Root River Watershed Restoration Plan
Horlick Dam Alternatives

Presentation to the Root River Restoration Planning Group
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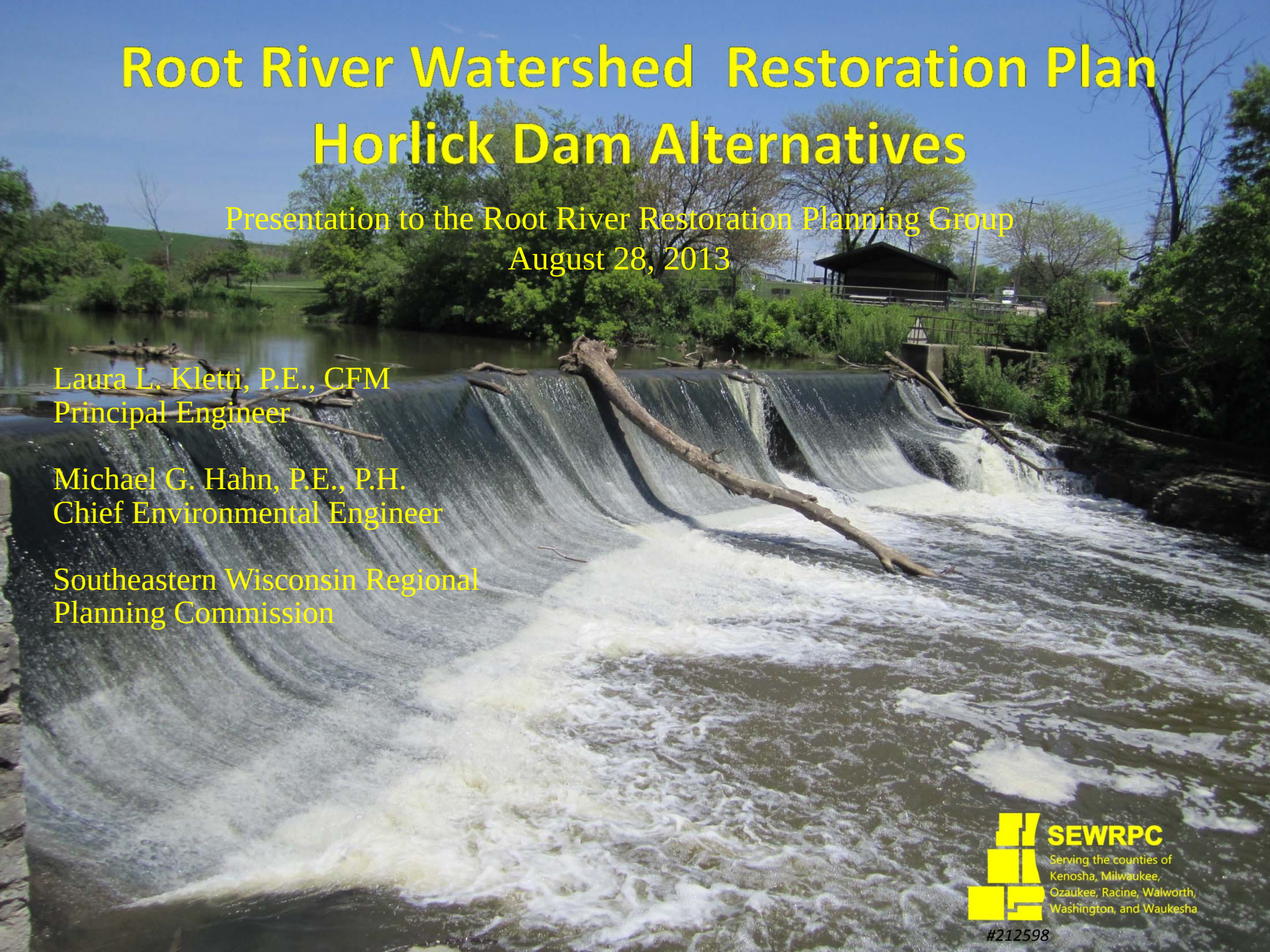
Southeastern Wisconsin Regional
Planning Commission



SEWRPC
Serving the counties of
Kenosha, Milwaukee,
Ozaukee, Racine, Walworth,
Washington, and Waukesha

#212598

Partners and Funding Agencies

Wisconsin Coastal Management Program

UW Extension
University of Wisconsin–Extension

sweet water
Southeastern Wisconsin Watersheds Trust, Inc.

Watershed Initiative Network
WIN
Root-Pike

Wisconsin Dept. of Natural Resources

mmsd
Preserving The Environment • Improving Water Quality

National Oceanic and Atmospheric Administration
NOAA
U.S. Department of Commerce

Municipalities and Counties of the Root River Watershed

Racine County Wisconsin
Since 1836

The Fund for Lake Michigan

Southeastern Wisconsin Regional Planning Commission

Plan Approach

1. Second-level plan, building from Recommendations of the 2007 SEWRPC Regional Water Quality Management Plan Update (RWQMPU)
2. Developed four focus issues based on survey and local input:
   - Water quality
   - Habitat
   - Recreational use and access
   - In Racine County only: Flooding and status of the Horlick dam
3. Characterized the watershed concentrating on features related to the four focus issues

Plan Approach

4. Identify targets to be achieved by the end of the five-year plan period
5. For Each Target, Identify Actions to be Taken
6. Identify Foundation Actions
7. Develop an Implementation Strategy

The plan is being documented in:

SEWRPC Community Assistance Planning Report No. 316, *A Restoration Plan for the Root River Watershed*

Alternatives for the Horlick Dam

Reasons for Horlick Dam Evaluation

- The dam must be upgraded to meet State standards, or demolished and removed. Doing nothing is not an option.
- Horlick dam break analysis completed by consultant being reviewed now by WDNR
- Preliminary conclusion is a Significant Hazard rating which requires a 500-year spillway capacity
- Significant Hazard dam rating indicates failure would not result in loss of human life but would cause economic and environmental losses

