Re-evaluating Flood Hazard Designs at Critical Infrastructure along the Mississippi River

Proactive By Design.
Our Company Commitment

CONNECTICUT
Association of Flood Managers

Annual Conference 2016

Presented by: Christine Suhonen on October 25, 2016

GZA GeoEnvironmental, Inc.

OUTLINE

1. The problem
2. The site's hydrologic setting
3. GZA's approach
4. Lessons learned

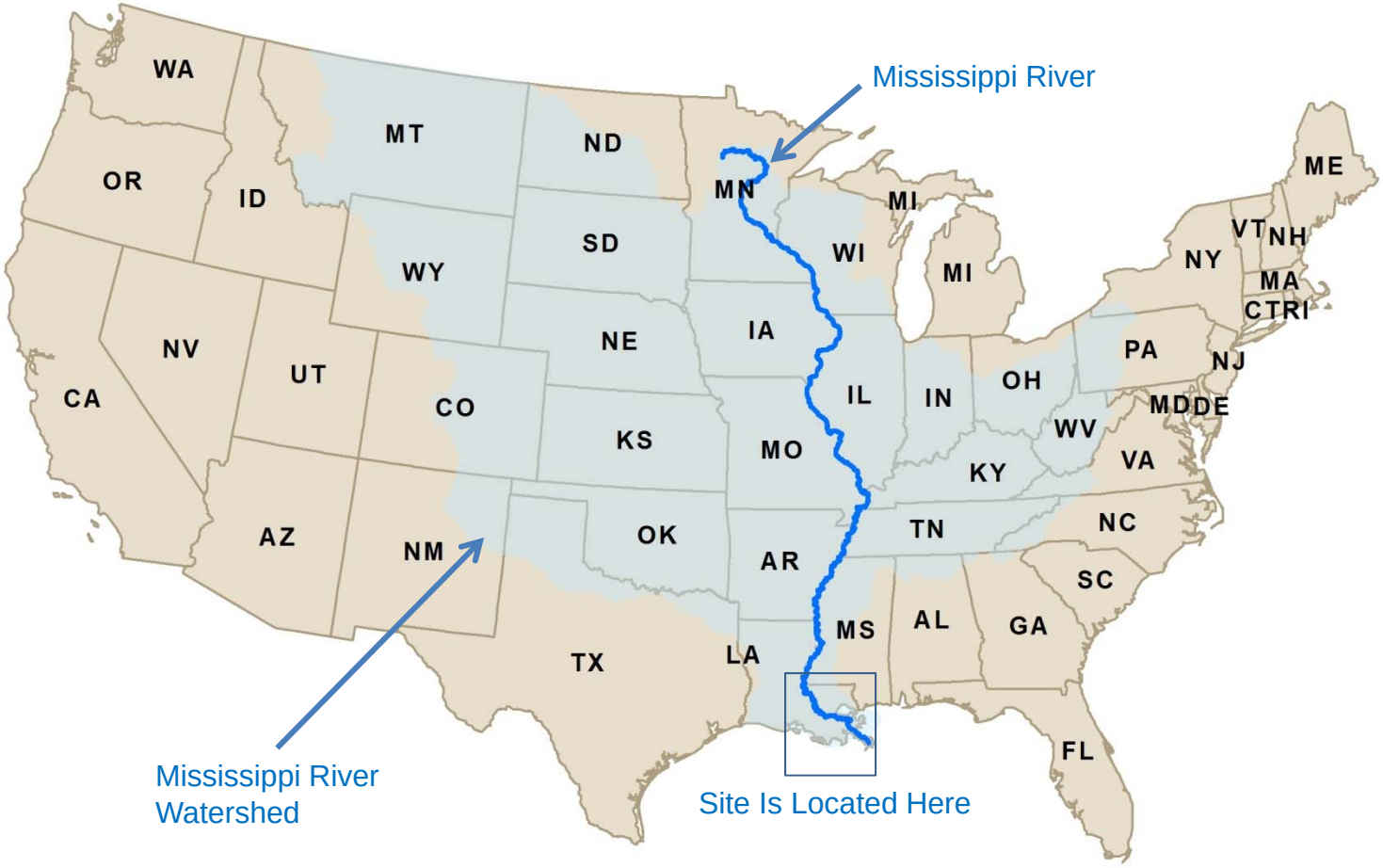
Problem

Is the site protected from the Probable Maximum Flood?

A flood resulting from the most severe combination of hydrologic and meteorological conditions that are considered reasonably possible.

