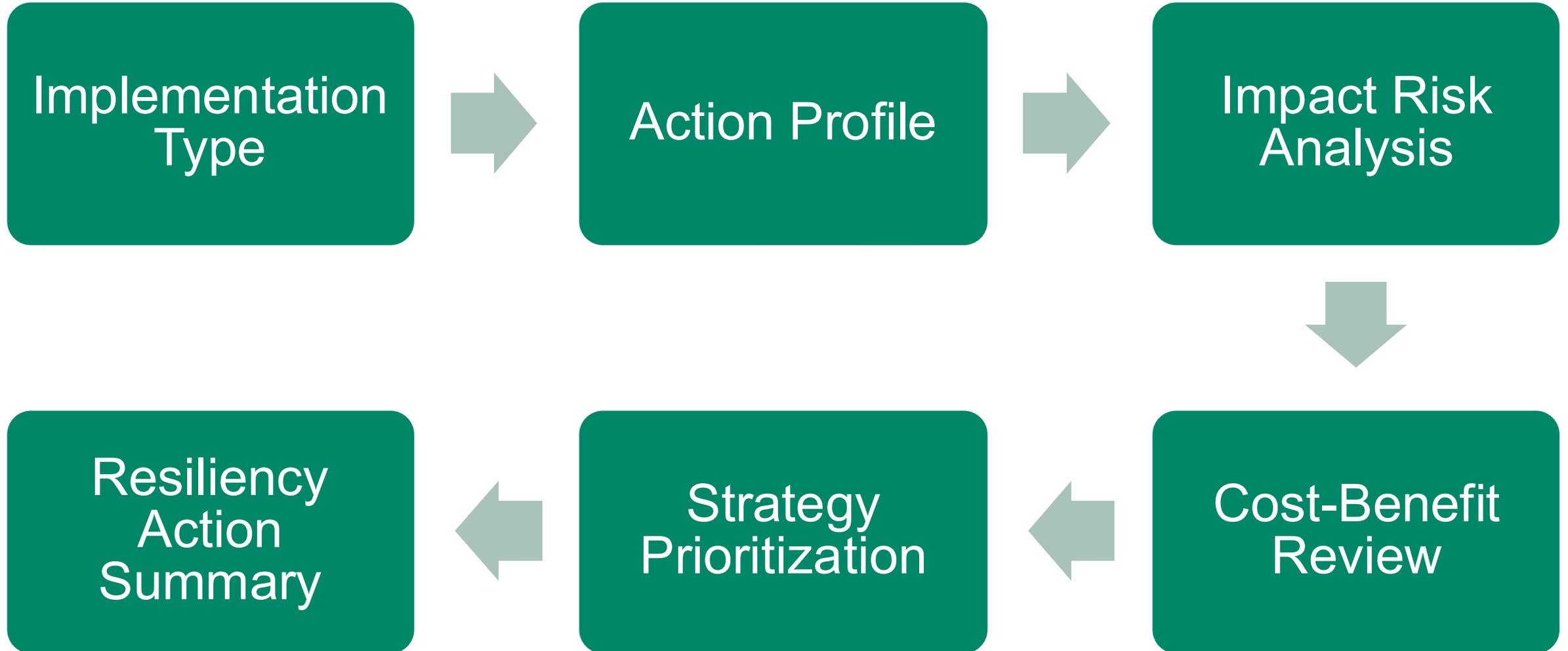


# Levees

Flood Resiliency Blueprint Principal Advisory Group (PAG):  
Methodology Review

Daniel Kang, Flood Risk Solutions (FRS)

## Workflow Overview



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## Basic Action Profiling

### Option #1: Existing Levees ID

- Highlight existing infrastructure
- Build Levee Profile from USACE NLD
- Local Levee Partnership Team (LLPT) Status

### Option #2: New Levees/Floodwalls

- Build Levee Profile from user-input
- Preliminary site analysis
- Preliminary design considerations

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# Action Impact Risk Analysis

