Public Meeting for Deep Creek Watershed

Flood Control Dam # 19A and Dam # 21

Yadkin County, North Carolina

January 24, 2022

NRCS

Established Yadkin County North Carolina 1850

Schnabel ENGINEERING

Build Better. Together.

Meeting Protocol and Expectations

- Please Mute Your Phone / Computer
- Meeting is Being Recorded
- Agenda on Yadkin County Website
- Q&A Session at End of Presentations
  - Raise Hand Icon
  - Chat Icon for Typing Questions
- PowerPoint will be Posted to the Website

Today's Objectives

- Explain Roles and Responsibilities of Key Parties
  - NRCS
  - Local Sponsors
  - Contractor and Subcontractors
  - NC Dam Safety Agency
- Review Alternatives for Rehab. of Dams 19A & 21
- Present Analyses, Effects and Costs
- Encourage Input and Contributions By Others

The Team

NRCS

Mary Waligora, PE.
Assistant State Engineer

NORTH CAROLINA
Environmental Quality

Sue White
State Dam Safety Engineer

Yadkin County
North Carolina

Jason Walker
District Director of Yadkin SWCD

Schnabel ENGINEERING

Maridee Graves, PE
Project Manager

Bryan Porter, EI
Assistant Project Manager

Wade Biddix
Planning Coordinator

James Featherston
Senior Economist

MMI
MOGENSEN MITIGATION, INC

Gerald Pottern
Principal Environmental Scientist

HORN
& ASSOCIATES, INC.

David Horn

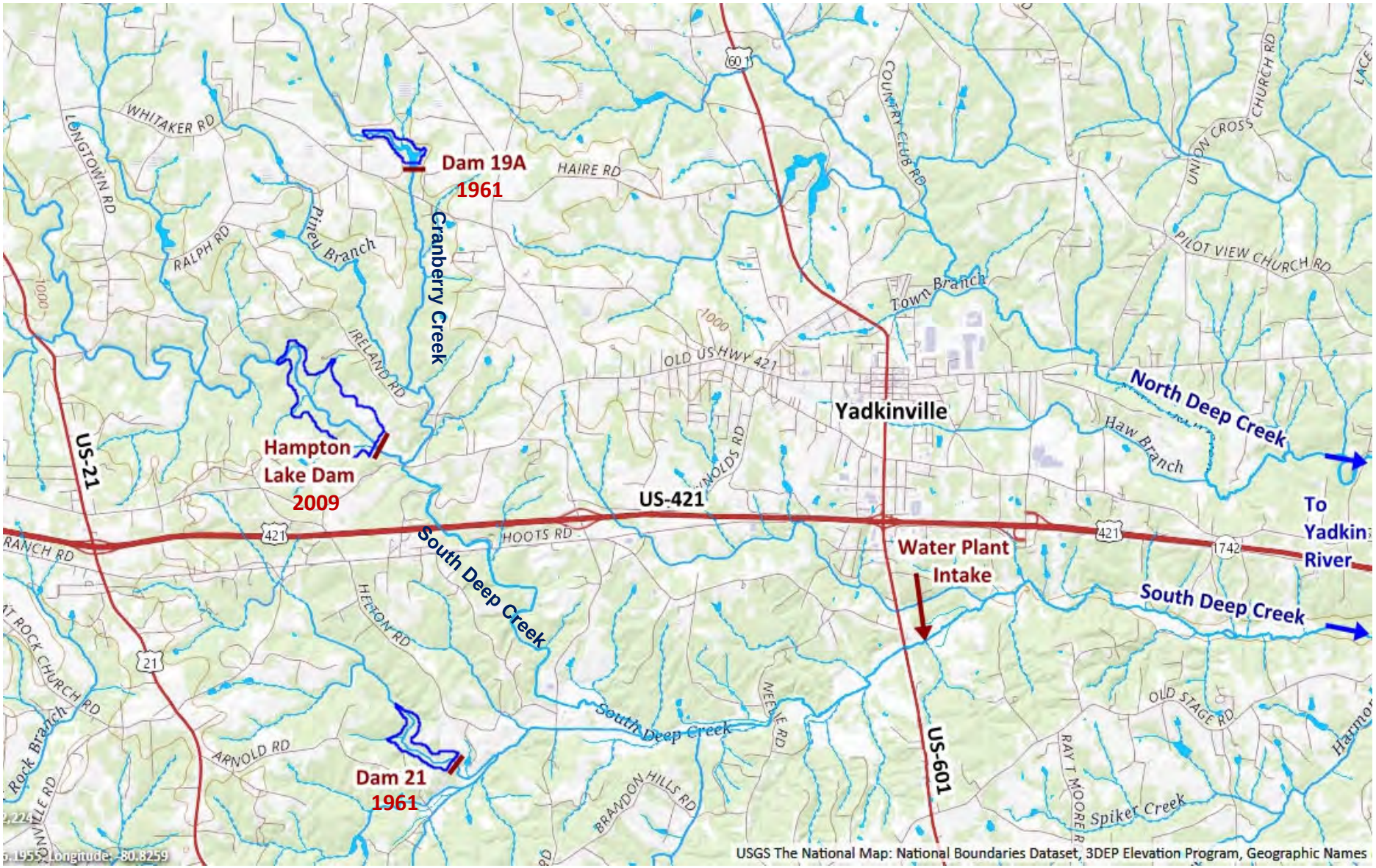
ALLIED
ENGINEERING & SURVEYING

Clinton B. Osborne (Clint), PLS

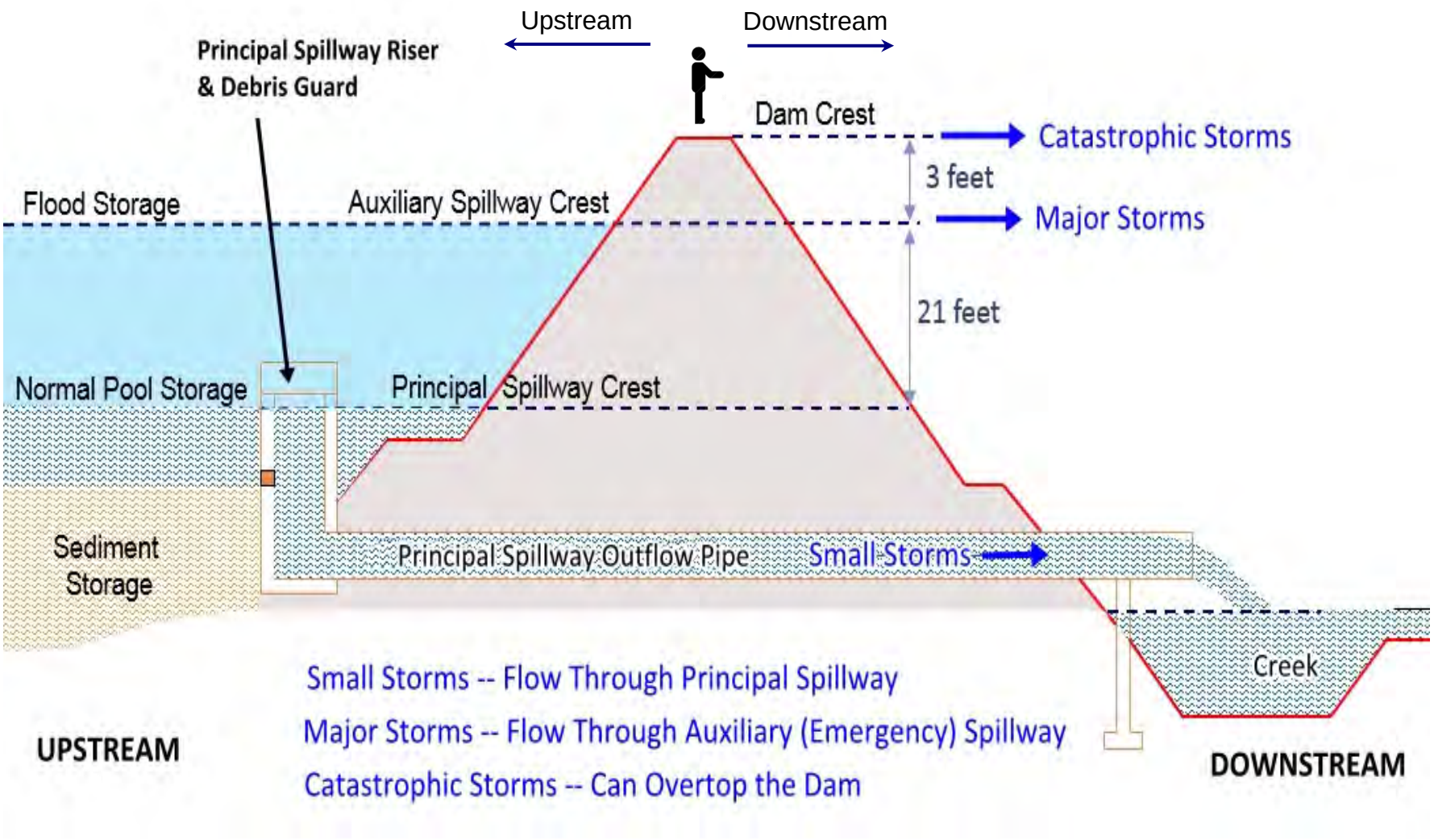
Relationship between Sponsors, NRCS, and NC Dam Safety

- Yadkin County / Yadkin SWCD (Sponsors) are the dam owners and operators.
- NRCS provides technical and financial assistance.
- NC Dam Safety regulates dams, determines hazard class of dams, etc.

Where are Deep Creek Dam 19A and Dam 21 and what lands do they protect from flooding?



How Do Flood Control Dams Work?



NRCS ROLE & REHABILITATION PROGRAM

MARY WALIGORA – Assistant State Engineer
Project Manager

USDA

United States Department of Agriculture

• North Carolina
Natural Resources Conservation Service

NRCS Role & Rehabilitation Program

January 24, 2022 | Mary Waligora, PE, M. Eng.

Natural Resources Conservation Service

nrcs.usda.gov/

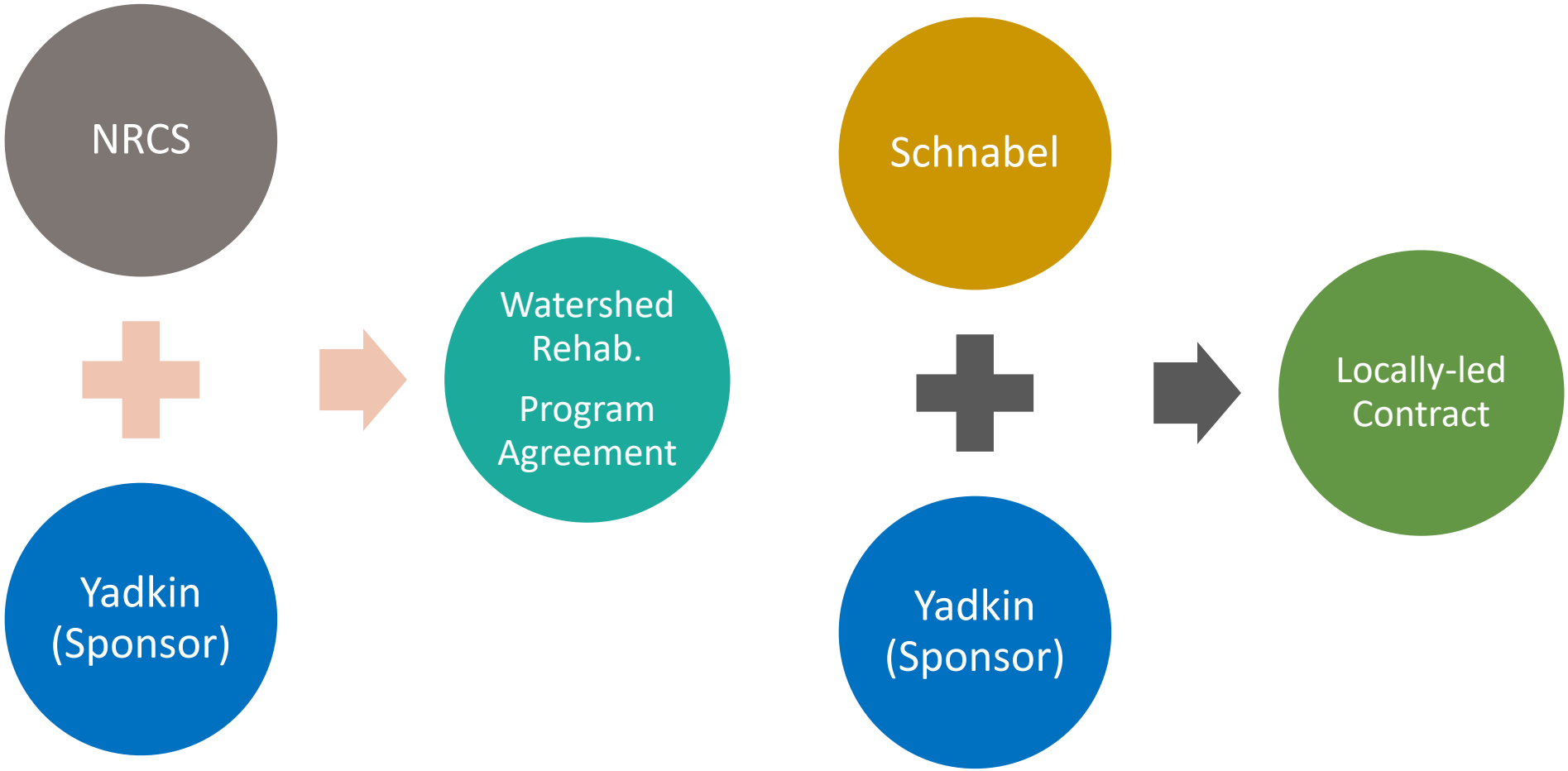
Federal Funding for Watershed Rehabilitation

- NRCS Watershed Programs are authorized by Congress
- Watershed Protection and Flood Prevention Act of 1954 (PL 83-566)

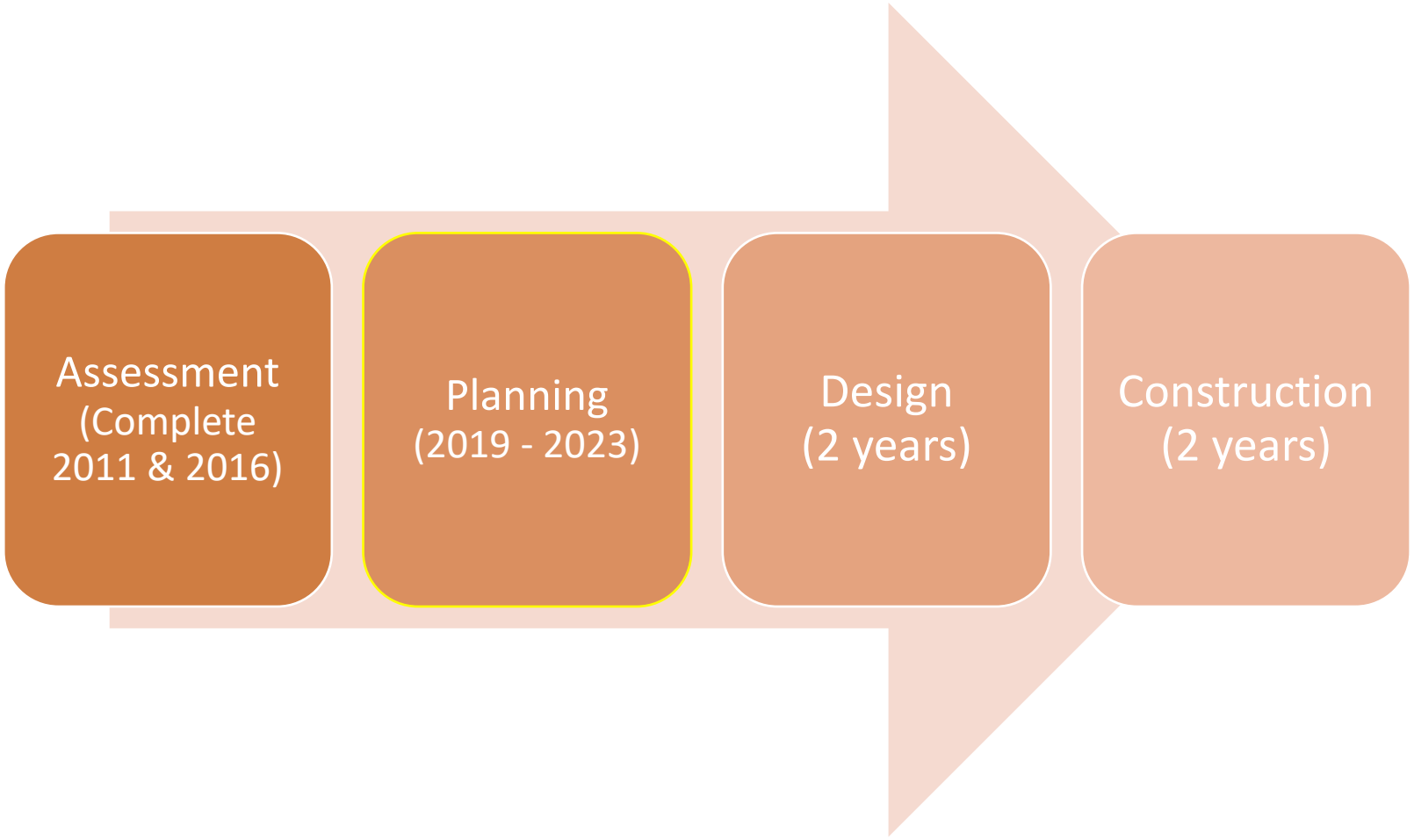
Cost-Share With Dam Rehab.