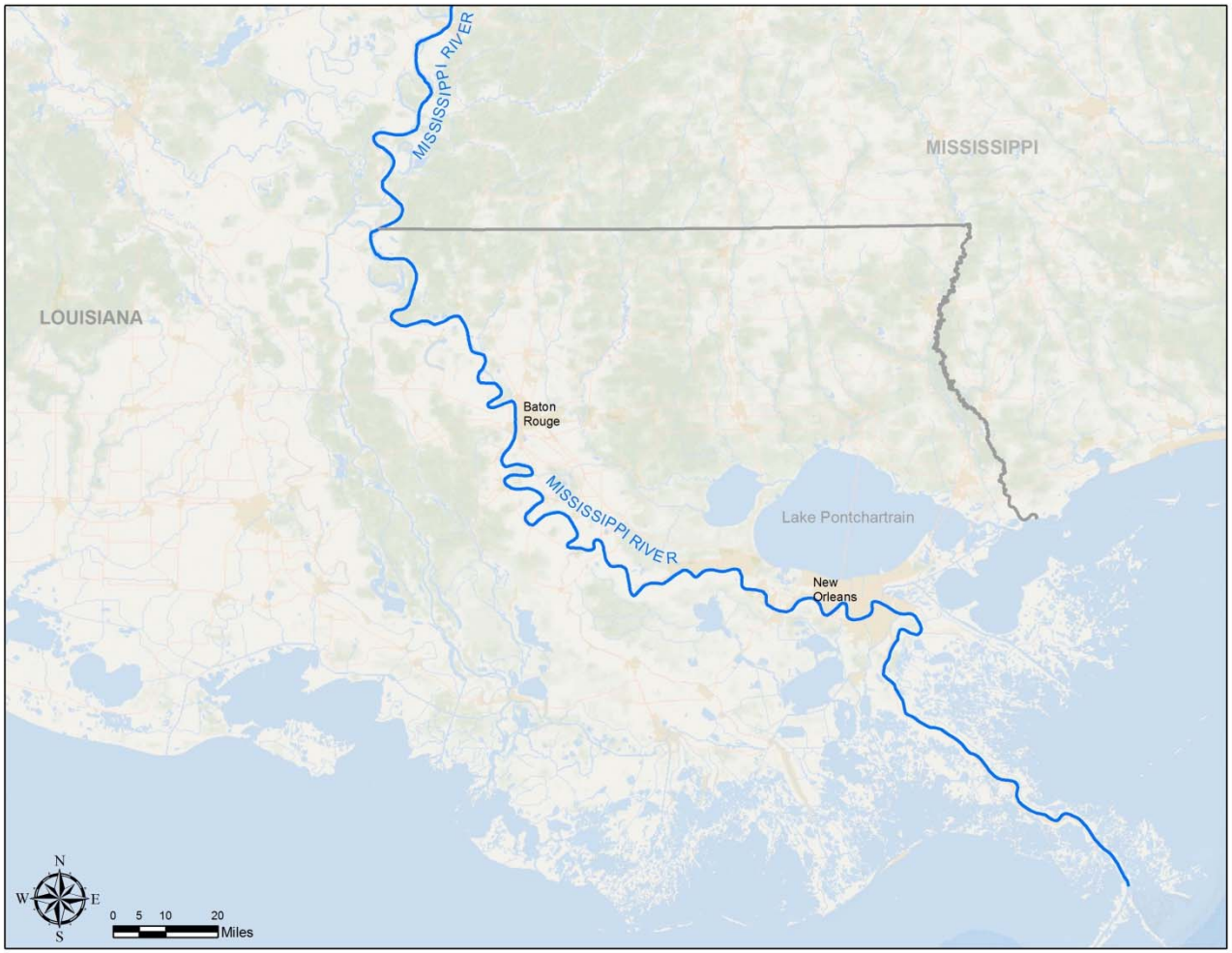
BACKGROUND

Area of Interest



BACKGROUND

Hydrologic Setting



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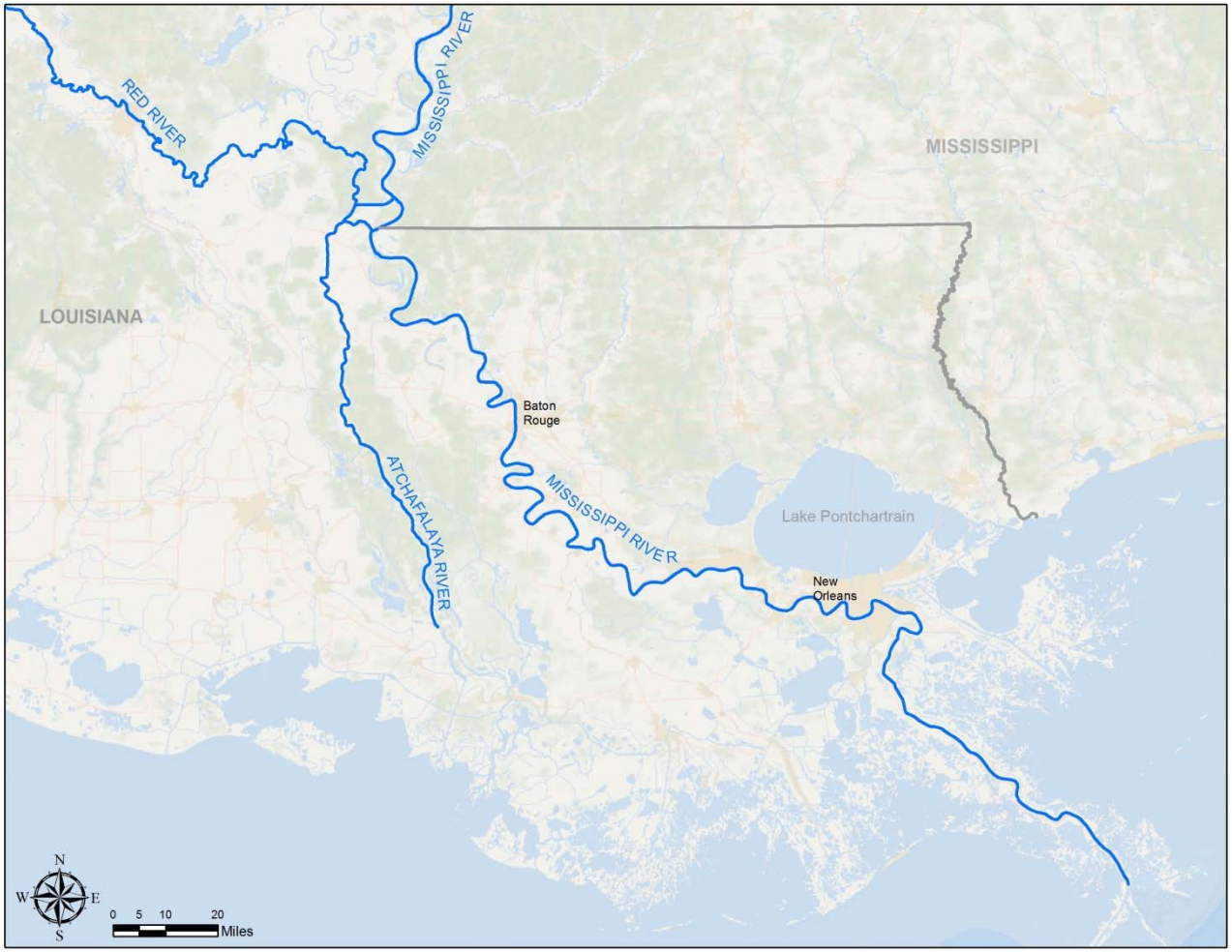
Hydrologic Setting