- Performance & Consequence
  - Target Flood Scenario
  - Flood risk reduction potential
    - Existing Pre-Action
    - Expected/Reduced Post-Action (Tier-2)
  - Potential affected hazards
  - Levee accreditation criteria (FEMA NFIP 44 CFR §65.10)

# Action Impact Risk Analysis: Existing Levees

🏠 **Lumberton Levee**
Data Change Request
Download Data ▾

🔍 Search

🗺 Mapping

📊 Data

**Location**  
Lumberton, Robeson County, North Carolina

**System ID**  
390005000001

**Operation and Maintenance Organization**  
City of Lumberton

**Floodplain Management**  
FEMA Region 4

**Last Assessment Date**  
12/7/2020

### Summary

The levee system is located in Lumberton, NC in Robeson County along the right bank of the Lumber River. The levee system consists of three segments; one project segment and two non-project segments. The project segment begins at the tie in with Interstate 95 (approximately 1,050-ft north of VFW Road) and extends south and east paralleling the Lumber River to the tie-in with the intersection of Alamac Road / S. Chestnut St. The I-95 non-project segment extends from the intersection with I-74 to the levee embankment (project segment). The Alamac Road / S. Chestnut St. non-project segment extends from the project levee embankment to Popes Crossing Road. The project levee embankment was designed in 1974 by the United States Department of Agriculture (USDA) - Natural Resources Conservation Service (NRCS) (f/k/a Soil Conservation Service) after a work plan agreement was formalized in March 1966 between the Robeson Soil and Water Conservation District, Robeson County Drainage District Number 1, and the City of Lumberton. The City of Lumberton is responsible for the operation and maintenance of the levee embankment.

### Performance & Condition

A Screening Level Risk Assessment (SLRA) was conducted July 2019 – May 2020. This levee is a non-US Army Corps of Engineers (USACE) system. The SLRA was based on findings from an inspection and information provided by the local owner/operator, City of Lumberton. The results of the SLRA indicate the primary performance concern is driven by uncertainties related the placement of the closure across the CSX RR under the I-95 embankment. I-95 was loaded to nearly 100% of its height in 2018 and failed at the closure. The City has since developed interim closure plans and plans to construct a permanent closure. Also, water can flow into and out of the leveed area through Jacob Swamp Bridge on Alamac Road during flood events with possible negative or positive impacts to the population and assets behind the levee. The City is evaluating impacts of flow through Jacob Swamp Bridge to inform risk management measures. Consequences for this levee system are considered medium based in the impacted leveed area, population, and economic damages. For both scenarios, prior overtopping and overtopping, the population at risk of about 5,700 people. Economic damages are approximately \$200 Million. Critical infrastructure includes

### Behind this Levee

🏠

**2,125 Buildings**

Source: USACE National Structure Inventory 2023

👤

**5,736 People**

Source: USACE National Structure Inventory 2023

🏠

**\$1 Billion in Property Value**

Source: USACE National Structure Inventory 2023

🌾

**1,371 Acres of Farmland**

Source: USDA Cropland Data Layer 2022

🐾

**No Endangered Species Living Behind This Levee**

Source: USFWS Threatened & Endangered Species 2023

🏢

**13 Critical Structures**

Source: DHS Homeland Infrastructure Foundation-Level Data (HIFLD) Open 2023

🏘

**2 Communities**

Source: FEMA Communities Layer 2020

🌍

**Tribal Lands Behind This Levee**

Click here for more information

### Levee Length

2.833 Miles

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### Average Levee Height

10 Feet

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### Year Levee Constructed

1974

### Flooding Hazard

**Flooding Source**  
📍 The primary source of floodwater for the levee system. This can include several rivers if tributary rivers are adjacent to the levee. Lumber River

**Upstream Dams**  
📍 Dams upstream of the levee within a certain distance in the river reaches that are flood control and during floods could be contributing to the stage of the river through operational or spillway releases. No Data

