

FLAT ROCK DAM FEASIBILITY STUDY & RECOMMENDATION



GRANT OVERVIEW

- In January 2022, the Metroparks worked with the Great Lakes Fisheries Commission (GLFC) to submit a grant application to NOAA's Great Lakes Fish Habitat Restoration Program for the Flat Rock Dam Feasibility Study
- The program aims to support projects that will lead to a significant and sustainable benefits for Great Lakes native fish species
- Our project is part of a larger suite of projects submitted by the Great Lakes Fisheries Commission

No.	Section/Project
1.	Project Summary
2.	Applicant Qualifications
3.	Project Narratives
A.	NEBAGAMON CREEK RAILROAD EMBANKMENT AND CULVERT REMOVAL PROJECT
B.	INNER SAGINAW BAY REEF RESTORATION PROJECT
C.	SALMON RIVER TRESTLE POOL PROJECT
D.	CAMPBELLS ROAD CULVERT REPLACEMENT PROJECT
E.	FLAT ROCK/HUROC DAM FISH PASSAGE PROJECT
F.	LITTLE BAY DE NOC, MI SHORELINE RESTORATION PROJECT
G.	SALMON RIVER PHASE 3 PROJECTS
H.	NORTHERN LAKE MICHIGAN (CHARLEVOIX/HARBOR SPRINGS) REEF RESTORATION PROJECT
4.	Data Management Plan