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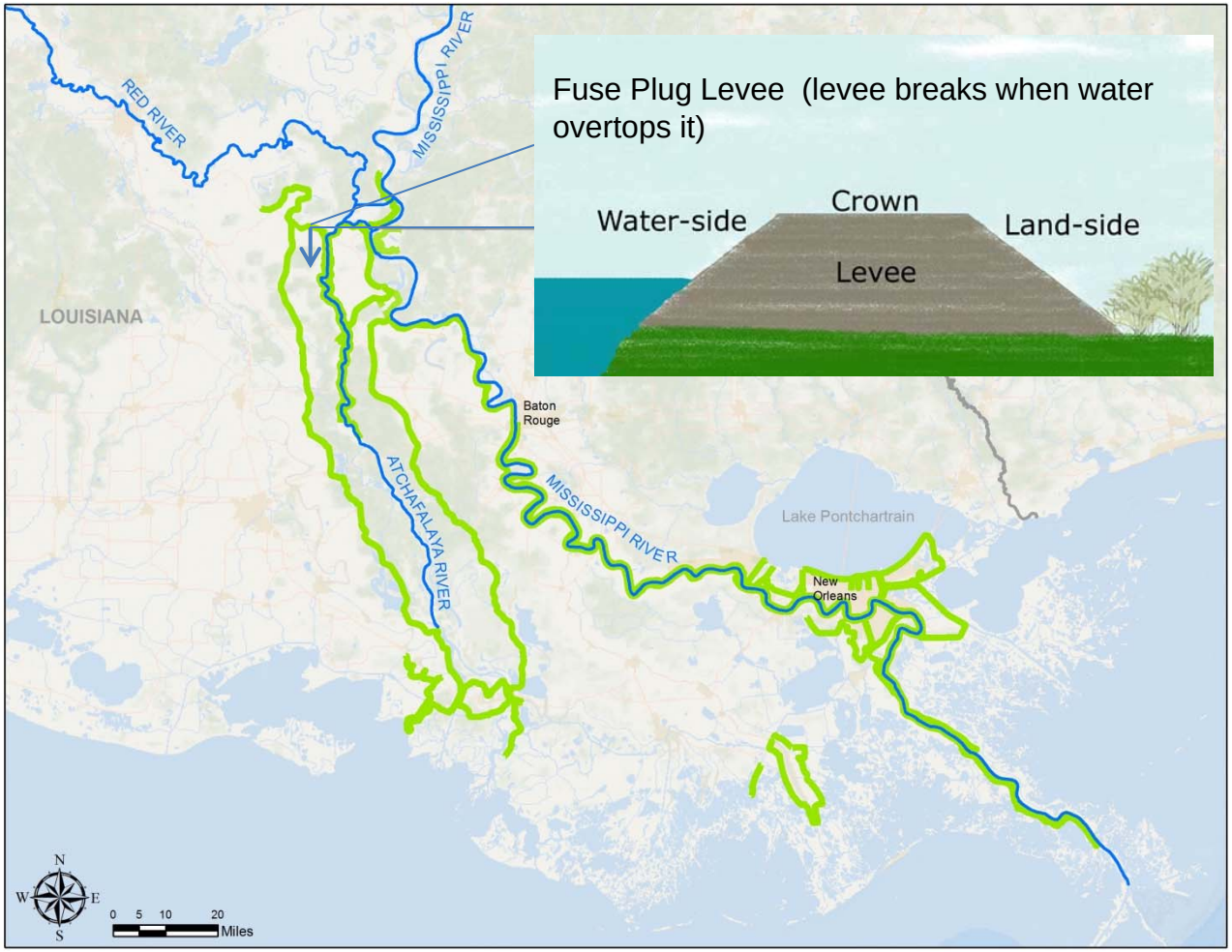
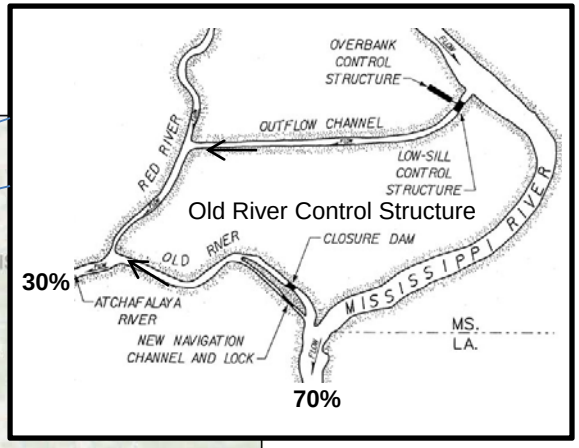
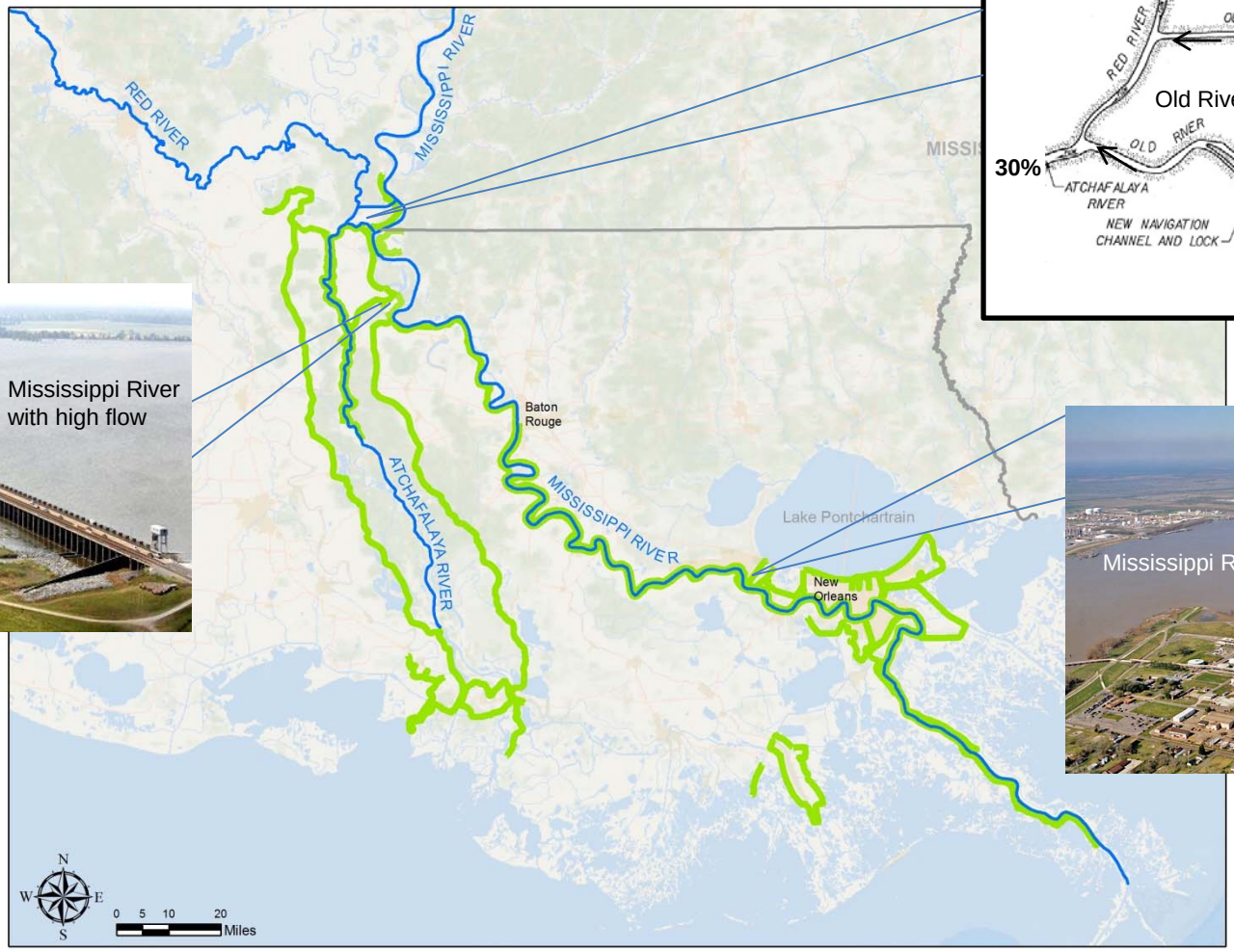
Hydrologic Setting