Reasons for Horlick Dam Evaluation

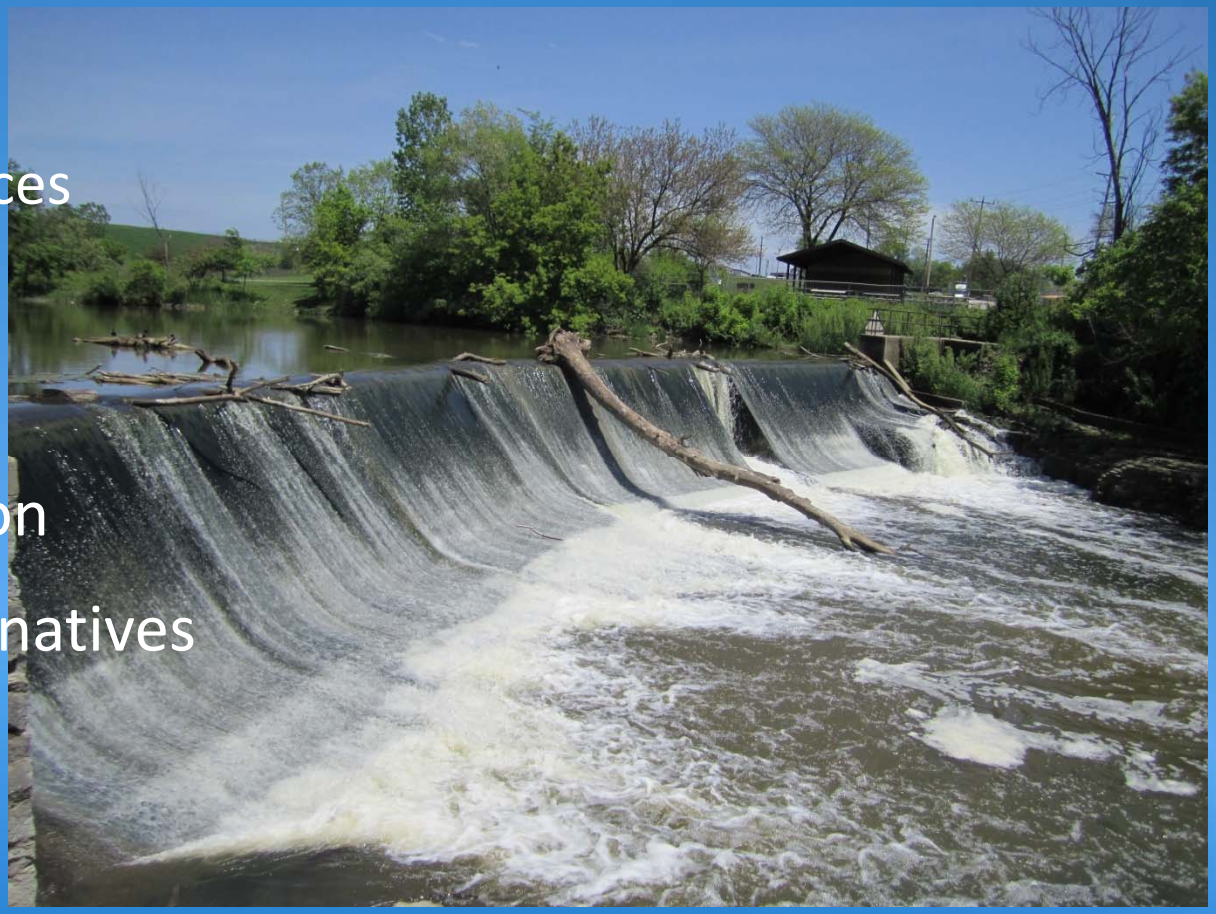
- Horlick dam as constructed has a 10-year spillway capacity
- Once WDNR approves, the County may have up to 10 years to perform modifications to meet the spillway capacity requirement if they choose to maintain the dam

Engineering Process

- Feasibility Analysis (Conceptual Alternatives)
- WDNR Hazard Rating Determination
- WDNR Order
- Racine County Decision on How to Proceed
- Preliminary Engineering
- Final Design
- Plans and Specifications
- Construction/Demolition

Horlick Dam Alternatives

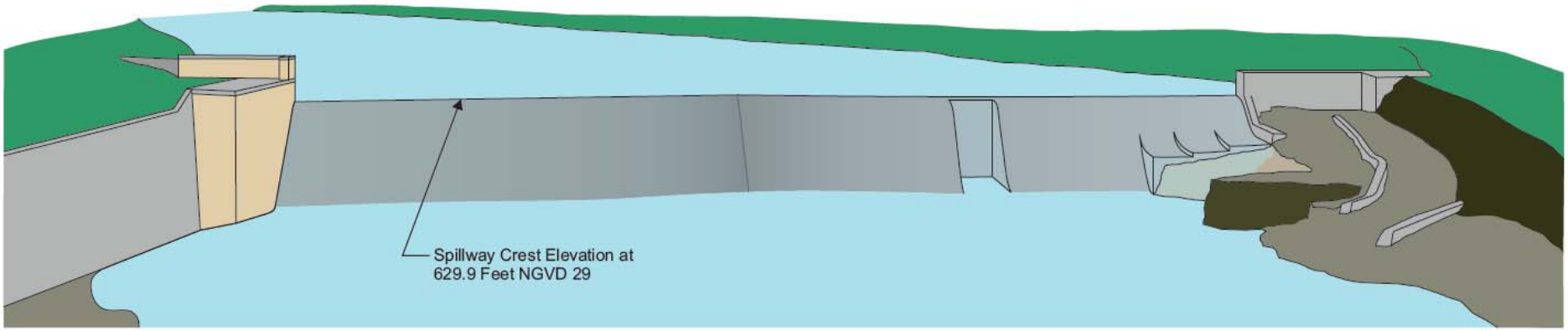
- Issues of Concern
  - Water Quantity
  - Water Quality
  - Natural Resources
  - Social
  - Costs
- Baseline Condition
- Conceptual Alternatives



