

City of Cleveland Heights

# Peer Review Initial Findings

## Shaker Lakes Alternatives Review

**Amanda Hess, P.E., CFM**

Project Manager

**Bill Kingston, P.E.**

Project Engineer

October 25, 2021



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ISO 9001:2015  
CERTIFIED

# Gannett Fleming

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## Amanda Hess, PE, CFM



### Subject Matter Expert

- Instructor for seminars on hydrologic and hydraulic modeling
- Project Manager for over 20 conceptual design/alternative analysis studies and designs
- Gannett Fleming's Vice President, Hydrologic & Hydraulic Group Manager

## Bill Kingston, PE



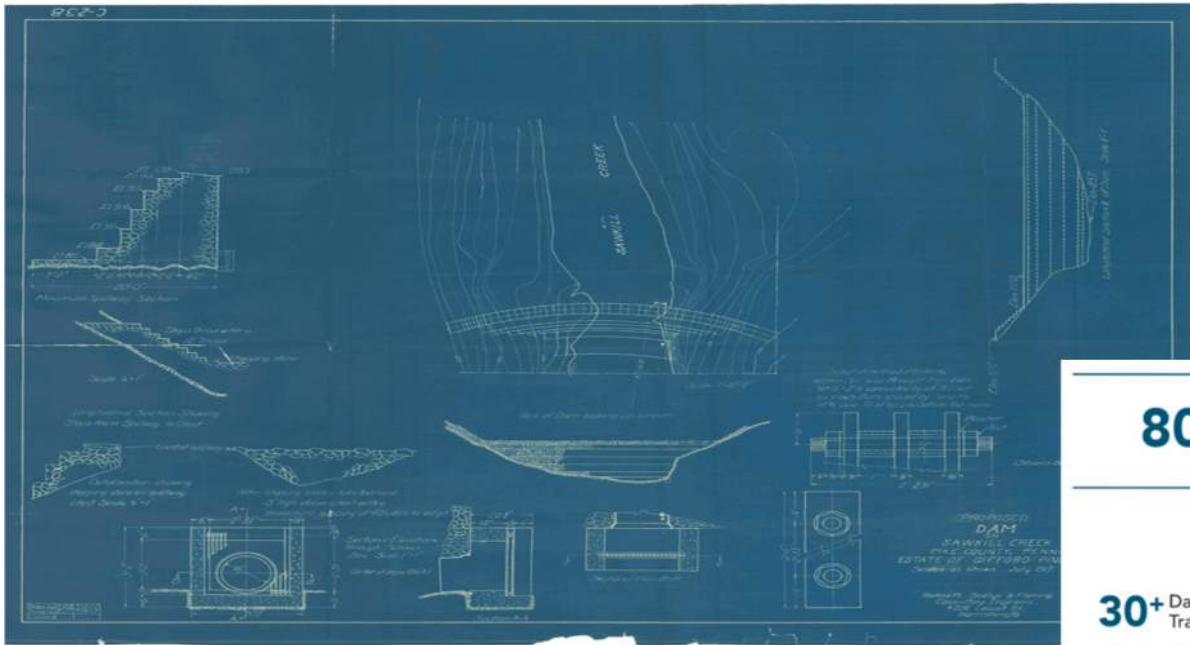
### Subject Matter Expert

- Lead H&H Engineer for several spillway rehabilitations
- M.S. Civil Engineering: Probable Maximum Flood Modeling
- Gannett Fleming's Hydrologic & Hydraulic Engineer/Project Manager



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# Gannett Fleming



Founded in 1915 by Farley Gannett. Our first design assignment was a hydropower dam for the summer home of Gifford Pinchot in Pennsylvania in July 1917, illustrated above.