BACKGROUND

Hydrologic Setting



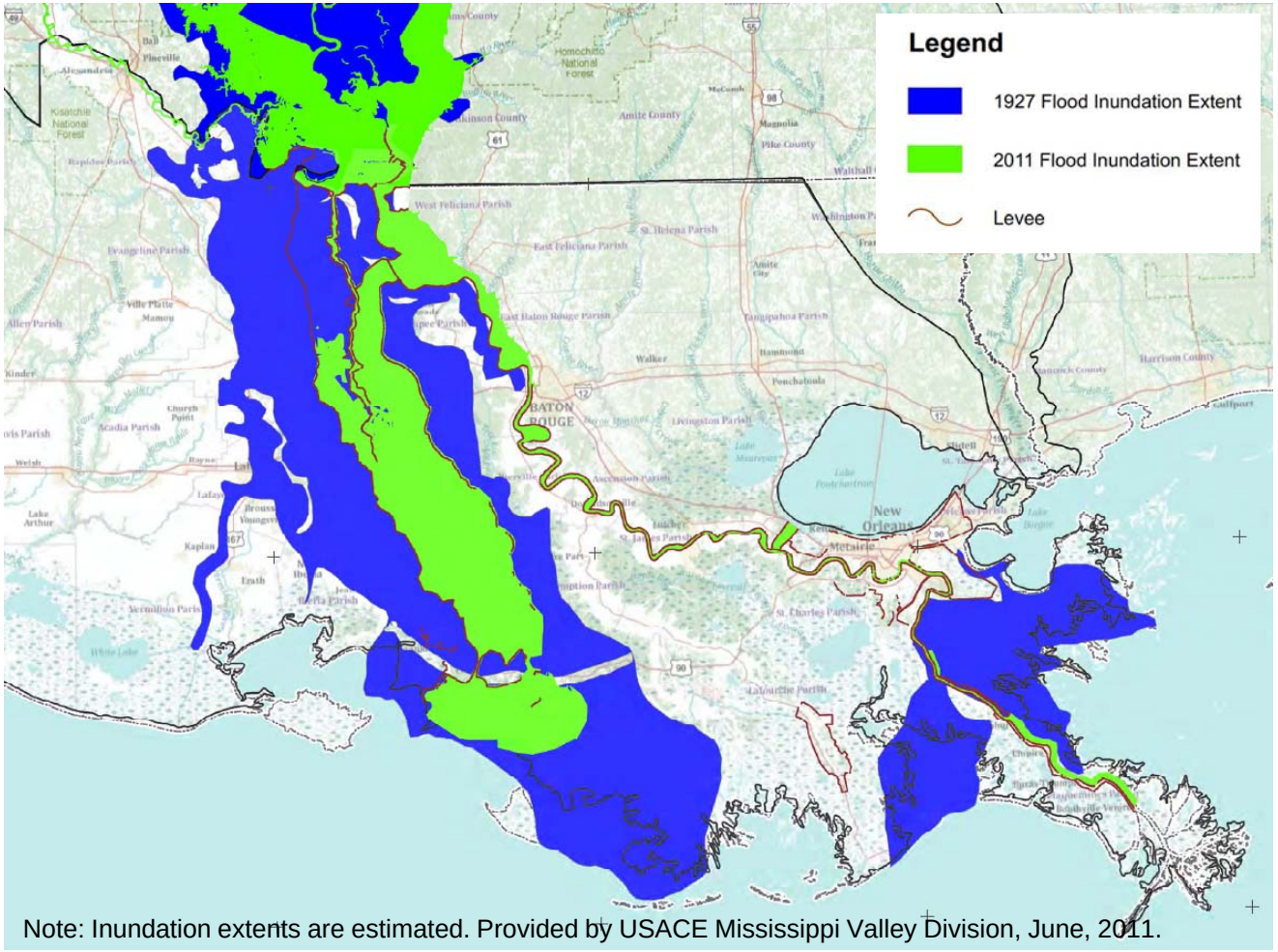


Owned and operated by:

US Army Corps of Engineers®

BACKGROUND

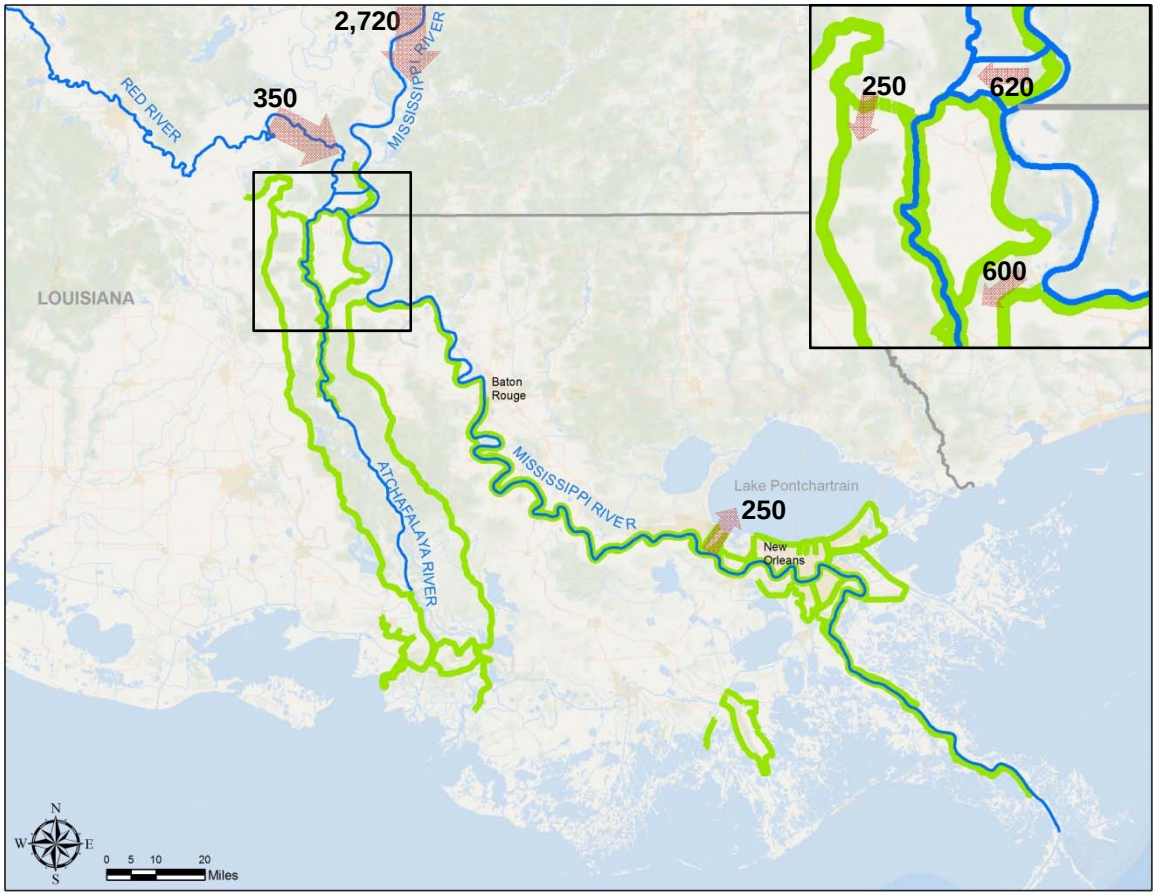
History of Mississippi River Flooding



Note: Inundation extents are estimated. Provided by USACE Mississippi Valley Division, June, 2011.

