

Overview of 2D Unsteady Flow Modeling with HEC-RAS

Stanford Gibson, PhD

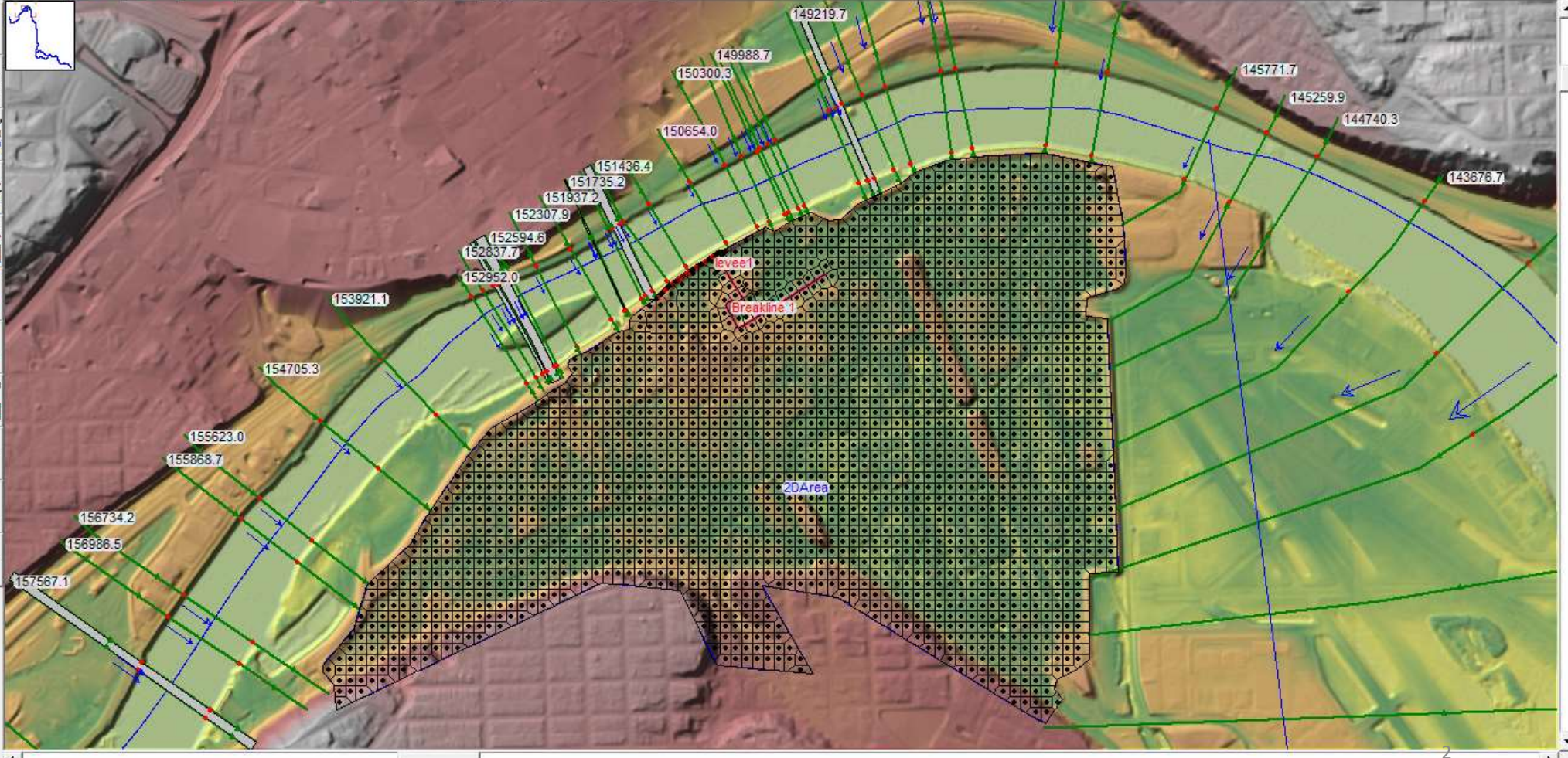
Models by:

Gary Brunner, P.E., D. WRE, M.ASCE



1D Model with a 2D Levee Area

- Junct.
- Cross Section
- Brdg/Culv
- Inline Structure
- Lateral Structure
- Storage Area
- 2D Flow Area
- SA/2D Area Conn
- Pump Station
- HTab Param.
- View Picture



