

# INTERACTIVE INUNDATION MAPPING USING GIS

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Kleinschmidt is a premier service provider to the hydroelectric industry in the United States and Canada.



TransCanada is a leader in the responsible development and reliable operation of North American energy infrastructure.



## GOALS FOR “NEW” INUNDATION MAPS

- Create time-sensitive information
- Define extent, timing and duration of flood event better than historical maps
- Include depth information throughout the inundation areas
- Include corresponding transportation information

# FLOODING MAPPING

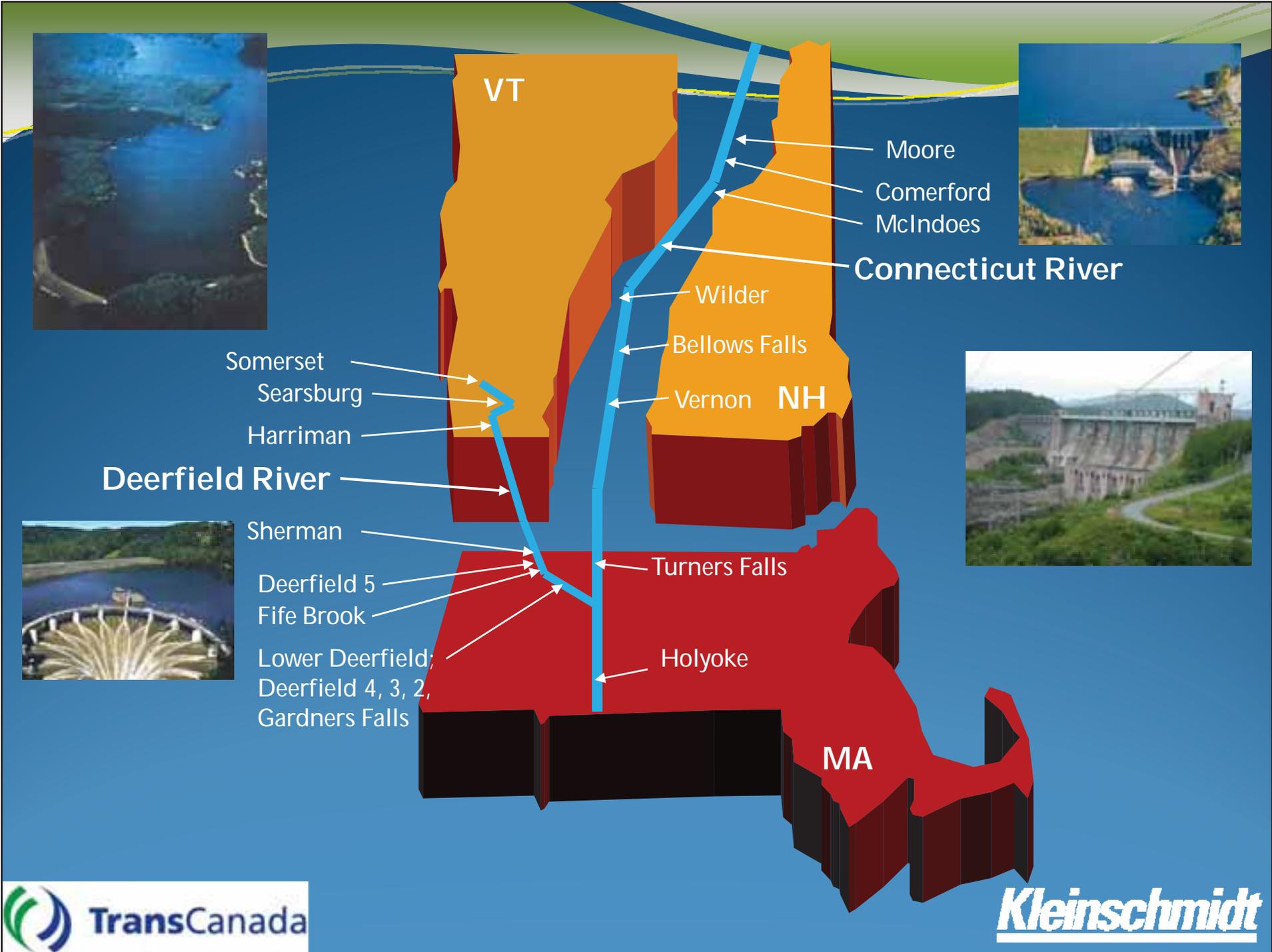
## Traditional

(Crayons and Topographic Maps)

VS.

## Interactive

(Digital and GIS Maps)



# INTERACTIVE LAYERS

- Potential Flooding Extents
- Depth Grids
  - Maximum Depth
  - Specific Time Step Depths
- Hydrographs
- Structure/Bridge Data
- Breach Summary Data



# FLOODING EXTENTS



# FLOODING EXTENTS



# FLOODING EXTENTS



# MAXIMUM DEPTHS

**Identify** [?] [X]

Identify from:  PMF Maximum Depths (ft) [v]