- NRCS Funds
  - 100% of Planning Costs
  - 100% of Design Costs
  - 65% of Total Project Costs (NTE 100% of Construction Costs)
  - NRCS Staff Costs are paid 100% by NRCS
- Local Sponsors Fund
  - 35% of Total Project Costs (Cash or In-Kind Credit)
  - 100% of Permit Costs

Agreement with Sponsoring Local Organization (SLO)

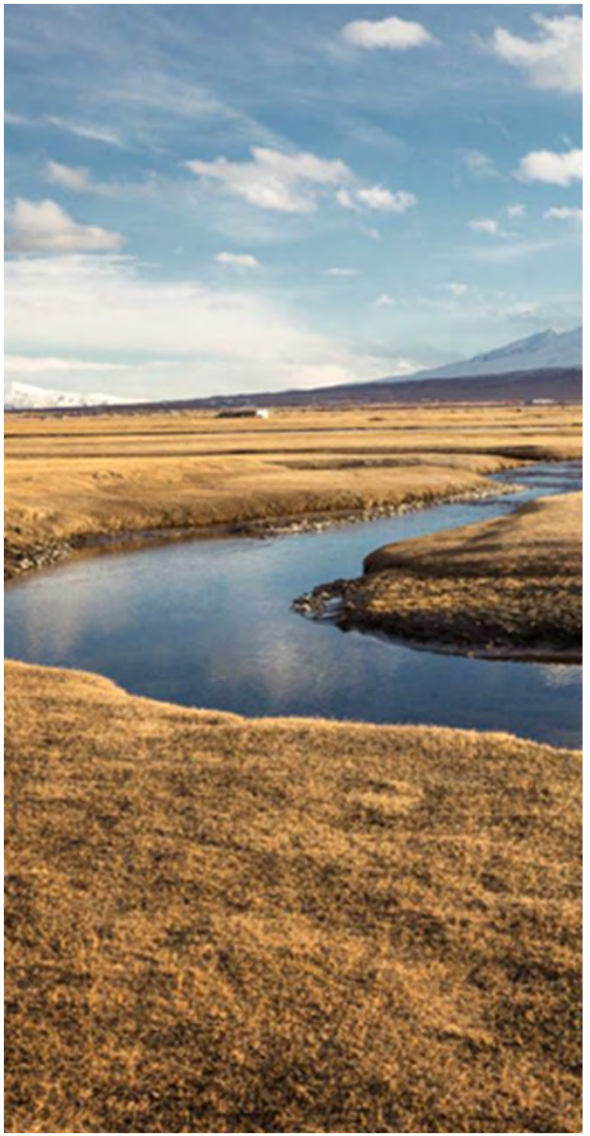


The Watershed Rehabilitation Program Process



Need for a Watershed Plan

- Quantify current conditions
- Describe all alternative solutions considered
- Assess the environmental impacts of each alternative
- Evaluate the extent alternatives achieve the stated purpose and need
- Set responsibilities for financing, installation, operation and maintenance



NRCS Responsibilities

i) Adherence to State and Federal Requirements

ii) Watershed Program Information Assistance

iii) Provide guidance/oversight of the preparation of the Watershed Plan

iv) Implementation Assistance

v) Real Property Rights Work Maps
(Further land rights responsibilities are provided by the SLO)

vi) Operation and Maintenance Assistance
(SLO must ensure the O&M is performed)

vii) Soil and Water Conservation District Involvement

viii) Dedicated Staff for Technical Review of Watershed Plans (NWMC)

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ROLES OF THE LOCAL SPONSORS

JASON WALKER – District Director, Yadkin SWCD

Role of the Local Sponsors

- Operation and maintenance of the dams:
  - Perform site visits/inspections.
  - Embankment mowing/vegetation control
  - Removal of debris around the spillways
  - Animal control

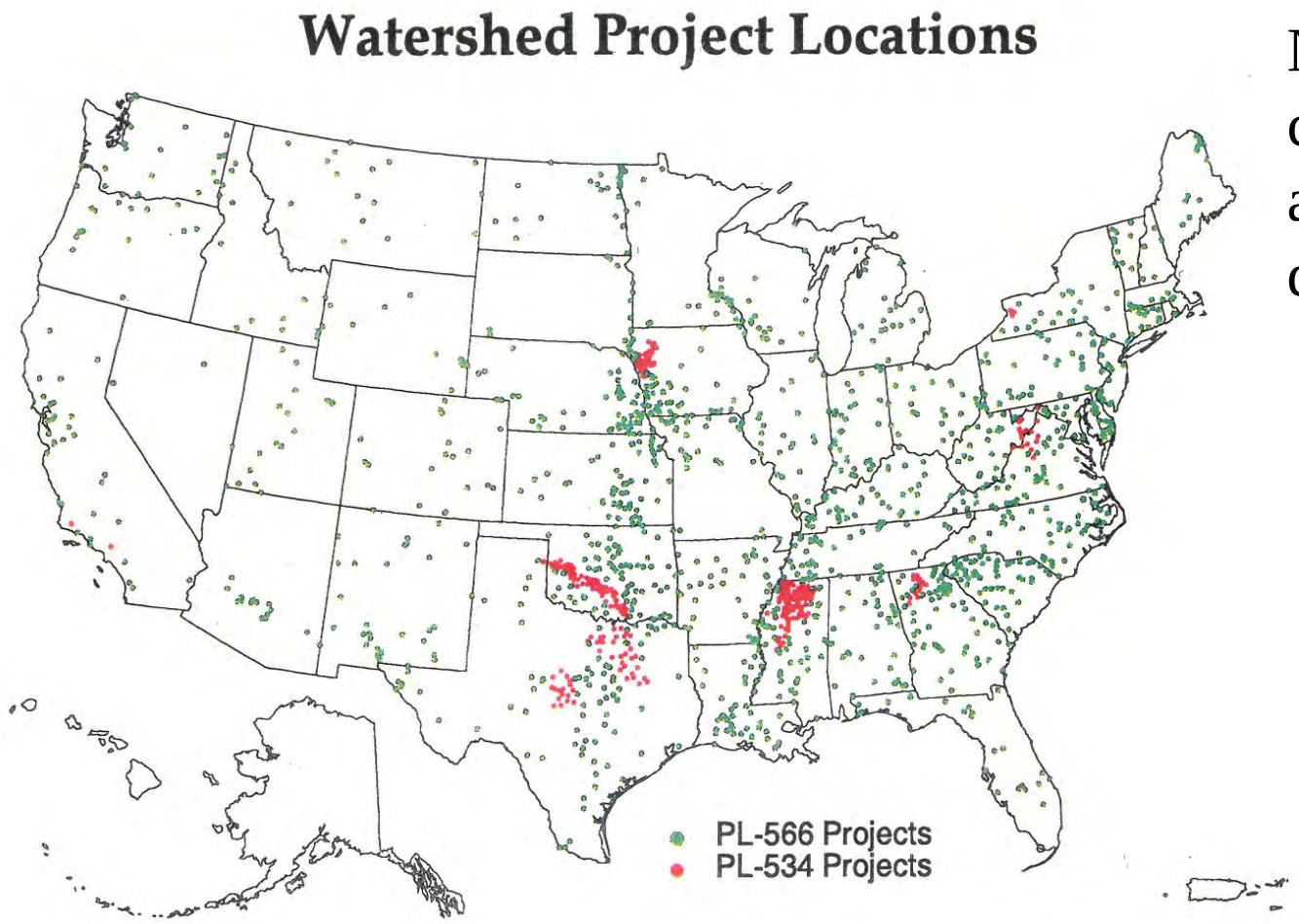
Role of the Local Sponsors

- Dam rehabilitation program through NRCS:
  - Request NRCS planning assistance
  - Public participation
  - Provide 35% of the total project cost (cash or in-kind credit) and 100% of the permit costs
  - Obtain permits
  - Operation and maintenance: Once the dams are rehabilitated, the Sponsors continue the operation and maintenance of the dams

SMALL WATERSHED PROGRAM, PURPOSE AND NEED FOR ACTION, DAMS STATISTICS

WADE BIDDIX – Planning Coordinator

Small Watershed Program



NRCS has assisted communities build almost 12,000 dams since 1948

Purpose and Need for Action

- **Purpose:** Provide flood protection to the watershed for public safety, bridges, roads, agricultural and other lands, buildings, structures, infrastructure, and other features. The Sponsors also want to comply with applicable dam safety, design, and performance criteria of NRCS and NC Division of Dam Safety while minimizing environmental, economic, and social impacts.
- **Need:** Action is needed because the existing dams do not meet current NC or NRCS dam safety and performance standards. Action is necessary to reduce the risk of flood damage to homes, public facilities, businesses, and an expanded infrastructure as well as to reduce the risk of loss of life due to an overtopping breach of the existing dams or breach of the auxiliary spillways as a result of headcut erosion.

Dam 19A Overview

Statistics for Dam No. 19A

- Located on Cranberry Creek.
- Maintained by Yadkin SWCD.
- Built in 1961:
  - **Low hazard** potential dam.
  - Purpose: flood control dam.
  - Service Life: 50-years (2011).
  - Designed to pass 9.2 inches of rain (1,540 cfs)
- Now:
  - Classified as a **High hazard** potential dam.
  - Required to pass 26.8 inches of rain (10,095 cfs) – NRCS.

Dam 19A - Lake and Principal Spillway Riser

Dam 19A - Left Auxiliary Spillway

Dam 19A - Right Auxiliary Spillway

Dam 19A - Dam Crest

Dam 19A - Principal Spillway Conduit Outlet Pipe

Dam 21 Overview

Statistics for Dam No. 21

- Located on unnamed tributary to South Deep Creek.
- Maintained by Yadkin SWCD.
- Built in 1961.
  - Low hazard potential dam.
  - Purpose: flood control dam.
  - Service Life: 50-years (2011).
  - Designed to pass 7.95 inches of rain (610 cfs)
- Now:
  - Classified as a High hazard potential dam.
  - Required to pass 28.5 inches of rain (11,764 cfs) – NRCS.

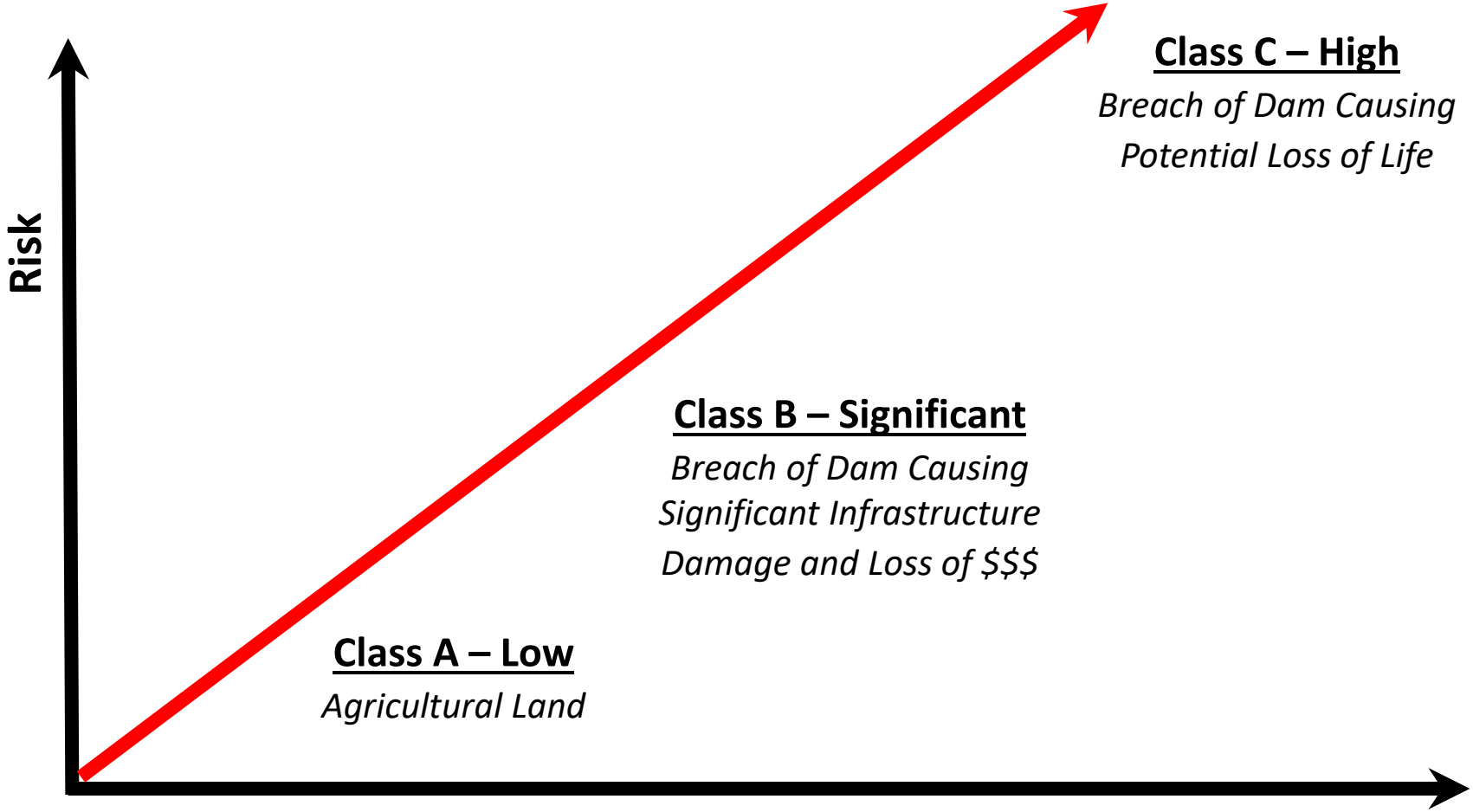
Dam 21 - Lake and Principal Spillway Riser

Dam 21 - Auxiliary Spillway

Dam 21 - Dam Crest

Dam 21 - Principal Spillway Conduit Outlet and Plunge Pool

Hazard Classes of Dams



Project Planning and Scoping

- The resource issues relevant to decision-making were identified through Scoping Meetings.