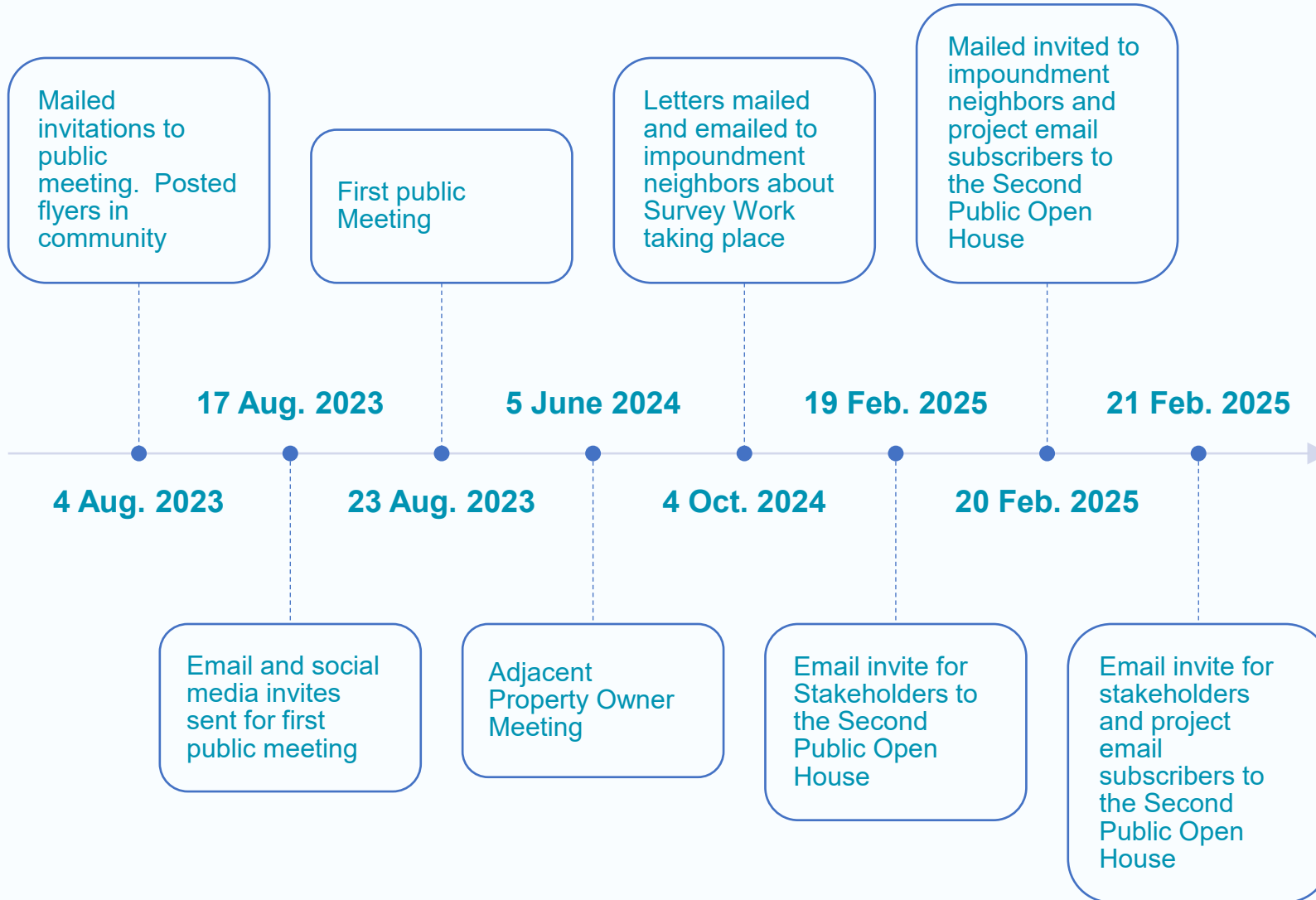
GRANT OVERVIEW

- The grant was awarded in October 2022 for \$1,686,539
- The Metroparks provided \$25,000 in cash match, and over \$45,000 in in-kind match with staff time
- There are 2 phases of the grant, first is the feasibility study phase, and next is the design phase. There is approximately \$920,000 in grant funds for the design engineering
- The grant has been extended and runs through September 30, 2027