Baseline Conditions

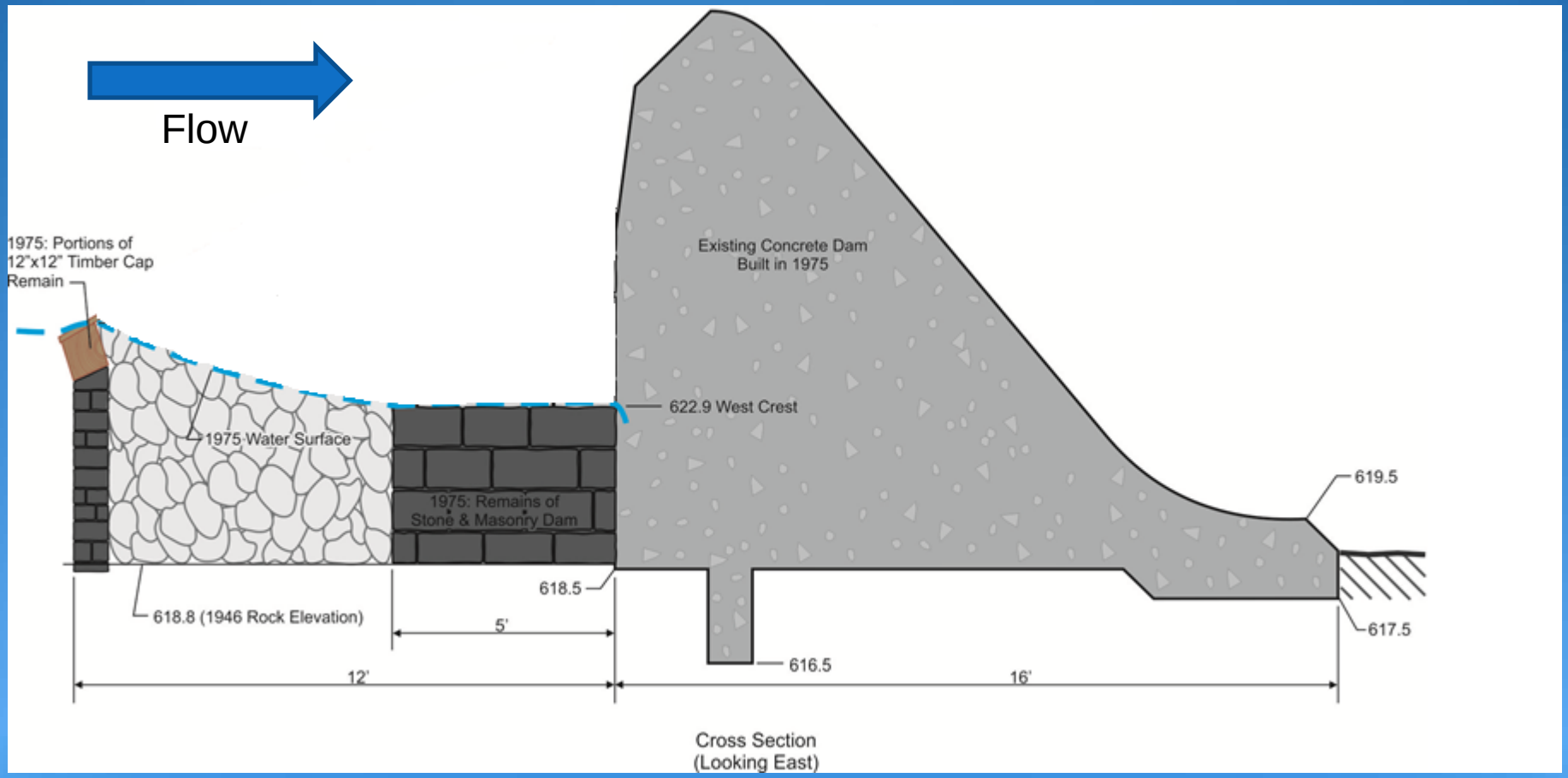
Figure V-A

EXISTING CONDITIONS OF HORLICK DAM - LOOKING NORTH (UPSTREAM)