ENVIRONMENTAL

GERALD POTTERN – Biologist

Existing Environmental Conditions

Geology & Topography
Climate & Hydrology
Public Water Supplies
Water Quality
Coastal Zone Resources
Soils & Prime Farmlands
Land Cover & Land Use
Streams, Lakes & Wetlands
Riparian Lands & Floodplains
Wild & Scenic Rivers
Plant Communities
Invasive Plant Species
Significant Natural Areas

Parks & Conservation Areas
Aquatic Wildlife Communities
Terrestrial Wildlife Communities
Endangered / Protected Species

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Natural Resources: Streams, Lakes, & Wetlands

South Deep Creek Tributary below Dam-21

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Cranberry Creek Downstream of Dam-19A

Good coarse rocky habitat, limited fine sand & silt

Variable depths – Riffles and Pools. Bed Slope = 0.8 %

Meandering stream pattern, Wide forest buffer

Flows south ~ 3 miles from Dam to South Deep Creek

South Deep Creek Tributary Downstream of Dam-21

Predominantly fine sand & silt -- Limited coarse rocky bed

Depth more uniform – Few riffles and pools. Slope = 0.2 %

Straightened and Channelized -- Limited meander pattern

Floodplains mostly farmed – Limited or no forest buffer

Flows east ~ 2 miles from Dam to South Deep Creek

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Rare Freshwater Mussels: Creeper Mussel, Brook Floater, and Eastern Creekshell

CHRIS BARNHART, MISSOURI STATE UNIVERSITY

Upper End of Lake Above Dam-19A, Facing Toward Dam

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Upper End of Lake Above Dam-19A, Facing Upstream

MOGENSEN MITIGATION, INC

Silted Creek 1/2 mile above Dam-19A

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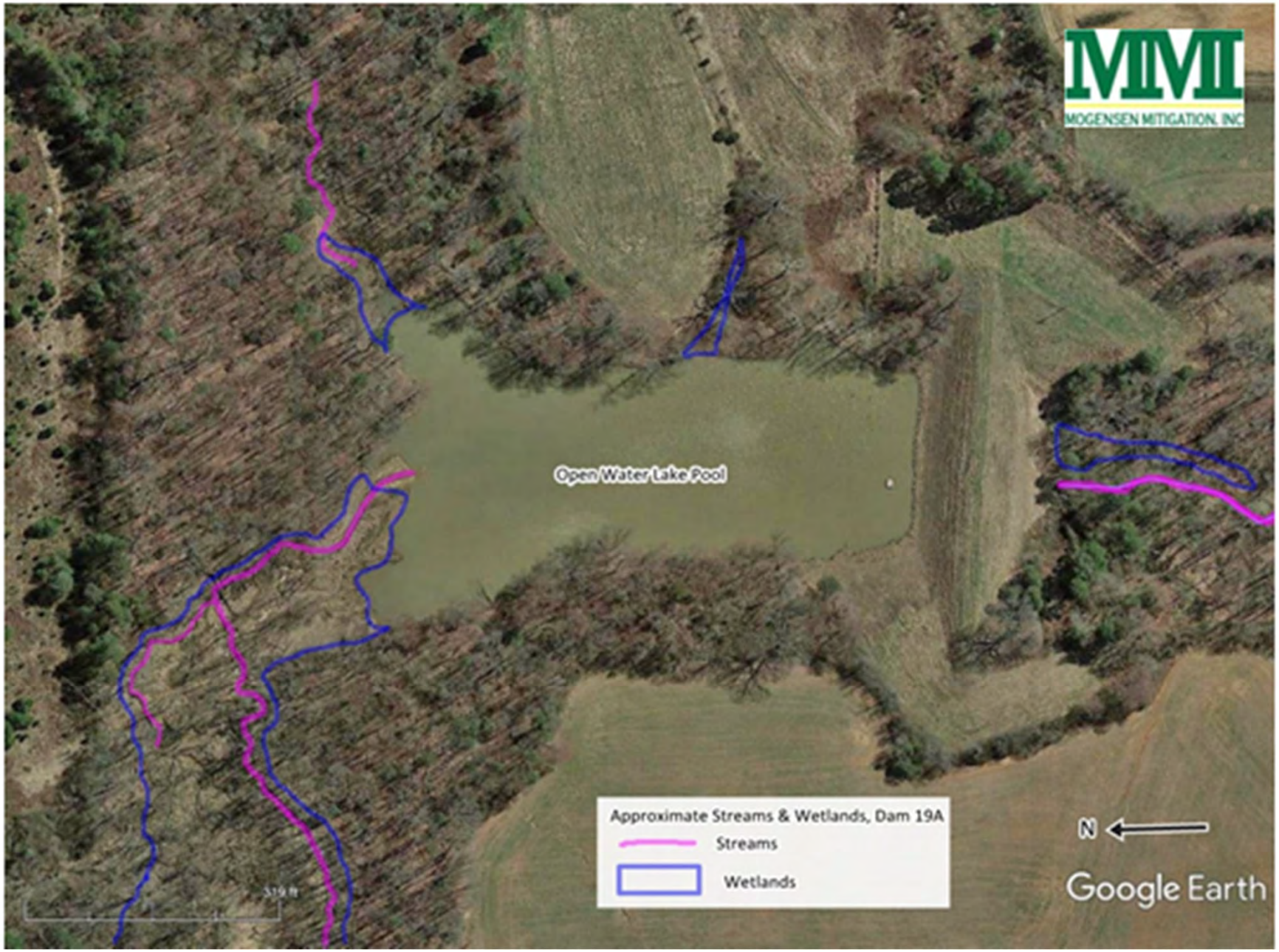
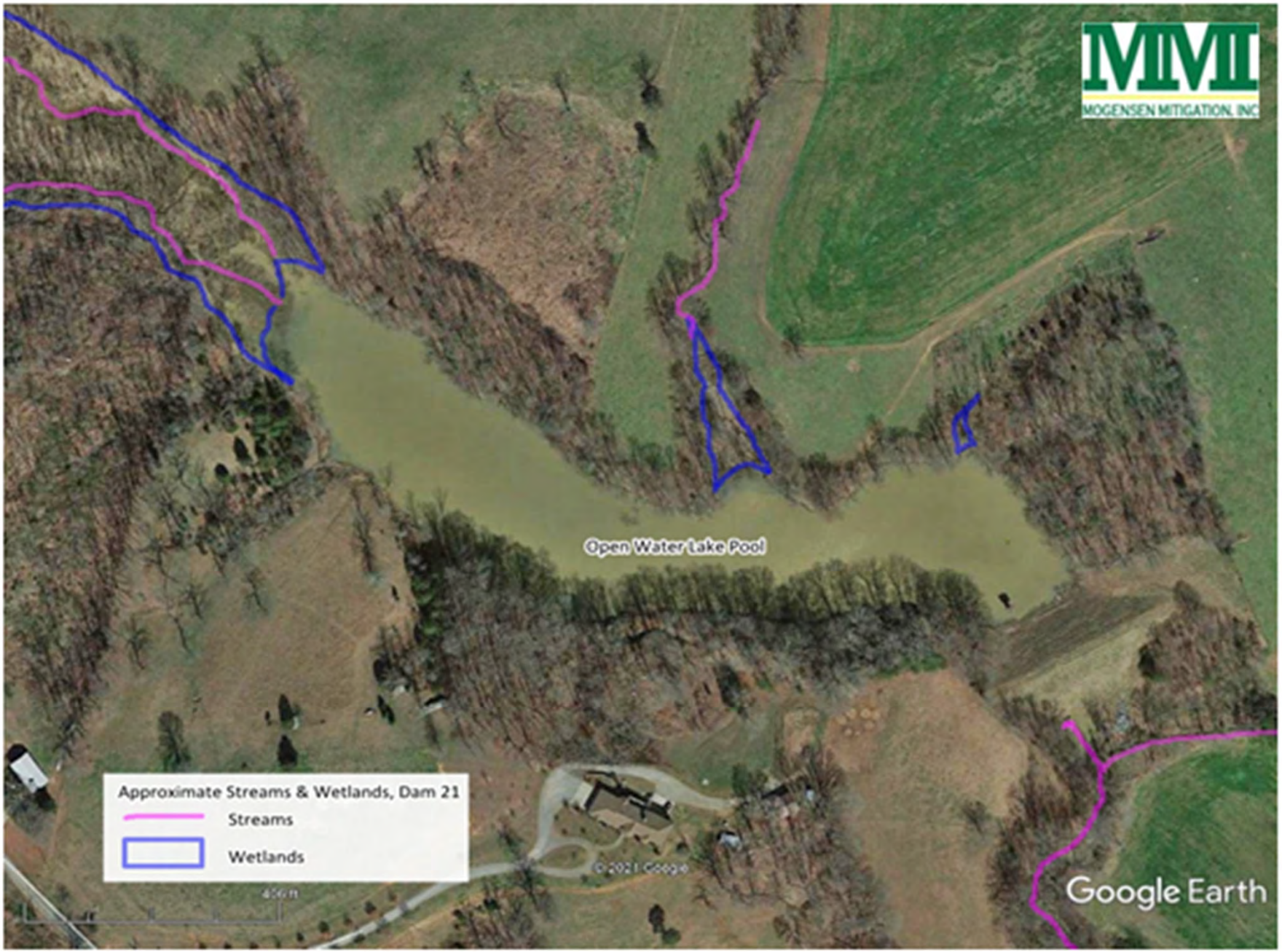
MOGENSEN MITIGATION, INC

Estimated Wetlands and Streams at Dam 19A



Estimated Wetlands and Streams at Dam 21



Social and Cultural Resources Existing Conditions

JAMES FEATHERSTON - Economist

Demographics Downstream Within the Breach Inundation Zones

Item	Dam 19A	Dam 21	Yadkinville
Race			
White	97.0%	96.0%	84.2%
African-American	2.0%	2.0%	4.4%
American Indian	0.0%	1.0%	0.8%
Asian	0.0%	0.0%	0.2%
Pacific Islander	1.0%	1.0%	0.0%
Other Race	0.0%	0.0%	7.8%
Mutiracial	0.0%	0.0%	2.6%
Ethnicity			
Hispanic	17.0%	14.0%	32.0%
Not Hispanic	83.0%	86.0%	68.0%

Environmental Justice / Civil Rights

- The area within the breach inundation zone (compared to Yadkinville and Yadkin County) has:
  - higher per capita income
  - lower level of poverty
  - higher median household income, and
  - Lower presence of a minority population
- The Eastern Band of Cherokee Indians have ancestral ties to North Carolina. The tribe will be contacted to solicit their interest and input.

Economic Impacts of Existing Dams

- Watershed modeled with dams in place and dams removed
- Flooding impacts to downstream properties:
  - Residential Houses = 8 (both dams)
  - Stream Crossings (bridges) = 13 (10 by both dams, 3 more by dam 19A)
  - Roadways = 6 (both dams)
  - Total Crossings/Roadways = 19
  - Area downstream with Flood Reduction:
    - Dam 19A = 153 acres
    - Dam 21 = 127 acres

Existing Economic Impacts / Average Annual Damages and Benefits

Dam 19A			
Item	Damages w/o Both Dams	Damages w/19A only	Benefits w/19A only
Residential Bldgs.	$5,200	$3,100	$2,100
Crossings and Roadways	$349,800	$312,500	$37,300
Ag – Crop/Pasture	$132,500	$88,800	$43,700
Ag – Sediment Reduction	$2,300	$1,500	$800
Totals	$489,800	$405,900	$83,900

Dam 21			
Item	Damages w/o Both Dams	Damages w/21 only	Benefits w/21 only
Residential Bldgs.	$5,200	$3,200	$2,000
Crossings and Roadways	$349,800	$312,500	$37,300
Ag – Crop/Pasture	$132,500	$83,300	$49,200
Ag – Sediment Reduction	$2,300	$1,400	$900
Totals	$489,800	$400,400	$89,400

Benefits of the Dams

- Flood Reduction Associated with the Dams:
  - 8 buildings
  - 6 Roadways
  - 13 Stream Crossings
  - 280 Acres Ag Land
- **$173,300 average annual benefits**

Social Impacts

- Rehabilitation of Dam 19A will reduce threat to loss of life from a catastrophic breach:
  - 3 Residences
  - 3 Crossings
  - 15 Population at Risk (PAR)
- Rehabilitation of Dam 21 will reduce threat to loss of life from a catastrophic breach:
  - 3 Crossings
  - 6 Population at Risk (PAR)

ENGINEERING

MARIDEE ROMERO-GRAVES – Senior Engineer / Project Manager

Investigations and Analyses

- Survey and Bathymetry / Sedimentation
- Inspections
  - Dam
  - Spillways
- Geotechnical Investigations and Analyses
- Hydrology and Hydraulic Analysis
- Structural Analysis

Survey and Bathymetry – Sedimentation in the Reservoirs

Dam 19A

- Sediment survey - February 2021
- Storage volume
  - Design: 49.7 acre-feet
  - Current: 14.6 acre-feet
- 24 years remaining storage (as of 2021)
- Does not meet minimum required remaining storage of 50 years.

Recommendations to Provide 54-Year Life:
1) Dredge 18 acre-feet of sediments
2) Raise the reservoir normal pool

Survey and Bathymetry – Sedimentation in the Reservoirs

Dam 21

- Sediment survey - February 2021
- Storage volume
  - Design: 61.0 acre-feet
  - Current: 33.0 acre-feet
- 46 years remaining storage (as of 2021)
- Does not meet minimum required remaining storage of 50 years.

Recommendations to Provide 54-year Life:
1) Dredge 8.3 acre-feet of sediments
2) Raise the reservoir normal pool

Dam Inspections - General Conditions

- Visual inspections - February 2021:
  - Dams appeared to be in fair condition.
  - Main concerns to be addressed:
    - Reservoir drain gate under 6-8 feet of sediments.
    - Seepage/wet downstream toe for Dam 19A.
    - Inadequate sediment storage capacity.
  - Other maintenance issues to be addressed:
    - Bare areas/ ground irregularities to be repaired/seeded.
    - Debris removal near/on the PSW riser.
    - Minor corrosion of PSW metal parts.

Principal Spillway Inspections

- Dam 19A
  - Video pipe inspection shows exposed aggregates, a longitudinal crack, some leakage at joints.
  - Estimated remaining service life ~20 years.
  - Current NRCS design criteria requires min. diameter of the conduit pipe of 30-inches. Current pipe is 18-inches in diameter.

Recommendations:
Replace 18” conduit pipe with 30” pipe, install new riser and low-level gate.

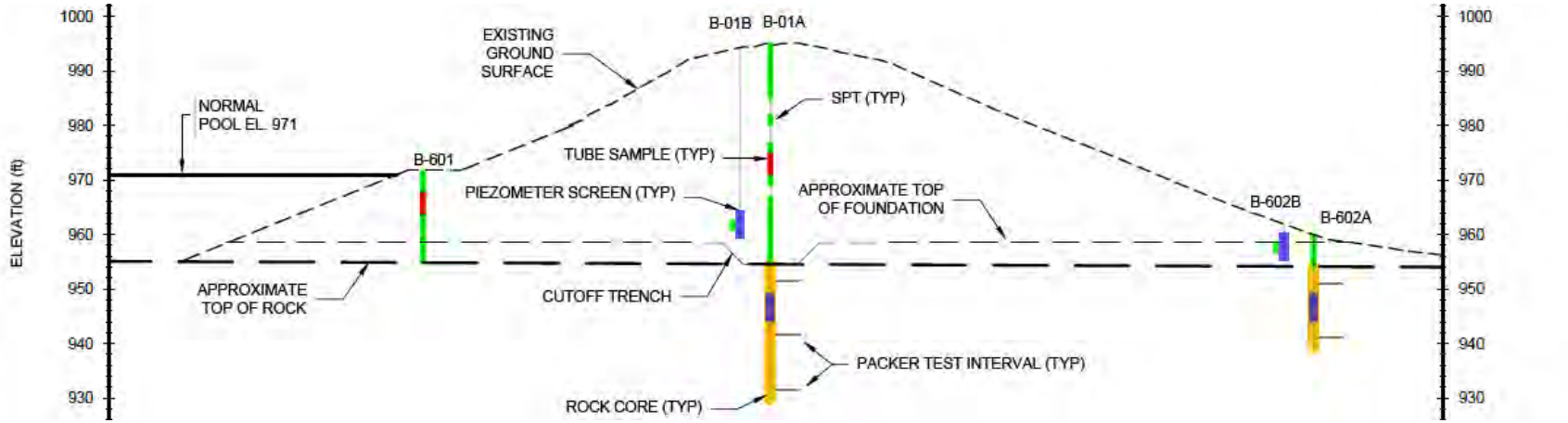
Principal Spillway Inspections

- Dam 21
  - 30-inch diameter RCP.
  - Video pipe inspection shows some cracking and localized reinforcement corrosion along some sections of the pipe.
  - Estimated remaining life service ~50 years.
  - However, according to NRCS National Operation and Maintenance Manual, pipe inspections shall be performed at least once every five years.

Recommendation:
Perform a video inspection of PSW conduit pipe during Design Phase.

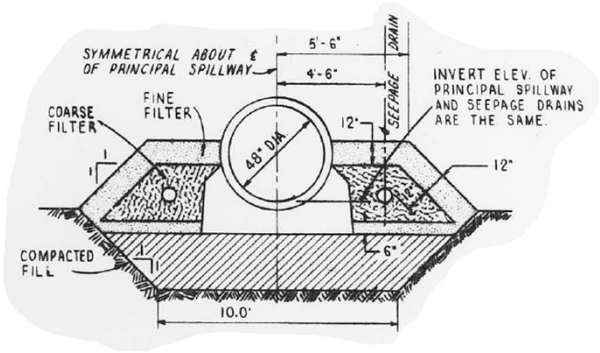
Geotechnical Investigations

- Performed March 2021
- Purpose: Characterize the subsurface materials in the dam embankments, foundations, and auxiliary spillways.
- 14 boreholes, 6 hand augers, field testing, and laboratory testing.



Results of Geotechnical Evaluation

- Filter Compatibility and Internal Drains
  - Compatibility between soil materials and filter drains is acceptable.
  - Corrugated metal pipe in toe drain needs to be replaced
- Seepage
  - Dam 19A: Seepage issues are present
  - Dam 21: No issues identified
- Static slope stability
  - Dam 19A: Does not meet criteria
  - Dam 21: Does not meet criteria
- Seismic Performance
  - Dam 19A: Does not meet criteria
  - Dam 21: Meets criteria



Recommendations:

1. **New toe drain systems - both dams**
2. **Seismic stabilization - Dam 19A**

Hydrologic and Hydraulic (H&H) Analyses

- Watershed Hydrology for both dams
  - Land cover, Soil/Hydrologic Group, Runoff Curves, Time of Concentration
- Route storm events through dams
  - 2-year through 500-year frequency
  - Probable Maximum Precipitation
- Evaluate ability of existing dam to store flood waters and/or safely pass flood flows (auxiliary spillway capacity).
- Evaluate potential for erosion of the vegetated auxiliary spillways at each dam during flood flows

Summary of H&H Results

- NRCS Criteria – Full Probable Maximum Precipitation (PMP) is Design Event for High Hazard Dams.
  - Both dams overtopped during the NRCS design storm

- NC Dam Safety Criteria – ½ Probable Maximum Precipitation is Design Storm for High Hazard Dams in NC.
  - Both dams overtop during the NC Dam Safety Design Storm

- Auxiliary spillways erode and breach during PMP event, and therefore does not satisfy NRCS or NC Dam Safety criteria.