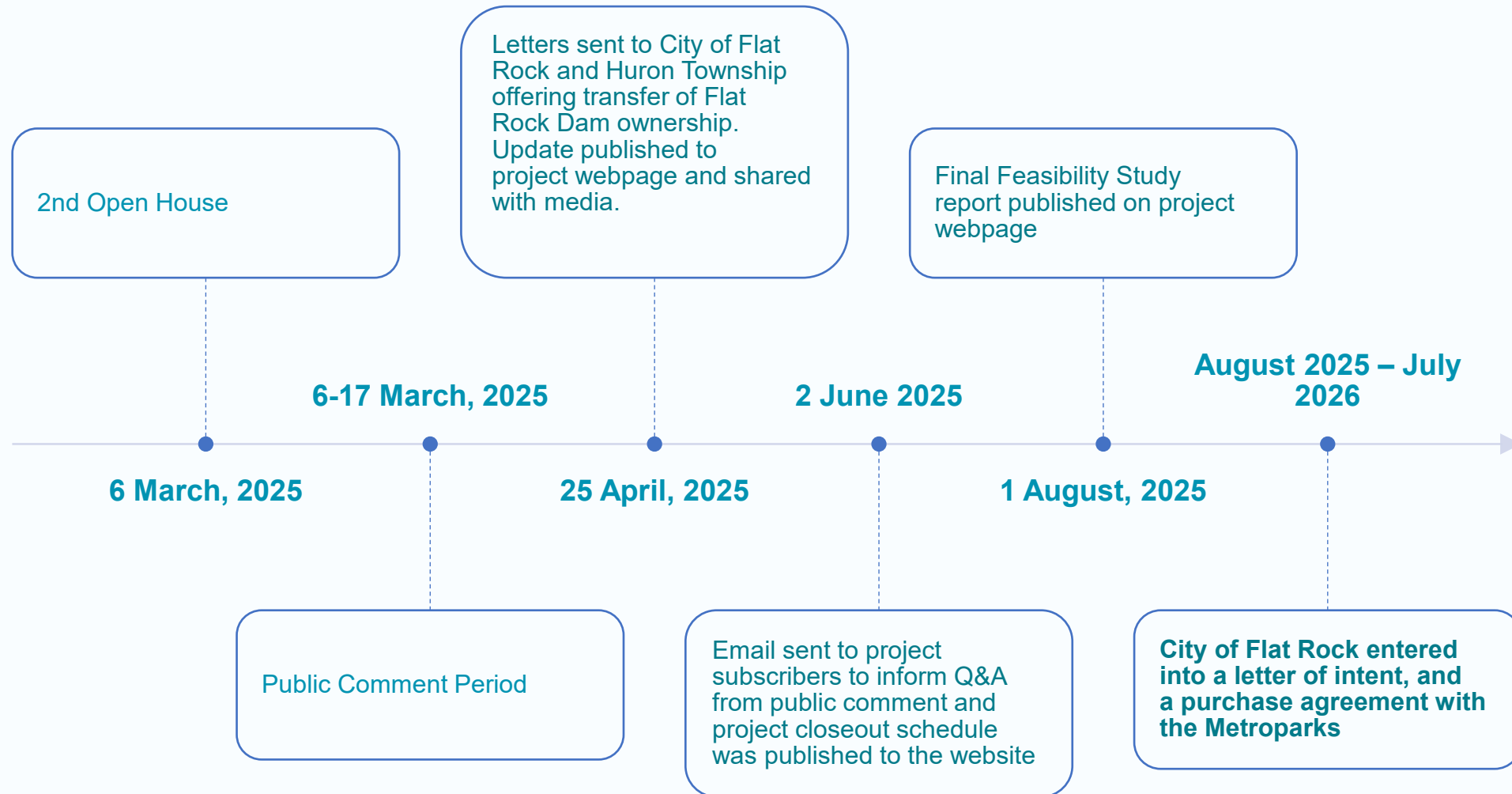


Map shows the basin wide map of the GLFC partnership projects

COMMUNITY ENGAGEMENT



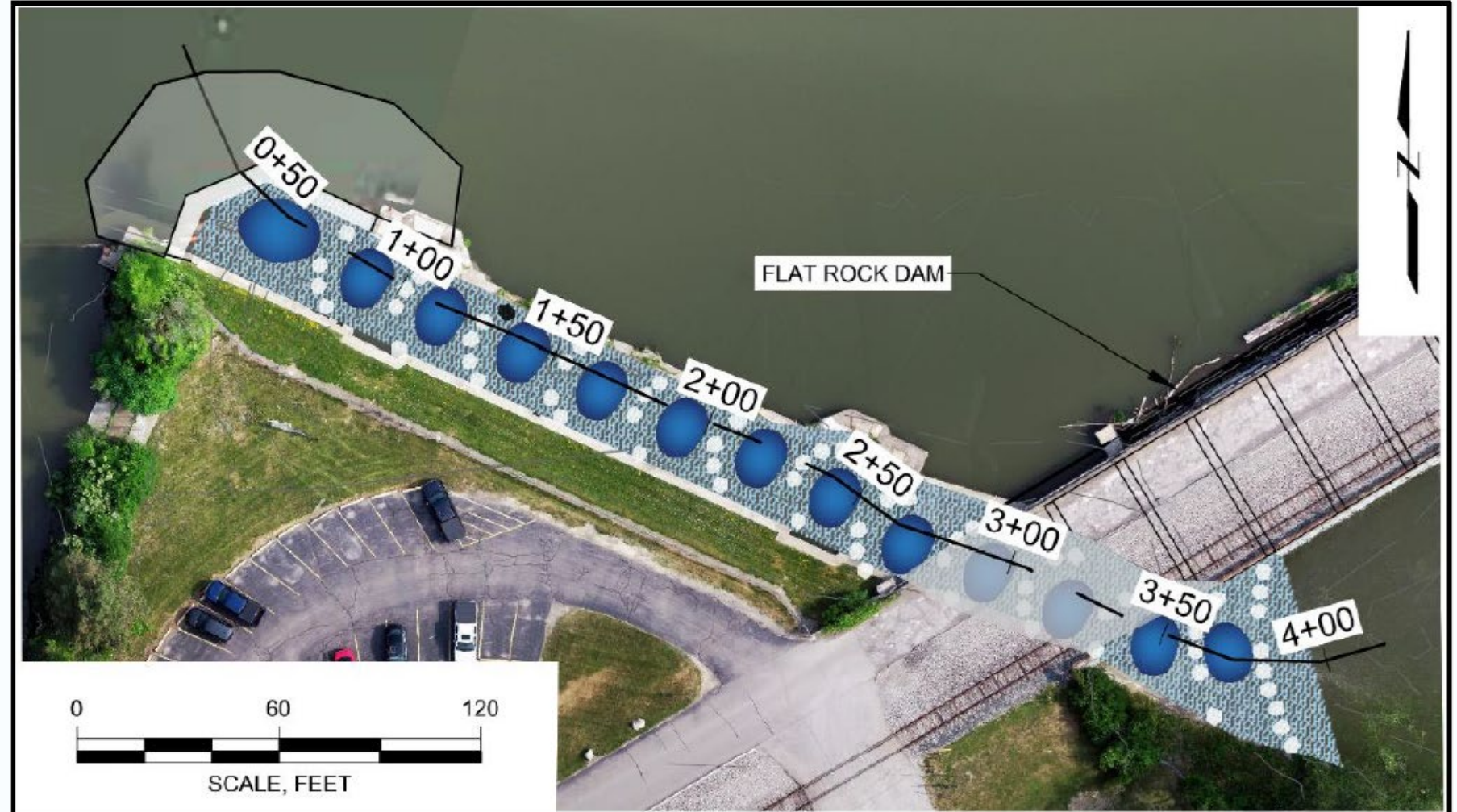
COMMUNITY ENGAGEMENT



OVERVIEW OF ALTERNATES