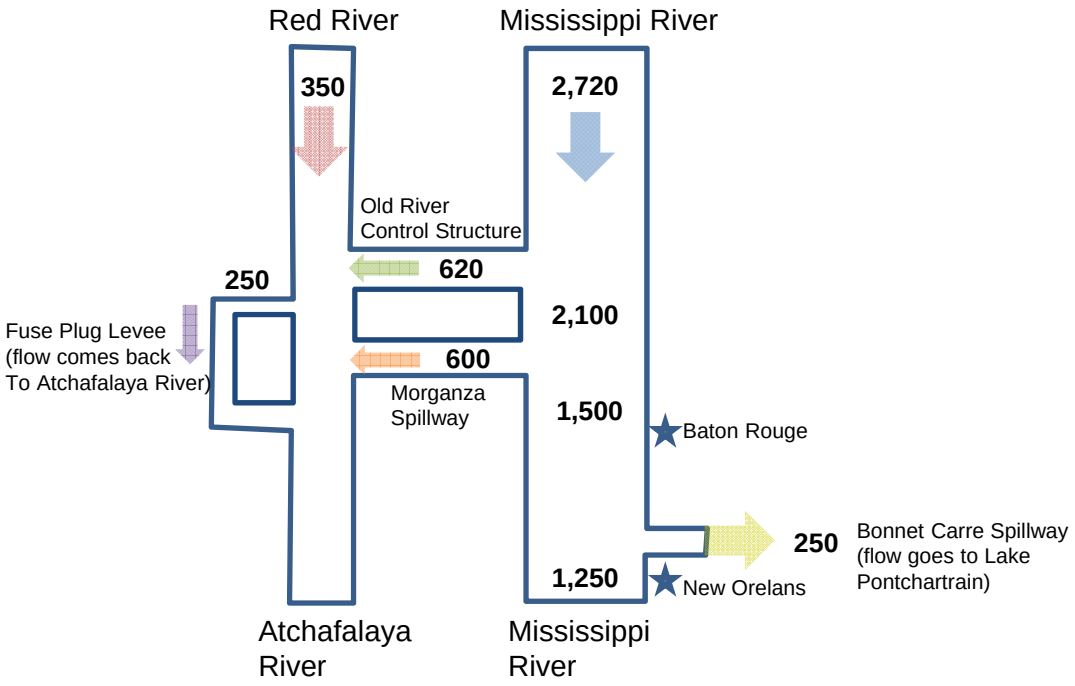
APPROACH

Project Design Flood



Provided by USACE. Flows are in 1,000s of cubic feet per second.

Project Design Flood



Provided by USACE.

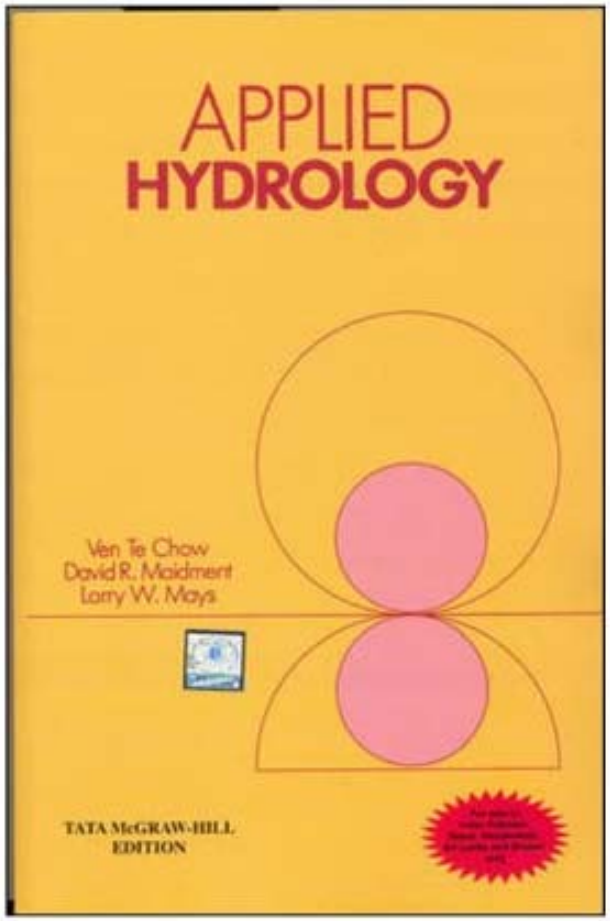
APPROACH

Calculate PMF Flow

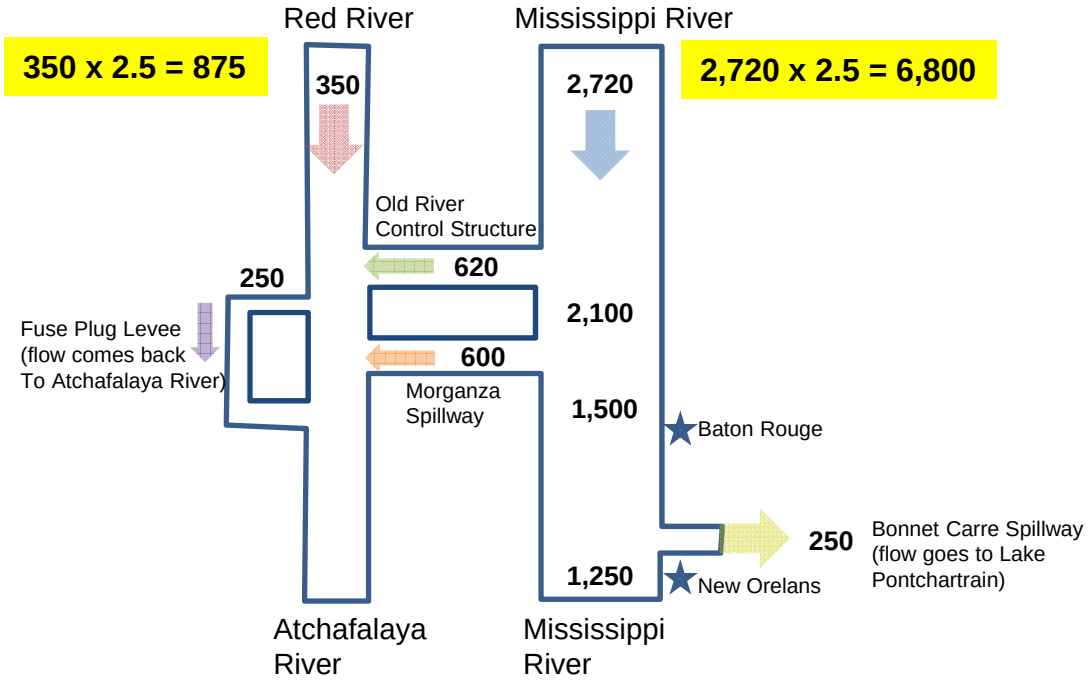
$$PDF = 40\% \; to \; 60\% \; of \; PMF$$