Structural Stability Analyses

- Analyses Performed:
  - Stability analyses for various water load scenarios.
  - Global seismic Factor of Safety estimated.
- Results:
  - Risers meet current design criteria for global stability.
  - The footing and wall reinforcing meet ACI 350 criteria.

Formulation and Evaluation of Alternatives

WADE BIDDIX

Formulation and Evaluation of Alternatives

- **Formulation Process**
  - The process begins with identifying alternatives that meet the Purpose and Need statement goals. This “Statement” requires that alternatives meet current safety and performance standards and provide at least the level of flood protection that were provided originally by the dams.

Required Alternatives to be Considered

- No Federal Action (Future without Federal Investment – FWOFI)
- Structural Rehabilitation to current criteria
- Decommissioning (removal)
- Nonstructural Alternatives (elevation, relocation, zoning, etc.)

Alternatives Considered But Eliminated From Detailed Study

- **Decommissioning** – removes the flood detention capacity of the dam by cutting a notch in the existing embankment, reconnecting and restoring the stream channels upstream and downstream of the dam, and providing downstream flood protection up to the 100-year storm. Flood protection could include:
  - elevating the impacted structures (houses, roadways, etc.),
  - floodproofing the impacted structures,
  - relocating the impacted structures outside the flood limits.

  Estimated Cost: Dam 19A = $25 million; Dam 21 = $22 million
- **Nonstructural** – modifies the dam to a low or significant hazard structure while relocating and/or floodproofing properties downstream that would be at incremental risk from a dam failure. Example:
  - elevating the impacted structures (houses, roadways, etc.),
  - floodproofing the impacted structures,
  - relocating the impacted structures outside the flood limits, and/or
  - purchasing deed restrictions to restrict future development on land located between the 100-year storm and breach elevations.
- Estimated cost = Dam 19A = $27 million; Dam 21 = $24 million

Alternatives Considered and Moved Forward to Detailed Study

Future Without Federal Investment (No Action) - The Sponsors decided that in the absence of federal funding, they would seek other funding options to implement the preferred alternative identified during the planning process.

Structural Alternatives 1, 2 and 3 – Involves structurally rehabilitating the dams to meet NRCS and NC Dam Safety design and performance standards.

ALTERNATIVES ANALYSES

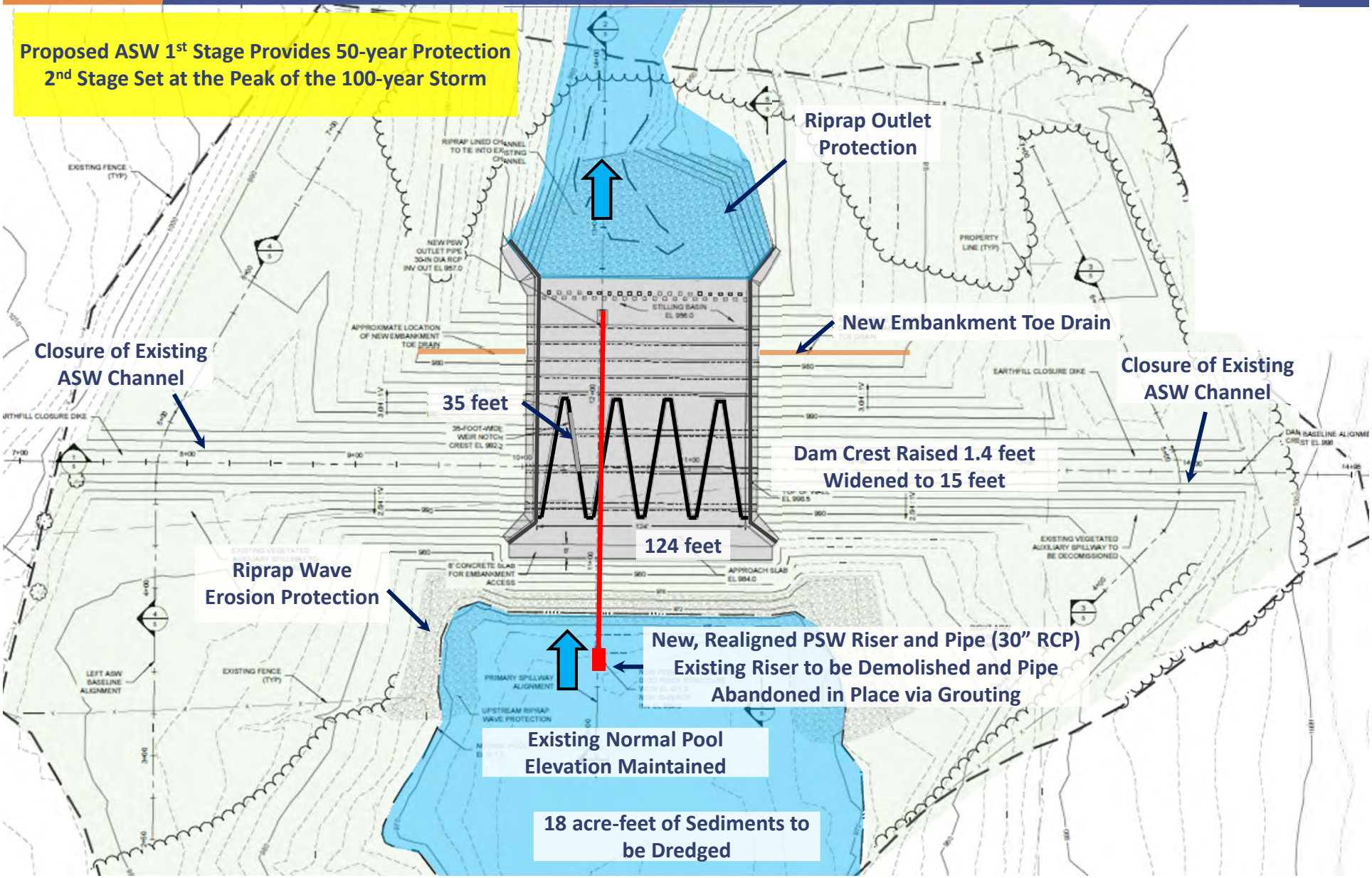
BRYAN PORTER

Measures Included in all Structural Alternatives

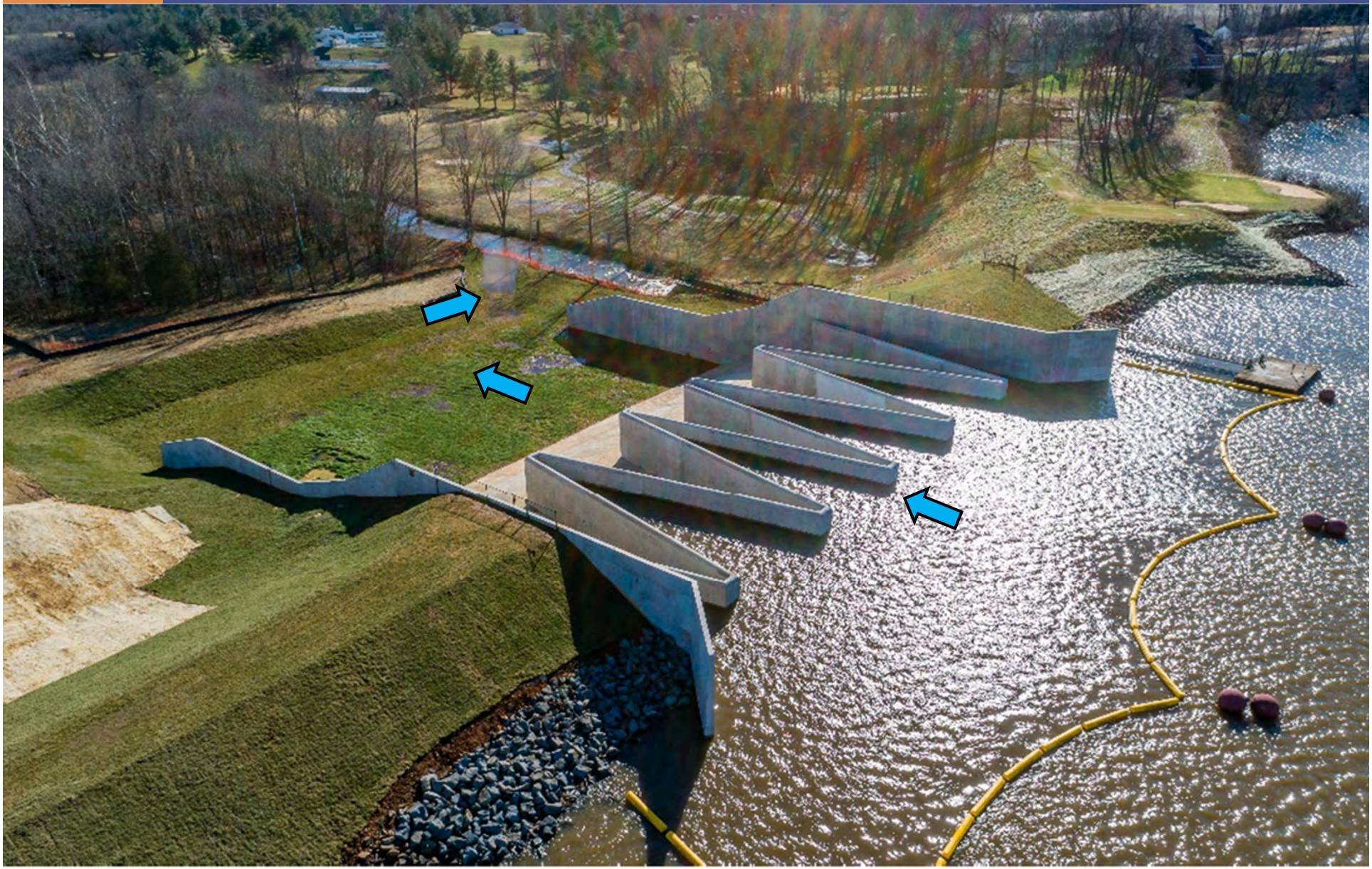
- Principal Spillway System
  - New low-level drain system
  - Removal of existing concrete riser and low-level drain (Dam 19A only)
  - Abandon existing conduit pipe (Dam 19A only)
  - New concrete riser (Dam 19A only)
  - New conduit pipe (Dam 19A only)
- Auxiliary Spillway
  - Close existing spillway
  - New concrete spillway over the dam
- Dam
  - Raise crest
  - Widen the crest to 15 feet (to meet NRCS requirements)
  - Flatten downstream (DS) slopes
  - Install bench on DS slope
  - Abandon existing drain system
  - New robust drain system
- Additional Sediment Storage
  - Remove sediments from reservoir or raise normal pool

Dam 19A – Overview

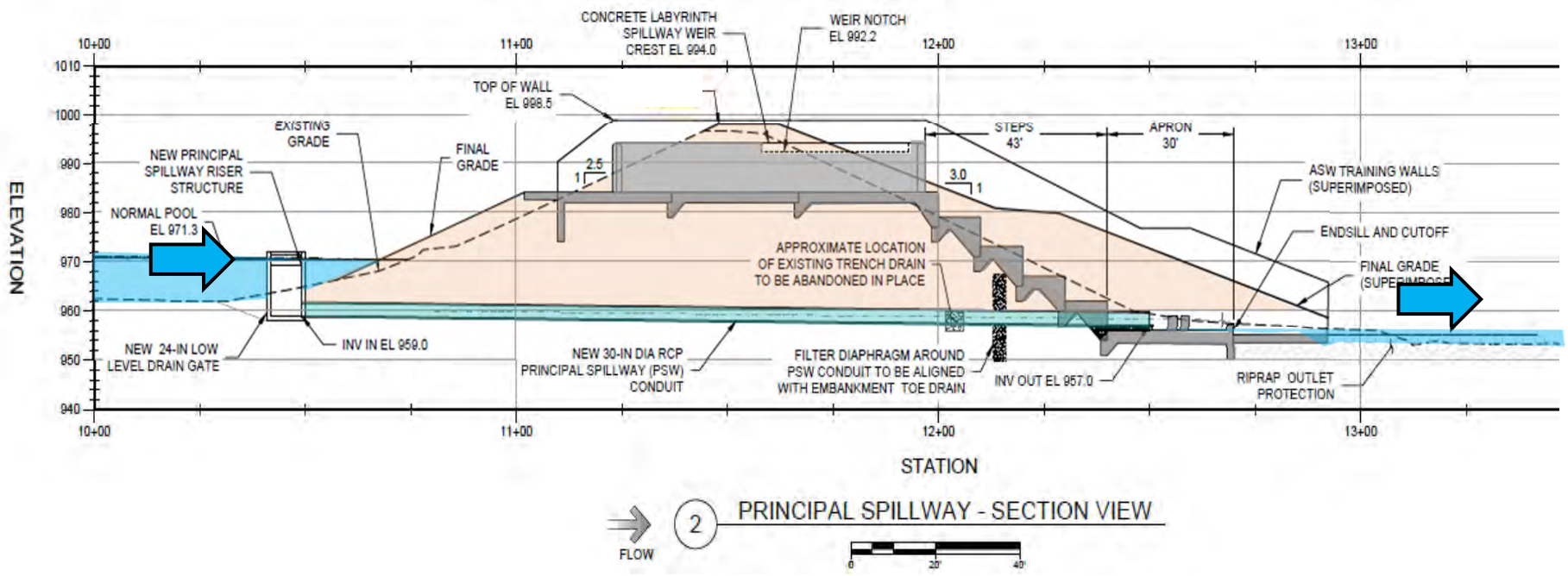
Dam 19A – Alternative 1: Labyrinth Weir Auxiliary Spillway (2 Stage) Over the Embankment