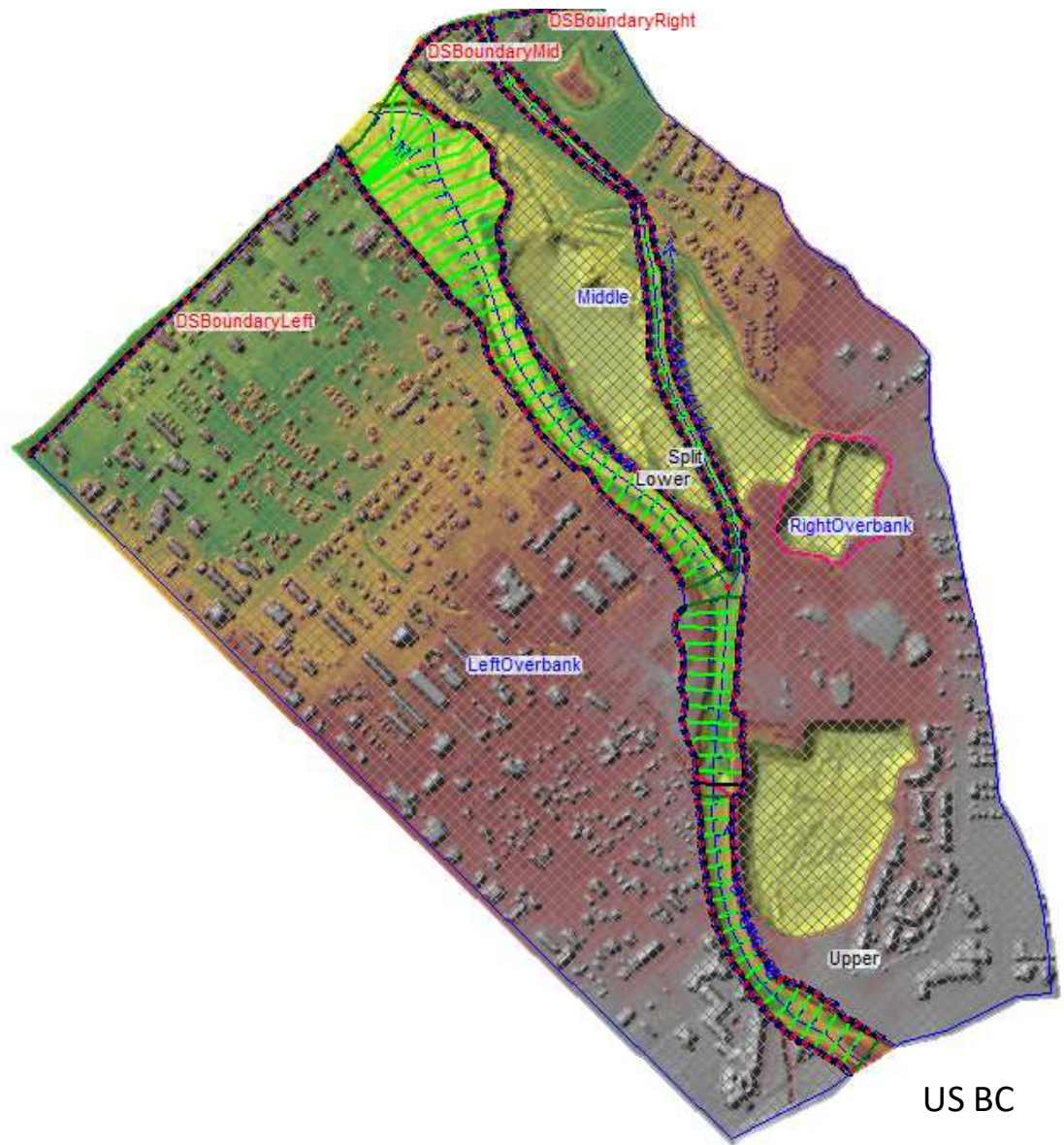


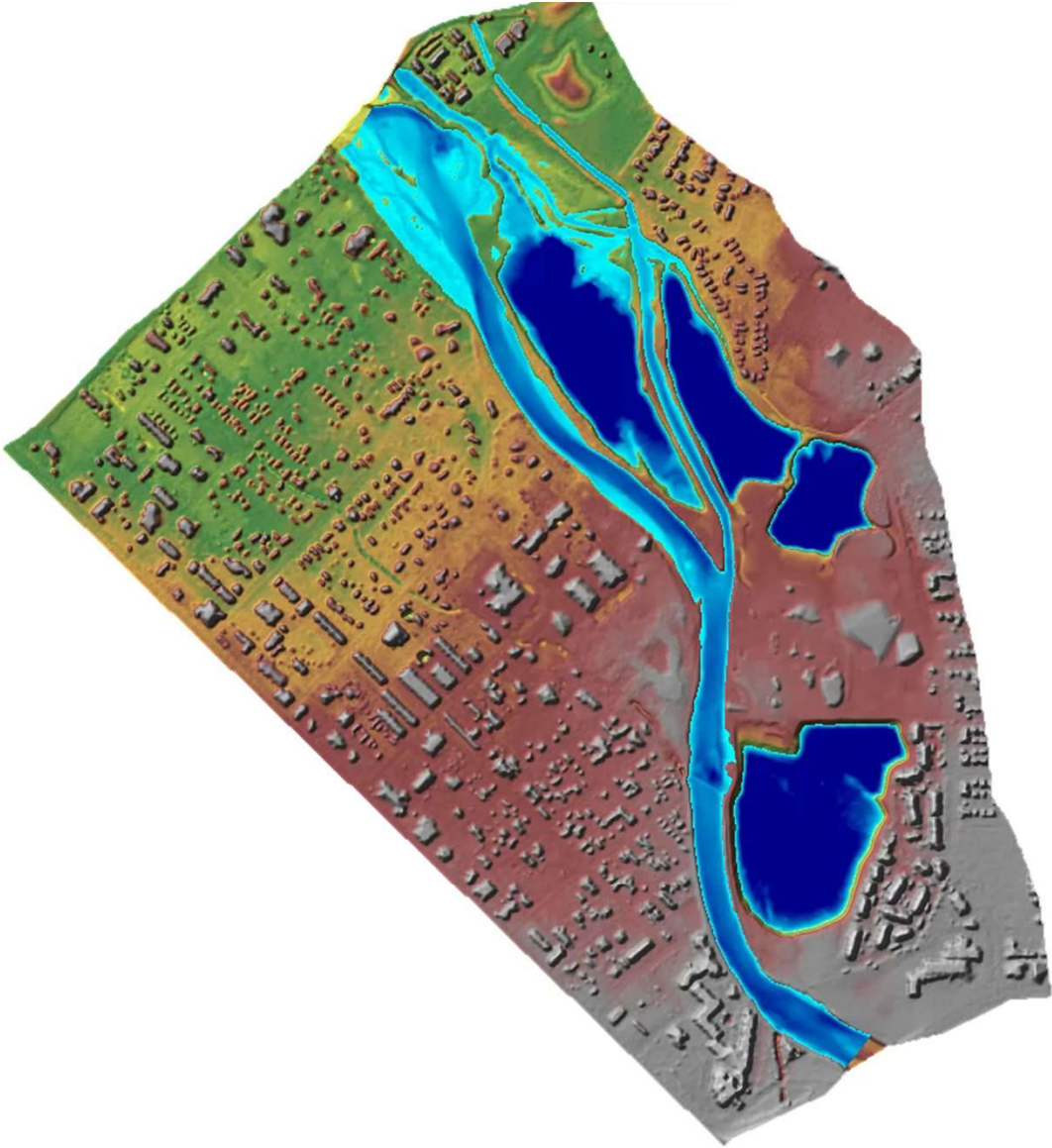
Selected: Depth

121 E02055 23.33.00



1000 ft

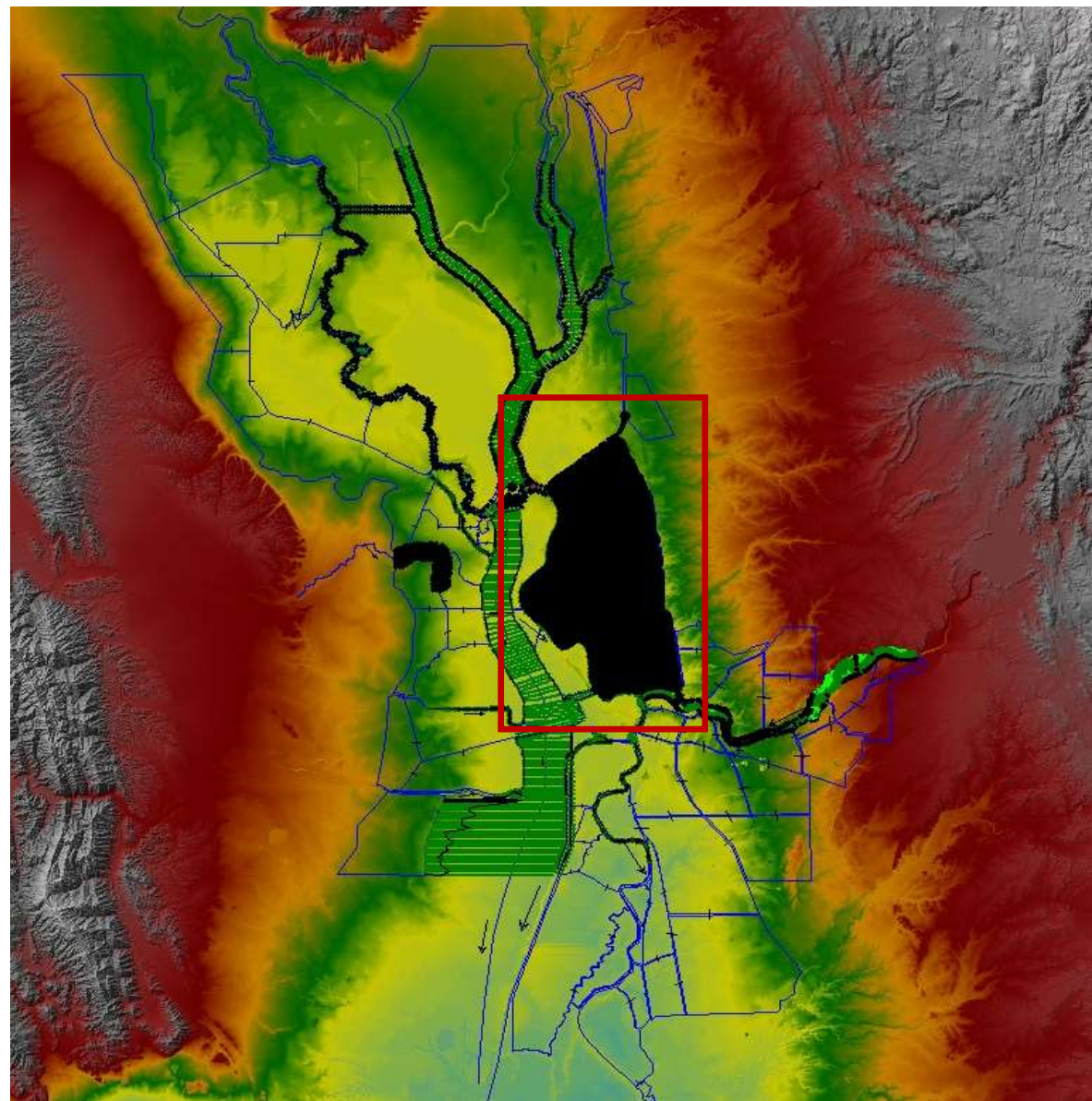




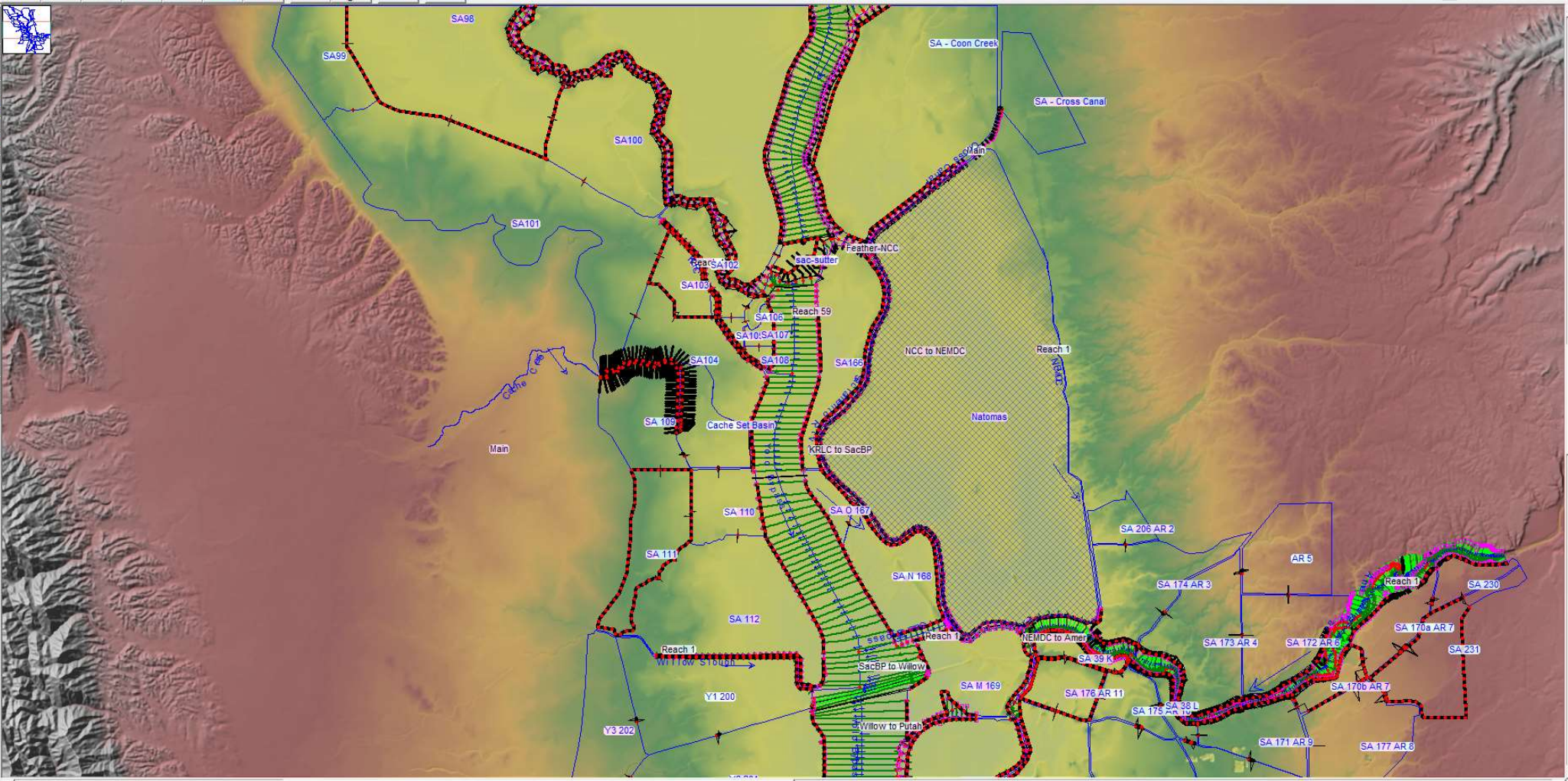
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1000 ft

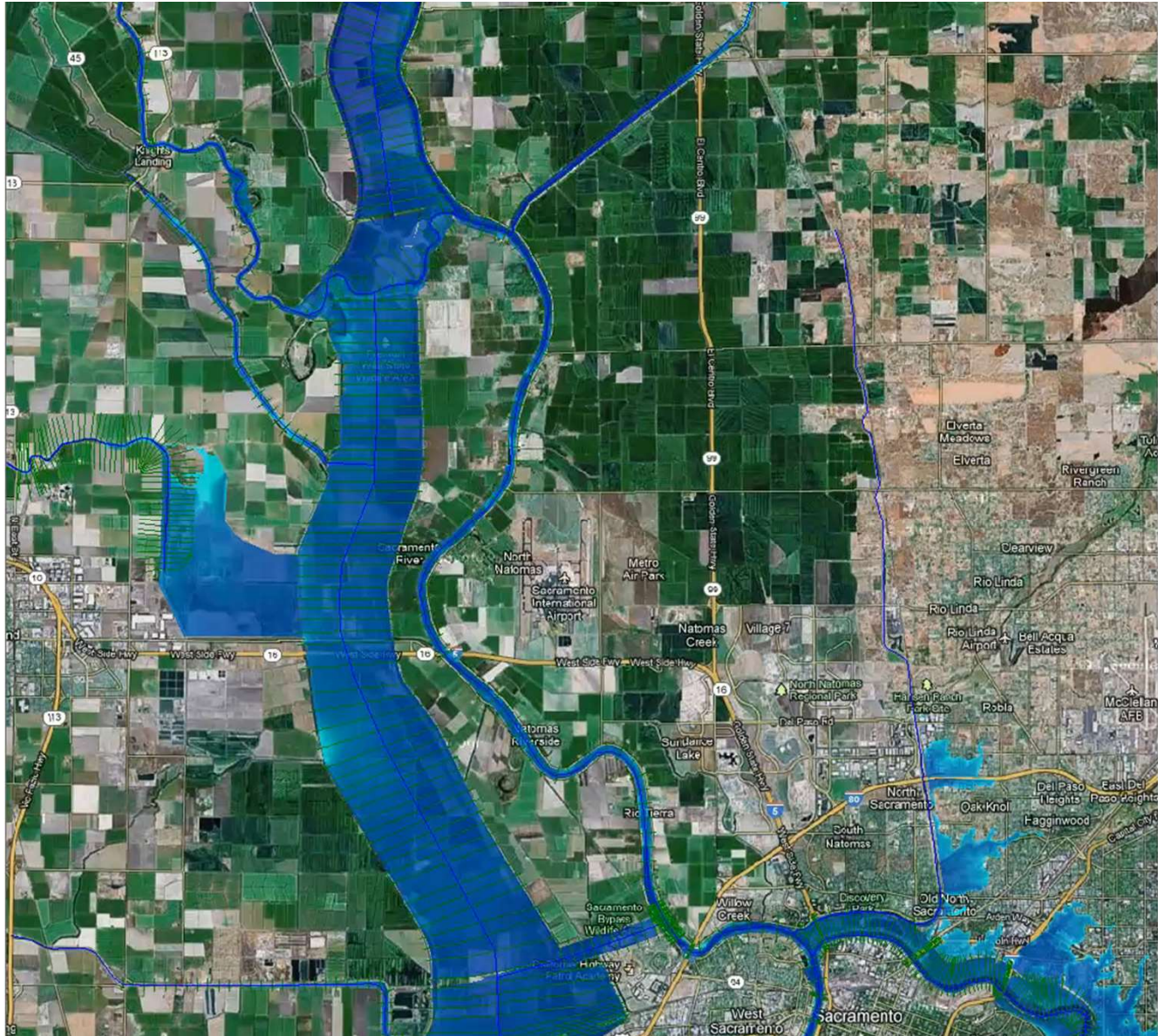
Detailed 1D/2D Model Sacramento River System Model

