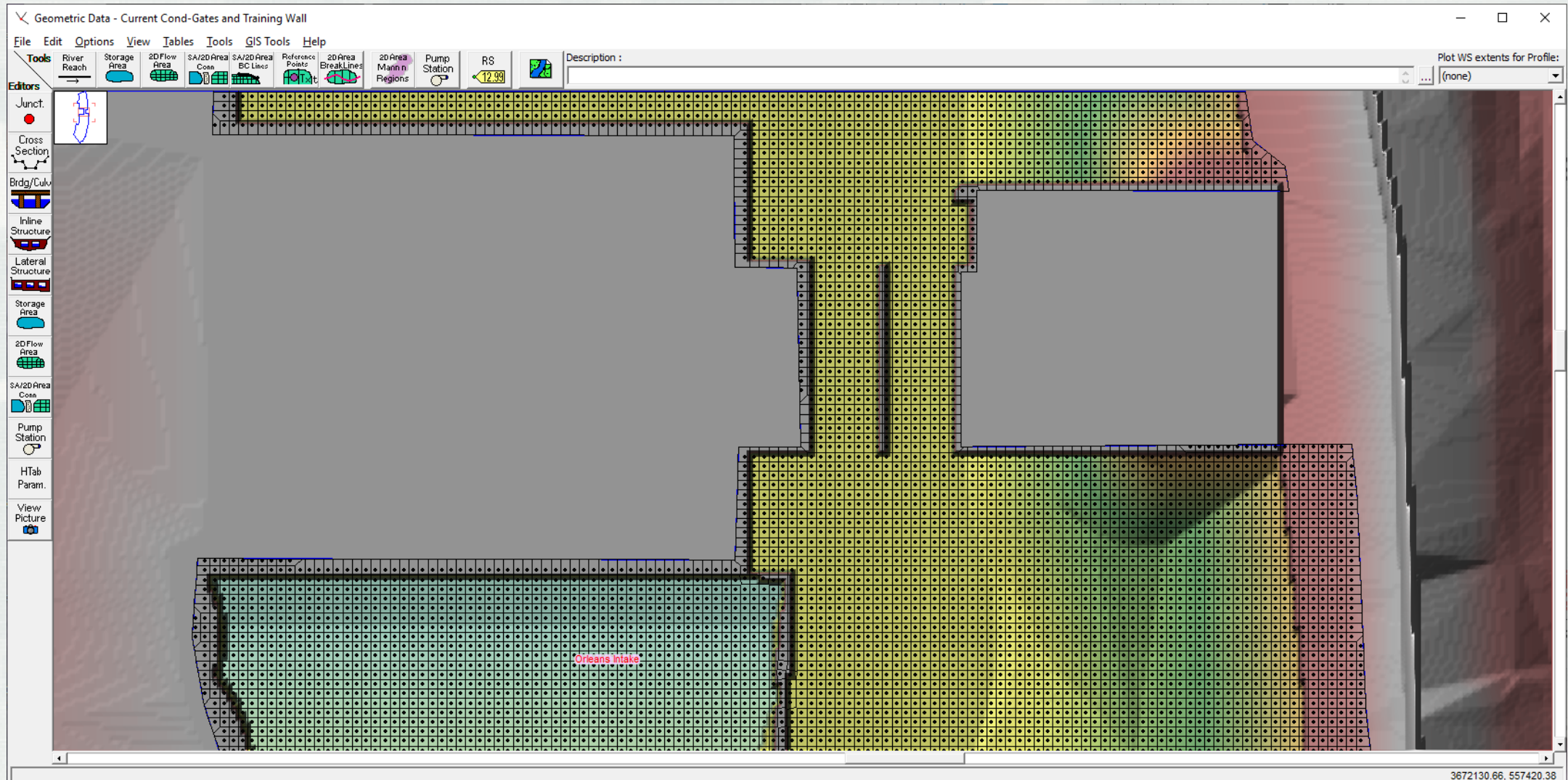
OK Cancel



Detailed Modeling of Gates – Orleans Canal



Detailed Modeling of Gates – Orleans Canal



Orleans Canal - Animation