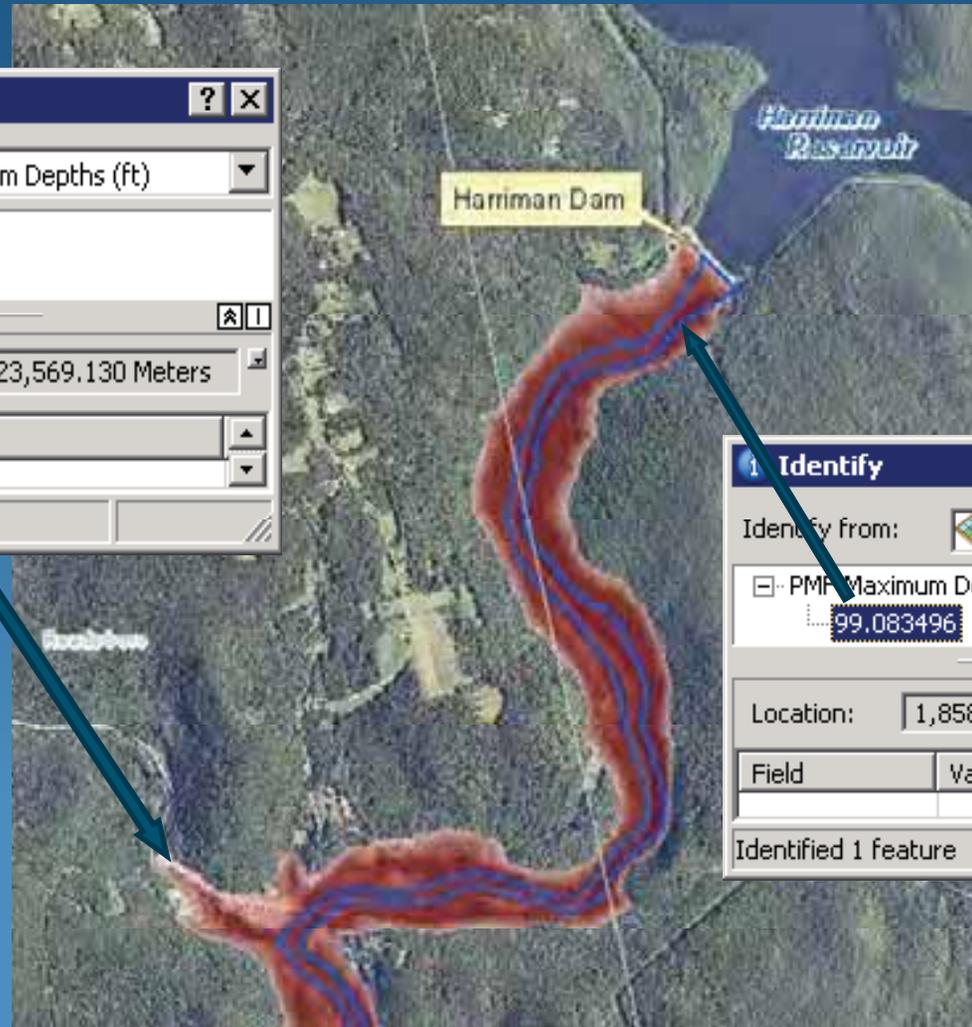
PMF Maximum Depths (ft)

3.512207

Location: 1,858,751.303 2,423,569.130 Meters

Field	Value
-------	-------

Identified 1 feature



**Identify** [?] [X]

Identify from:  PMF Maximum Depths (ft) [v]

PMF Maximum Depths (ft)

99.083496

Location: 1,858,385.785 2,425,350.532 Meters

Field	Value
-------	-------

Identified 1 feature

## DEPTHS TIME STEPS

- The time step layers were developed to depict the incremental depth caused by a breach at any location.
- Results show where the “breach wave” is located on the river.
- Six time steps were developed