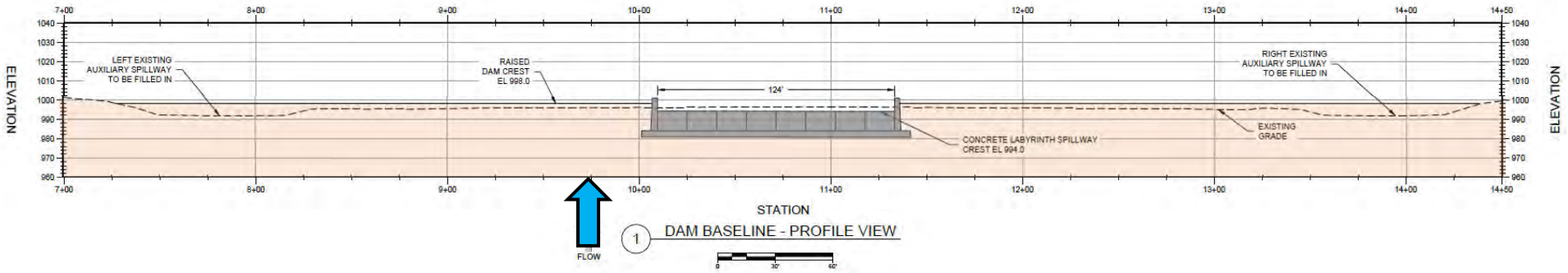


Example of a Labyrinth Weir Located in Virginia

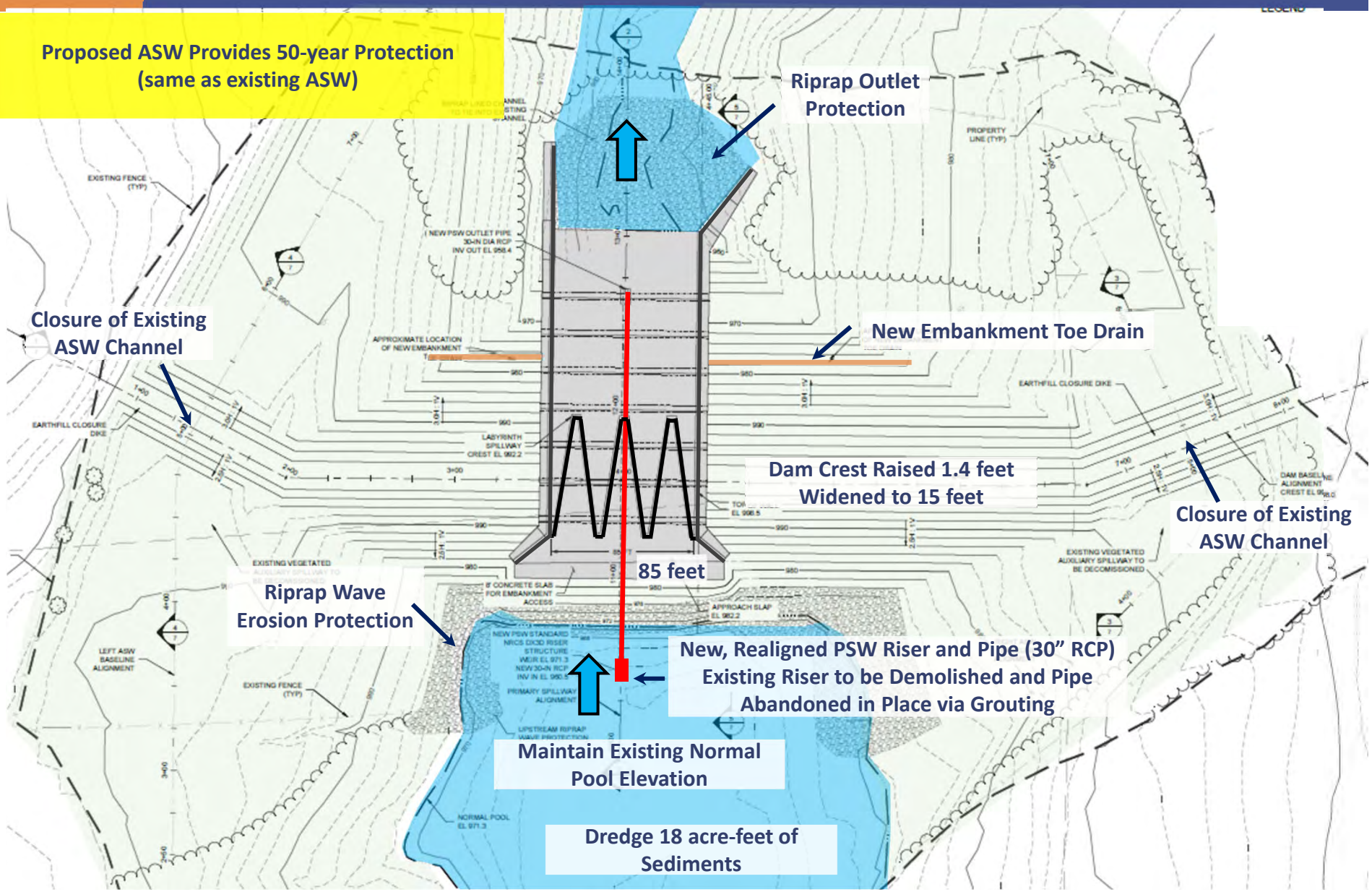


Dam 19A – Alternative 1: Section and Profile Views

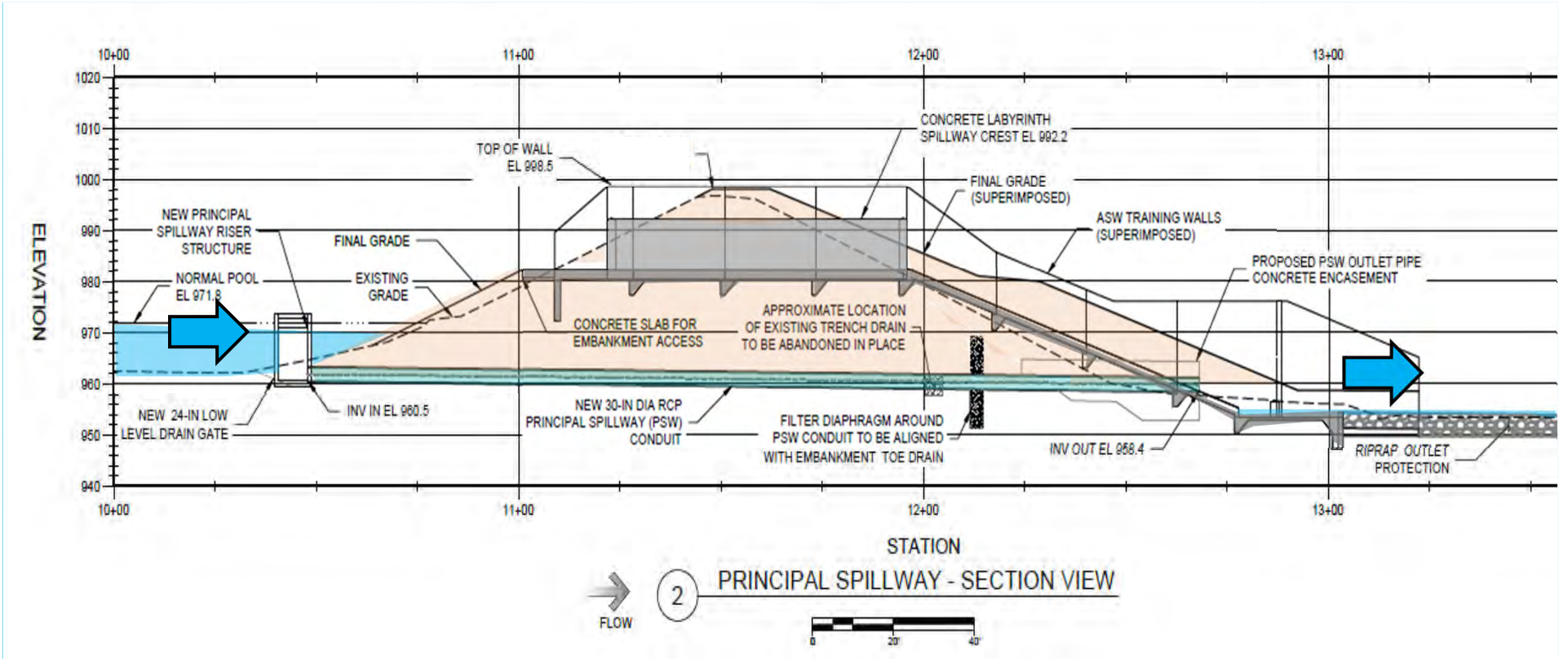


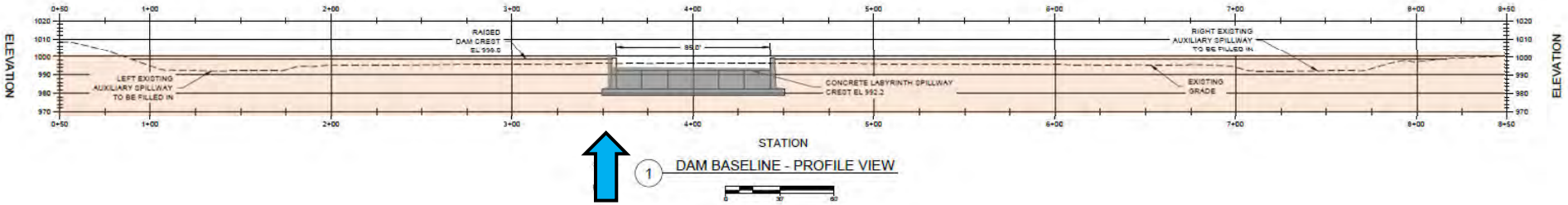


Dam 19A – Alternative 2: Labyrinth Weir Auxiliary Spillway Over the Embankment (One Stage)

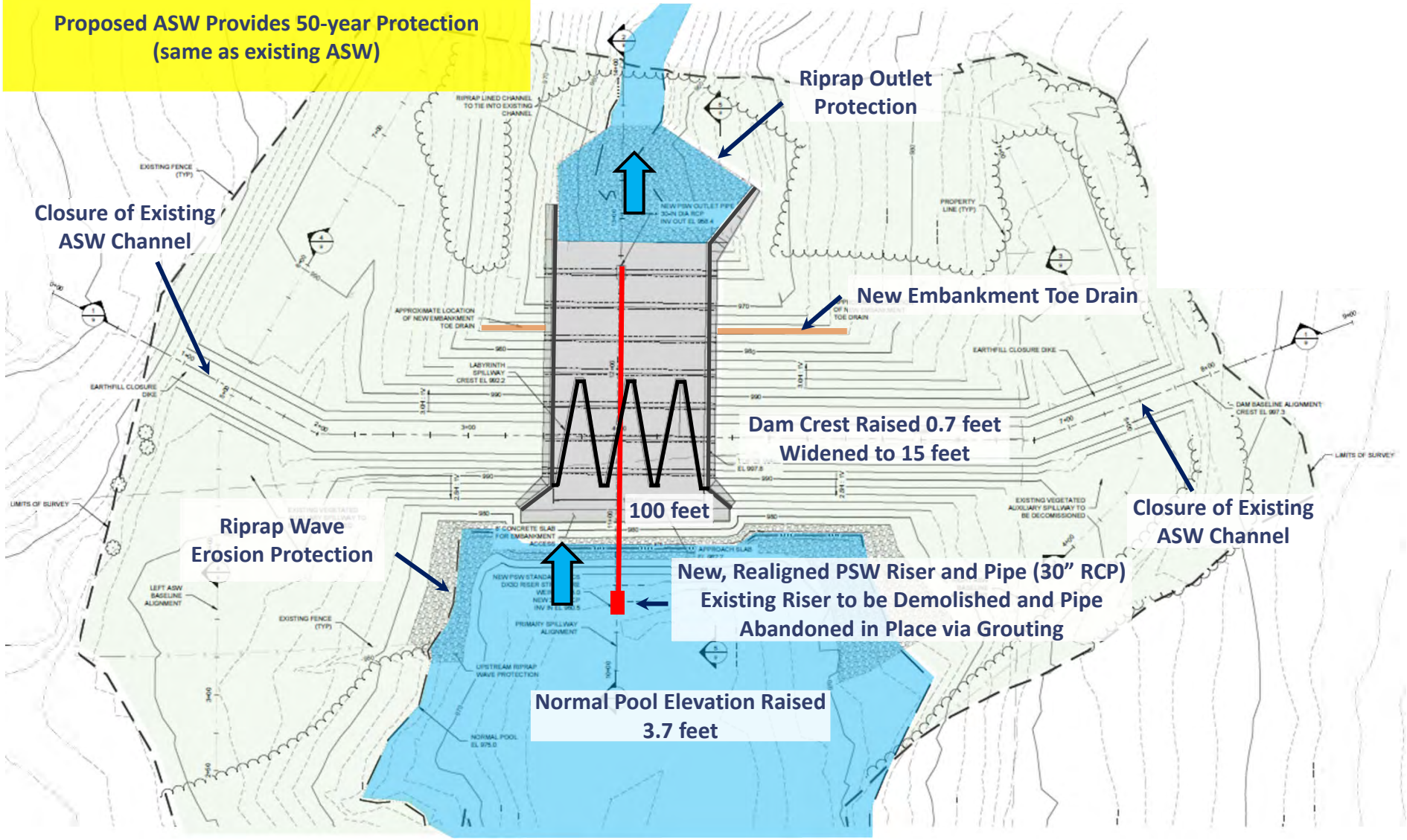


Dam 19A – Alternative 2: Section and Profile Views



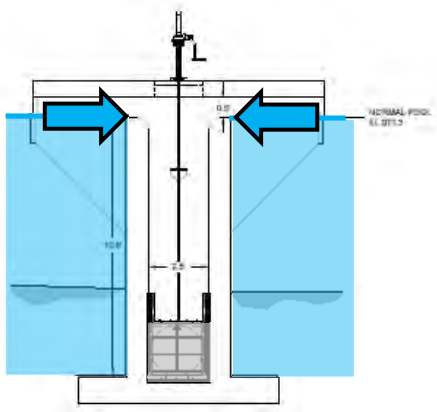


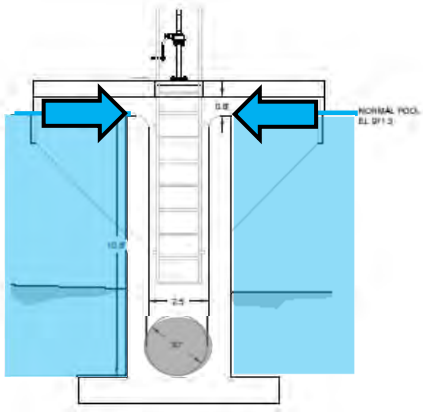
Dam 19A – Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool

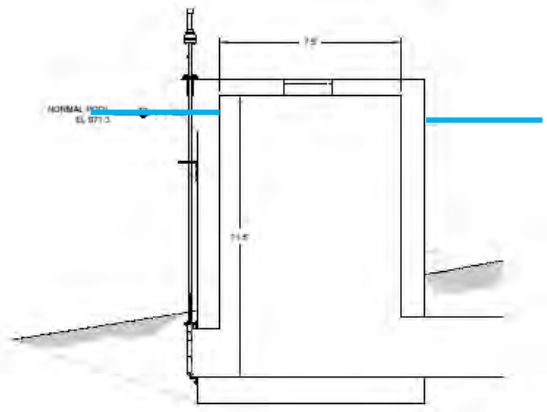


Dam 19A – Proposed Principal Spillway Riser

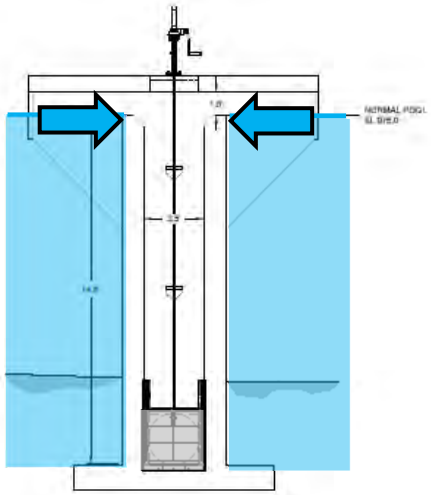
Alternatives 1 and 2 Proposed Concrete Riser, Low-Level Drain and Conduit Pipe

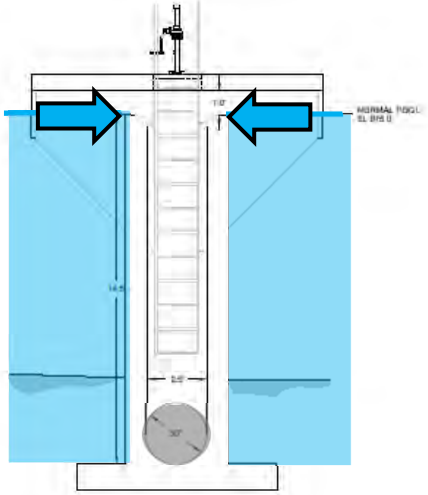


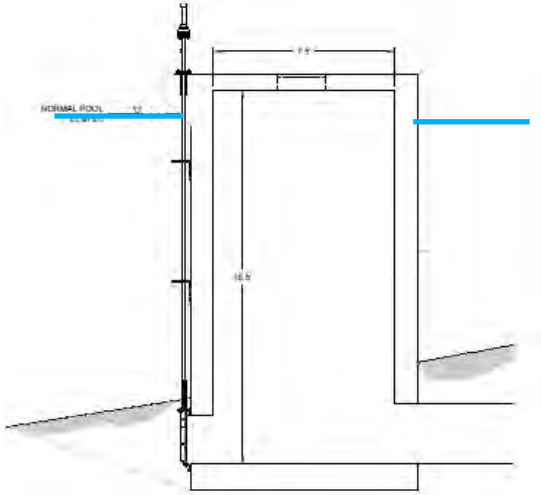




Alternative 3: Raised NP, Proposed Concrete Riser, Low-Level Drain and Conduit Pipe