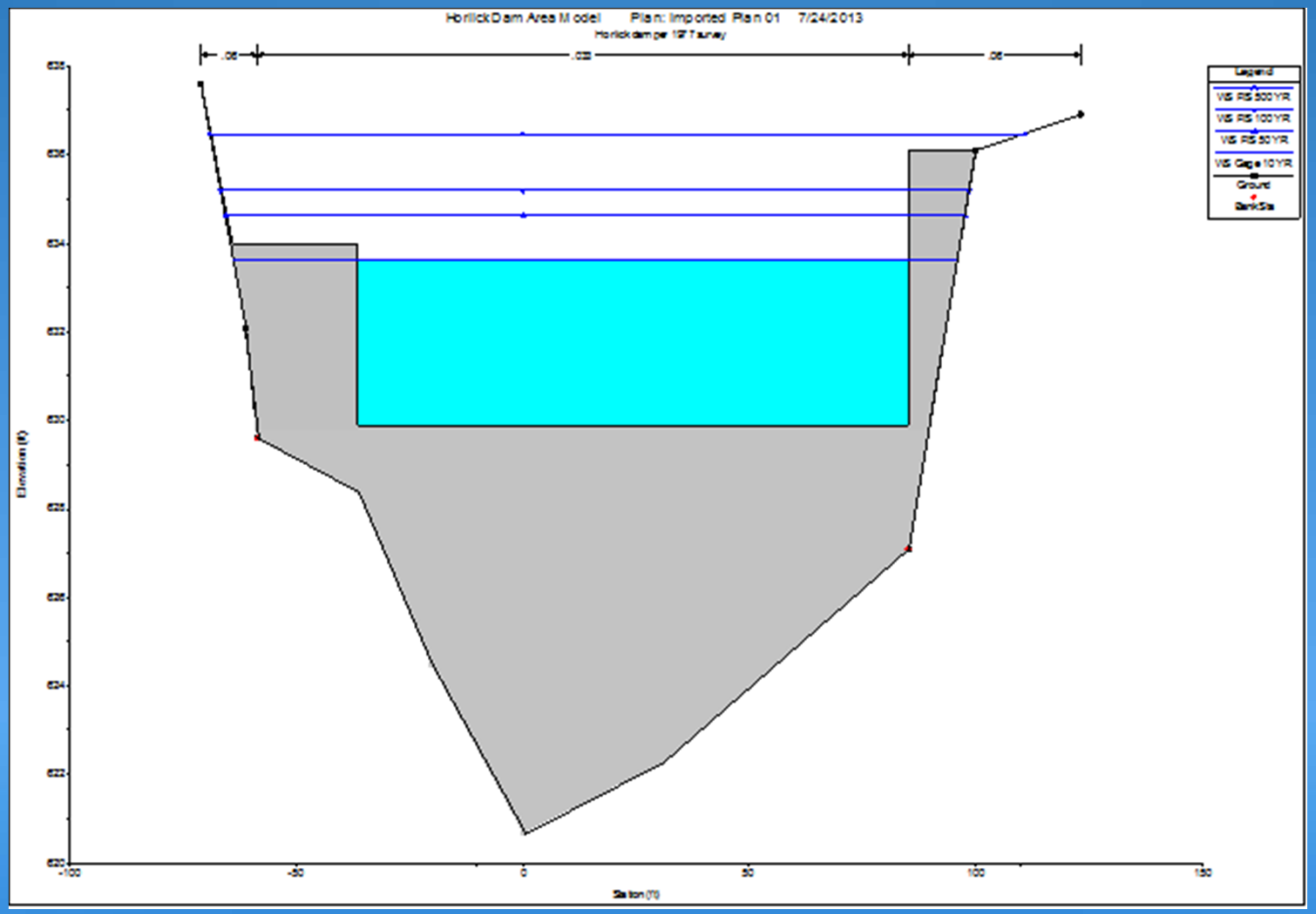


1975 Reconstruction

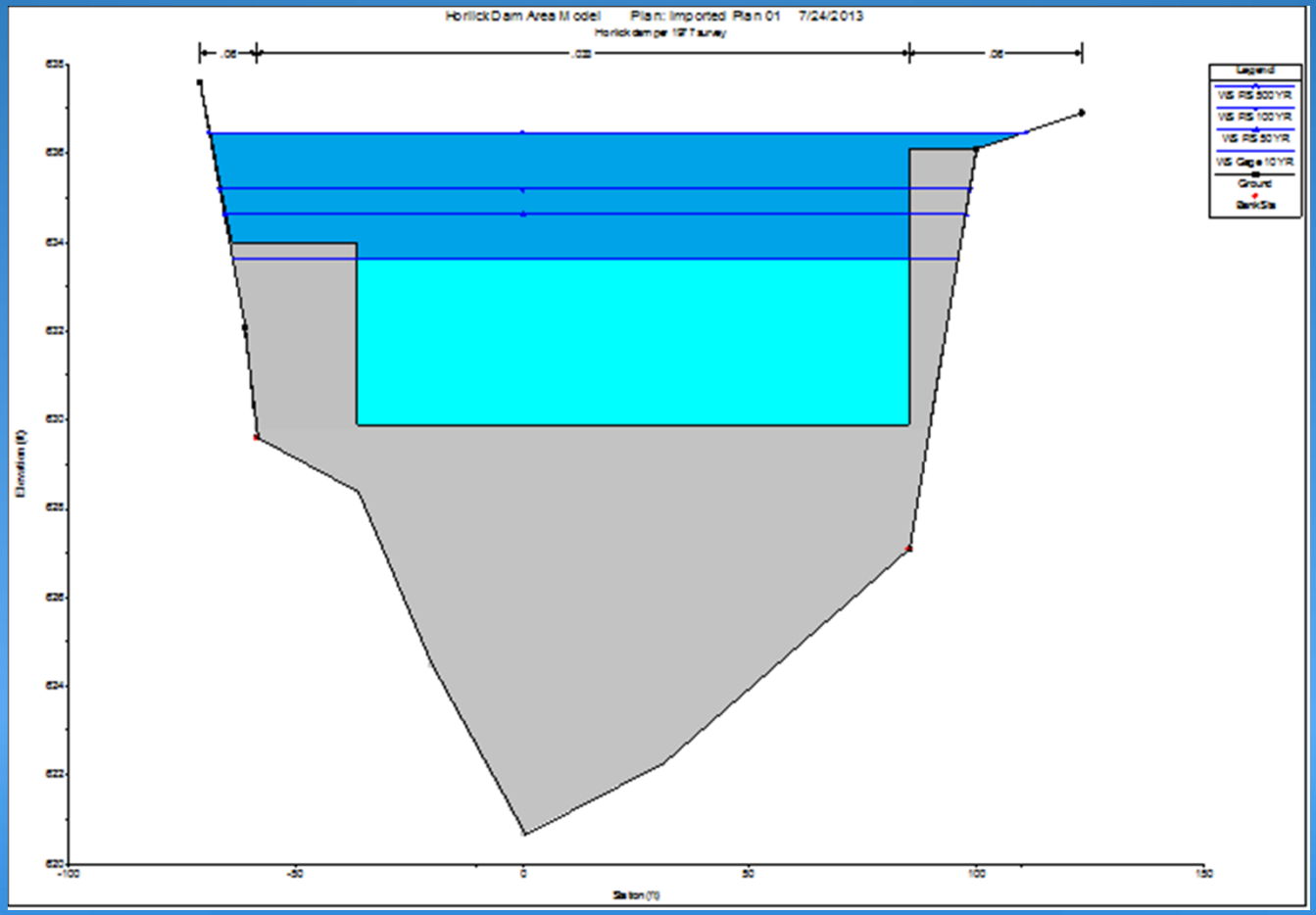
Baseline Conditions – Side View



Baseline Conditions – 10-year

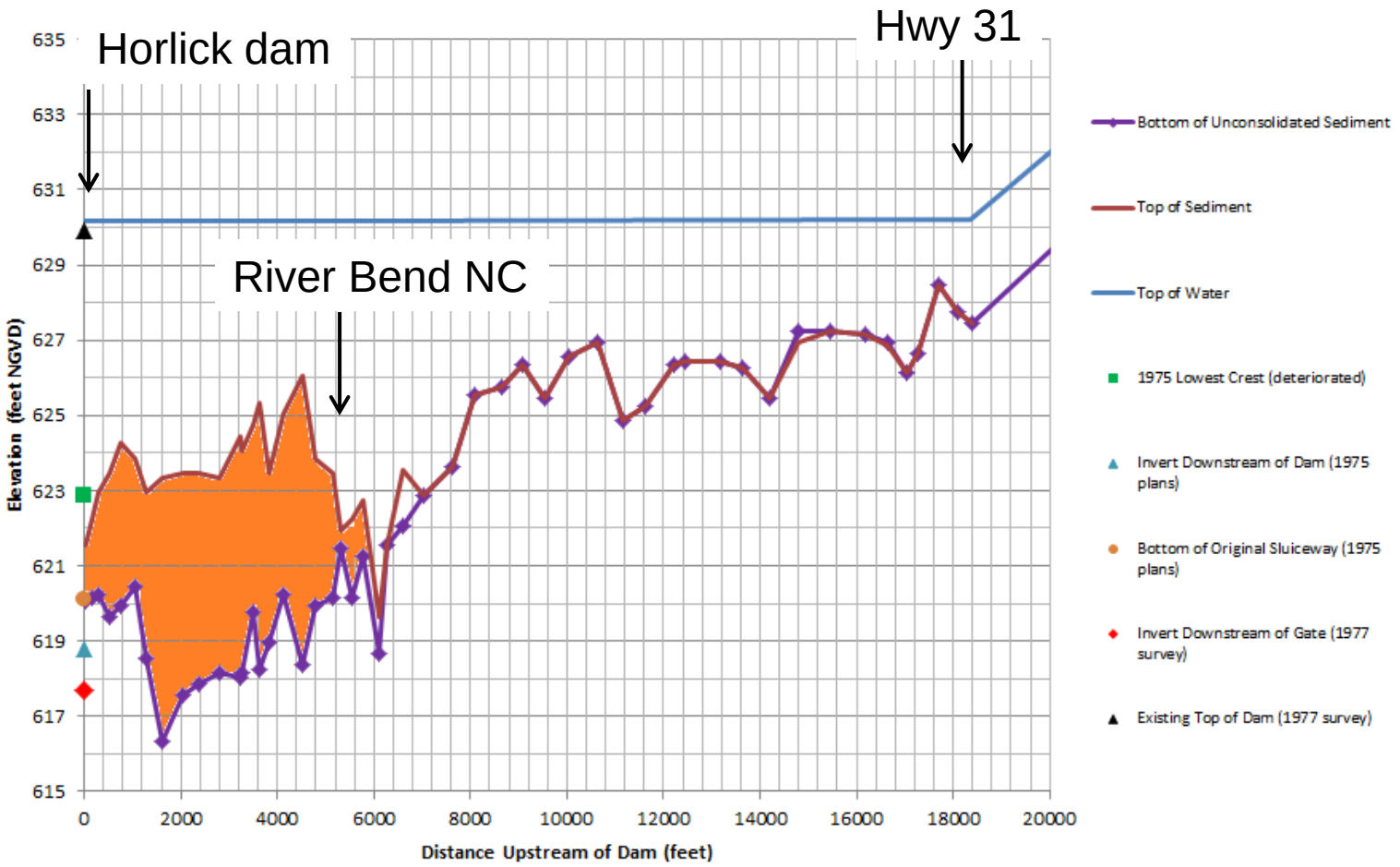


Baseline Conditions – 500-year



Sediment Volume

Figure IV-K
Horlick Impoundment Profile on December 1, 2011



Aquatic Invasive Species (AIS)