# 1 HOUR TIME STEP LAYER



# 2 HOUR TIME STEP LAYER



# 3 HOUR TIME STEP LAYER



# 6 HOUR TIME STEP LAYER



# 9 HOUR TIME STEP LAYER



# 12 HOUR TIME STEP





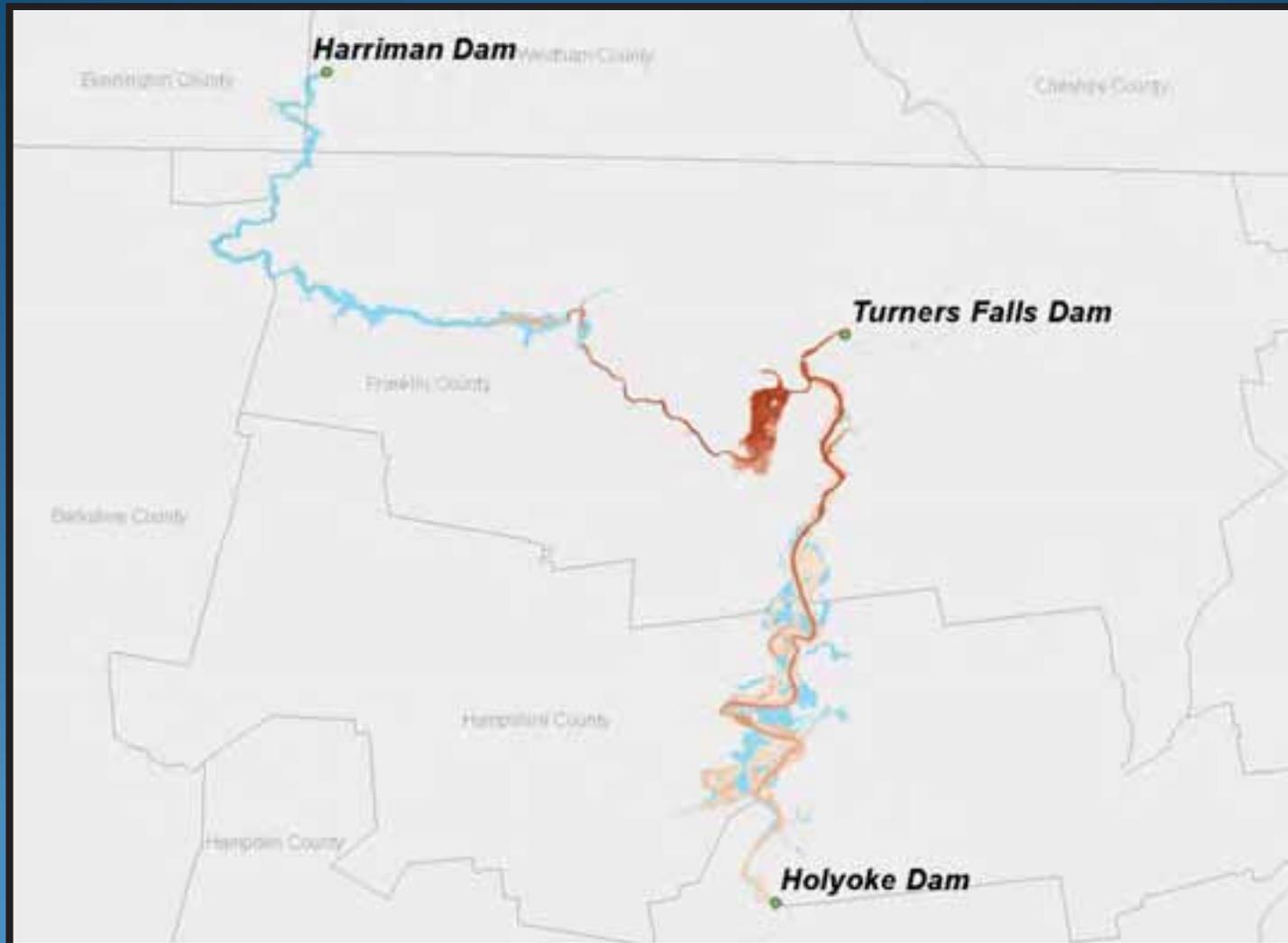
# 2 HOUR TIME STEP & MAXIMUM EXTENT



# 3 HOUR TIME STEP & MAXIMUM EXTENT



# 6 HOUR TIME STEP & MAXIMUM EXTENT



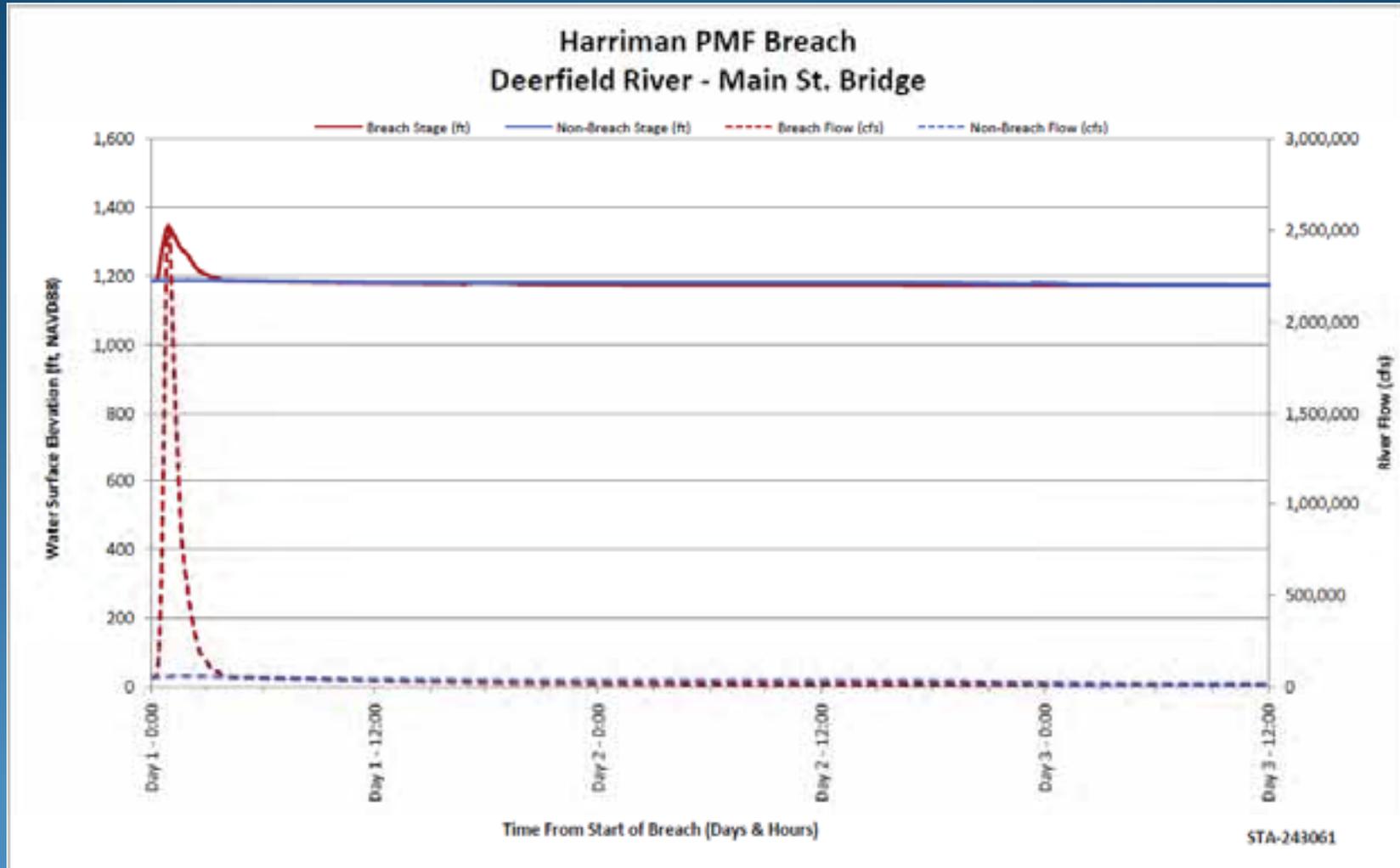
# 9 HOUR TIME STEP & MAXIMUM EXTENT



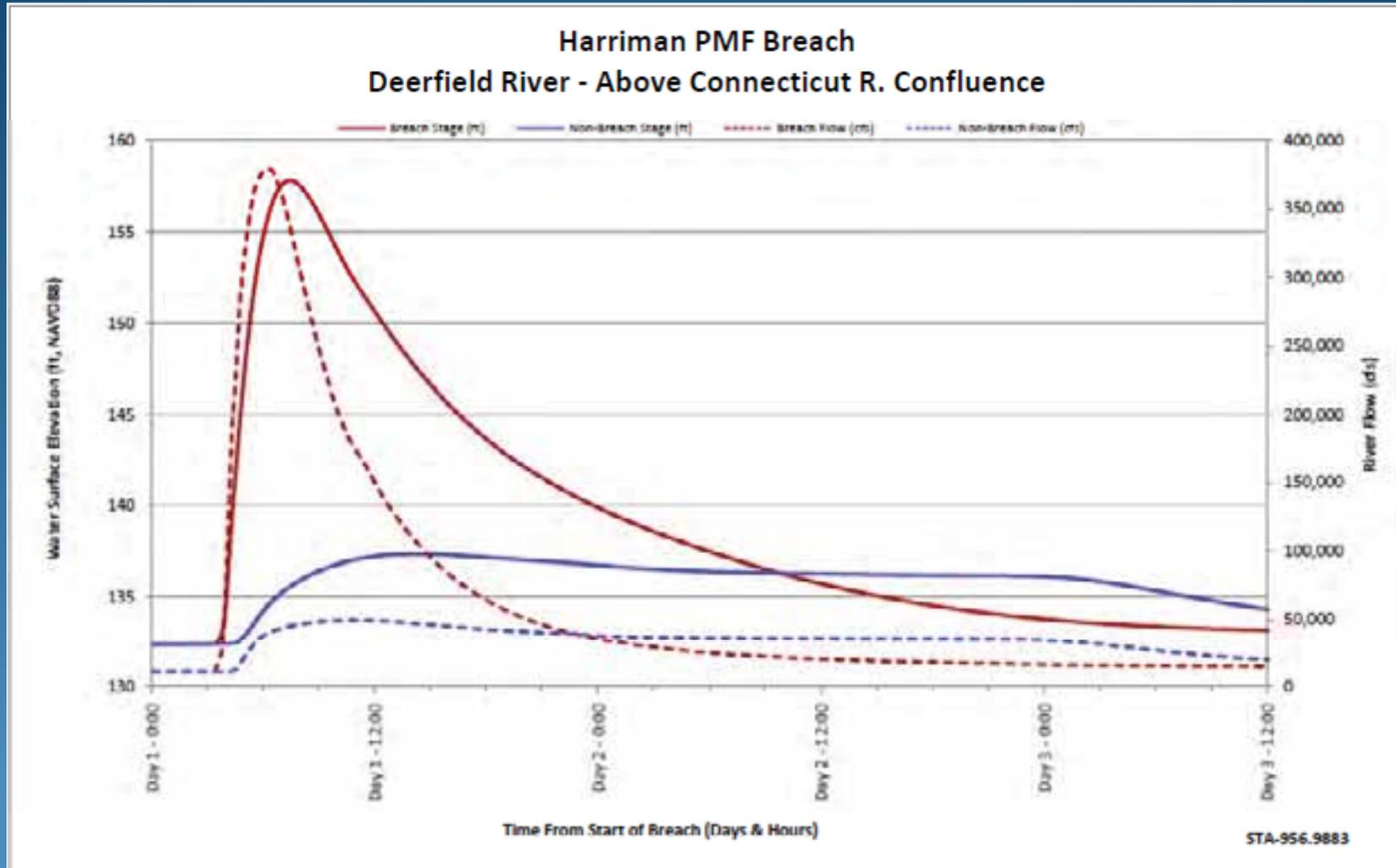
# 12 HOUR TIME STEP & MAXIMUM EXTENT



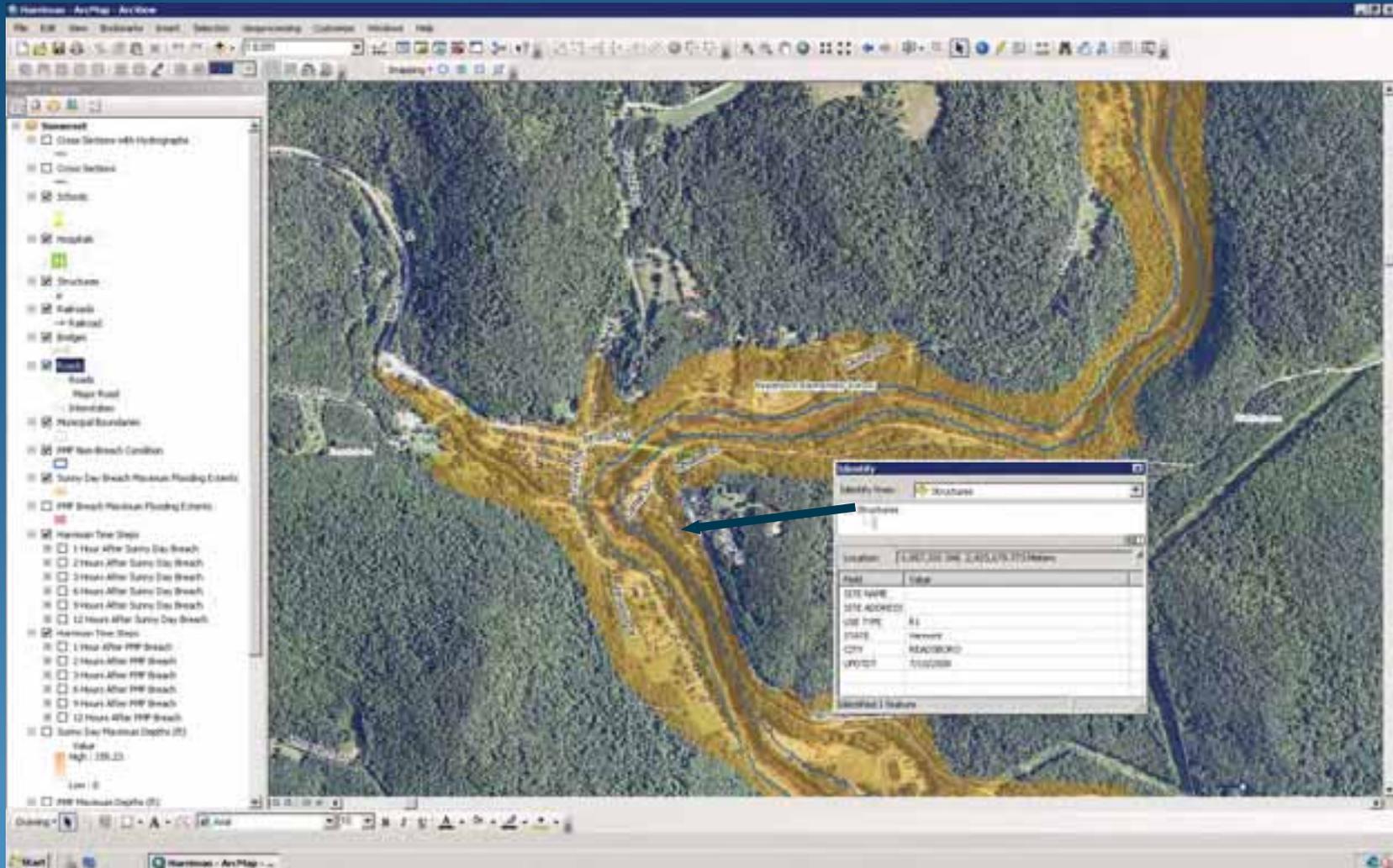
# HYDROGRAPHS



# HYDROGRAPHS



# STRUCTURE AND BRIDGE DATA



# CROSS-SECTION DATA



FERC Project: 2323 Harriman Dam

Section Number: 12

Section Name: Below Readsboro

Distance from Dam (miles): 3.8

**Fair Weather (Sunny Day) Breach:**

Water Surface Elevation (ft): 1240.10  
Water Surface Rise (ft): 105.00  
Breach Wave Arrival Time (hrs): 0.25  
Time to Peak of Breach Wave (hrs): 0.92  
Peak Breach Flow (cfs): 1631710

**Probable Maximum Flood (PMF) Breach:**

Water Surface Elevation (ft): 1257.10  
Water Surface Rise (ft): 106.20  
Breach Wave Arrival Time (hrs): 0.25  
Time to Peak of Breach Wave (hrs): 1.00  
Peak Breach Flow (cfs): 2497967