Alternative 1: Fish Passage Modification

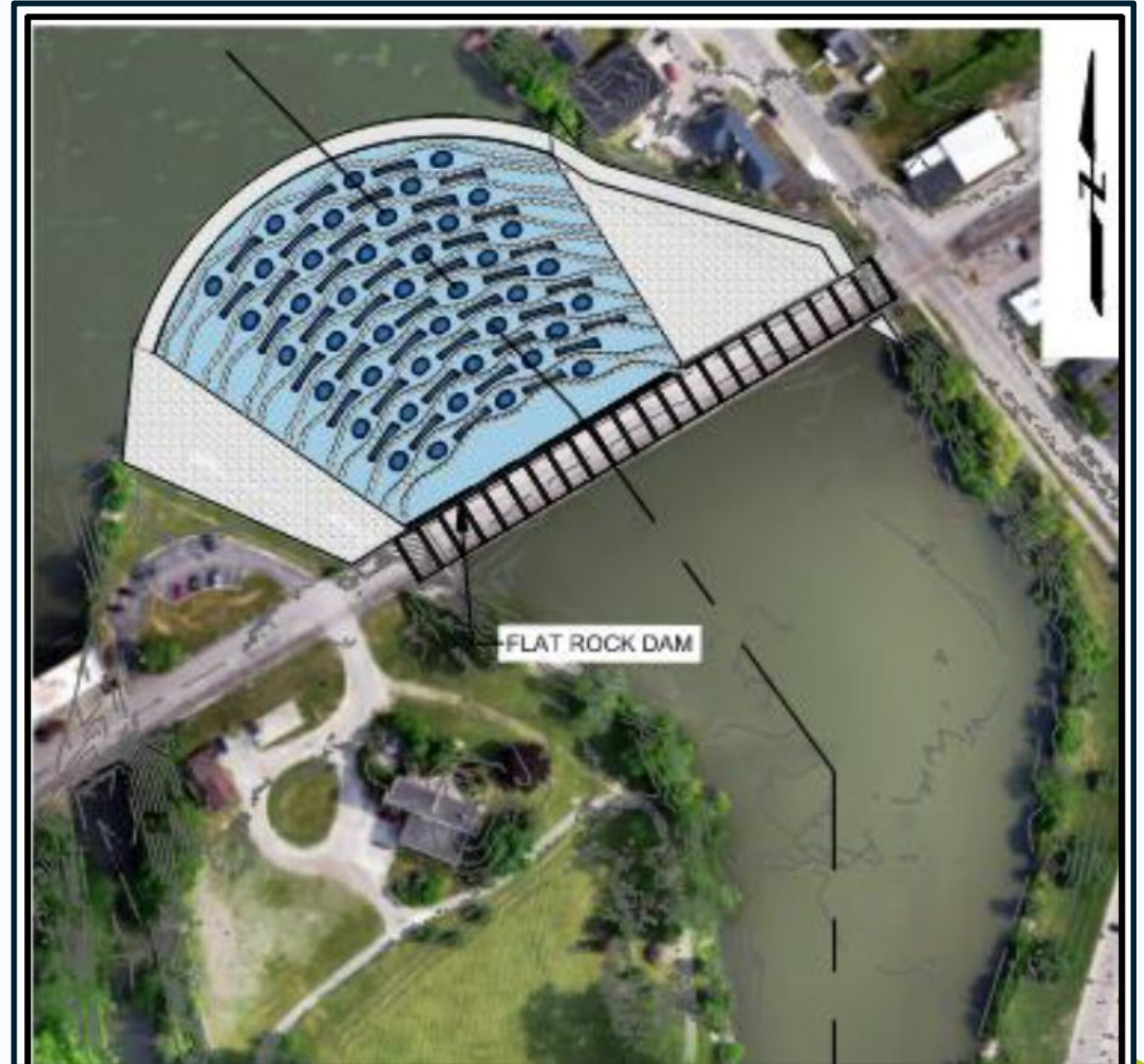
- Only addresses fish ladder and fish passage
- Does not in any way improve the Flat Rock Dam
- Least effective option for fish passage out of all options