**Historic Loading by Percentage of Height** 📊

0%	0 Occurrences
75%	5 Occurrences
90%	9 Occurrences

# Action Impact Risk Analysis: New Levees/Floodwalls

Guidance for Flood Risk Analysis and Mapping, Levees

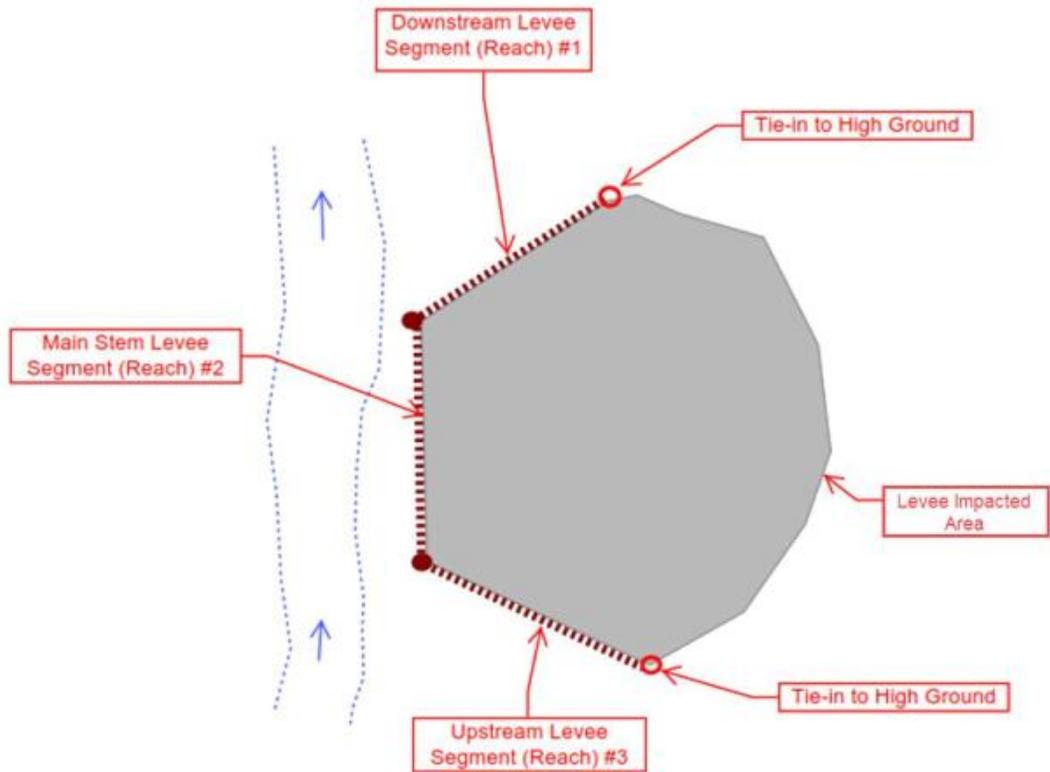
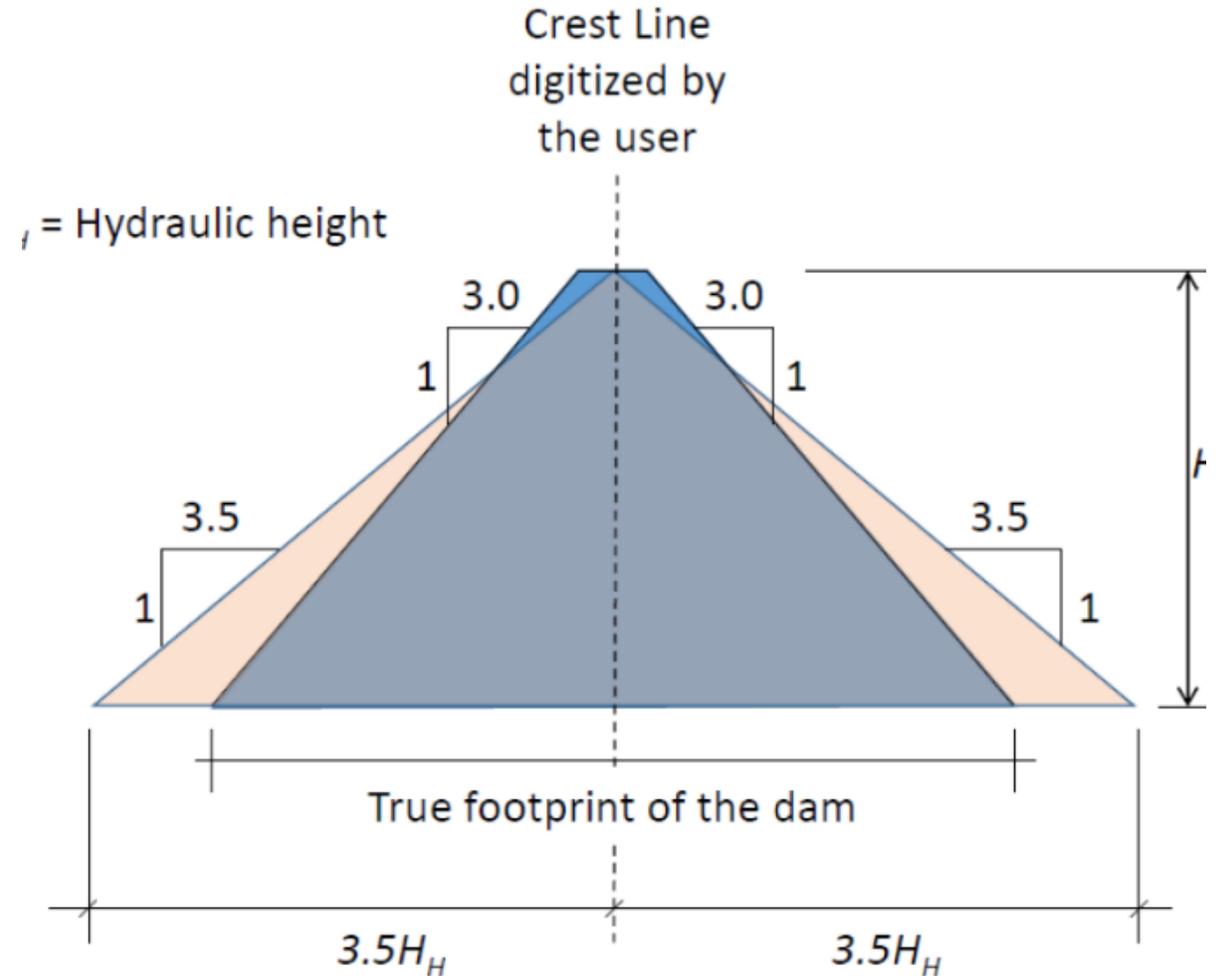