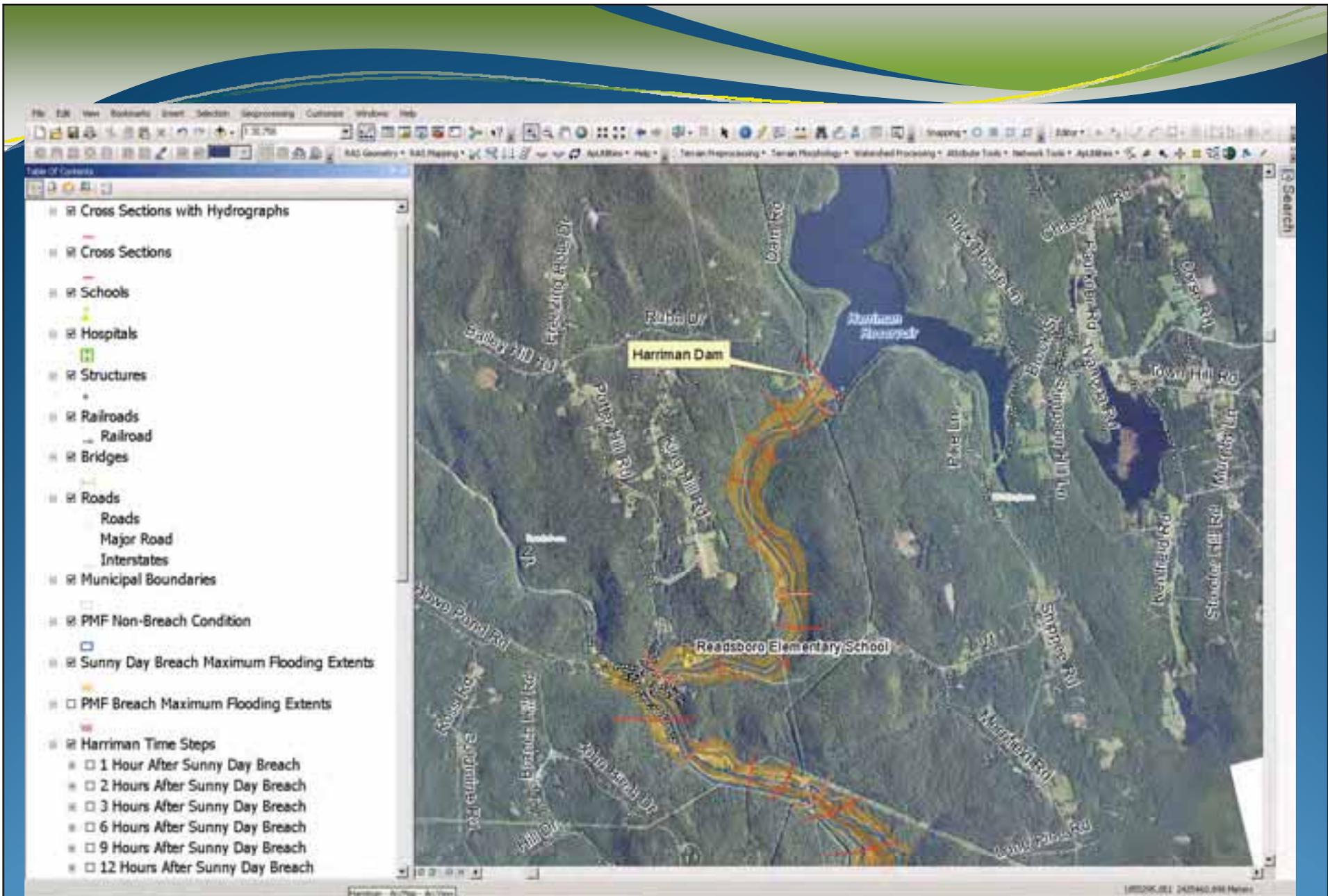
Station: 239,510

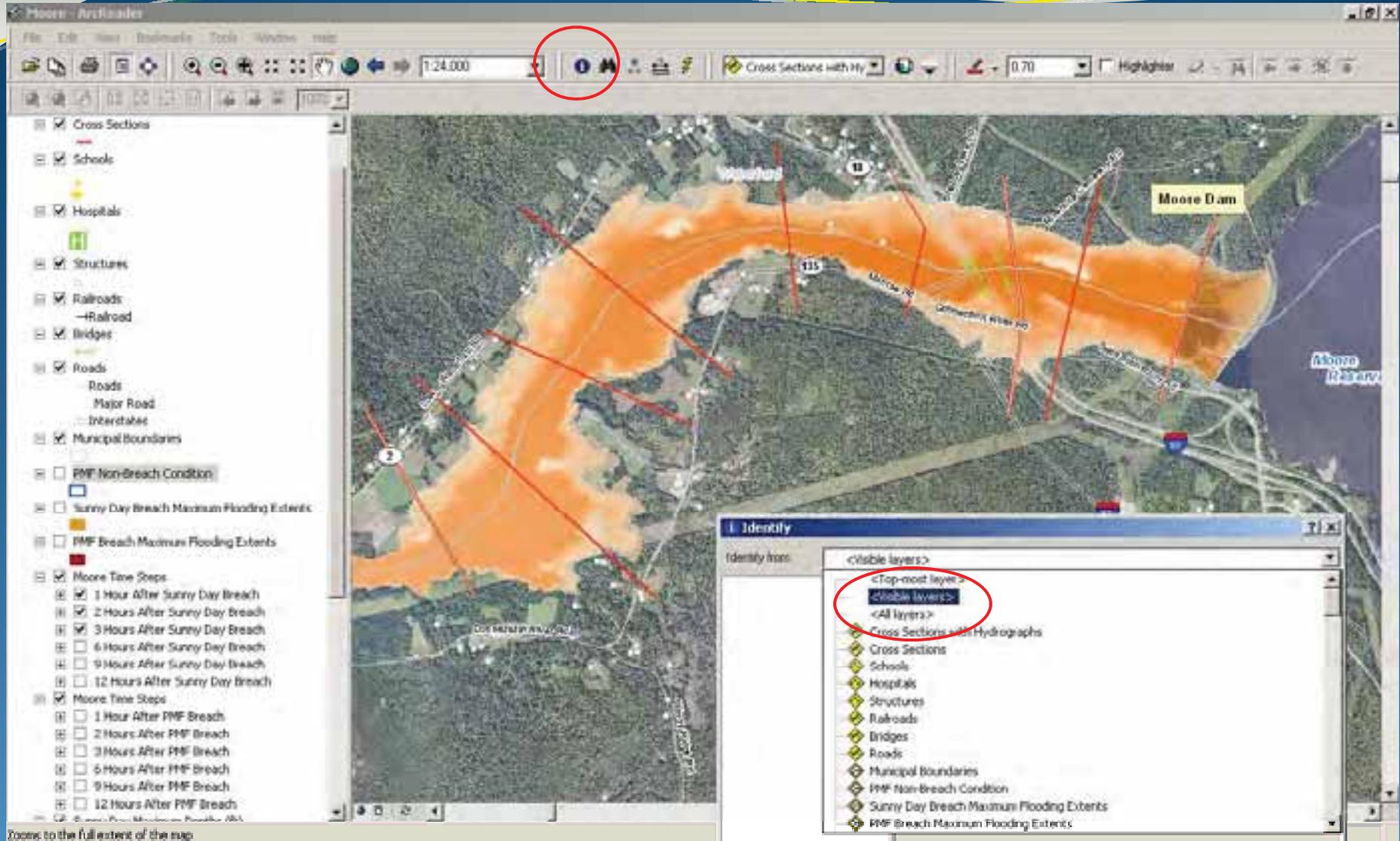
# GIS READER APPLICATION

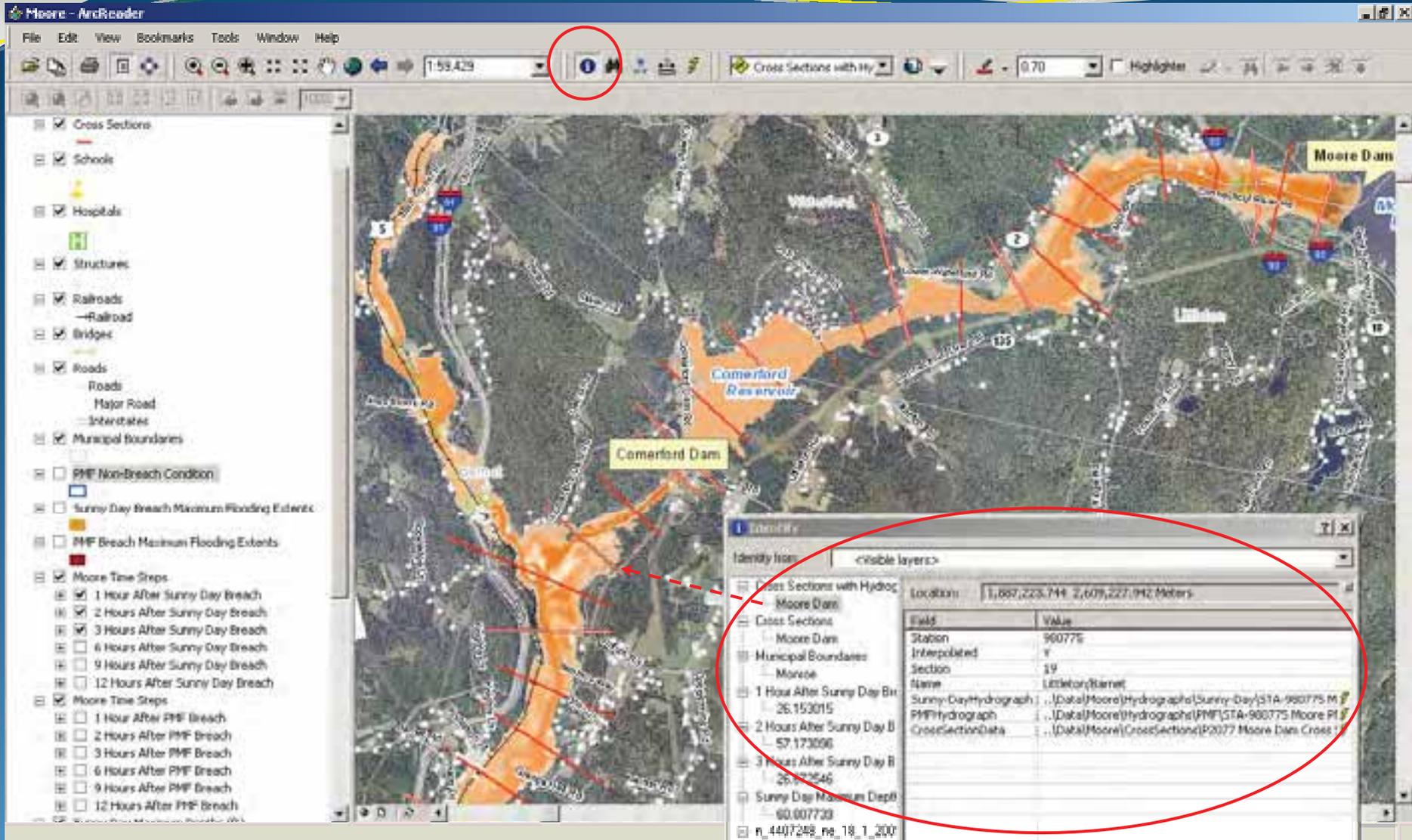
- Is used by:
  - Town, city, county, and state emergency responders
  - Regional planning commissions
  - Any community that could be affected by an emergency situation at one of the dams
- Is distributed on:
  - Tiny (but huge) flash drive