OVERVIEW OF ALTERNATES

Alternative 2: Partial Removal

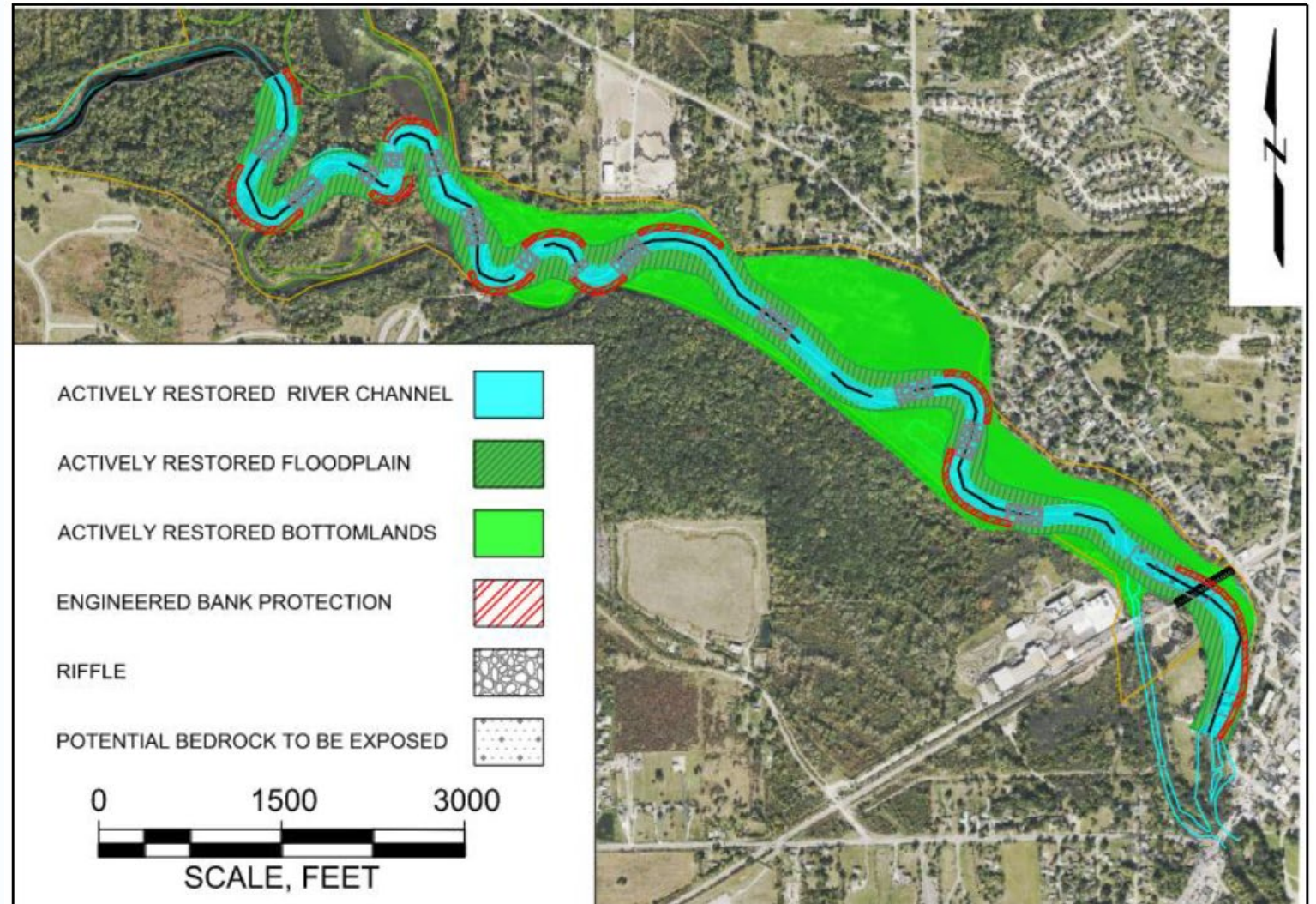
- Improves fish passage potential
- Increased ability for paddlers to travel along the Huron River without portaging
- Current impoundment maintained, minimal impact to adjacent property owners
- Lowers legacy costs of the dam and long-term risk associated with the dam