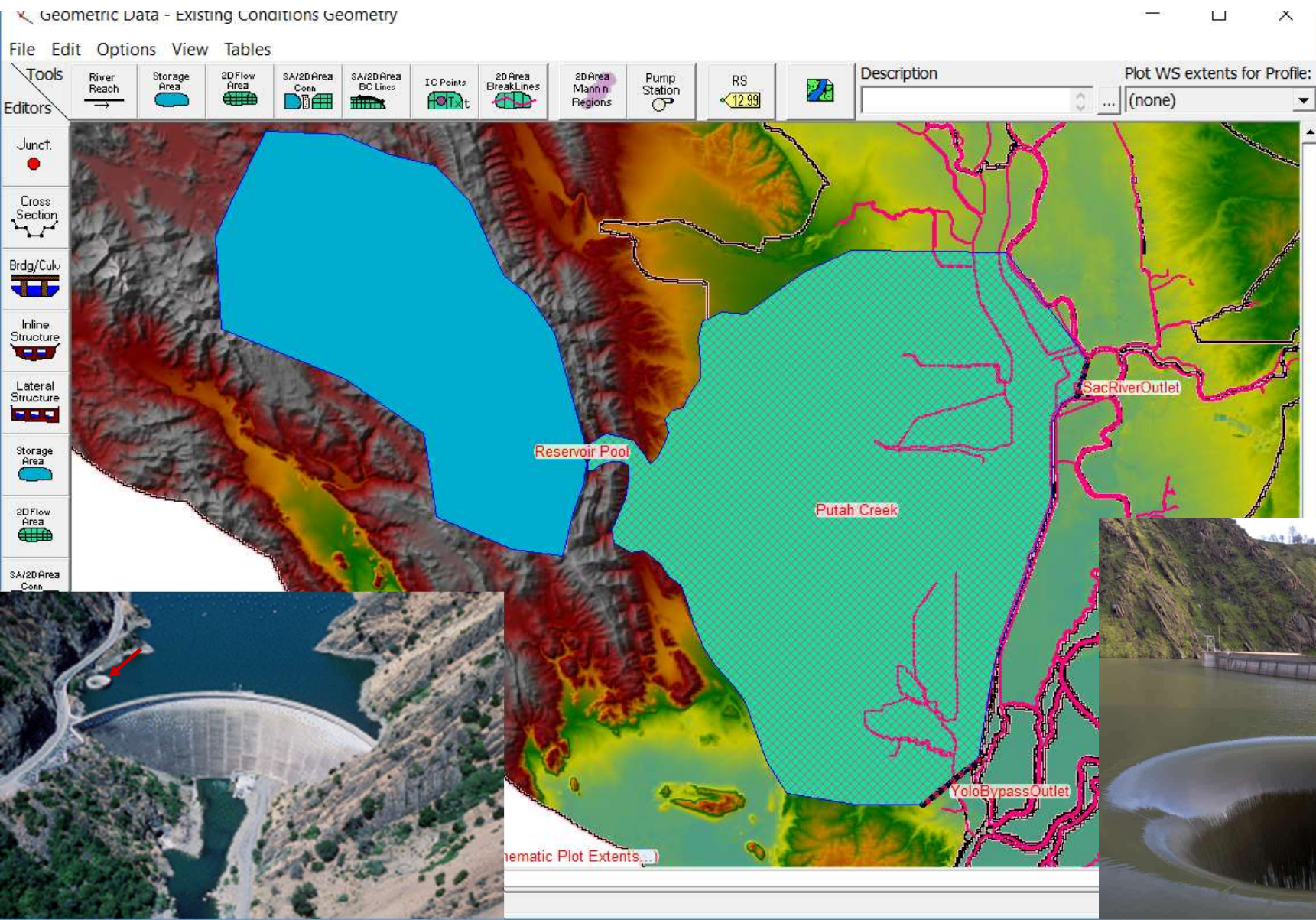


- Editors
- Junct.
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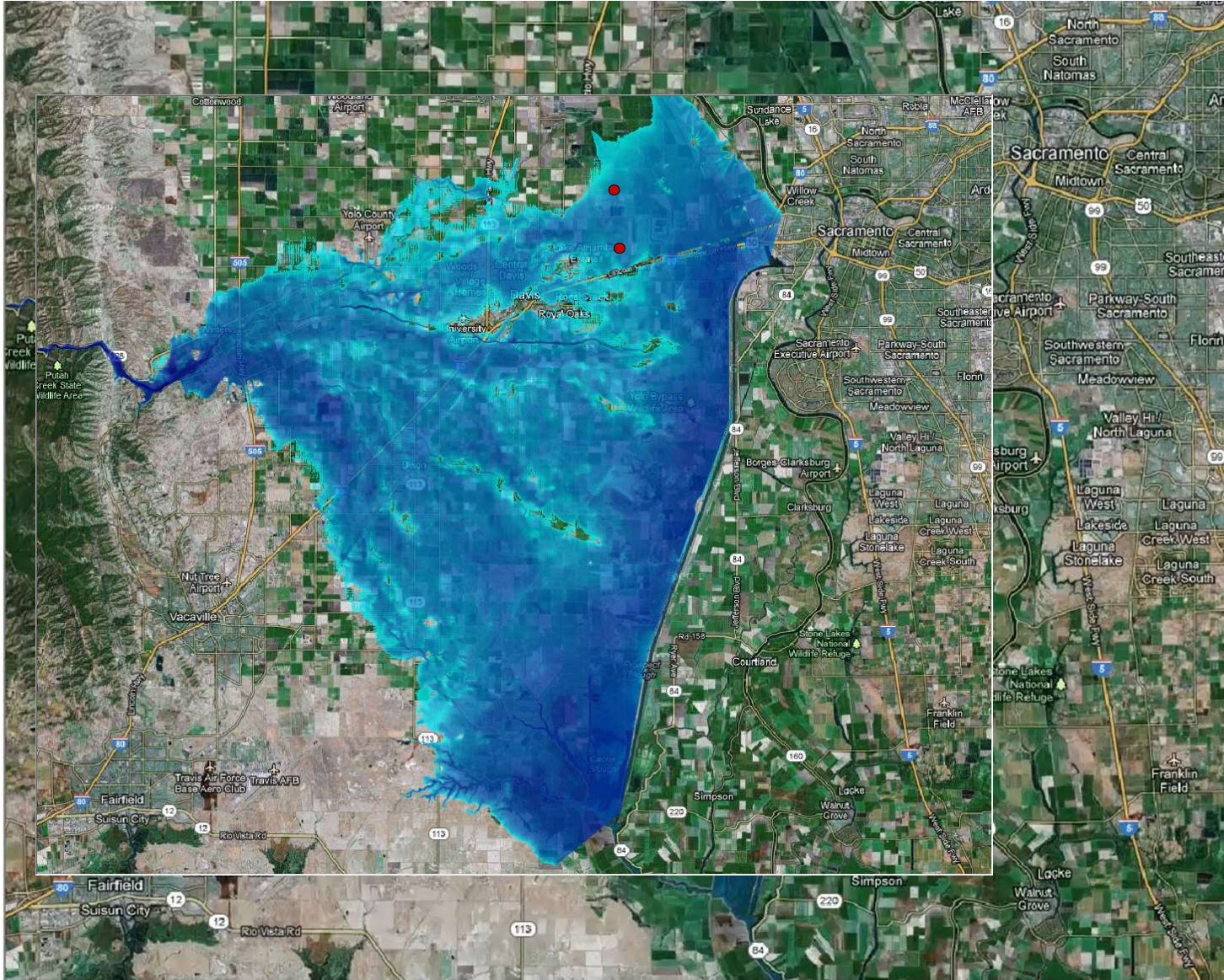