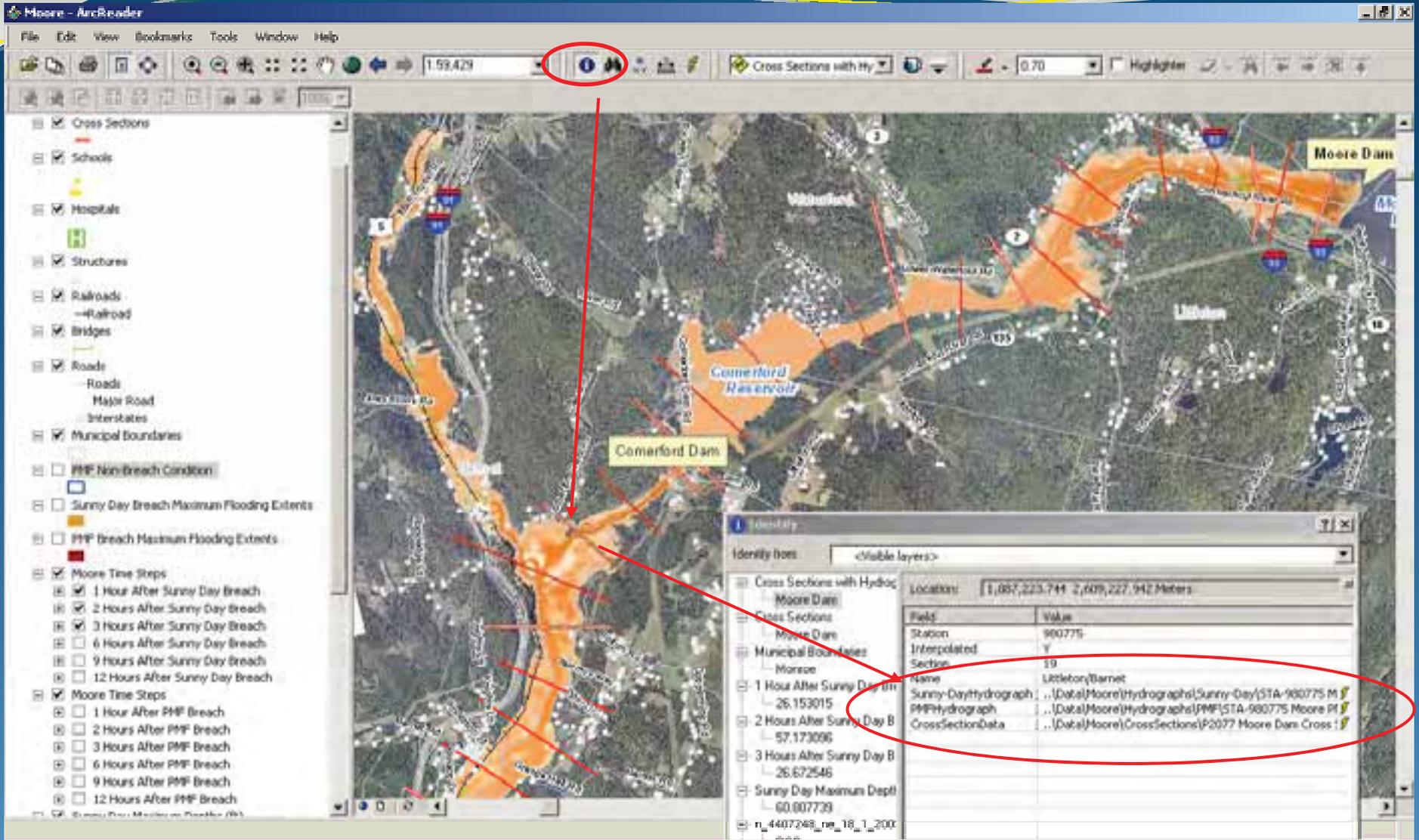


# INTERACTIVE INUNDATION MAPPING - KEY FEATURES









Moore - ArcReader

File Edit View Bookmarks Tools Window Help

1:59,429

Cross Sections with Hydro

0.70

Highlighter

TransCanada

FERC Project: 2077 Moore Dam

Section Number: 19

Section Name: Littleton/Barnet

Distance from Dam (miles): 8.1

Fair Weather (Sunny Day) Breach		Probable Maximum Flood (PMF) Breach	
Water Surface Elevation (ft):	553.00	Water Surface Elevation (ft):	558.20
Water Surface Rise (ft):	107.50	Water Surface Rise (ft):	79.40
Breach Wave Arrival Time (hrs):	0.40	Breach Wave Arrival Time (hrs):	0.35
Time to Peak of Breach Wave (hrs):	1.80	Time to Peak of Breach Wave (hrs):	1.75
Peak Breach Flow (cfs):	2080500	Peak Breach Flow (cfs):	2279670

Station: 900775

Identity

Identity Item: <Visible layers>

Field	Value
Station	900775
Interpolated	Y
Section	19
Name	Littleton/Barnet
Sunny Day Hydrograph	...\\Data\\Moore\\Hydrographs\\Sunny Day\\STA-900775 Moore PM
PMF Hydrograph	...\\Data\\Moore\\Hydrographs\\PMF\\STA-900775 Moore PM
CrossSectionData	...\\Data\\Moore\\CrossSections\\P2077 Moore Dam Cross 1

Start

Microsoft PowerPoint - ...