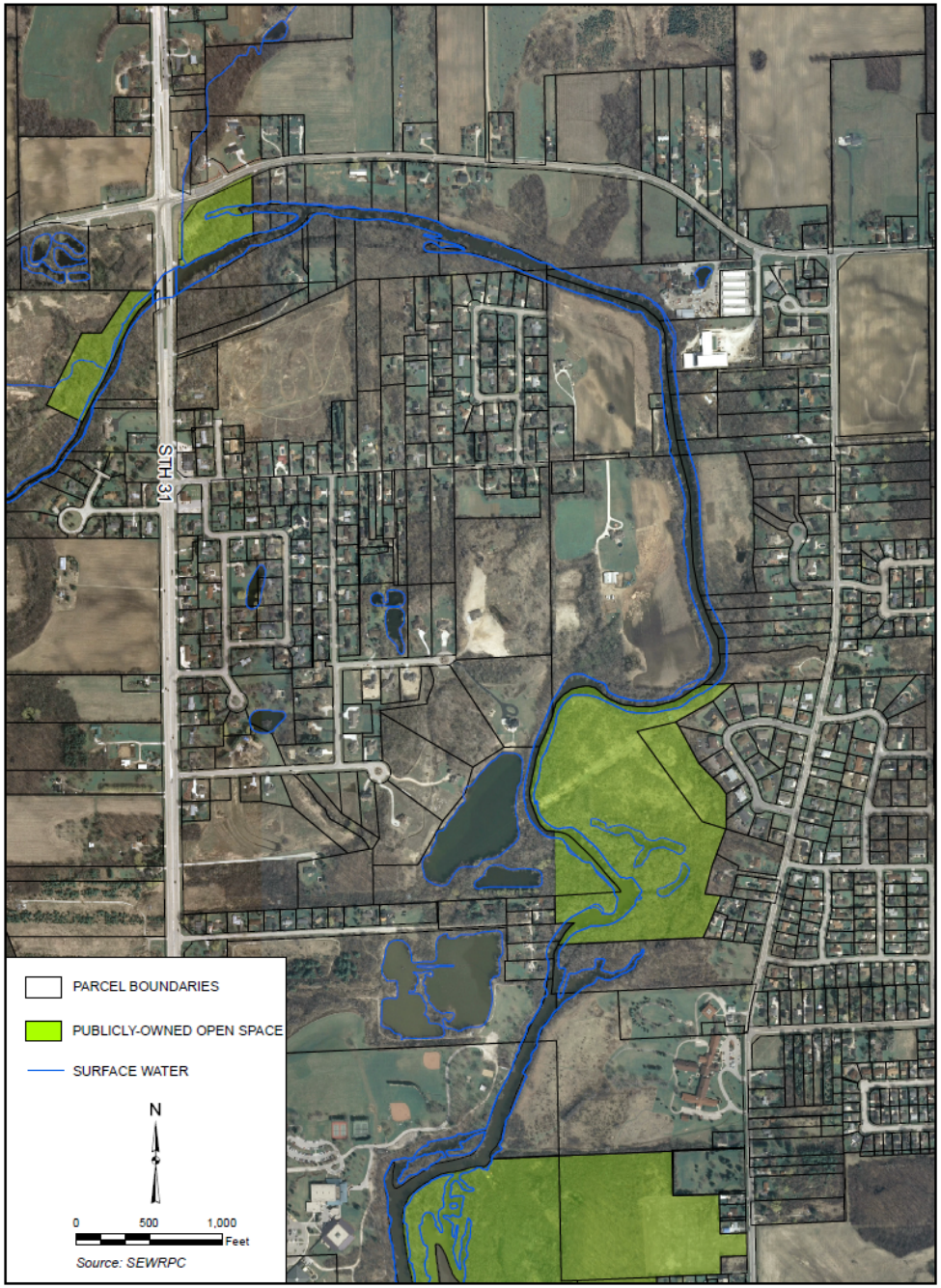
- Species/Issues of Concern
  - Sea Lamprey
  - Round goby
  - VHS – Viral Hemorrhagic Septicemia
- Horlick dam as currently constructed is a barrier to AIS based on the WDNR criterion of the 100-year event
- WDNR considers the Horlick dam to be most downstream barrier to AIS from Lake Michigan

Safety Concerns

- Dam / structural failure
- High flow hazards
- Boater / fisherman safety
- Foot access hazards

Map V-B
LAND OWNERSHIP IN THE VICINITY OF
HORLICK DAM IMPOUNDMENT

Map V-B (Cont.)
LAND OWNERSHIP IN THE VICINITY OF
HORLICK DAM IMPOUNDMENT



Alternatives

Conceptual Alternatives

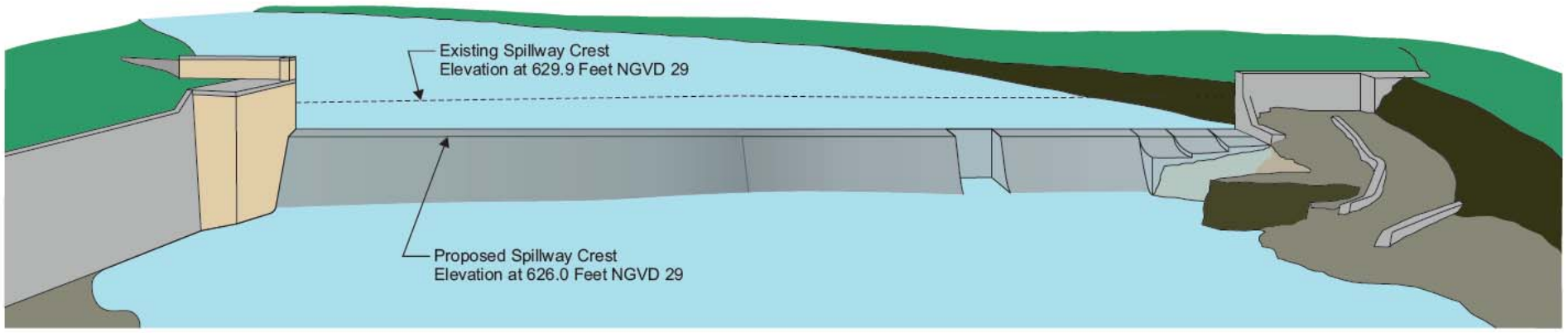
- Modify Dam to Enhance Spillway Capacity
- Modify Dam to Enhance Spillway Capacity & Provide Fish Passage Under Low and High Flow Conditions
- Partial Removal
- Full Removal