Natomas, California



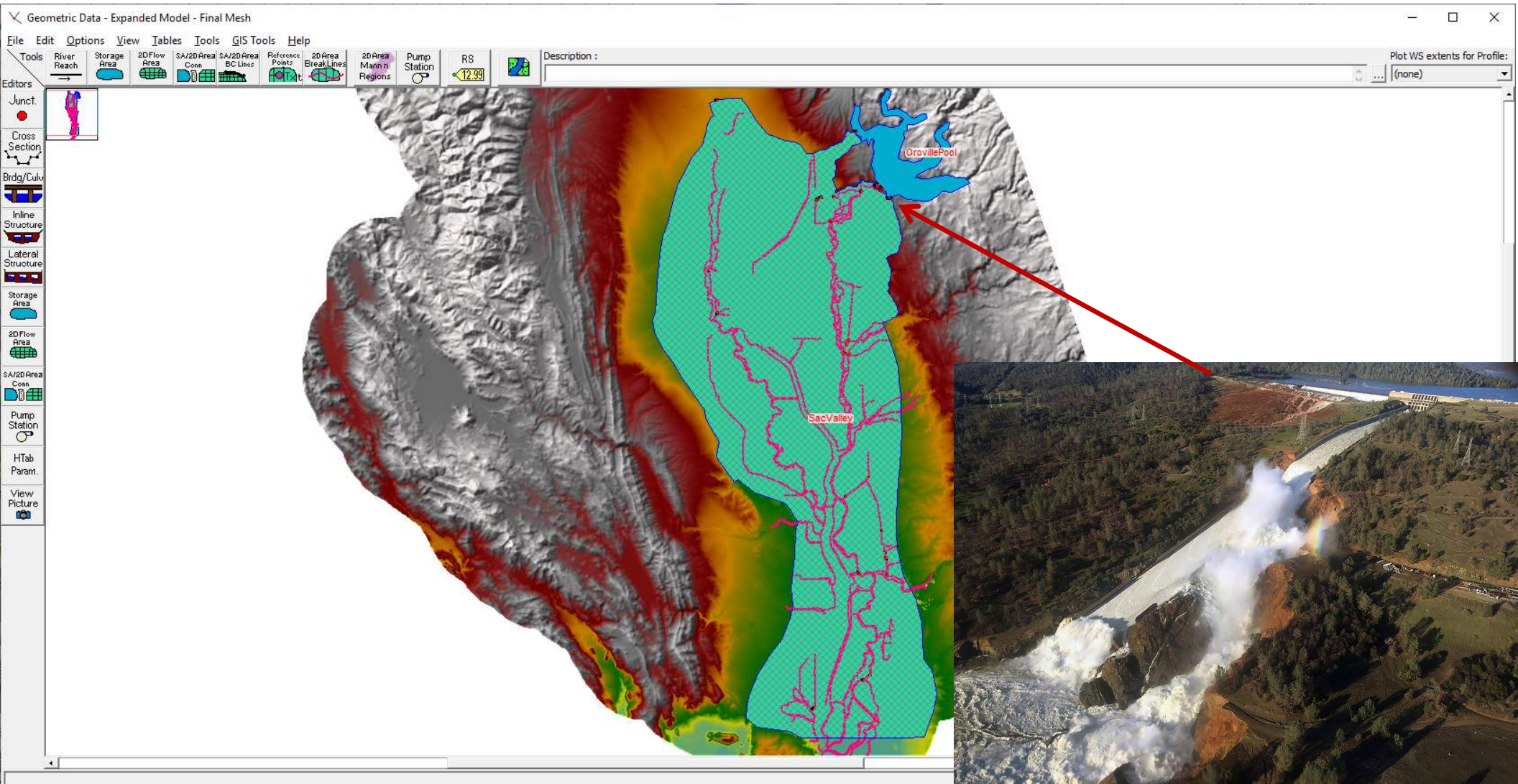


Monticello Dam Breach Example

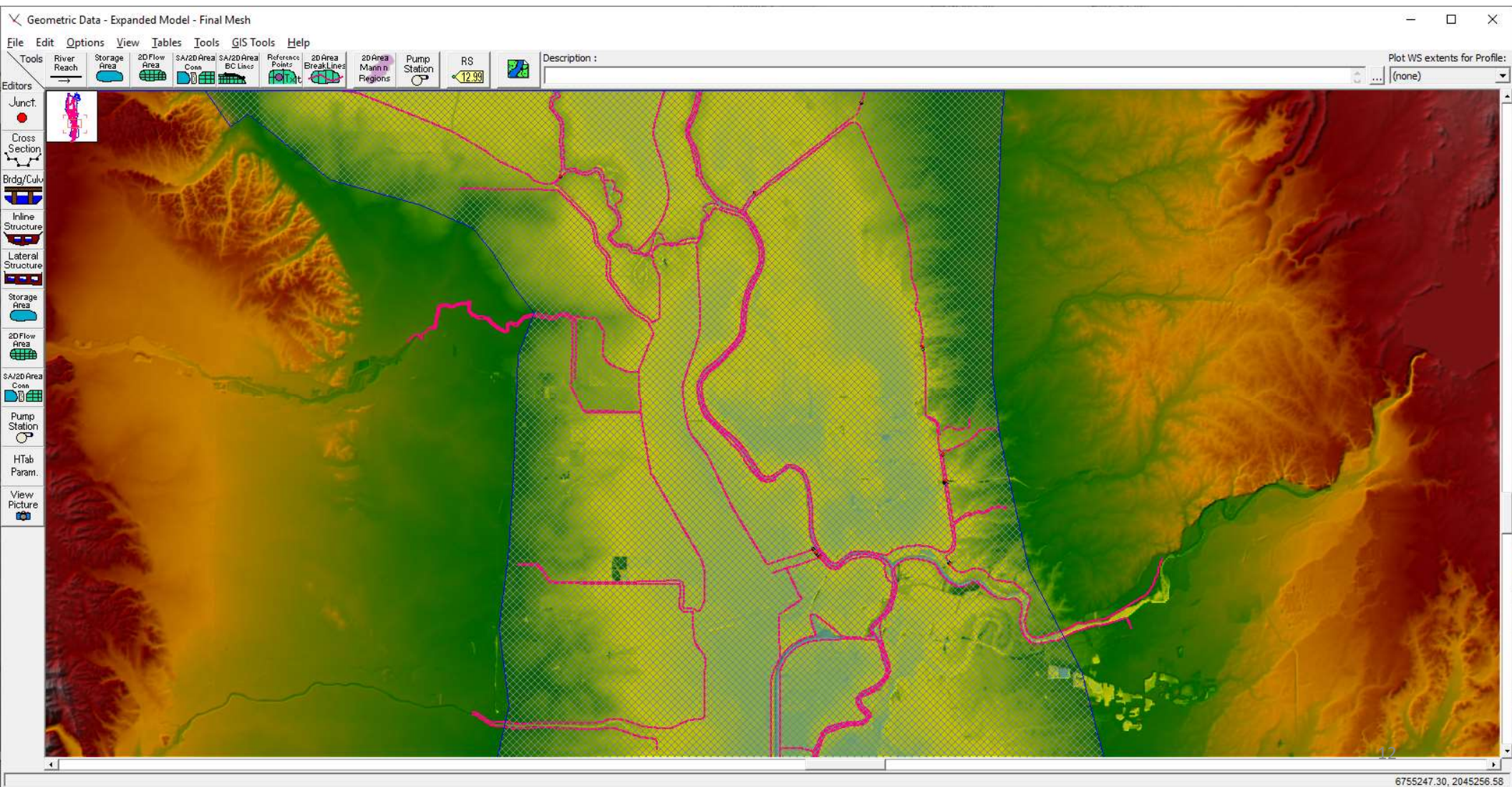


Monticello Dam Breach Example

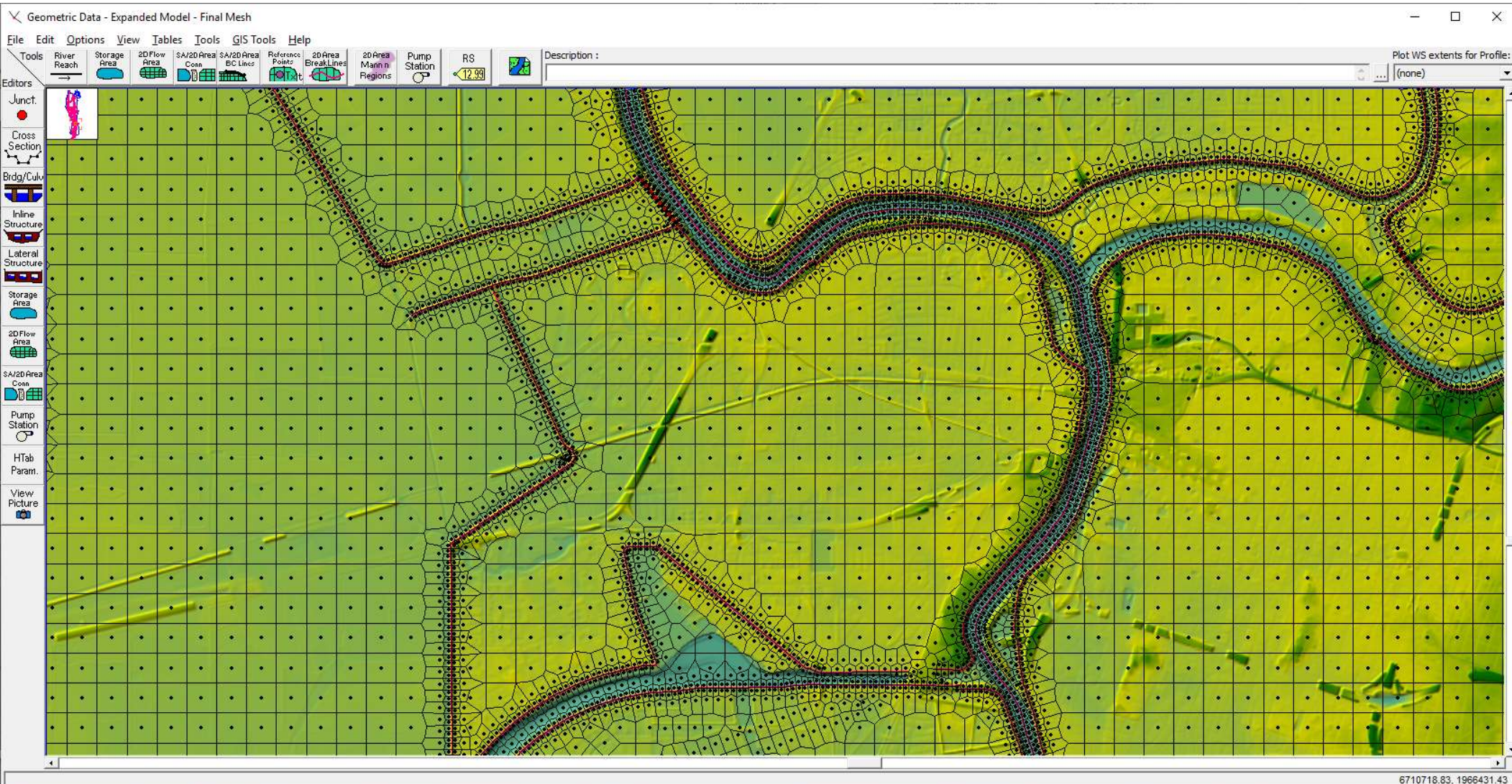
Oroville Dam – Failure Analysis

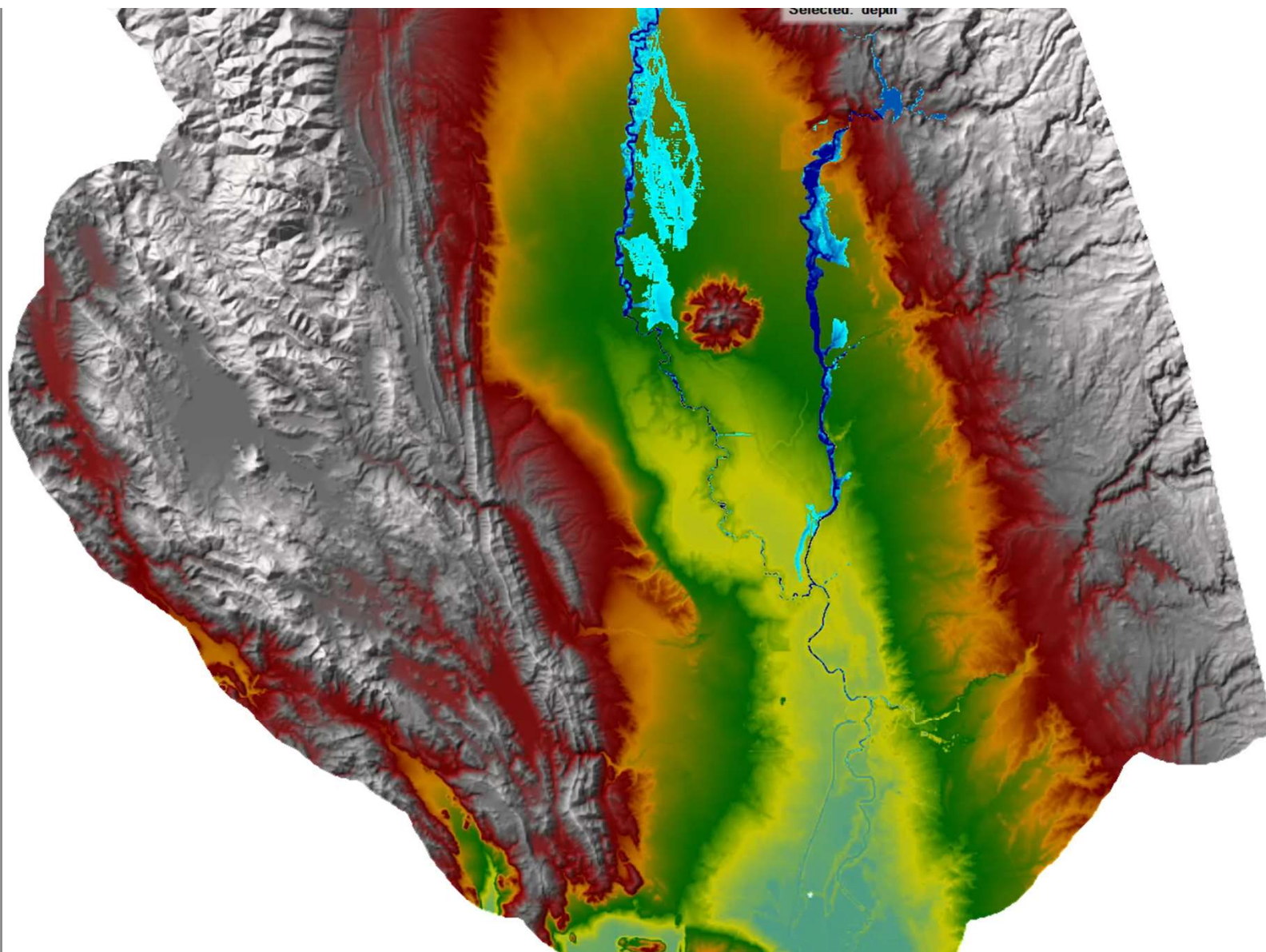


Oroville Dam – Failure Analysis