OVERVIEW OF ALTERNATES

Alternative 3: Full removal with active restoration

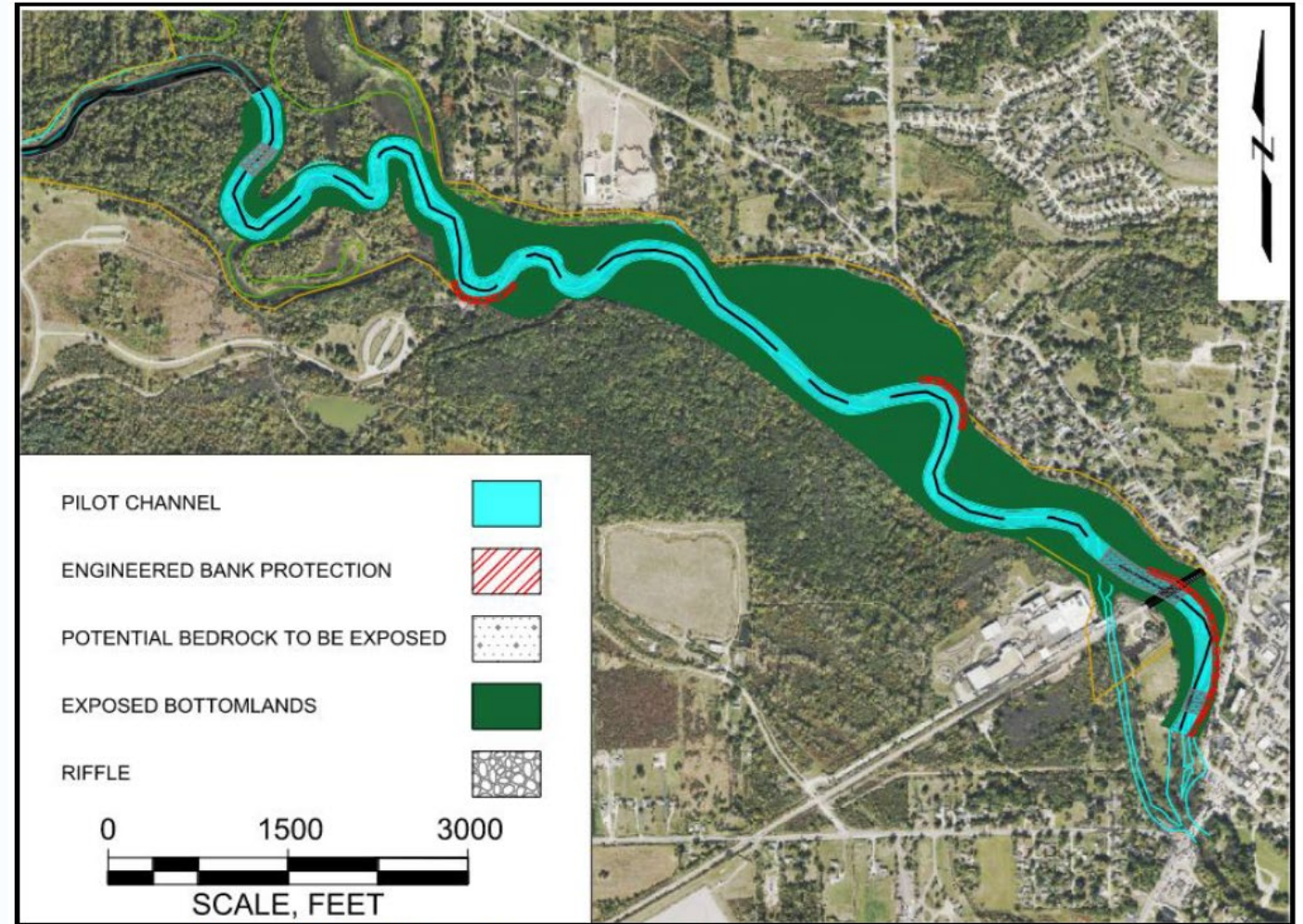
- Improved condition of river ecosystem – best option for fish
- Greater potential for outside funding
- Removes all future expenses and liabilities with the dam
- Most expensive option



OVERVIEW OF ALTERNATES

Alternative 4: Full removal with passive restoration

- Improved condition of river ecosystem – best option for fish
- Greater potential for outside funding
- Removes all future expenses and liabilities with the dam
- Less expensive than active restoration, but still at least twice as expensive as partial removal



OVERVIEW OF ALTERNATIVES 1, 3 & 4

Consideration	Alt 1: No action, fish passage improvement	Alt 3: Full dam removal with active restoration	Alt 4: Full dam removal with passive restoration
Hydrologic	No change in water levels	Decrease in water levels: 5-6.4 feet immediately upstream of Flat Rock Dam tapering to existing water surface elevation 14,200 feet upstream, 1.3-1.4 feet decrease in water levels between Flat Rock and Huroc Dams.	
Wetlands & Threatened and Endangered Species	Wetlands unaffected; mussel survey and relocation may be required within the footprint of the proposed fishway.	Existing fringe wetlands may dry with lowered impoundment, but exposed bottomlands expected to form some wetlands where excavated sediment are not placed. Potential net gain of 70 acres of wetlands.	
Fish Passage	Effective for Lake Sturgeon, Walleye, and White Bass.	Opens 19 river miles for fish habitat and migration	