**#8**  
Dams and Reservoirs

**800+** Dam Inspections

Dam Rehabilitations  
**500+**

**100+** New Dams

**30+** Dam Safety Training Courses

**750+** Dambreak Inundation Studies

**25+** Operations and Maintenance Plans

**150+** Dam Safety & Risk Assessments

**7+** Dam Safety Program Peer Reviews

**100+** Emergency Action Plans and Plan Updates

**5+** Real Emergency Response Cases

**50+** Potential Failure Modes Analysis



## Scope of Engagement

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- Peer Review of NEORSD studies and conclusions regarding the proposed plans to address deficiencies at Horseshoe Lake Dam and Lower Shaker Lake Dam
  - Hydrologic and hydraulic analyses
  - Evaluation of engineering alternatives
  - Geotechnical, environmental and economic considerations
- Assess reasonableness of evaluation methodology and conclusions based upon accepted professional standards/state of the practice
- Participate in a virtual meeting to present initial findings and answer questions from representatives of City
  - Finalize scope and identify any open issues
  - Prepare written summary of review after virtual meeting



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# Typical Watershed Planning Study

1. Identify Problems and Determine Objectives

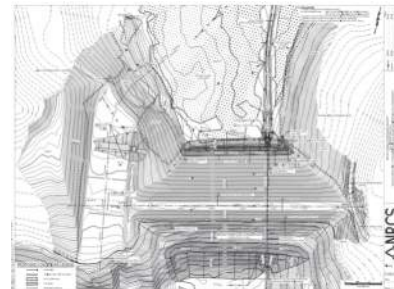


- Flood Reduction
- Environmental
- Recreation

2. Inventory Resources and Analyze Resource Data



3. Formulate & Evaluate Alternatives



4. Make Decision

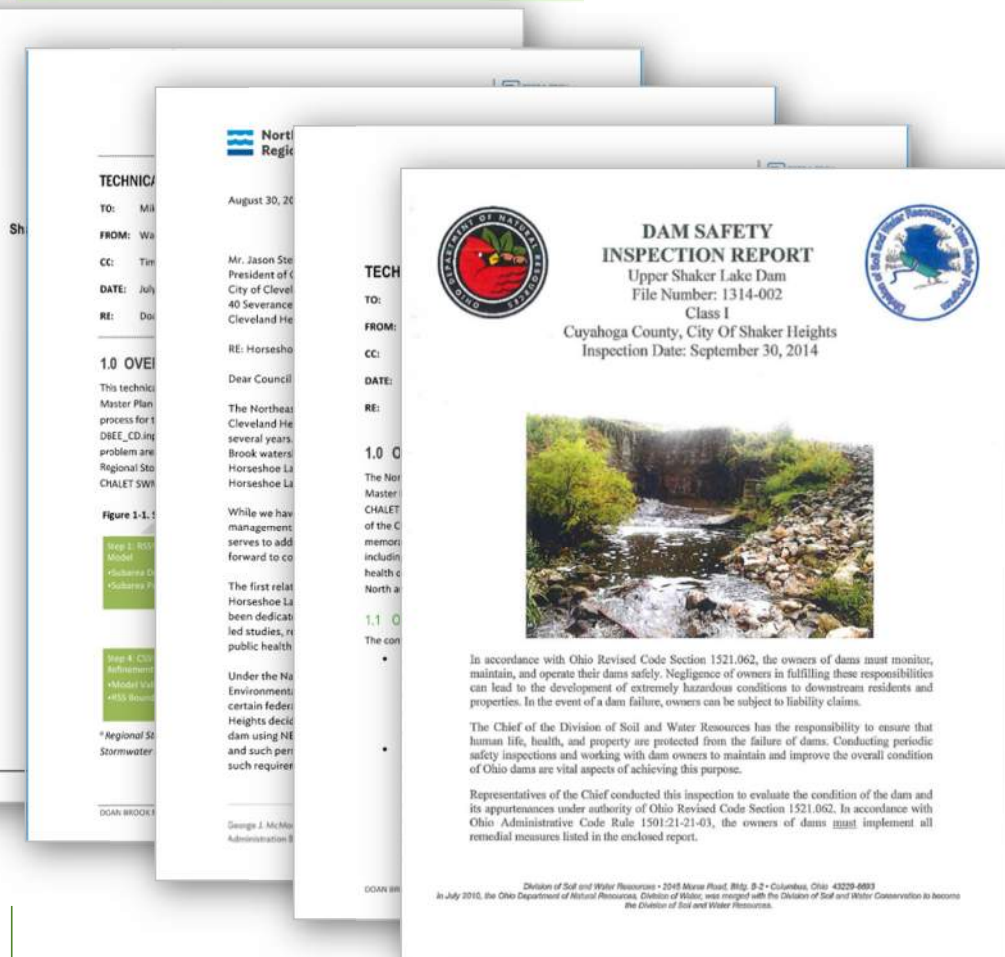


- Qualitative
- Quantitative

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# Documents Reviewed

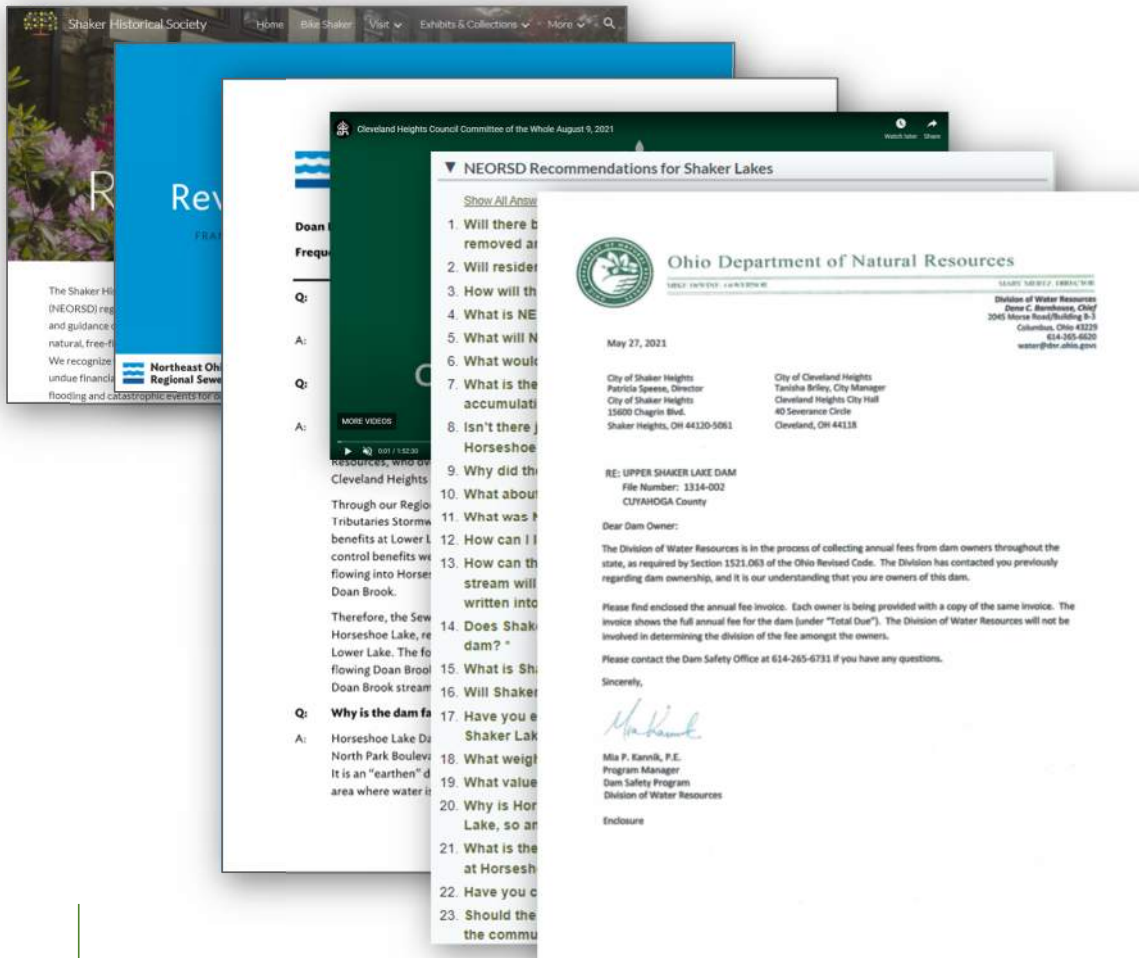


- Shaker Lakes Alternatives Review and Preferred Alternative Determination Memorandum (Revision No. 1)
  - Draft Doan Brook Model Build and Validation and Calibration Technical Memorandum
- NEORSRD's 8/30/21 Letter to Mr. Stein Re: Horseshoe Lake Dam
- Draft Doan Brook Aquatic Life Technical Memorandum
- ODN Dam Inspections from 2009, 2014, and 2018