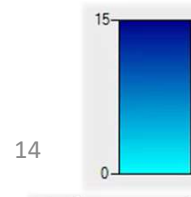
Oroville Dam – Failure Analysis



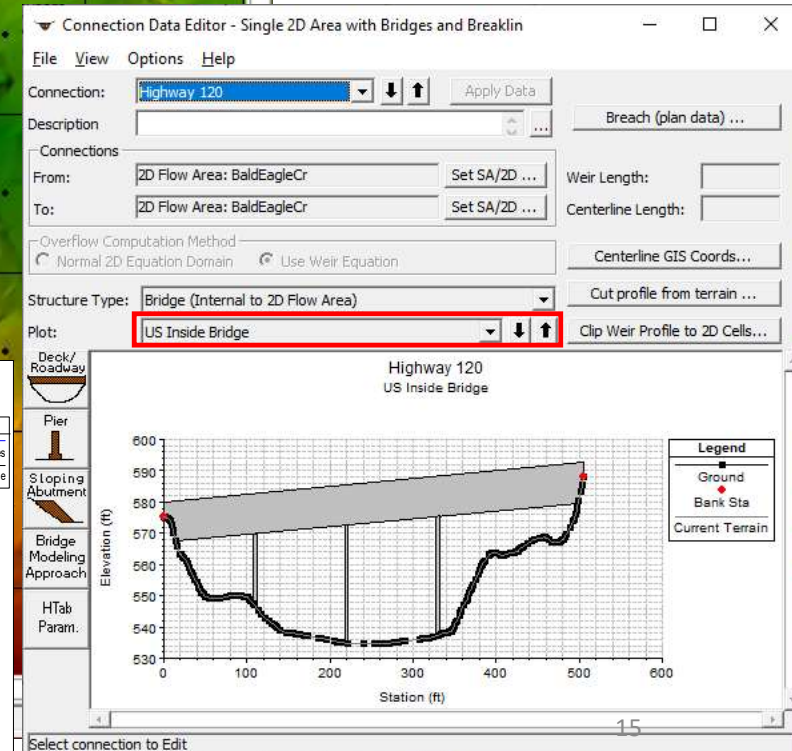
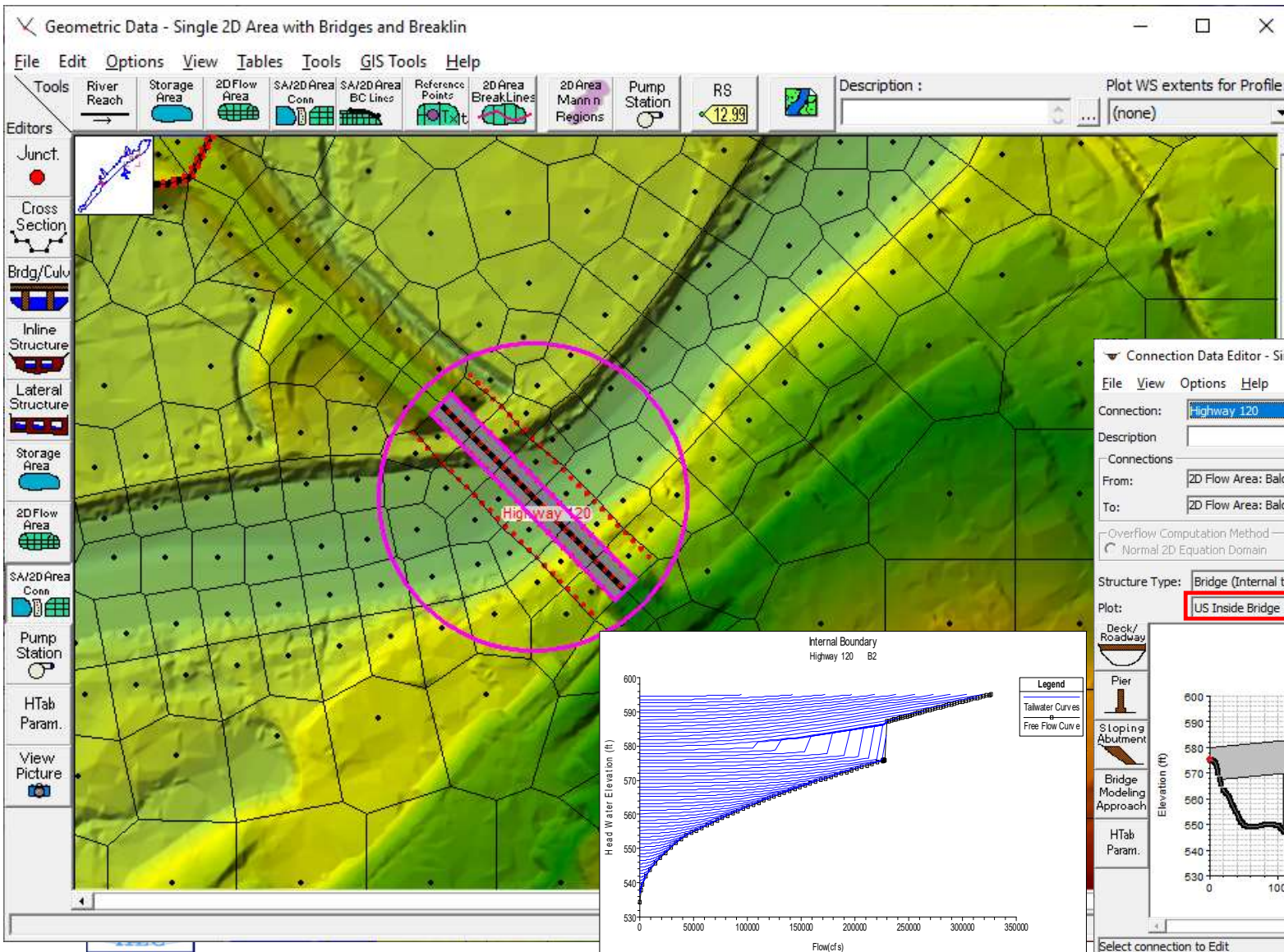


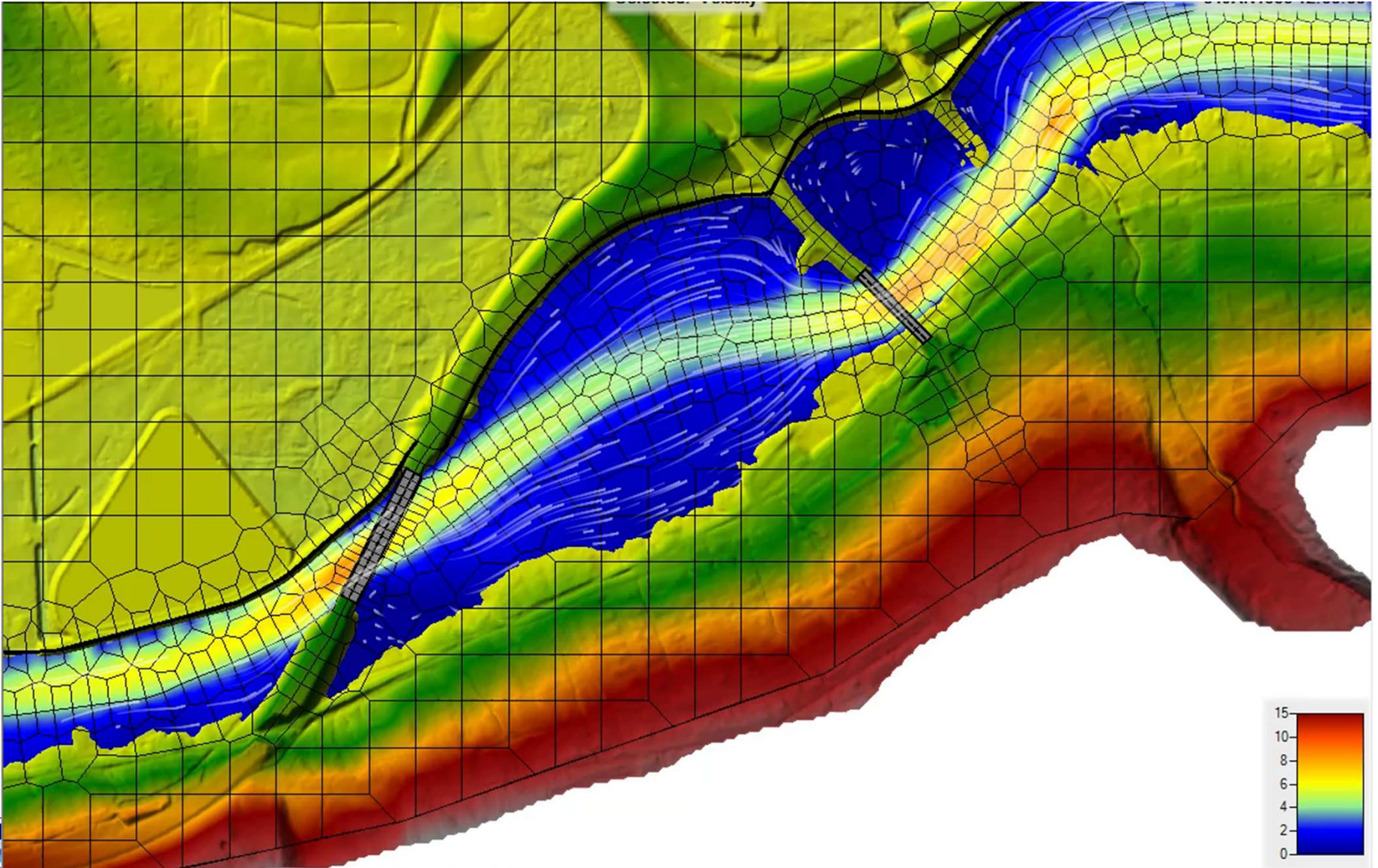
Selected: depth

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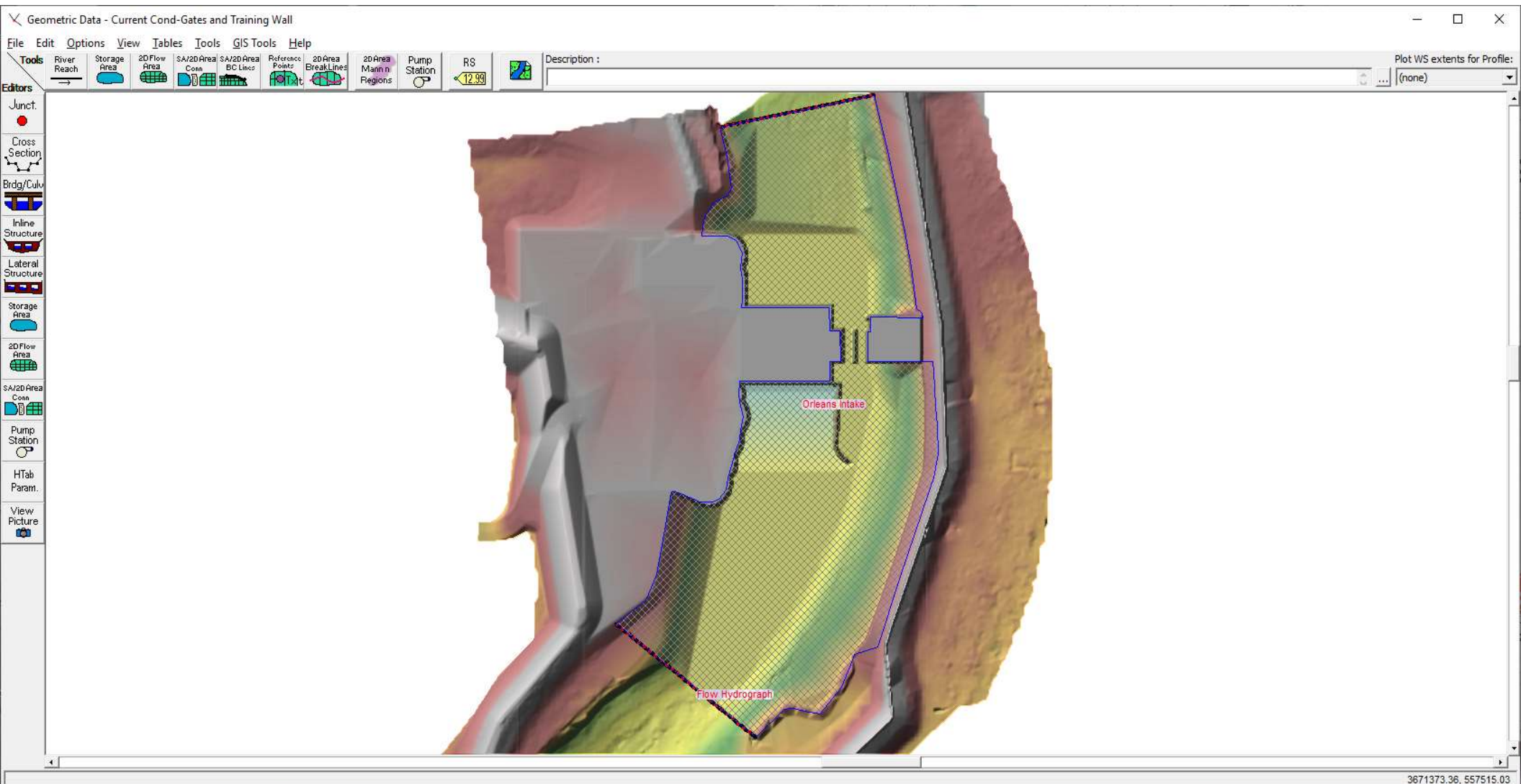