Gridded Precipitation and Infiltration example



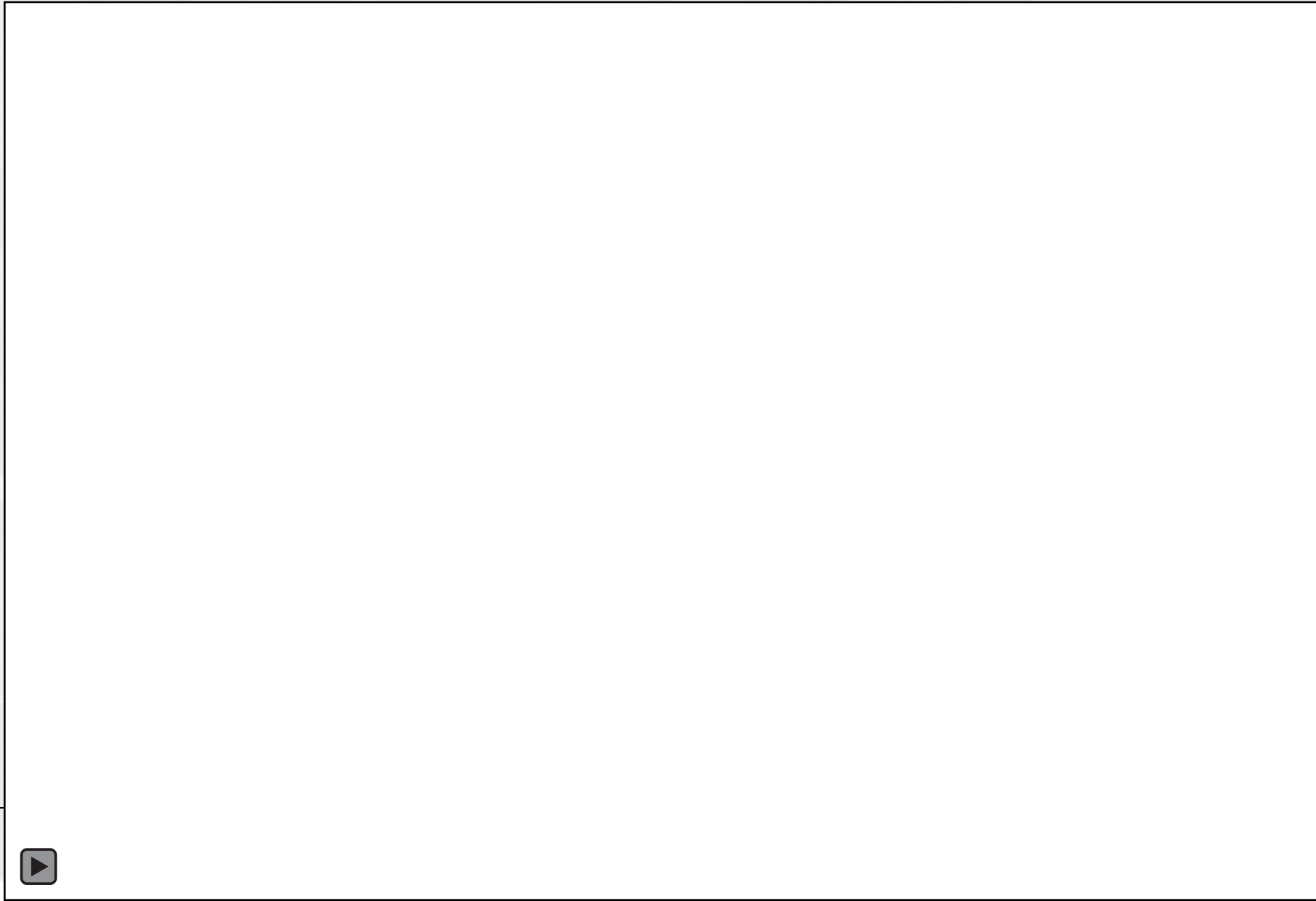
Hurricane Laura Precipitation



Hurricane Laura Wind Field



Hurricane Laura Water Surface



Questions?