OVERVIEW OF ALTERNATIVES 1, 3 & 4

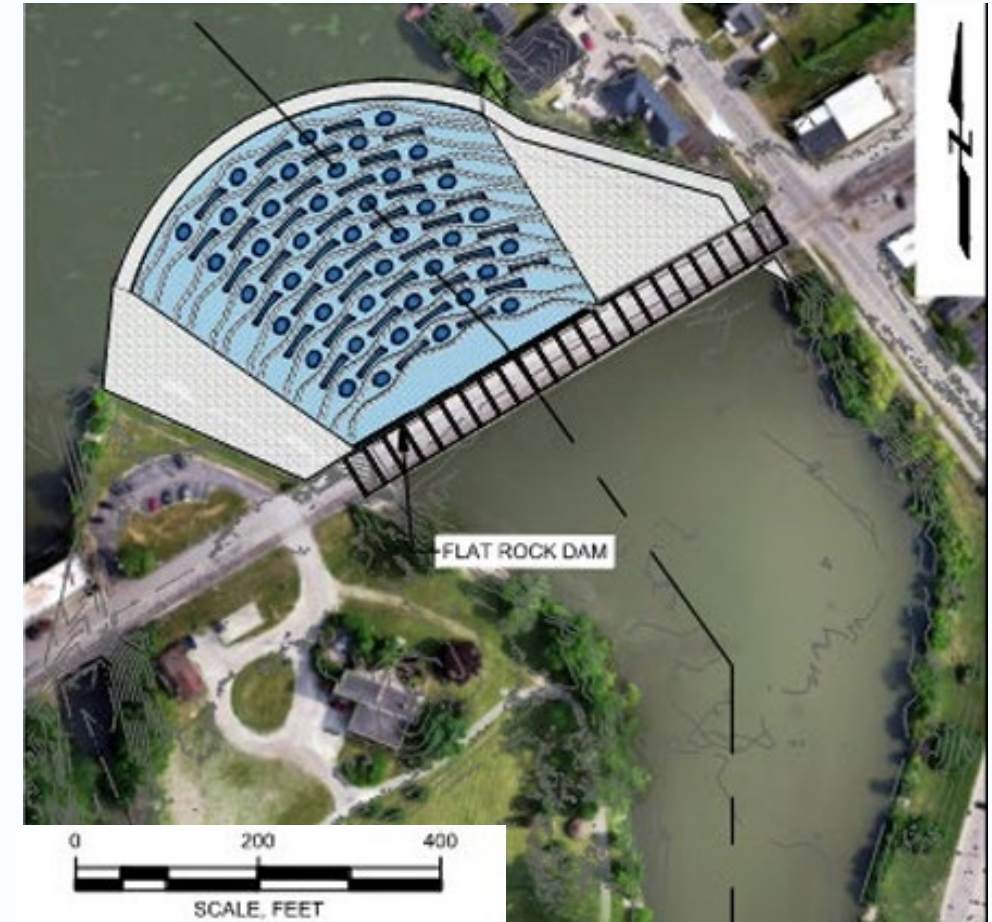
Consideration	Alt 1: No action, fish passage improvement	Alt 3: Full dam removal with active restoration	Alt 4: Full dam removal with passive restoration
Aquatic organism habitat	No improvement	Full removal provides largest habitat improvement by restoring a natural river system; active restoration mitigates temporary negative impacts and typically shows better short-term recovery.	Passive restoration may lead to temporary negative habitat impacts until equilibrium is re-established
Dam Safety	Flat Rock Dam remains a high-hazard dam.	Dams are removed, removing all long-term safety hazards and risk.	
Public Recreation	Recreational access unchanged with paddlers required to use gated portage route	Barrier removed and no portages required with the project area returned to a functioning riverine system	

OVERVIEW OF ALTERNATIVES 1, 3 & 4

Consideration	Alt 1: No action, fish passage improvement	Alt 3: Full dam removal with active restoration	Alt 4: Full dam removal with passive restoration
Regulation Change Consideration	Potential dam regulation changes may add \$3.5 million to maintenance costs over 50 years.	Flat Rock Dam removed and no longer regulated by EGLE. No long-term maintenance costs anticipated.	
Initial Construction Cost	Flat Rock Dam – \$2.6 Million	Flat Rock Dam – \$37.09 Million.	Flat Rock Dam – \$29.57 Million