2D Bridge Modeling

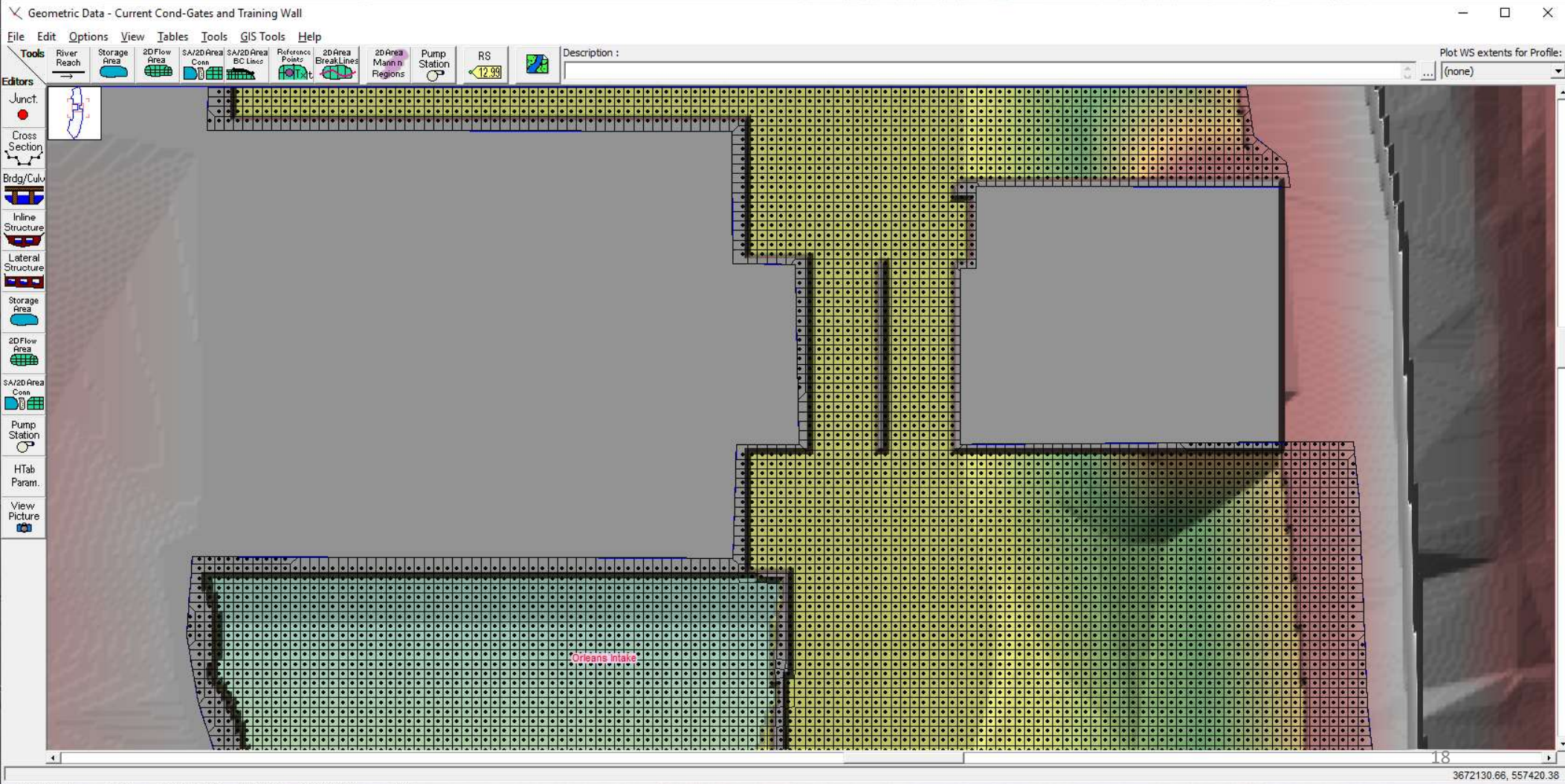


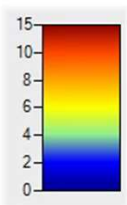
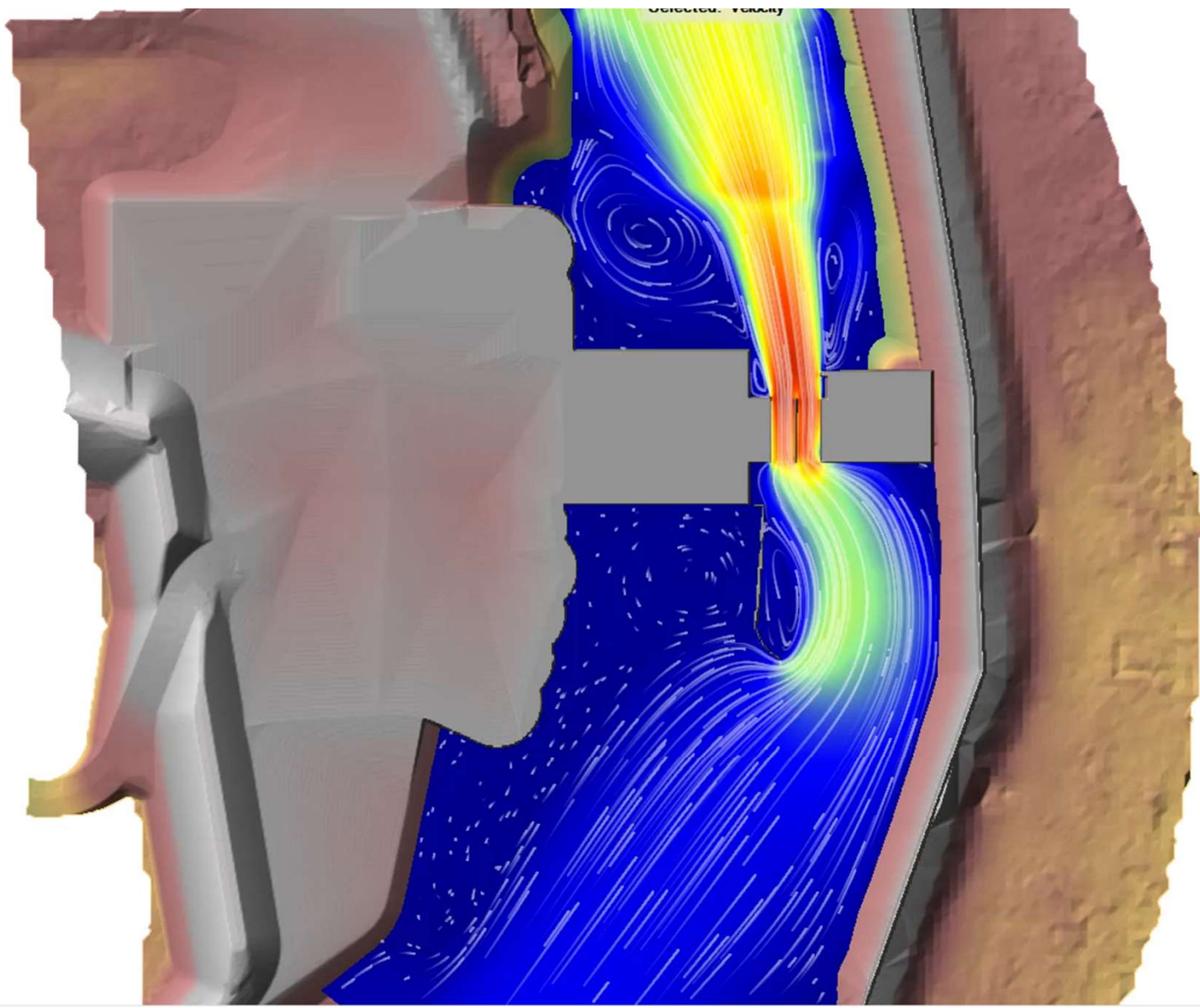