Rearrange

$$PMF = 2.5 * PDF$$



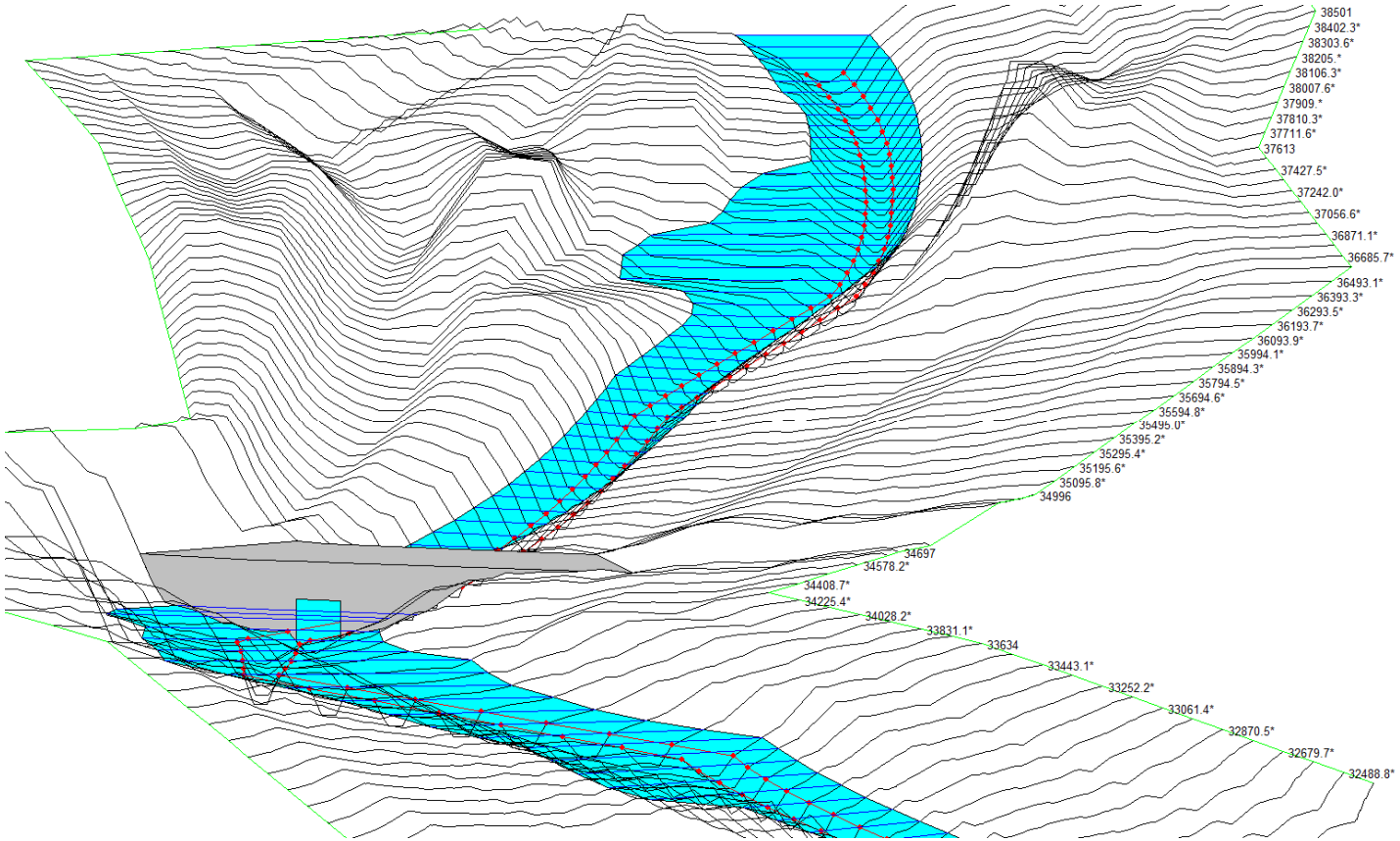
Project Design Flood



Provided by USACE.

APPROACH

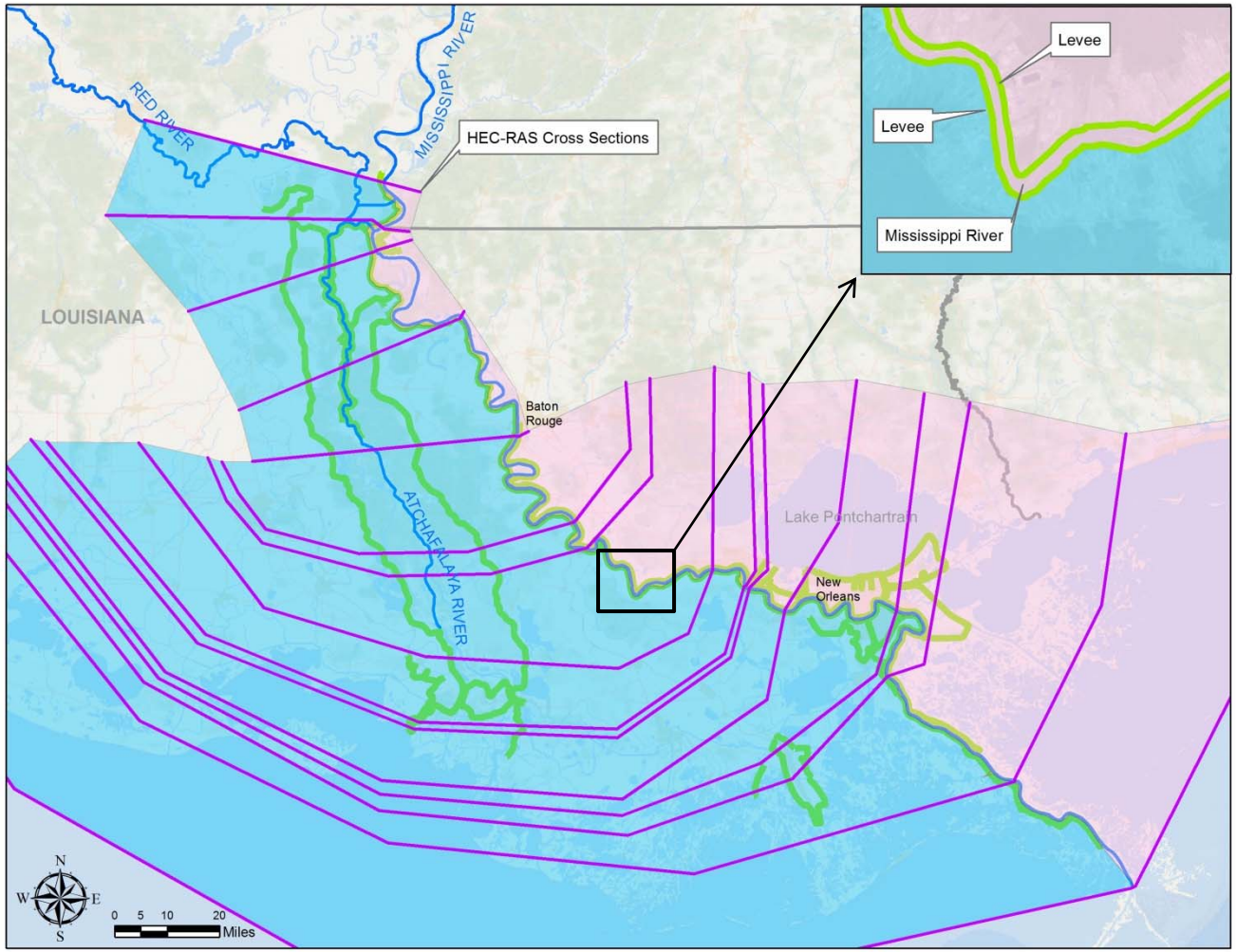
Calculate PMF Elevation



HEC-RAS computer program (used to model 1-dimensional flow)