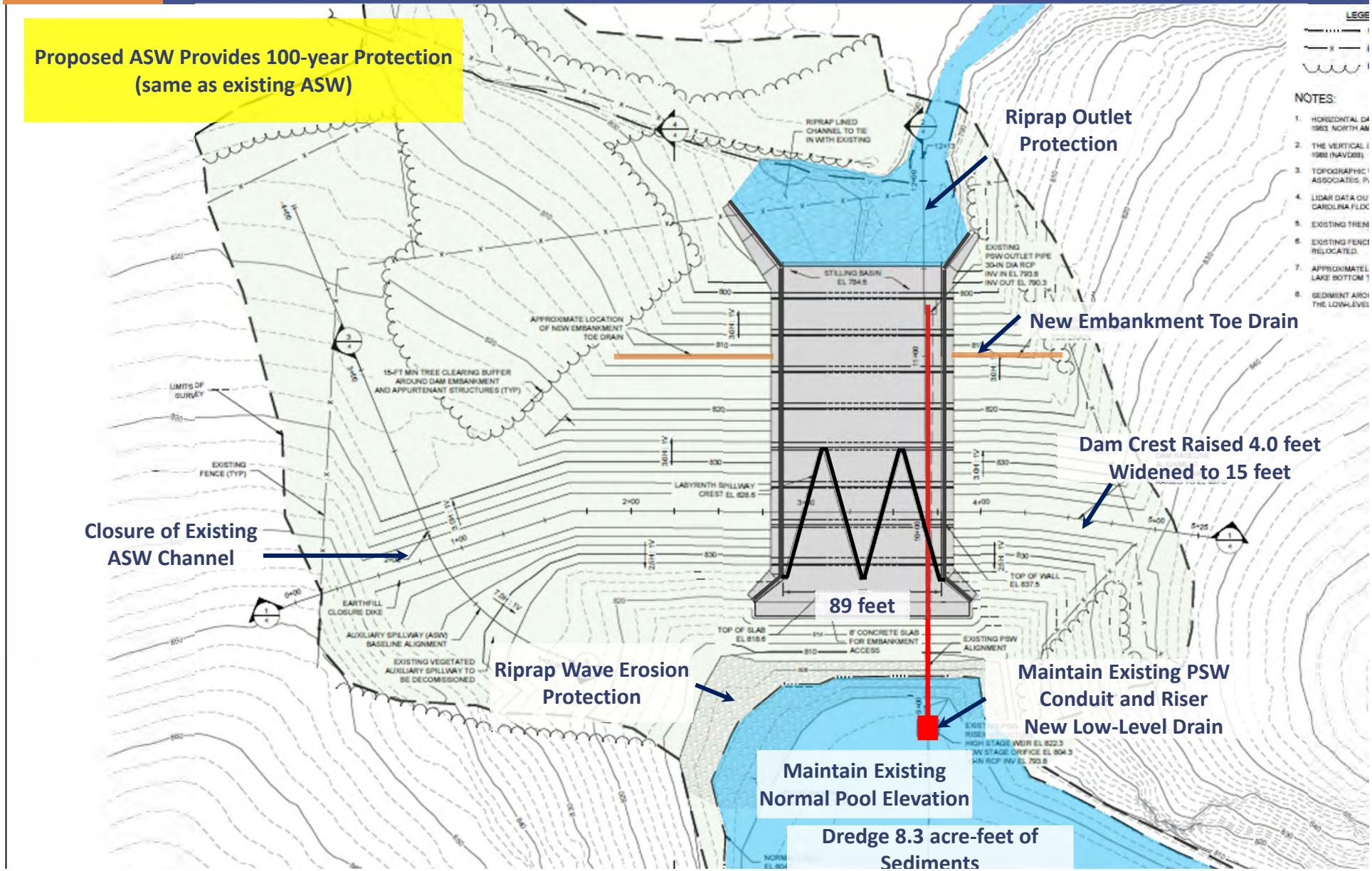


DAM 21 REHAB. ALTERNATIVES

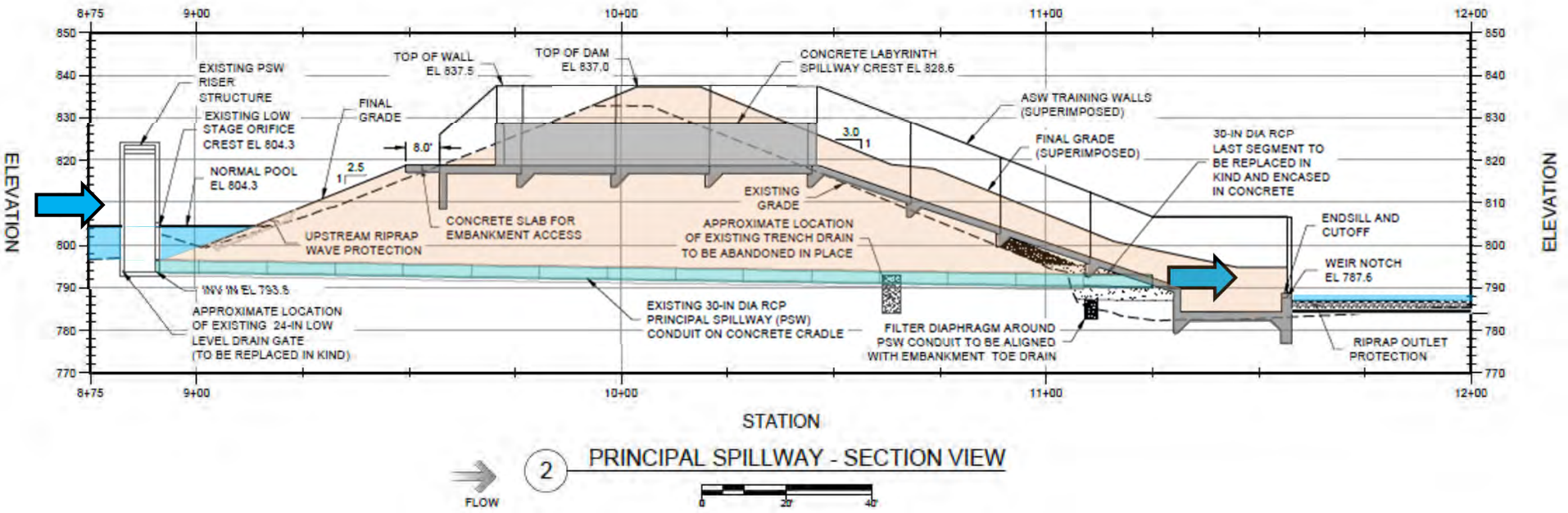
BRYAN PORTER

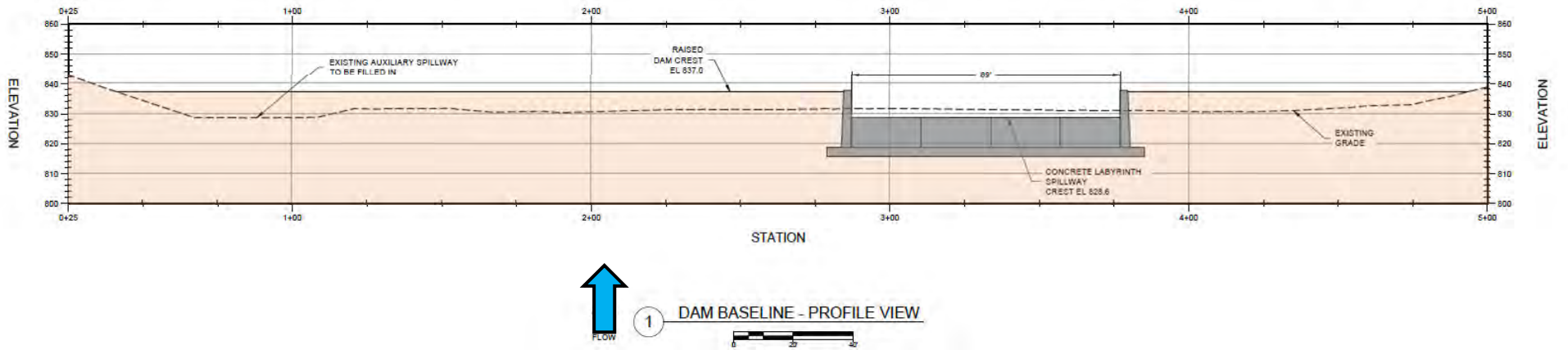
Dam 21 – Overview

Dam 21 – Alternative 1: Labyrinth Weir Auxiliary Spillway Over the Embankment

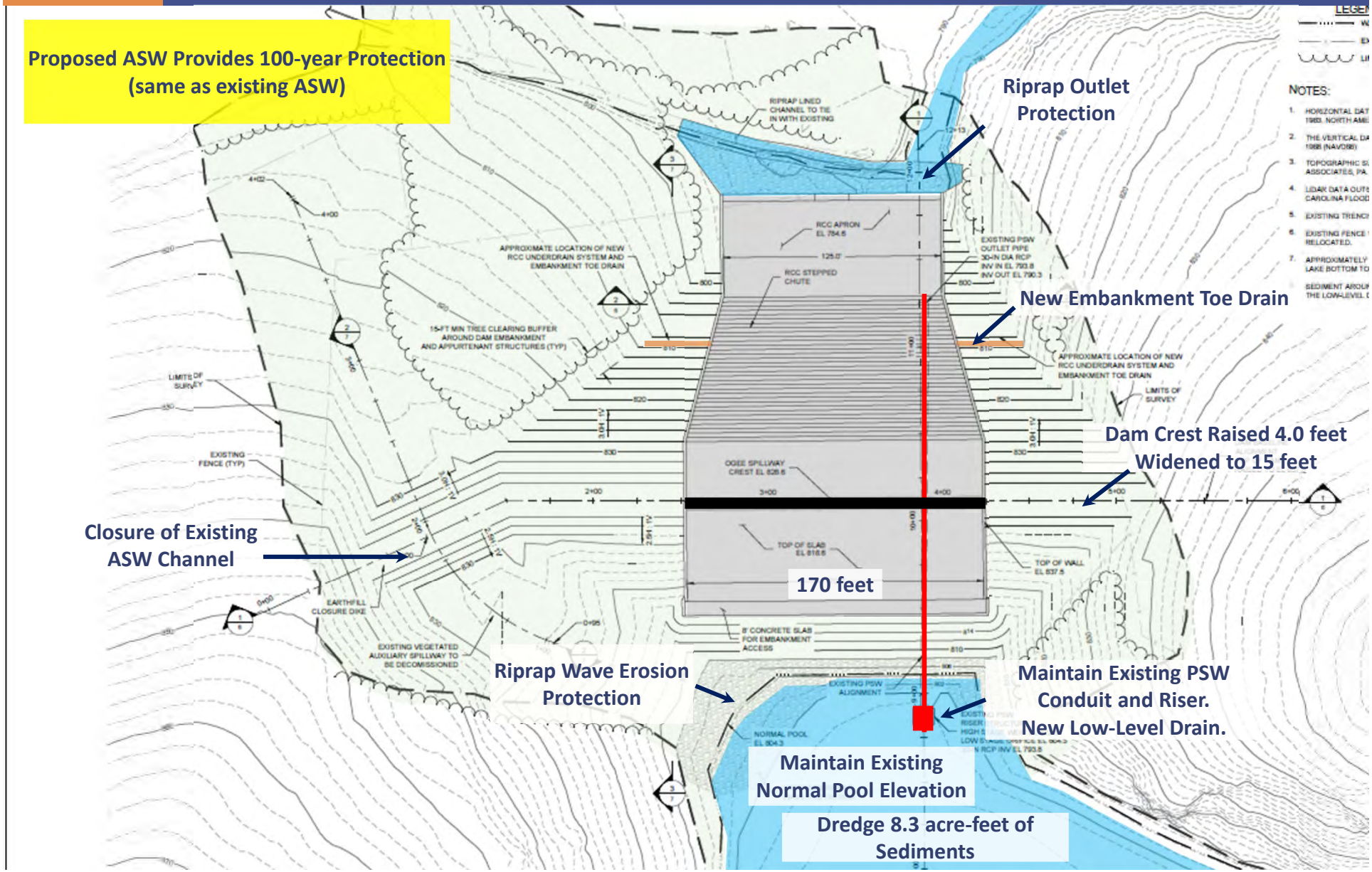


Dam 21 – Alternative 1: Section and Profile Views



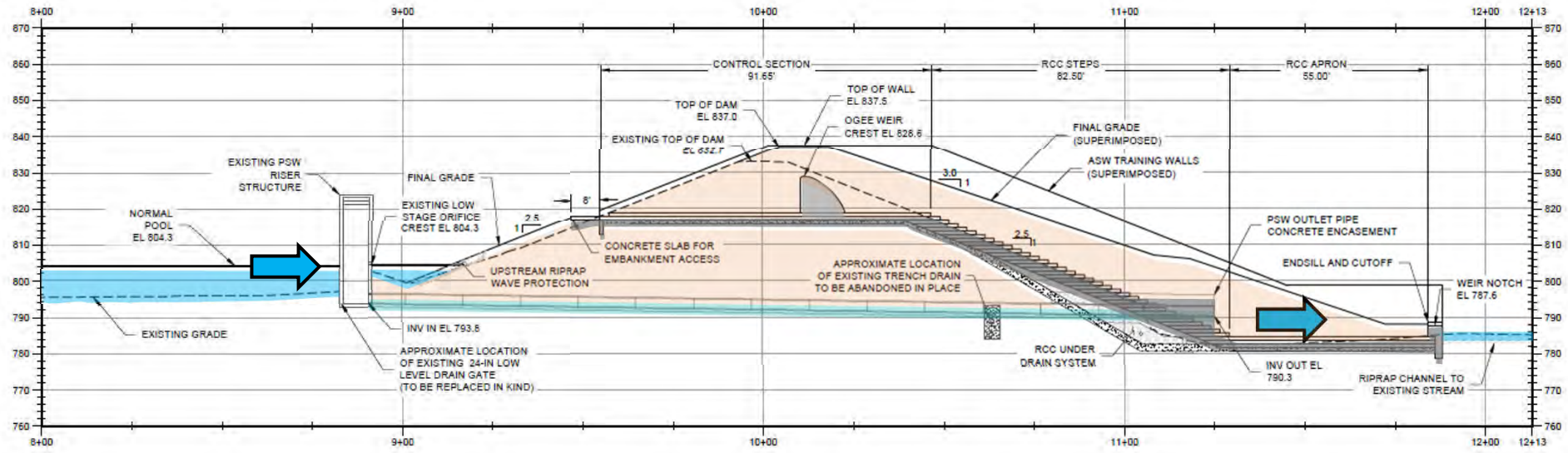


Dam 21 – Alternative 2: Ogee Weir Roller Compacted Concrete (RCC) Auxiliary Spillway Over the Embankment