Alternative 1

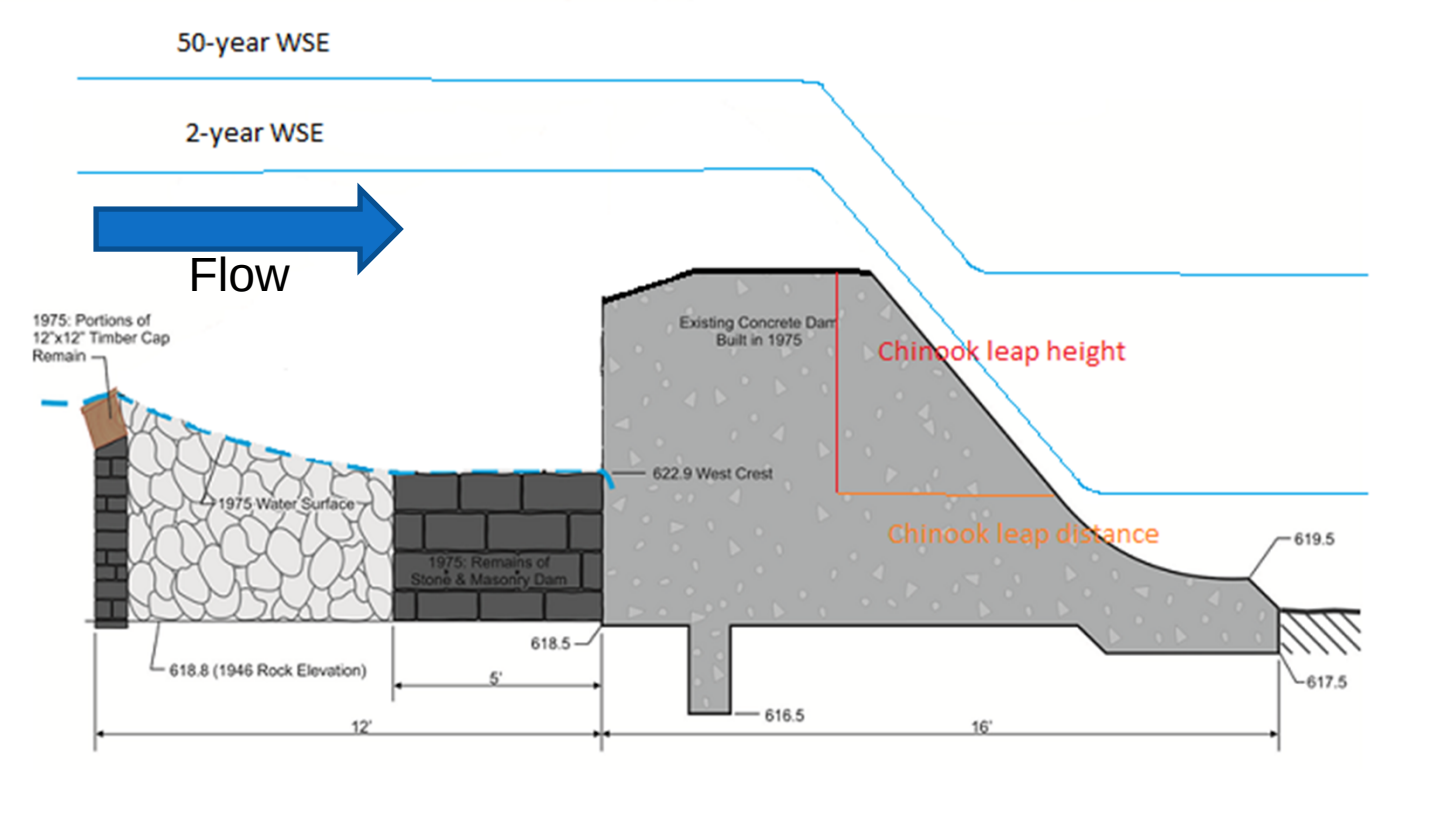
- Enhance Spillway Capacity to Meet 500-year Standard

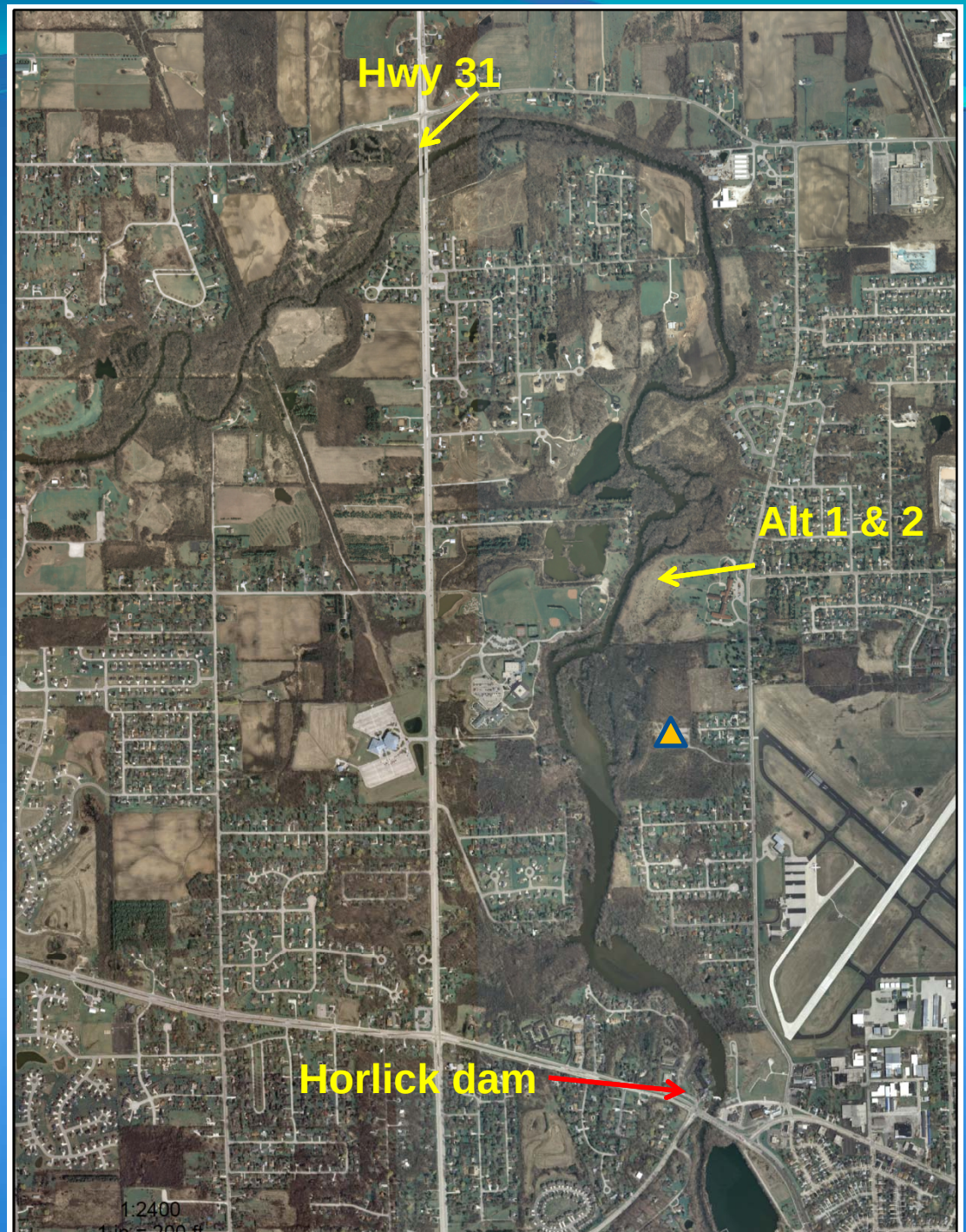
Figure V-B

CONCEPTUAL ALTERNATIVE 1:
ENHANCE SPILLWAY CAPACITY OF HORLICK DAM - LOOKING NORTH (UPSTREAM)