Detailed Gate Modeling– Orleans Canal



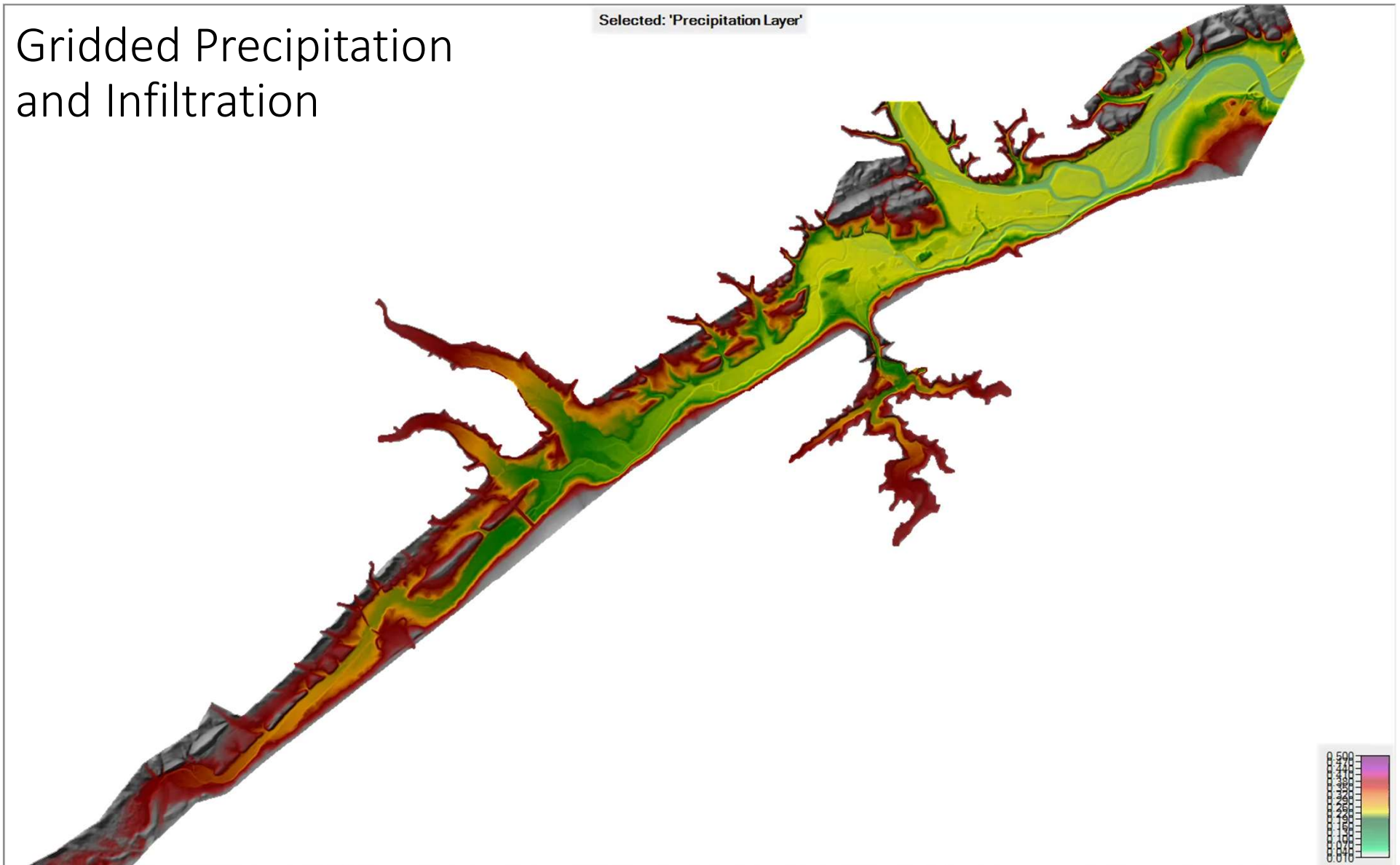
Detailed Gate Modeling— Orleans Canal





Gridded Precipitation and Infiltration

Selected: 'Precipitation Layer'



Santa Barbara Mud-and-Debris Flow

Local News

A Year Ago, Montecito Debris Flows Brought 'Unfathomable Destruction' to Coastal Community

Residents and first responders recall and reflect on the fateful Jan. 9 events that reshaped their world



Santa Barbara County responders launched into rescue mode in the early-morning hours of Jan. 9, 2018 after debris flows devastated Montecito. (Ray Ford / Noozhawk photo)

By Joshua Molina, Noozhawk Staff Writer | @JECMolina | January 8, 2019 | 10:02 p.m.



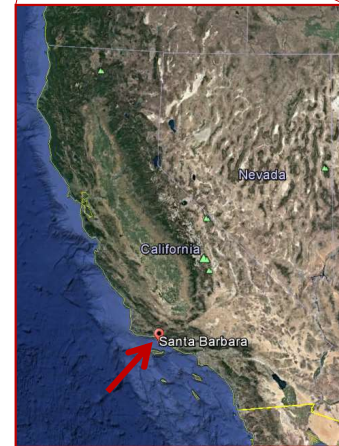
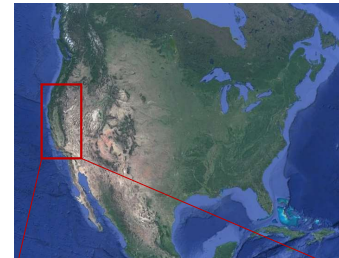
NATION & WORLD

Mudslide-stricken California town is all but emptied out as residents ordered to leave

By KRISTA FAURIA AND BRIAN MELLEY
ASSOCIATED PRESS | JAN 12, 2018 | 11:37 PM | MONTECITO, CALIF.



A house sits among boulders and mud along Glen Oaks Drive in Montecito after a major storm hit the burn area Wednesday. (Wally Skalij / Los Angeles Times)



23 Fatalities
Damages:
\$200 Million

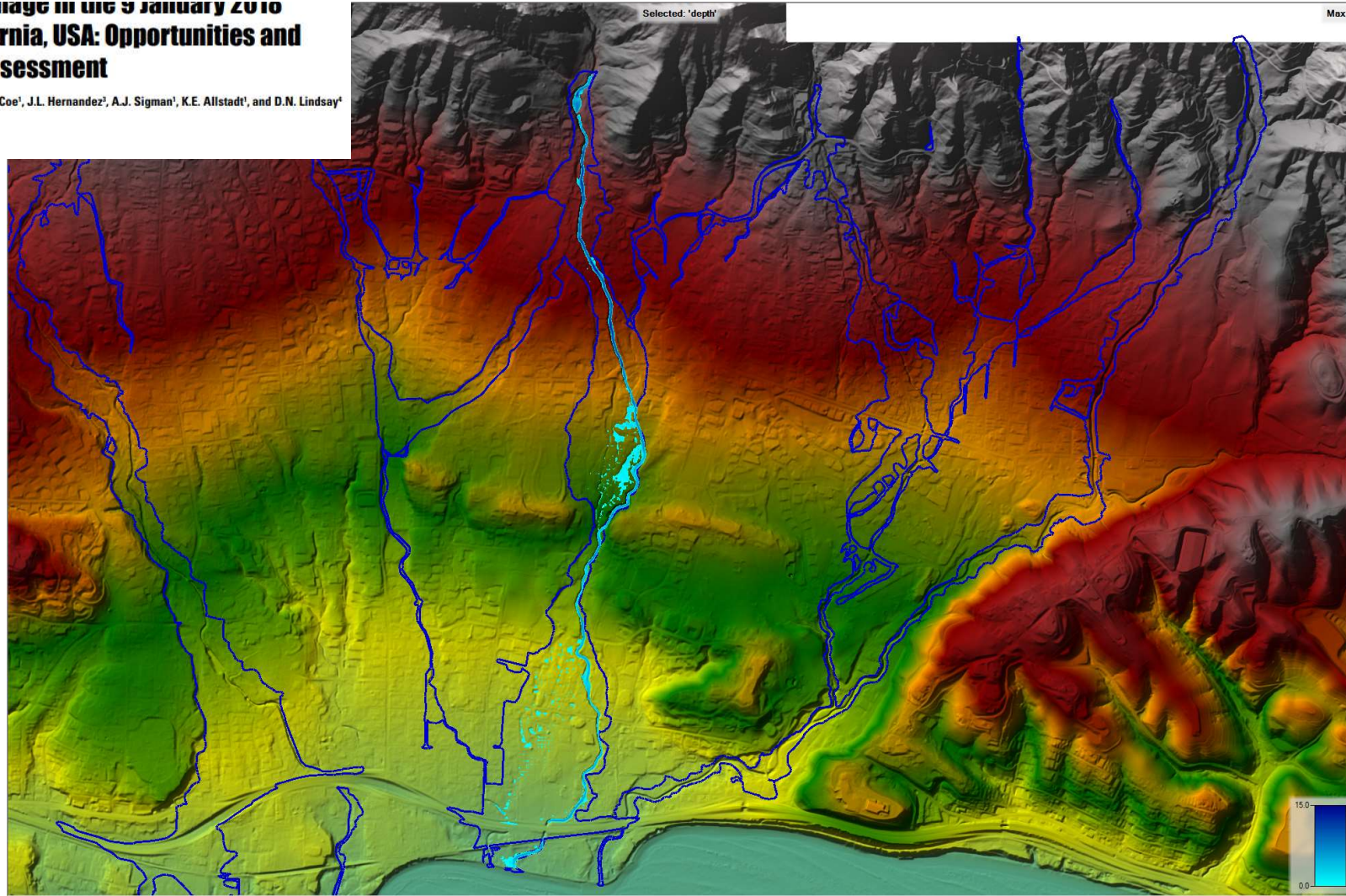
Intensification, flow dynamics, and damage in the 9 January 2010 Montecito debris-flow event, California, USA: Opportunities and challenges for post-wildfire risk assessment

J.W. Kean¹, D.M. Staley¹, J.T. Lancaster², F.K. Rengers³, B.J. Swanson³, J.A. Coe¹, J.L. Hernandez², A.J. Sigman¹, K.E. Allstadt¹, and D.N. Lindsay⁴

¹U.S. Geological Survey, P.O. Box 25046, MS 966, Denver, Colorado 80225, USA
²California Geological Survey, 801 K Street, MS 12-32, Sacramento, California 95630, USA
³California Geological Survey, 320 West 4th Street, Suite 950, Los Angeles, California 90013, USA
⁴California Geological Survey, 6105 Airport Road, Redding, California 96002, USA

Research Paper

GEOSPHERE

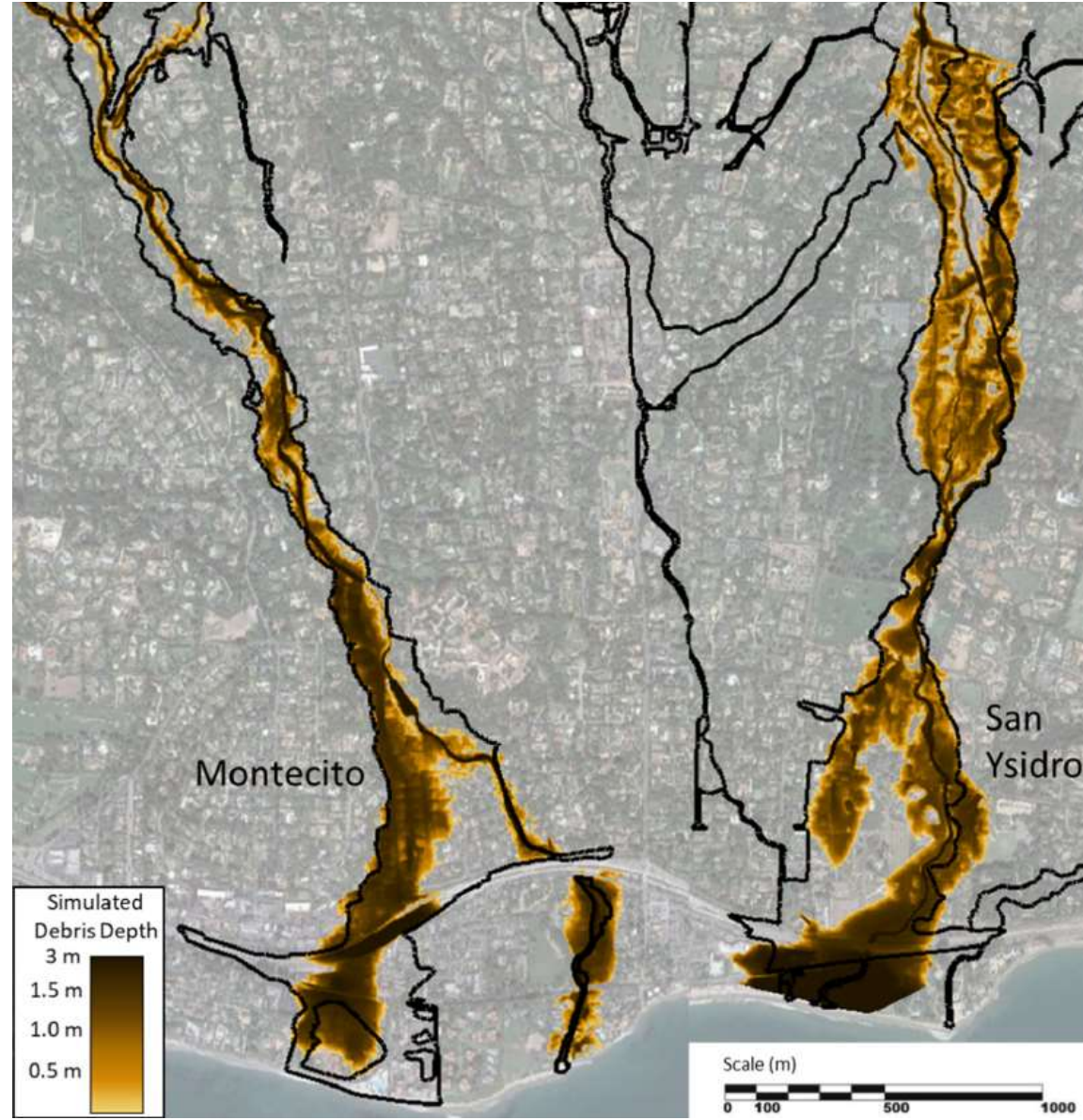
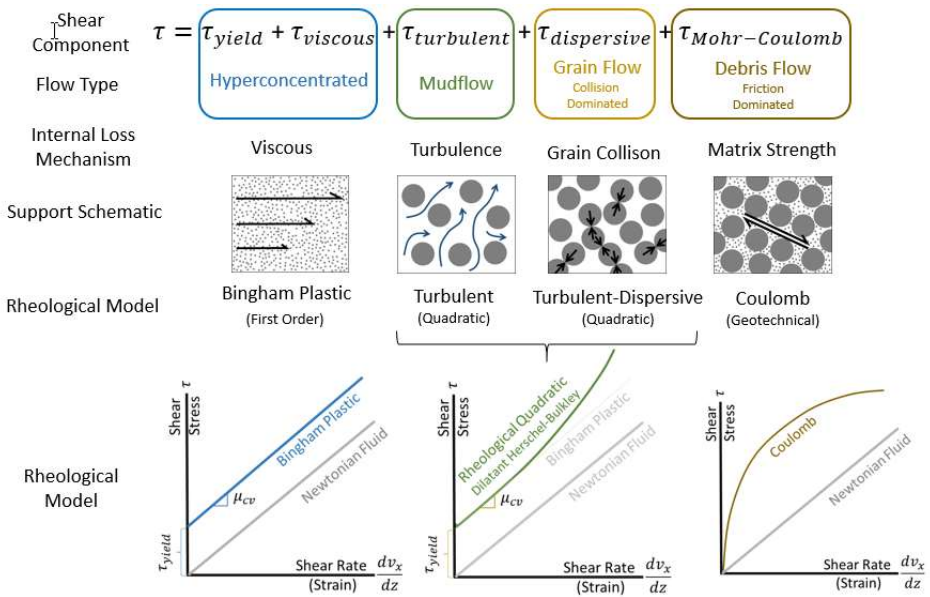