Figure 1: Example Levee System A



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## Cost-Benefit Review

- AACE No. 18R-97 Class 4 ROM%
- Existing Damage Costs Pre-Action
- Loss Avoidance Costs (Reduced Damage Costs Post-Action)
- Total Mitigation Action Cost = total associated capital cost(s) + annual O&M/lifecycle costs
- BCR "Cost Effectiveness" = Loss Avoidance Costs / Total Mitigation Action Cost

NATIONAL LEVEL SAFETY PROGRAM

### Summary of Costs Associated with Levee-related Activities

FINAL - NOVEMBER 2023

# Action Strategy Prioritization

- Feasibility ranking mechanism
  - Technicality
  - Regulatory Compliance/Urgency
- Minimum threshold scoring system

Criterion	Weight (%)
USACE Levee Safety Action Classification (LSAC)	20%
Population at Risk (PAR)	20%
Emergency Preparedness and O&M Plans Availability	20%
Potential Failure Mode Analysis (PFMA)	10%
Structural Feasibility	10%
Levee Ownership / Sponsor	5%
Environmental Consequences	5%
Benefit-Cost Ratio (BCR)	5%
Community/Stakeholder Efforts	5%

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# Resiliency Action Summary

- Qualitative inputs for additional project context:
  - Problem Statement & Objectives/Expected Outcomes
  - Assumptions & Constraints
  - Program Work Plan
  - Stakeholder Collaboration Efforts

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## Possible Optimizations for V3



Action Strategy Prioritization



Improved BCA Handling



Tier-2 Modeling Integration



Mediator for NLSP support

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better world

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