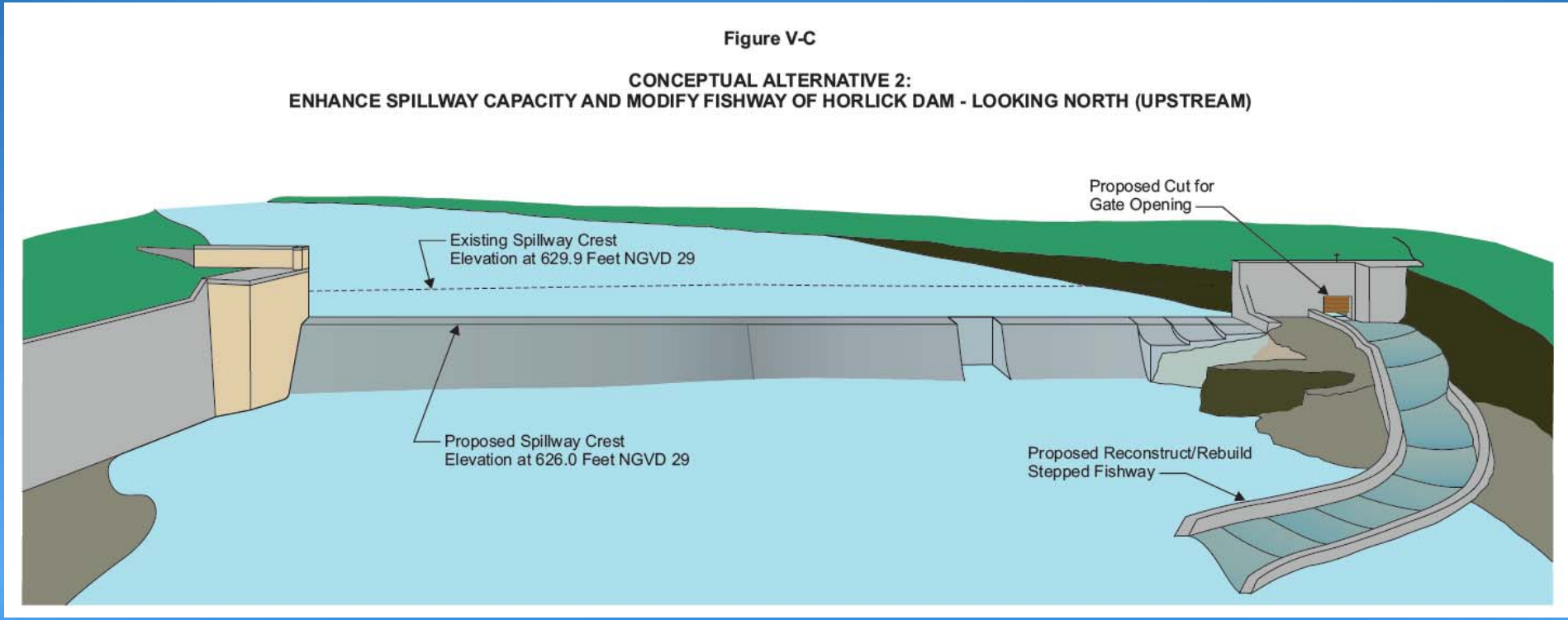
Alternative 1 – Side View




Hwy 31
Alt 1 & 2
Horlick dam
1:2400

Alternative 2

- Enhance Spillway Capacity and Fish Passage



1915 Fishway

Fishway Examples

Source: Ontario Ministry of Natural Resources

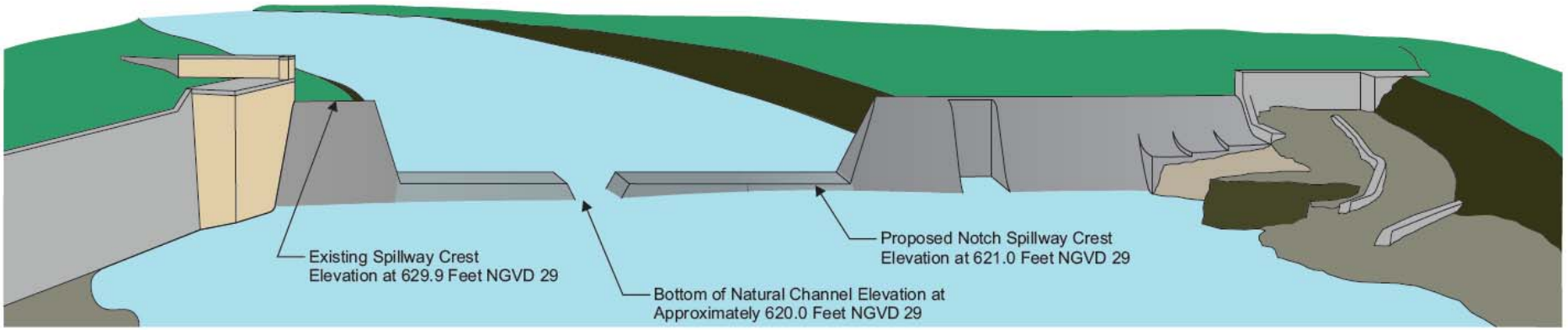
Source: State of Connecticut

Alternative 3

- Partially Remove Dam as Barrier

Figure V-D

CONCEPTUAL ALTERNATIVE 3:
COMPLETELLY NOTCHED SPILLWAY OF HORLICK DAM - LOOKING NORTH (UPSTREAM)