Article
Prototype Scale Evaluation of Non-Newtonian Algorithms in HEC-RAS: Mud and Debris Flow Case Studies of Santa Barbara and Brumadinho

Stanford Gibson ^{1,*}, Leonardo Zandonadi Moura ^{2,3}, Cameron Ackerman ¹, Nikolas Ortman ^{4,5}, Renato Amorim ^{6,7}, Ian Floyd ⁸, Moosub Eom ⁴, Calvin Creech ⁹ and Alejandro Sánchez ¹

<https://doi.org/10.3390/geosciences12030134>



Non-Newtonian Hydraulics



Hurricane Laura Precipitation

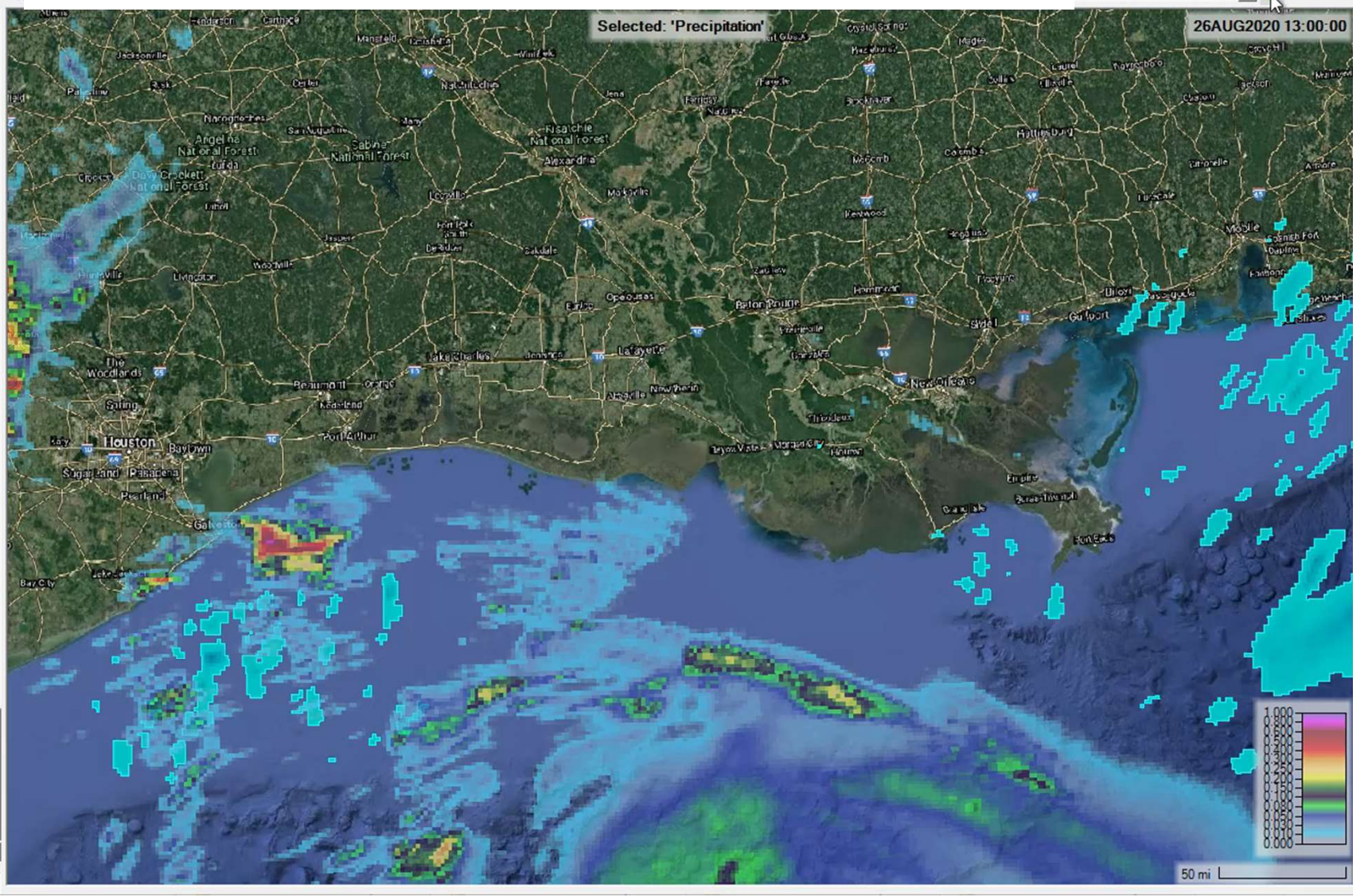
File Project Tools Help

Selected Layer: Precipitation

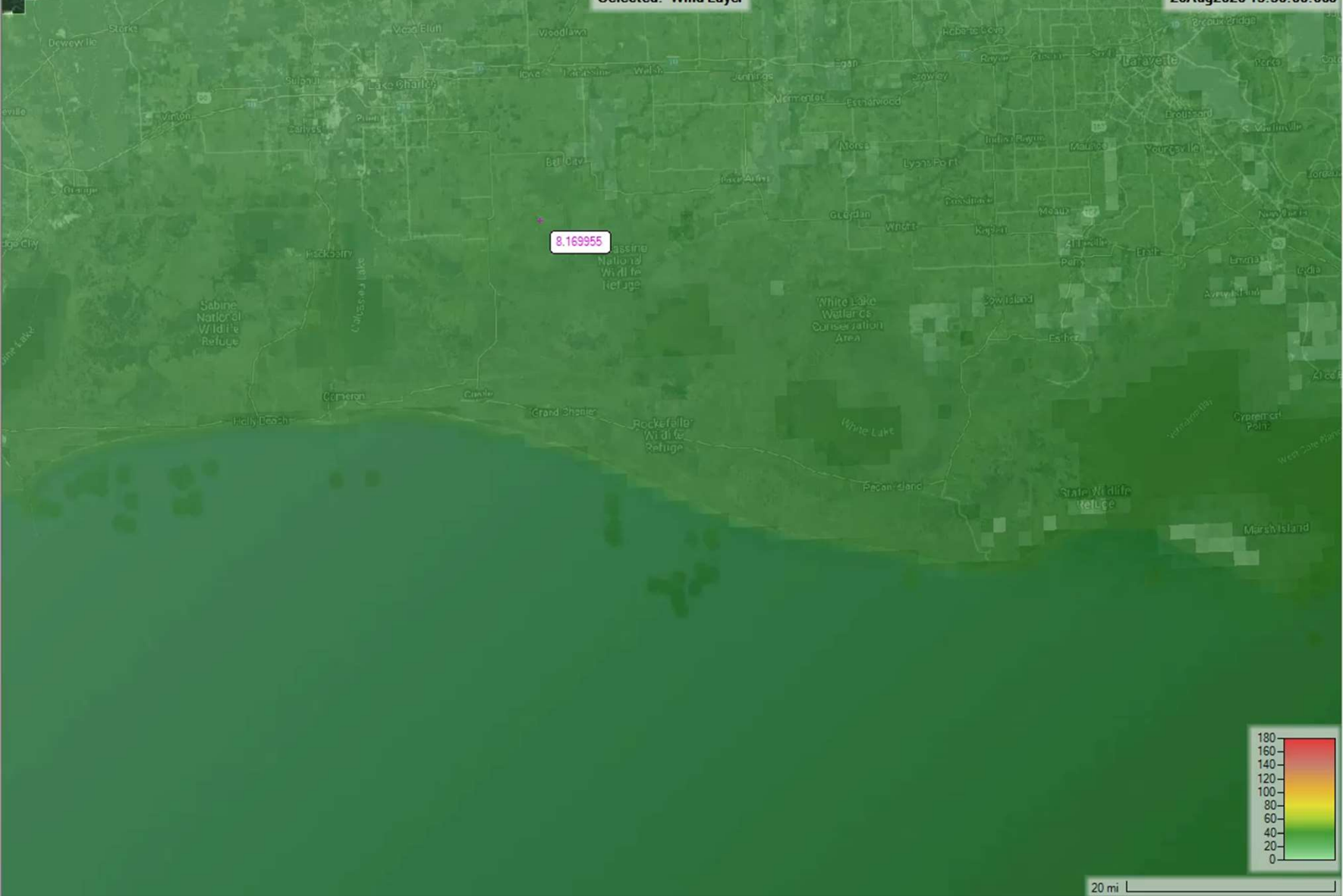
- Features
 - Geometries
 - test coast
 - Rivers
 - Cross Sections
 - Storage Areas
 - 2D Flow Areas
 - Bridges/Culverts
 - Inline Structures
 - Lateral Structures
 - SA/2D Connections
 - Pump Stations
 - BC Lines
 - Manning's n
 - Infiltration
 - Percent Impervious
 - Reference Points
 - Errors
 - Event Conditions
 - test coast
 - Wind
 - Precipitation
 - Precipitation (Accumulated)
 - Results
 - test coast
 - Event Conditions
 - Geometry
 - Depth (27AUG2020 06:00:00)
 - Velocity (Max)
 - WSE (Max)
 - Map Layers
 - ArcGIS Ocean Basemap
 - LandCover
 - Google Hybrid
 - Terrains
 - Terrain-test coast

Messages Views Profile Lines Active Features

(2553408.73, 3347339.95 1 pixel = 2250.81 ft)



Hurricane Laura Wind Field



Hurricane Laura Water Surface