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# Documents Reviewed



- Shaker Historical Society Statement - Response to NEORSR Recommendations
- NEORSR Presentation - Shaker Lakes: Review and Recommendations
- NEORSR's Doan Brook Restoration Near Horseshoe Lake Park FAQs
- Recording of August 9 Joint Council Meeting
- Shaker Heights FAQ Page
- History of Leases/Land Management and Land Use Plan for the Shaker Lakes Parklands



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## Other Information

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October 18, 2021 web meeting with:

- NEORSD
- Wade Trim
- Tetrattech

Information on:

- History of Stormwater Master Planning
- Dam Safety Deficiencies
- Sediment Considerations
- Rehabilitation Alternatives
- Cost Estimates

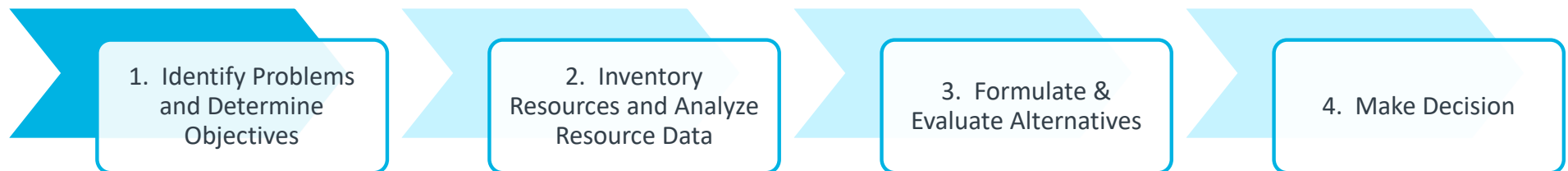


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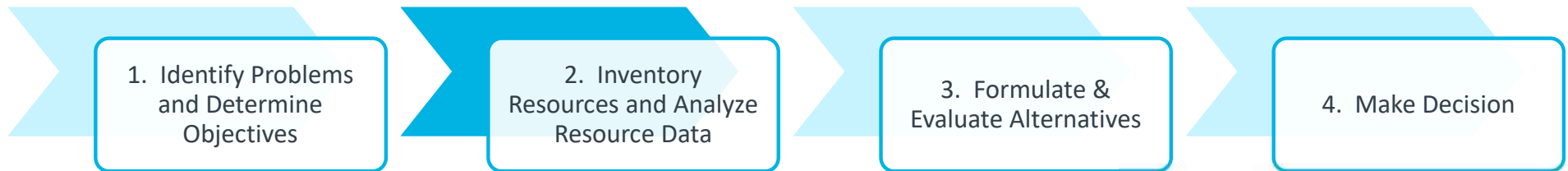
# Findings

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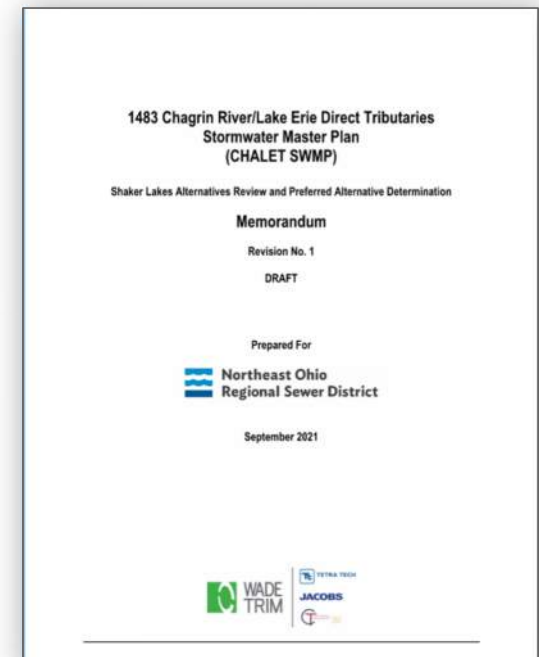