F:\Moore Dam EAP\Info...

May 29 11 Moore Dam E...

Moore - ArcReader

Search Desktop

11:41 PM

Moore - ArcReader

File Edit View Bookmarks Tools Window Help

1:59,429

Cross Sections with Hydro

0.70

Highlighter

100%

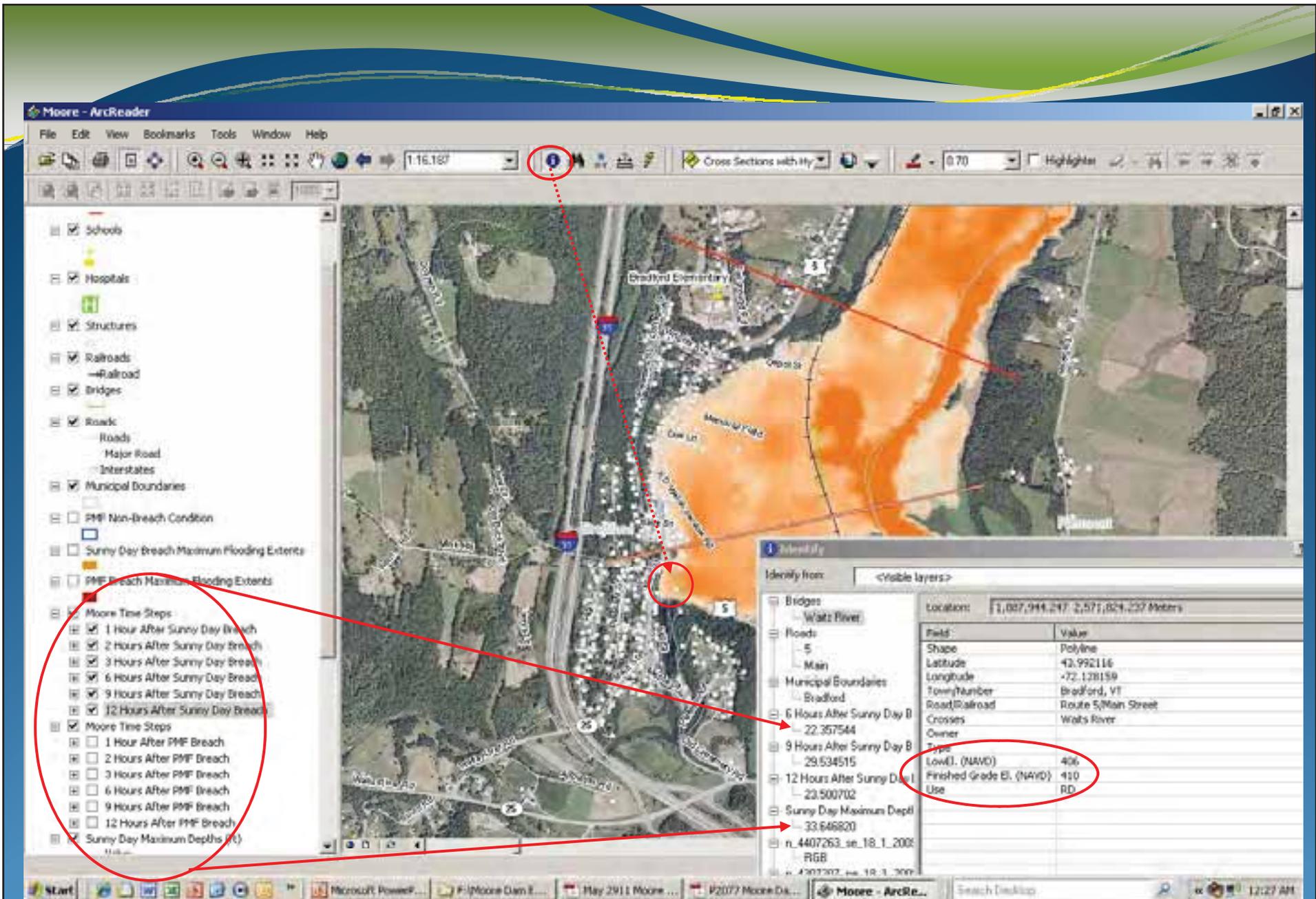
- Cross Sections
- Schools
- Hospitals
- Structures
- Railroads
- Bridges
- Roads
- Municipal Boundaries
- PMP Non-Breach Condition
- Sunny Day Breach Maximum Flooding Extents
- PMP Breach Maximum Flooding Extents
- Moore Time Steps
  - 1 Hour After Sunny Day Breach
  - 2 Hours After Sunny Day Breach
  - 3 Hours After Sunny Day Breach
  - 6 Hours After Sunny Day Breach
  - 9 Hours After Sunny Day Breach
  - 12 Hours After Sunny Day Breach
  - 1 Hour After PMP Breach
  - 2 Hours After PMP Breach
  - 3 Hours After PMP Breach
  - 6 Hours After PMP Breach
  - 9 Hours After PMP Breach
  - 12 Hours After PMP Breach

Comerford Dam

Field	Value
Station	900775
Interpolated	Y
Section	19
Name	Littleton/Barnet
Sunny-DayHydrograph	...\\Data\\Moore\\Hydrographs\\Sunny-Day\\STA-900775 M
PMPHydrograph	...\\Data\\Moore\\Hydrographs\\PMP\\STA-900775 Moore P
CrossSectionData	...\\Data\\Moore\\CrossSections\\P2077 Moore Dam Cross 1

Location: [1,057,223.744 2,609,227.942] Meters

11:41 PM





# CONCLUSION

- Outreach Sessions
- User Responses
  - Overall, information will greatly improve ability to plan for and respond to a potential flood emergency
  - Attendees impressed with interactive application and felt it was immediately applicable.
- Comparison to Traditional Mapping

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