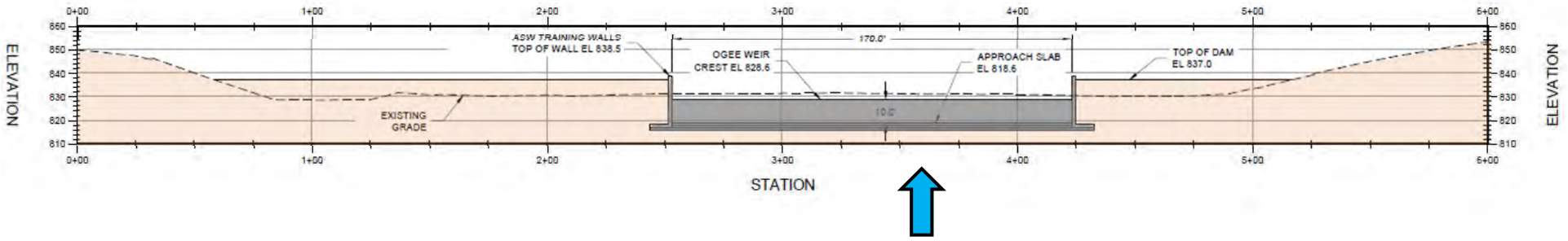


Example of an RCC Spillway Over the Dam

Dam 21 – Alternative 2: Section and Profile Views

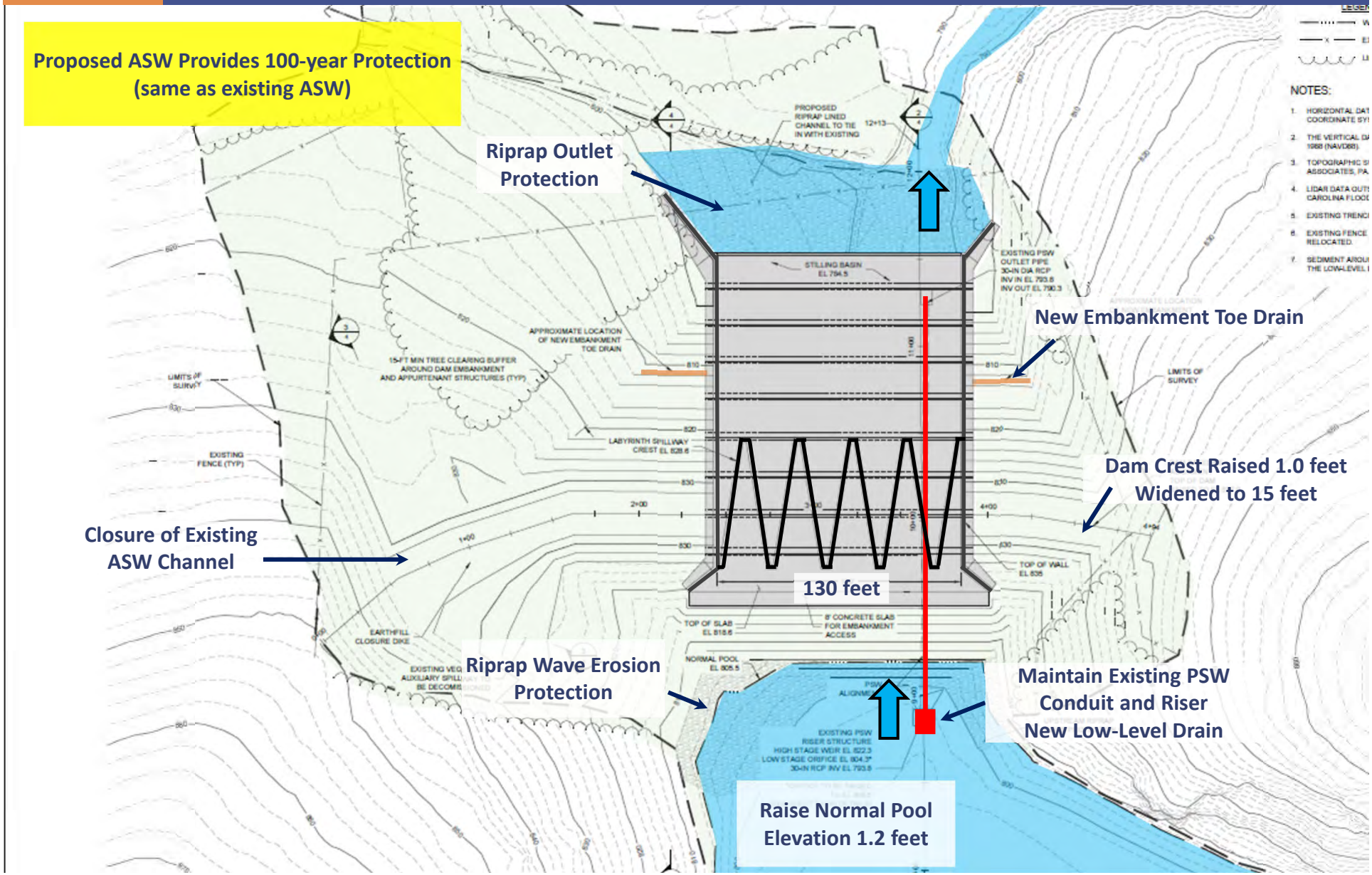


1 PRINCIPAL SPILLWAY - SECTION VIEW

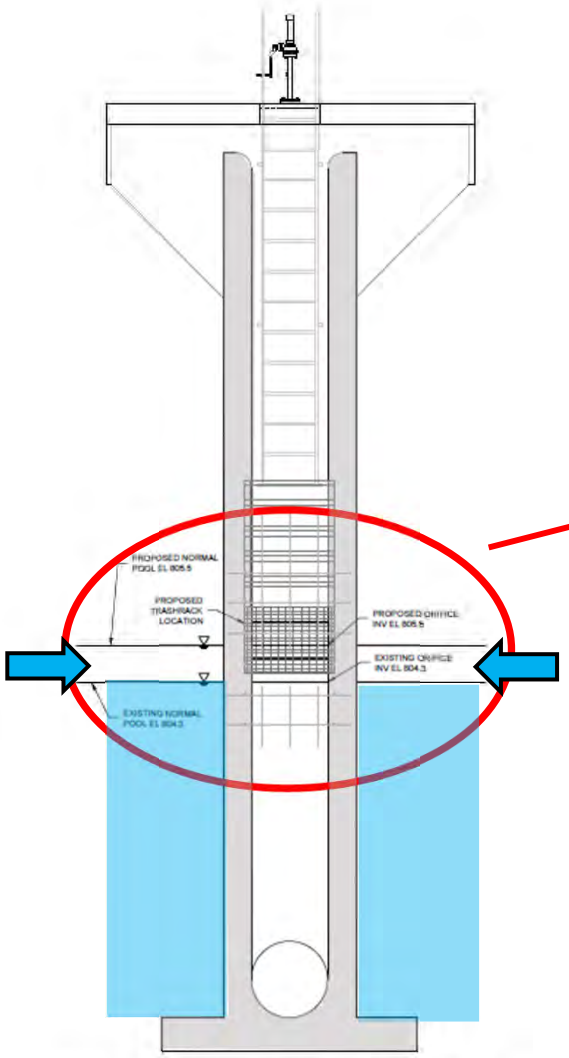


1 DAM ALIGNMENT - PROFILE VIEW

Dam 21 – Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool

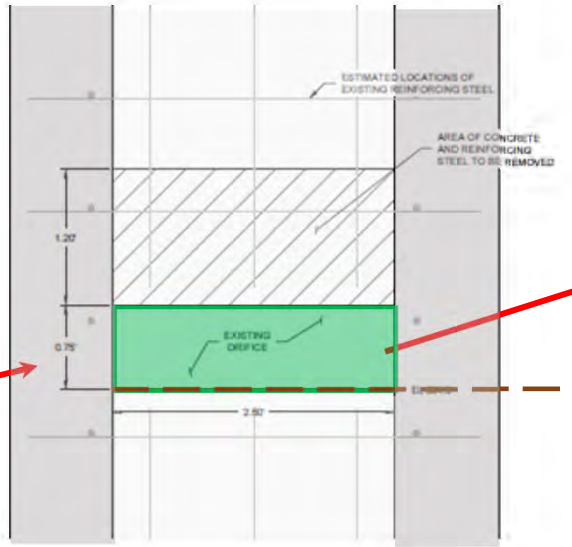


Dam 21 – Alternative 3: Proposed Concrete Riser Modification to Raise the Normal Pool



1 PSW RISER DOWNSTREAM WALL ELEVATION VIEW
N.T.S.

NOTE: EXISTING TRASH RACK NOT SHOWN FOR CLARITY.



2 STAGE 1 - CONCRETE CUT - ELEVATION VIEW
N.T.S.

4 STAGE 2 - CONCRETE FILL - ELEVATION VIEW
N.T.S.

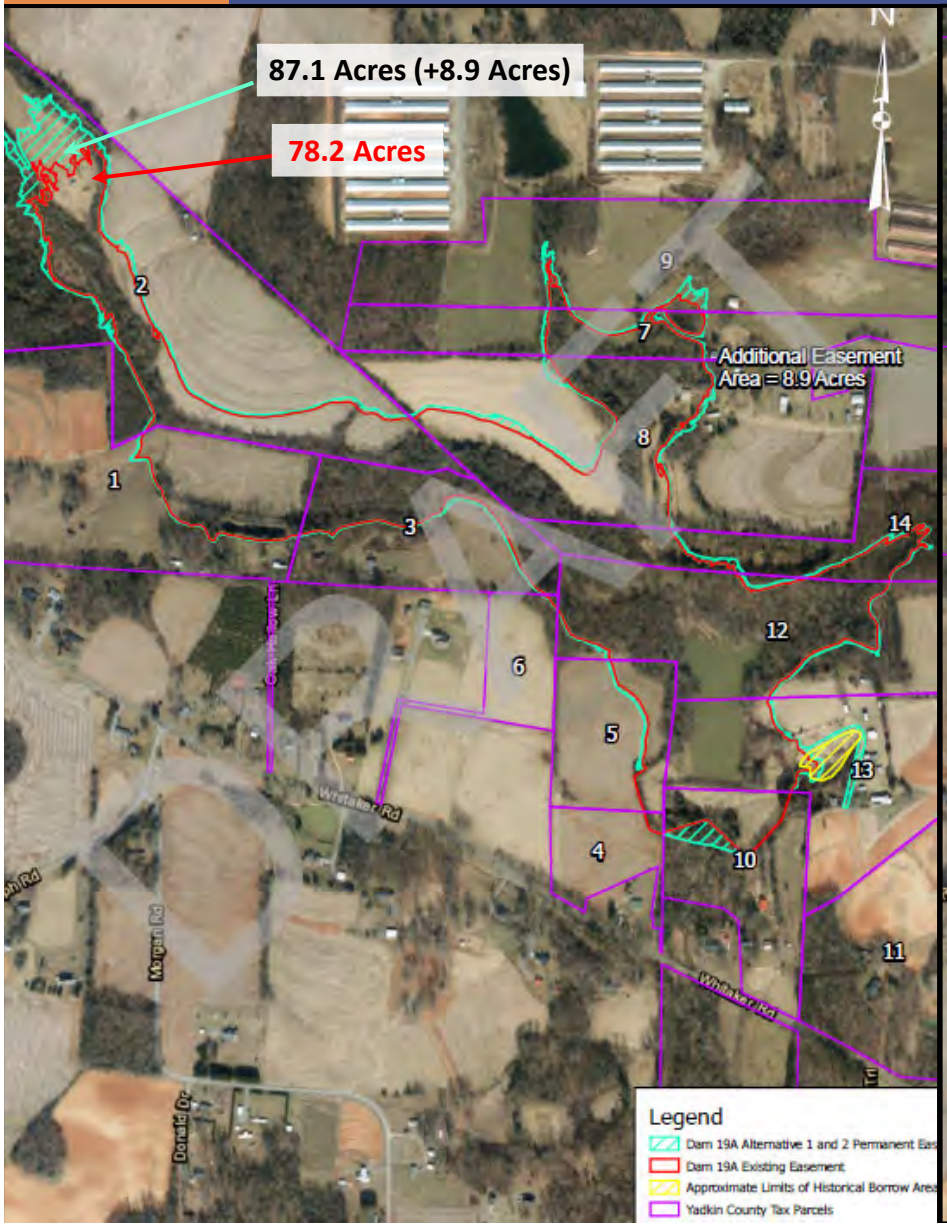
LANDRIGHTS / EASEMENTS

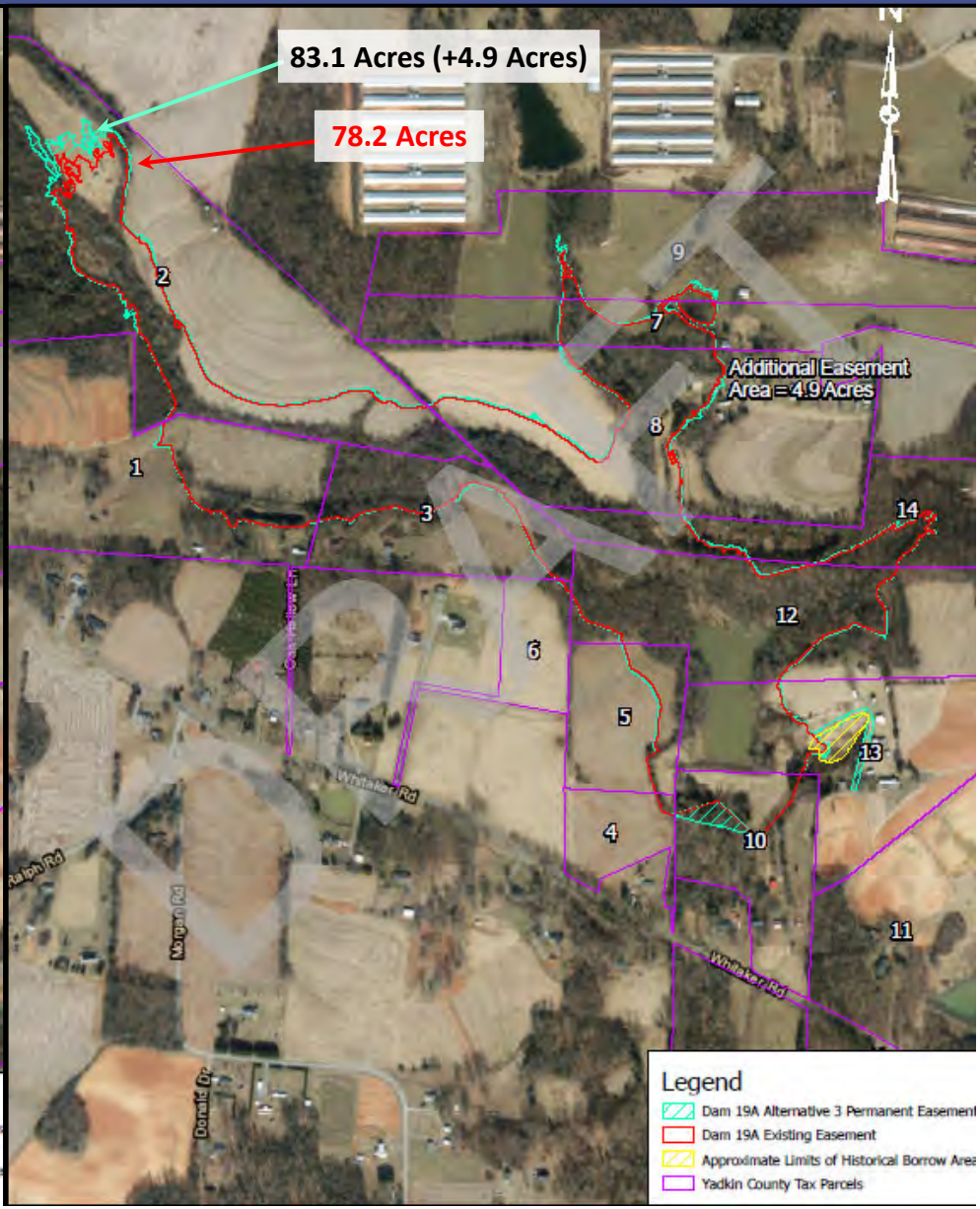
WADE BIDDIX

Dam 19A - Landrights / Easements

- Original construction:
  - Sponsors secured flood easements to the top of dam elevation and for areas needed for ingress/egress, construction, and operation and maintenance.
- For dam rehabilitation projects:
  - NRCS policy requires the **minimum landrights area upstream of the dam** to be the crest of the ASW elevation or the 100-year, 24-hour storm, whichever is higher. (Sponsors already have the minimum).

Dam 19A – Landrights / Easements (New Top of Dam Impacts)