APPROACH

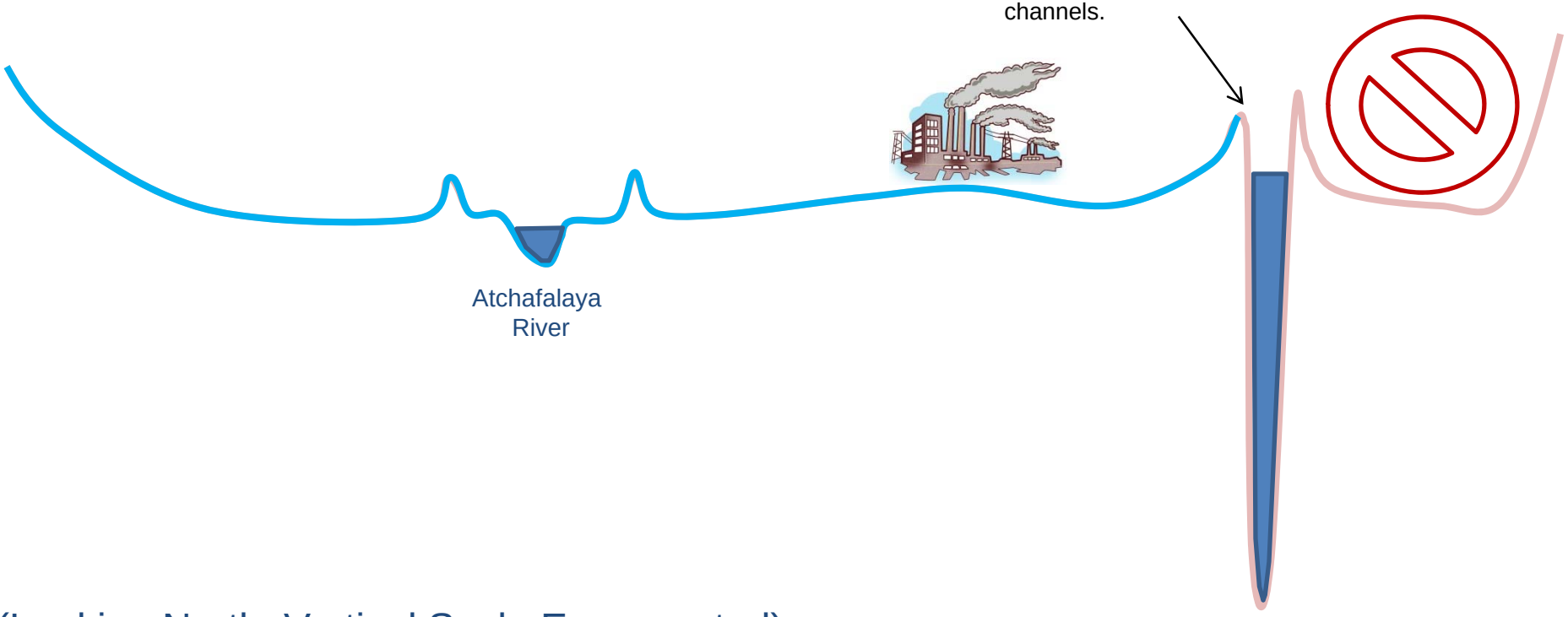
Calculate PMF Elevation



Calculate PMF Elevation

Levee modelled as division between two channels. Flow that overtops this levee can travel between the two channels.

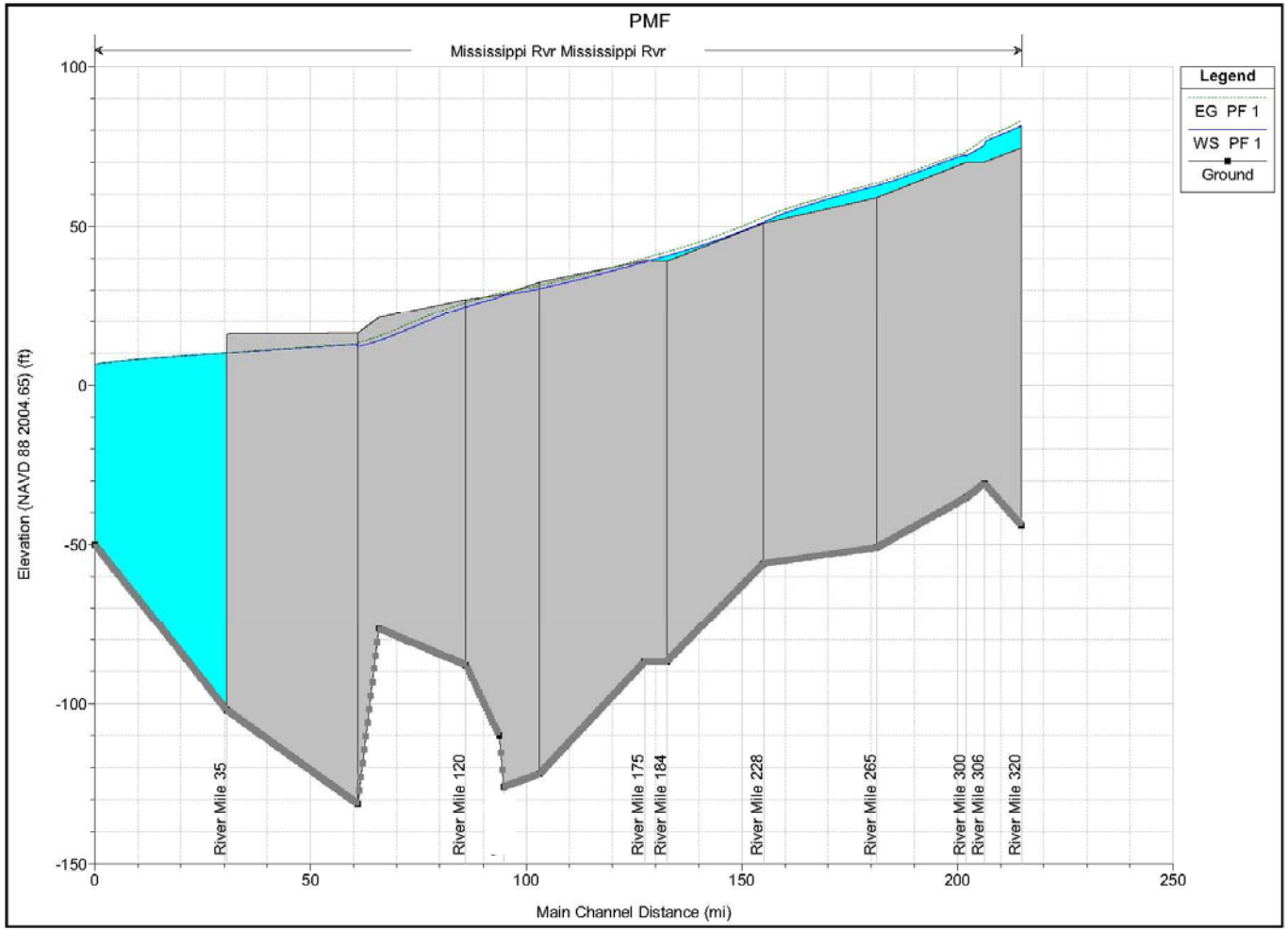
Conservative simplification was used as part of the Hierarchal Hazard Assessment.