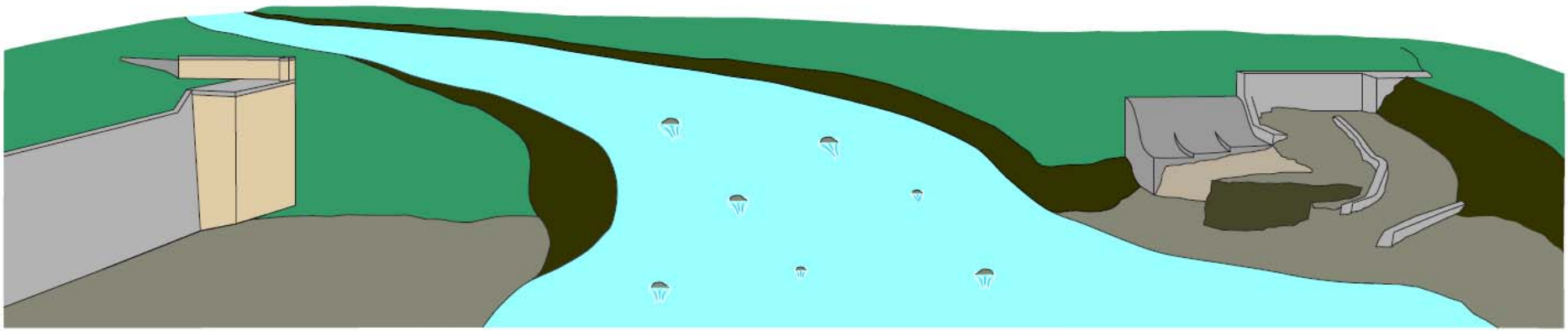


Alternative 4

- Remove Dam

Figure V-E

CONCEPTUAL ALTERNATIVE 4:
HORLICK DAM REMOVED - LOOKING NORTH (UPSTREAM)



Map V-D

CONCEPTUAL ALTERNATIVES: APPROXIMATE EXTENT OF FLOODPLAIN DURING BASEFLOW (50% EXCEEDENCE, 56 CFS)

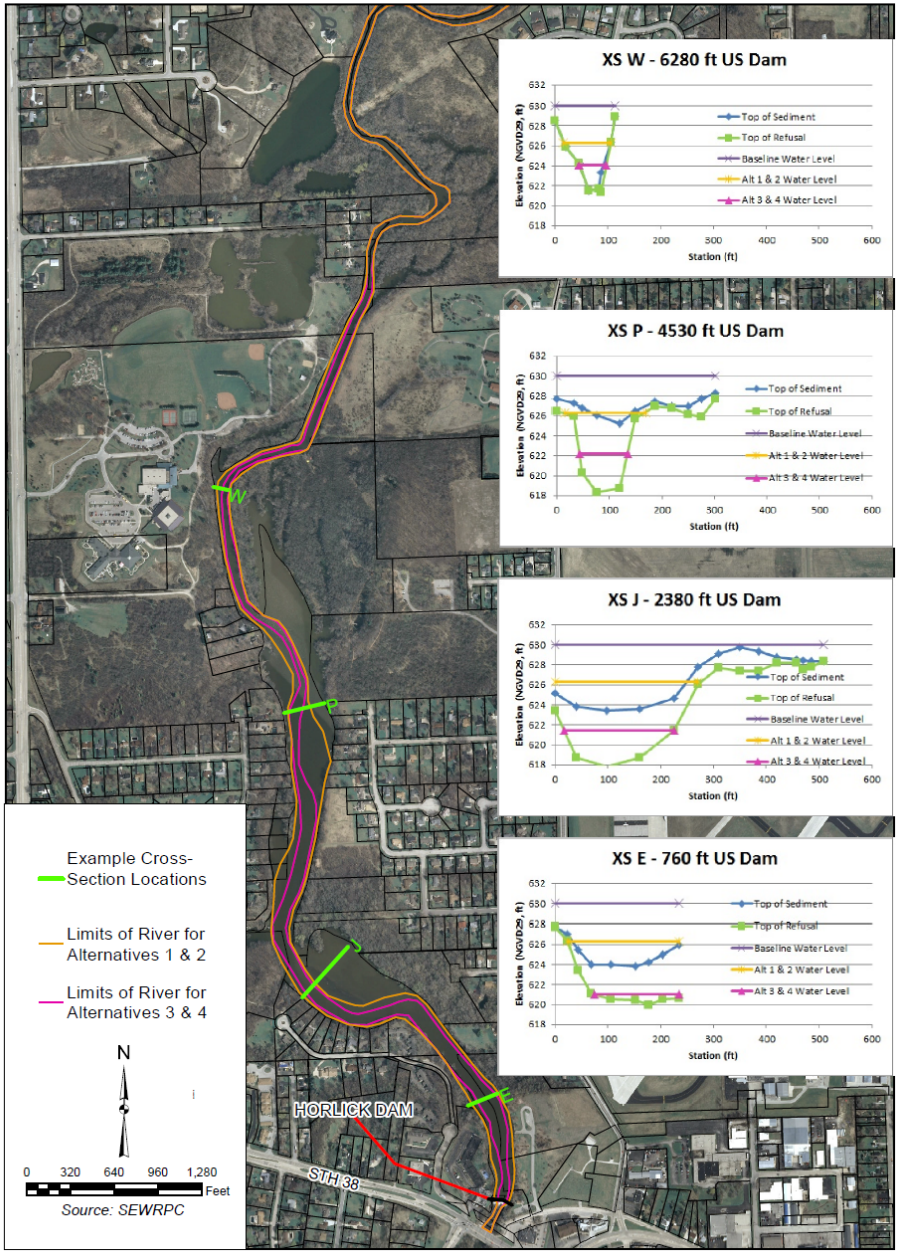


Table 1
Costs

Alternative	Capital Cost (dollars)	Annual Operation and Maintenance (dollars)	Total Present Worth Cost (dollars)
Alternative 1–500-Year Capacity	$390,000	$4,500	$461,000
Alternative 2–Alt 1 with Fishway	$480,000	$4,700	$555,000
Alternative 3–Full Notch of Dam	$440,000	$2,100	$473,000
Alternative 4–Dam Removal	$540,000	$ 700	$551,000

Table 2 Summary

Alternative	Flooding Upstream of Dam	Water Quality	Fish Passage and Overall Fish Community Improvement	Safety	Recreation			Access to River by Riparian Land Owners	Total Present Worth Costs (dollars)
					Paddling	Fishing Upstream of Dam	Recreational Salmon Fishing Immediately Downstream of Dam		
Baseline Condition	0	0	0	0	0	0	0	0	N/A
Alternative 1—500-Year Capacity	+	+	+	+	–	+	0	–	$461,000
Alternative 2—Alt 1 with Fishway	+	+	++	+	–	++	–	–	$555,000
Alternative 3—Full Notch of Dam	++	++	++	++	– –	+++	– –	– –	$473,000
Alternative 4—Dam Removal	++	+++	+++	+++	– –	+++	– –	– –	$551,000
Basis for Evaluation	Upstream flood elevations lowered	Loss of impound-ment	Elimination of blockage or addition of fishway	Loss of structure in River	Loss of consist-ent water levels	Improved passage upstream	Full blockage at dam removed	Lower water level removes direct access	

Additional Work/Information Needs

- Additional information to be gathered during preliminary engineering for Horlick dam
  - Additional sediment sampling in impoundment
  - Structural integrity issues
    - Dam modification alternatives (Alternatives 1, 2, and 3)
    - Right abutment at Riverside Inn (Alternative 4)

Project Web Site

- http://www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm

  - Presentations from public stakeholder meetings
  - Summary notes from Advisory Group meetings
  - Draft chapters as they are completed
  - Comment screen

Questions?