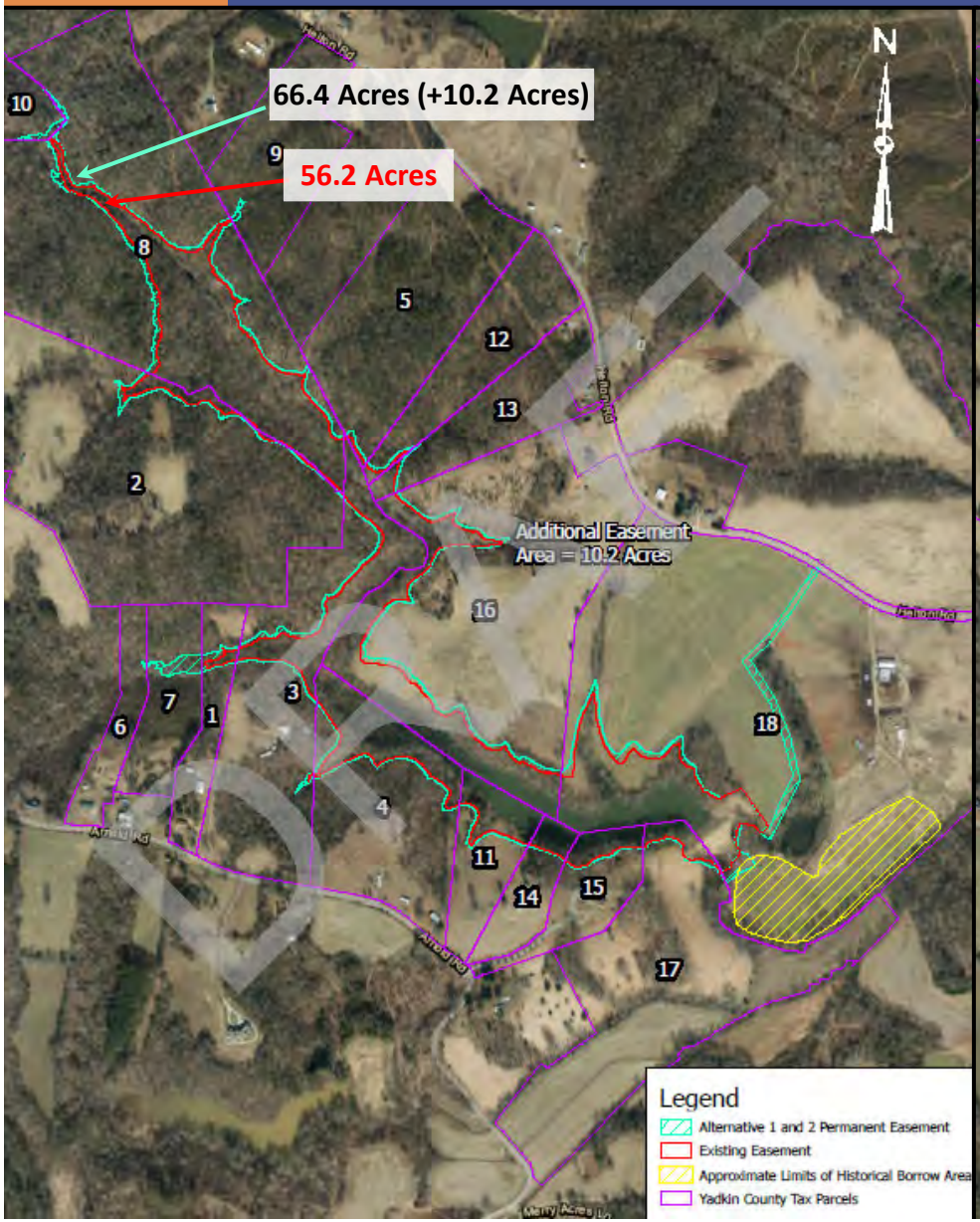
Dam 19A – Comparison of Alternatives

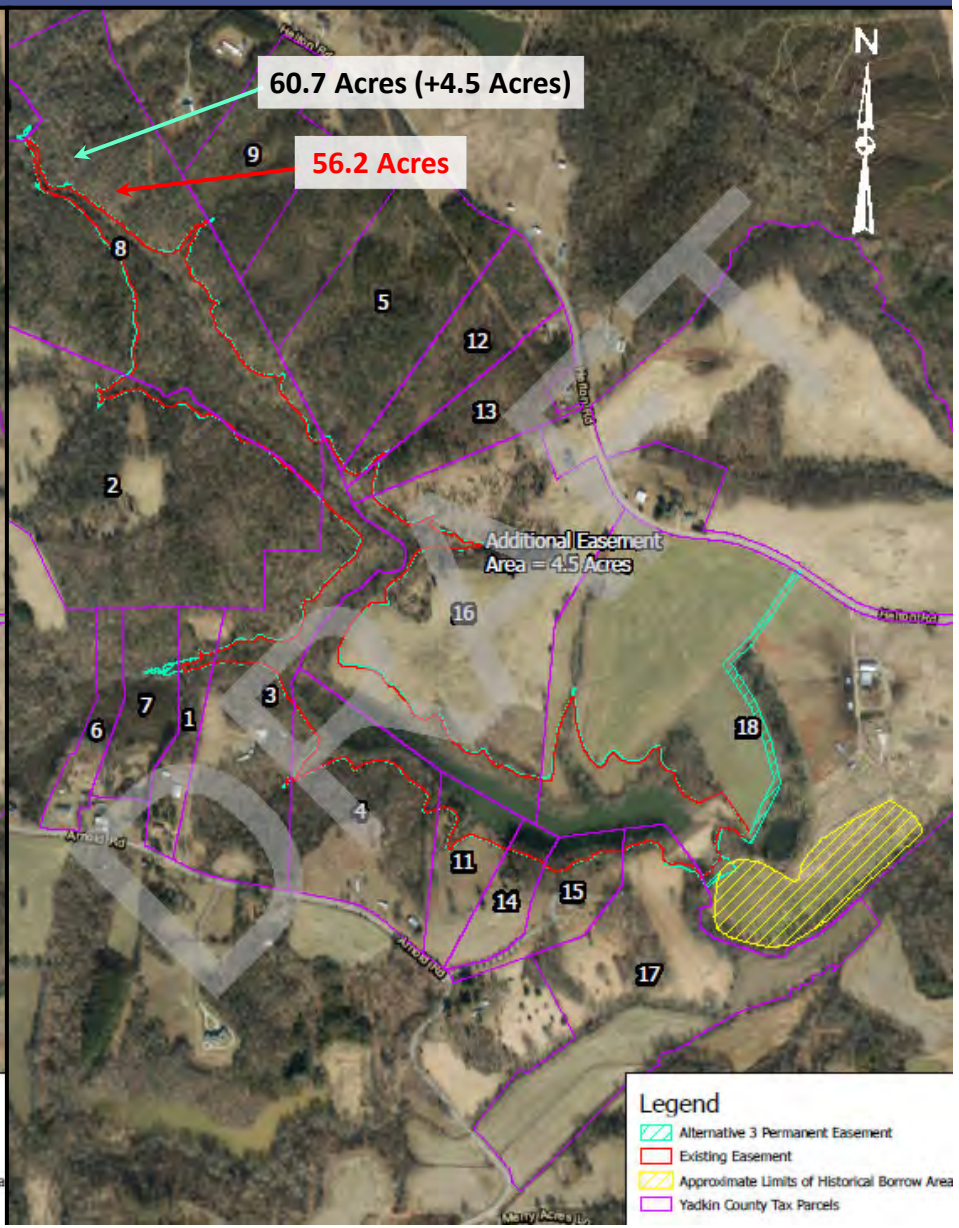
Alternative Description of Rehab. to NRCS and NC Dam Safety standards with federal assistance	# Parcels Affected	Acres Affected
• Alternative 1: Labyrinth Weir Auxiliary Spillway (2 Stage) Over the Embankment	13	87.1 (+8.9)
• Alternative 2: Labyrinth Weir Auxiliary Spillway Over the Embankment	13	87.1 (+8.9)
• Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool	13	83.1 (+4.9)

Dam 21 – Landrights / Easements

- Original construction:
  - Sponsors secured flood easements to the top of dam elevation and for areas needed for ingress/egress, construction, and O&M as shown on previous slide.
- For dam rehabilitation projects:
  - NRCS policy requires the **minimum landrights area upstream of the dam** to be the crest of the ASW elevation or the 100-year, 24-hour storm, whichever is higher. (Sponsors already have the minimum).

Dam 21 – Landrights / Easements (New Top of Dam Impacts)





Dam 21 – Comparison of Alternatives

Alternative Description of Rehab. to NRCS and NC Dam Safety standards with federal assistance	# Parcels Affected	Acres Affected
• Alternative 1: Labyrinth Weir Auxiliary Spillway Over the Embankment	18 (+3)	66.4 (+10.2)
• Alternative 2: Ogee Weir RCC Auxiliary Spillway Over the Embankment	18 (+3)	66.4 (+10.2)
• Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool	17 (+2)	60.7 (+4.5)

TOTAL PROJECT COSTS

JAMES FEATHERSTON

Dam 19A – Total Project Costs

Alternative Description to Rehab. to NRCS and NC Dam Safety standards with federal assistance	NRCS Funds	Local Funds	Total Funds
• Alternative 1: Labyrinth Weir Auxiliary Spillway (2 Stage) Over the Embankment	$9,825,800	$4,360,900	$14,186,700
• Alternative 2: Labyrinth Weir Auxiliary Spillway Over the Embankment	$8,277,900	$3,597,100	$11,875,000
• Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool	$6,529,600	$2,712,400	$9,242,000

Dam 21 – Total Project Costs

Alternative Description to Rehab to NRCS and NC Dam Safety standards with federal assistance	NRCS Funds	Local Funds	Total Funds
• Alternative 1: Labyrinth Weir Auxiliary Spillway Over the Embankment	$8,120,200	$3,486,100	$11,606,300
• Alternative 2: Ogee Weir RCC Auxiliary Spillway Over the Embankment	$8,665,000	$3,756,400	$12,421,400
• Alternative 3: Labyrinth Weir Auxiliary Spillway Over the Embankment / Raised Normal Pool	$8,248,700	$3,541,500	$11,790,200

Recommended Alternative

- NRCS planning policy (Principles, Requirements & Guidelines) state that Federal investments in water resources, as a whole, should strive to maximize public benefits, with appropriate consideration of costs. Public benefits encompass environmental, economic, and social goals; include monetary and non-monetary effects; and allow for the consideration of both quantified and unquantified measures.

Recommended Alternatives

Alternative Description for Rehab. to NRCS and NC Dam Safety standards with federal assistance. The following alternatives maximize public benefits with consideration of costs.

- Dam 19A Alternative 3 – Install 100-ft-wide Labyrinth Weir Auxiliary Spillway Over the Embankment , Raise Dam by 0.7 feet, Raise Normal Pool by 3.7 feet, and No Dredging.

- Dam 21 Alternative 1 – Install 89-ft-wide Labyrinth Weir Auxiliary Spillway Over the Embankment, Raise Dam by 4.0 feet, no change to Normal Pool, and Dredge 8.3 acre-feet of sediments.

	NRCS Costs	Other Costs	Total Costs
Totals	$14,649,800	$6,198,500	$20,848,300

Effects of Recommended Alternative

- **Keep in mind that the existing conditions already has 2 dams onsite. We are modifying the original footprint of the dams. These impacts are changes with the dams in place; not for new dams.**
- **Resources Located Within the Limits of Disturbance**
- Economic
- Social
- Environmental
- Cultural
- Ecosystem Services

Recommended Alternative Economic Impacts / Damages and Benefits

Dam 19A ALT 3, Dam 21 ALT 1			
Item	**Annual Damages w/o Project**	**Annual Damages w/Project**	**Annual Benefits**
Residential Bldgs.	$5,200	$2,900	$2,300
Crossings and Roadways	$349,800	$281,100	$68,700
Ag – Crop/Pasture	$132,500	$39,600	$92,900
Ag – Sediment Reduction	$2,300	$600	$1,700
Totals	$489,800	$324,200	$165,600

Recommended Alternative - Social/Economic Effects

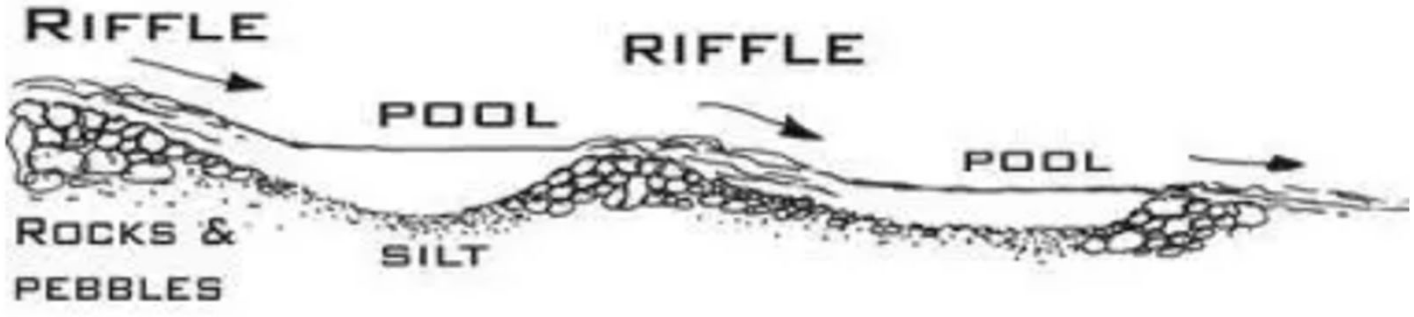
- Rehabilitation of Dam 19A will reduce threat to loss of life from a catastrophic breach:
  - **3 Residences**
  - **3 Crossings**
  - **15 Population at Risk (PAR)**
- Rehabilitation of Dam 21 will reduce threat to loss of life from a catastrophic breach:
  - **3 Crossings**
  - **6 Population at Risk (PAR)**
- Dam 19A Downstream flood protection will continue:
  - 8 buildings
  - 6 Roadways
  - 13 Stream Crossings
  - 153 Acres Ag Land
- Dam 21 Downstream flood protection will continue:
  - 8 buildings
  - 6 Roadways
  - 10 Stream Crossings
  - 127 Acres Ag Land

ENVIRONMENTAL EFFECTS / IMPACTS

GERALD POTTERN

Environmental Effects of Alternatives

- Impacts to Forests and Plant Communities
- Impacts to Streams and Wetlands
- Sediment Stabilization to Protect Downstream Habitat
- Maintaining Stream Flow Downstream



Short-term flooding upstream of the lake is NOT considered an environmental impact.

Dam 19A – Impacts of Alts 1 + 2 (Dredge Sediment)

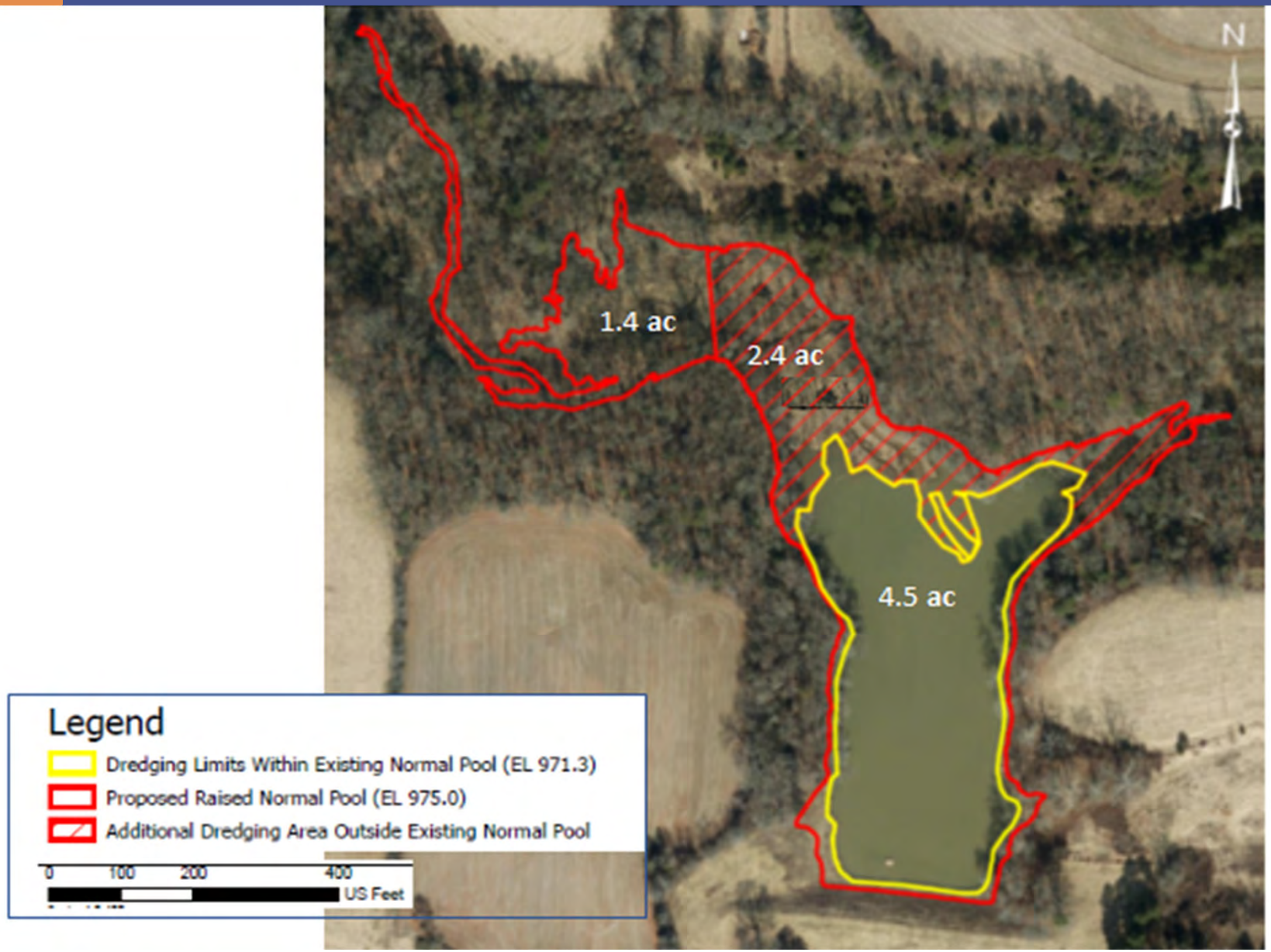
- Clear ~ 2.4 acres of bottomland forest for excavating sediment
- Most of this area is wetland
- Excavated area becomes open water lake pool (loss of wetland)
- Excavate sediment from open water pool (impact insignificant)
- Add fill in ~ 80 feet of stream below dam to widen the dam footprint and prevent stream bed erosion below the outlet

STREAM PROTECTION MEASURES:

Sediment Stabilization to Minimize Silt Downstream

Maintain Stream Flow to Protect Aquatic Life

Dam 19A - Limits of Disturbance (LOD)



Dam 19A – Impacts of Alt-3 (Raise Lake Pool)

- Clear ~ 3.8 acres of bottomland forest for expanded lake pool
- Estimated 2.5 to 3 acres of this area is wetlands
- Raise normal pool elevation by 3.7 feet
- New flooded area will become open water lake pool
- Add fill in ~ 80 feet of stream below dam to widen the dam footprint and prevent bed erosion below the outlet

STREAM PROTECTION MEASURES:

Sediment Stabilization to Minimize Silt Downstream

Maintain Stream Flow to Protect Aquatic Life

Dam 19A - Limits of Disturbance (LOD)

Dam 21 – Impacts of Alts 1 + 2 (Dredge Sediment)

- No bottomland forest impact; dredging in existing open pool only
- No direct wetland impacts
- Add fill in ~ 80 feet of stream below dam to widen the dam footprint and prevent bed erosion below the outlet

STREAM PROTECTION MEASURES:

Sediment Stabilization to Minimize Silt Downstream

Maintain Stream Flow to Protect Aquatic Life

Dam 21 – Limits of Disturbance

Dam 21 – Impacts of Alt-3 (Raise Lake Pool)

- Clear < 1.0 acre of shrubs & saplings along shore to expand pool
- Estimated 0.5 acre of this area is wetlands
- Raise normal pool elevation by 1.2 feet
- New flooded area will become open water lake pool
- Add fill in ~ 80 feet of stream below dam to widen the dam footprint and prevent bed erosion below the outlet

STREAM PROTECTION MEASURES:

Sediment Stabilization to Minimize Silt Downstream

Maintain Stream Flow to Protect Aquatic Life

Dam 21 – Impacts of Alt-3 (Raise Lake Pool)

NEXT STEPS AND SCHEDULE

WADE BIDDIX

Agency Consultations

Consultation letters will be sent soon to the following agencies:

- U.S. Army Corp of Engineers
- U.S. Fish and Wildlife Service
- FEMA
- NC Department of Environmental Quality
- NC Dam Safety Agency
- NC Historic Preservation Office
- NC Natural Heritage Program
- NC Wildlife Resources Commission
- Tribal Organizations

Planning Schedule

- Initial Draft Plan for Internal Review (NRCS and Sponsors) – by 3/11/22
- Preliminary Plan for NRCS Technical Review – by 5/2/22
- Draft Plan for NRCS Headquarters Programmatic Review – by 8/15/22
- Draft Plan for Public and Interagency Review – by 10/1/22
- Final Plan Ready for Approval and Signatures – by 12/30/22
- Steps by NRCS and Sponsors to Proceed to Design and Construction
  - Request Authorization of Plan by Chief of NRCS
  - Request Funding for Design and/or Construction

We Need Your Input

If you have any specific questions or need additional information, please let us know.

Points of Contact

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Mary.Waligora@usda.gov

Jason Walker, Director
Yadkin SWCD
(336) 849-7583
jwalker@yadkincountync.gov

Yadkin County Website

- **Yadkin County Website is** www.yadkincountync.gov

- **Information on the dams will be posted here.**

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