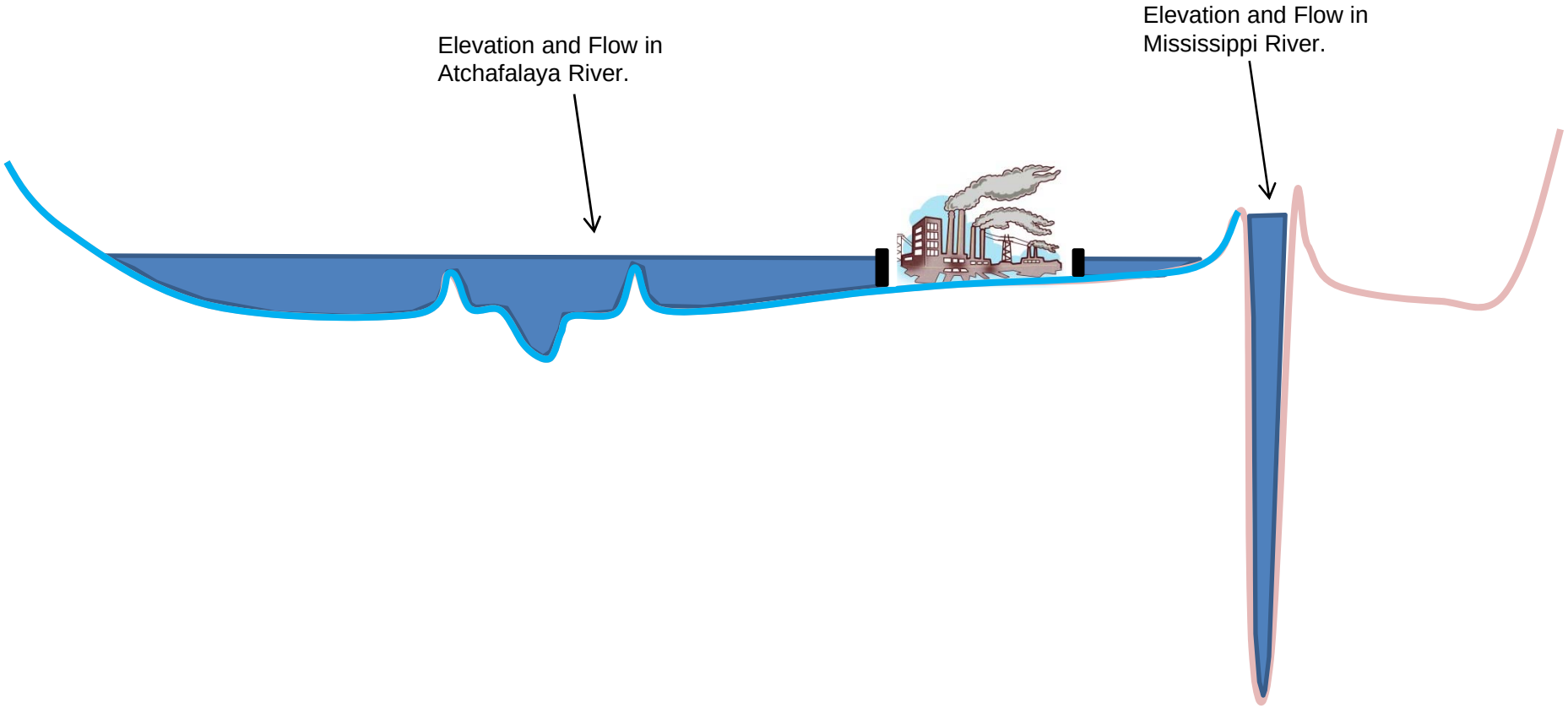
(Looking North, Vertical Scale Exaggerated)

APPROACH

Calculate PMF Elevation



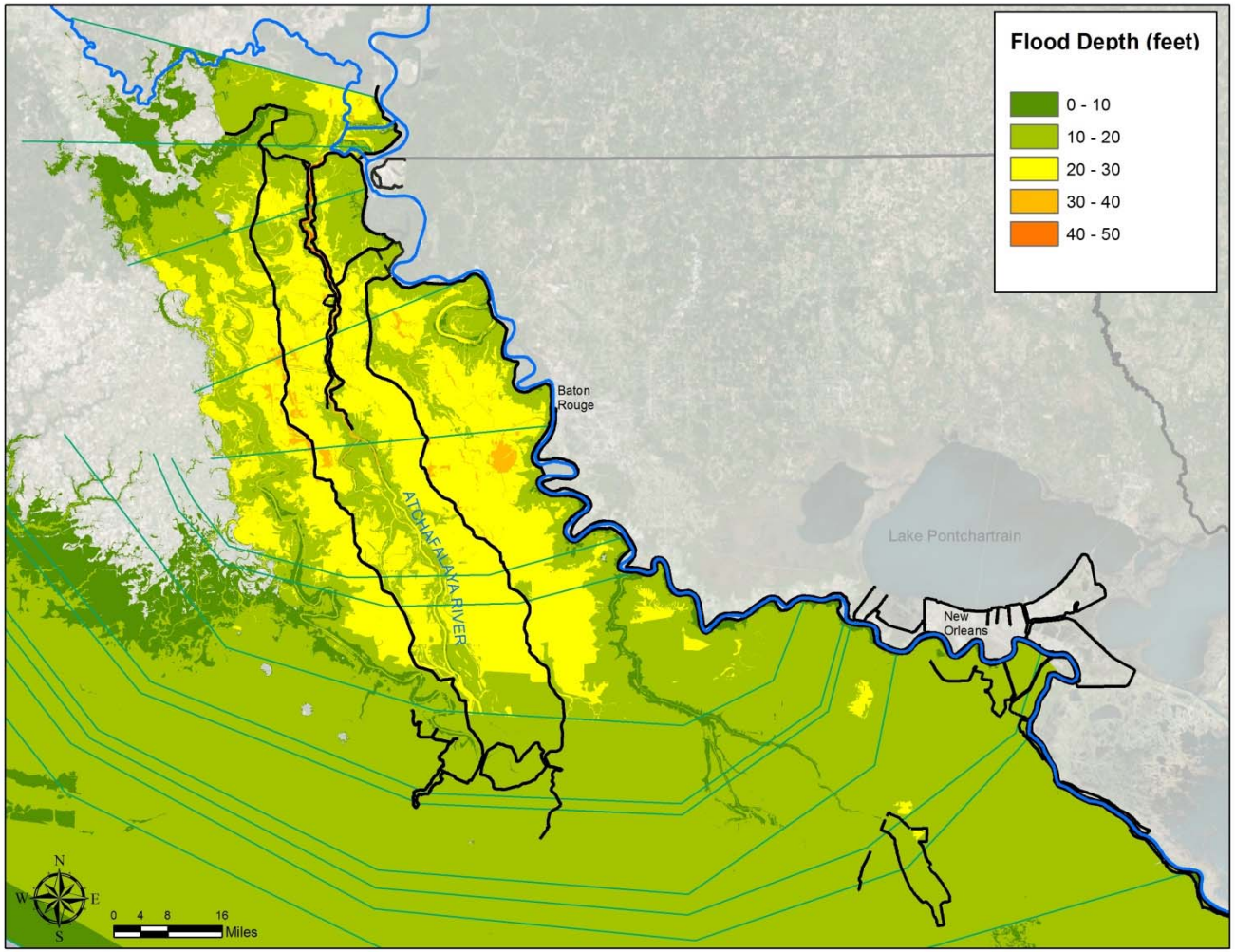
Results



(Looking North, Vertical Scale Exaggerated)

APPROACH

Results



LESSONS LEARNED

- Adding details to a model can be time consuming
- Focus on the model components that have the largest effect on your result
- Use conservative simplifications (i.e. Hierarchal Hazard Assessment)

- Avoid building critical infrastructure where almost half of the contiguous USA drains to.

Thank You !

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