- Project objectives relate to Stormwater Master Plan/Regional Stormwater Management Program
  - Reduce regional stream flooding
  - Reduce streambank erosion
  - Improve water quality

# Findings



- Hydrologic and Hydraulic Analysis
  - Included significant field data collection
  - Included calibration to historical events
  - Completed using generally accepted methodology
  - Reported results seem reasonable
- Environmental Investigations
  - Doan Brook Aquatic Life Assessment
  - Other investigations not documented (erosion? water quality?)



# Findings

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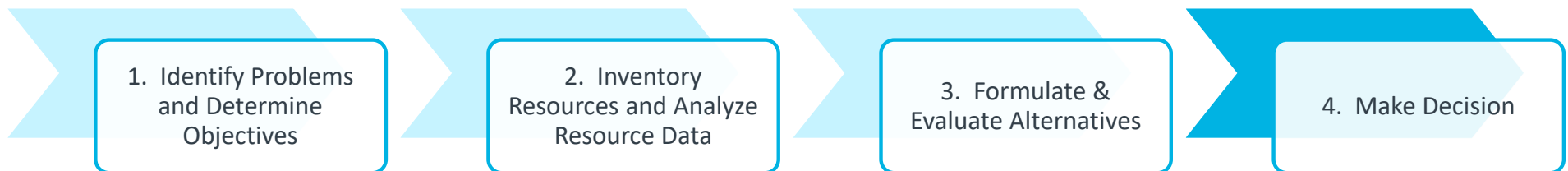


- Alternative Formulation
  - Not fully documented but appears to have been completed
- Alternative Evaluation
  - Uncertainty in costs
  - Evaluations of flood benefit completed
  - Evaluations of other factors not fully documented

More discussion on costs to follow

# Findings

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- Decision not based on cost but on meeting objectives
  - Reduce regional stream flooding
  - Reduce streambank erosion
  - Improve water quality

# Alternatives

	SCENARIO	COST
1.	No dams or lakes at both Horseshoe and Lower	<b>\$22.7 million</b> Horseshoe Lake removal = \$14.7 million Lower Lake removal = \$8 million
2.	Remove dam, no lake at Horseshoe Upgrade dam, maintain lake at Lower	<b>\$28.3 million*</b> Horseshoe Lake removal = \$14.7 million Lower Lake rebuild = \$13.6 million
3.	Class 1 dam, maintain lake at Horseshoe No dam or lake at Lower	<b>\$28.7 million</b> Horseshoe Lake rebuild = \$20.7 million Lower Lake removal = \$8 million
4.	Class 1 dams and lakes at both Horseshoe and Lower	<b>\$34.3 million</b> Horseshoe Lake rebuild = \$20.7 million Lower Lake rebuild = \$13.6 million

## Findings from Review of Cost Estimates

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- Largest uncertainty in cost relates to sediment
  - Chemical composition important
  - Based on GF projects, unit cost can vary widely
  - Plan for sediment removal should be optimized (Where? How much? Where will it go? How will it get there?)
- Conceptual designs were advanced to different levels
  - Varied estimates of similar line items
  - Line items/quantities not documented (schematics/plans?)
  - Choice of contingency percentages affect overall cost
- Cost Estimates do not include life cycle costs
  - ODNR requirements (Class I Dam)
  - Regular operation & maintenance
  - Sediment removal



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## Overall Finding

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- NEORSD followed their own process for decision making. Costs may differ, potentially significantly, from costs presented in alternatives evaluation; however, the selected alternative does not appear to be driven by costs, but instead by their desire to meet their own stormwater management objectives (reduce regional stream flooding, reduce erosion, improve water quality)

# Questions

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