OVERVIEW OF RECOMMENDATION OF ALTERNATIVE #2: PARTIAL DAM REMOVAL

- Partial dam removal of the Flat Rock Dam includes building rock arch rapids to maintain a similar reservoir level and tailwater conditions
- These are human-made structures that look and function like natural rapids, made by placing large boulders in a series. The water flows over and around the rocks, creating gentle steps or mini-waterfalls that fish can swim through, instead of being completely blocked by a dam.
- Benefits: continues current recreational (i.e. flatwater) activities, maintains current impoundment levels to adjacent properties, holistically improves fish passage for native fish species, reduces the risks associated with the Flat Rock Dam, and removes the hazardous portage for paddlers.
- Drawbacks: this option perpetuates ongoing sediment buildup, contributes to potential water quality issues within the impoundment, continues to disrupt the river ecosystem, and requires ongoing maintenance costs.
- This style of dam modification has been implemented across the Midwest



ALT #2: ENVIRONMENT & ECOSYSTEM CONSIDERATIONS

- Overall, good for the environment.
- Wetlands, shore areas and habitats will not be affected.
- Sediment movement and slow-flowing area that support fish, birds, and reptiles will mostly stay the same.
- After construction, the river bottom in that area will go from sandy to rocky.
 - This change might cause some short-term disruption but will improve habitat for fish and help them move upstream more easily over time.



ALT #2: WETLANDS & THREATENED AND ENDANGERED SPECIES

- Before starting, a mussel survey must be done in areas that will be disturbed (like spots where the riverbed is dug up or reinforced).
- Mussel surveys can be done up to five years in advance, but relocation needs to happen within two years of the project. If any federally protected mussels (like the Snuffbox) are found, the U.S. Fish and Wildlife Service (USFWS) must be consulted.



ALT #2: FISH HABITAT

- Various surveys performed by the MDNR have documented that the Huron River around Flat Rock supports 38 species of fish, only 8 of these species are present in the impoundment upstream of the Flat Rock Dam.
- The rock arch rapids that alternative #2 will provide, allows for upstream access to observed fish. Improved fish passage will also result in a greater diversity and abundance of mussels, as they require fish as hosts for reproduction.



ALT #2: NATURE-LIKE FISHWAY

- Gaps in between the rocks will allow fish to burst swim through them and enter pools ranging from 2 to 6 feet deep providing resting locations for fish prior to approaching the next upstream rock.
- Construction materials for the proposed rapids should have a substrate that is advantageous for spawning of multiple species such as Lake Sturgeon.

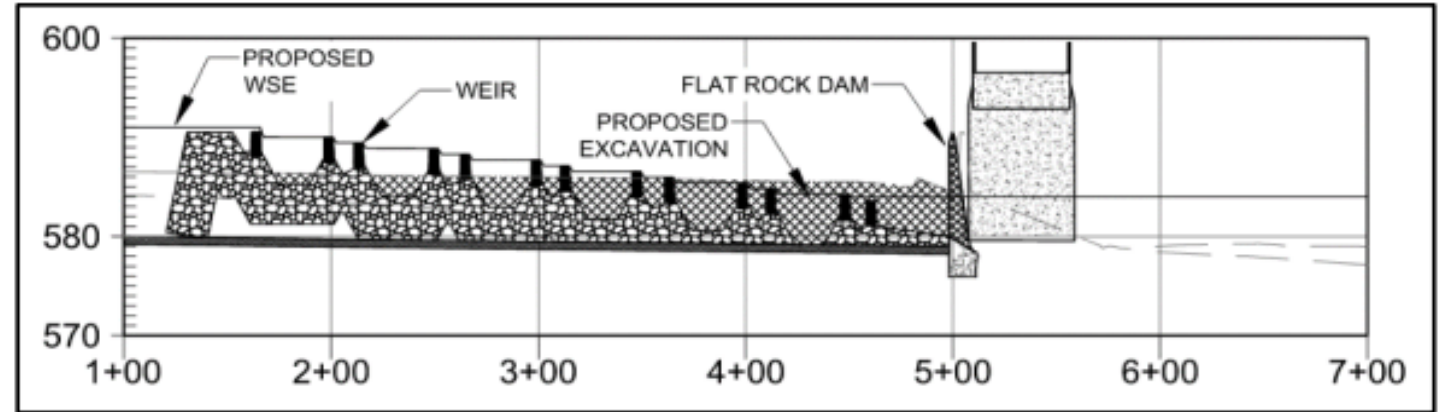


Figure 12: Partial Dam Removal - Profile View of Flat Rock

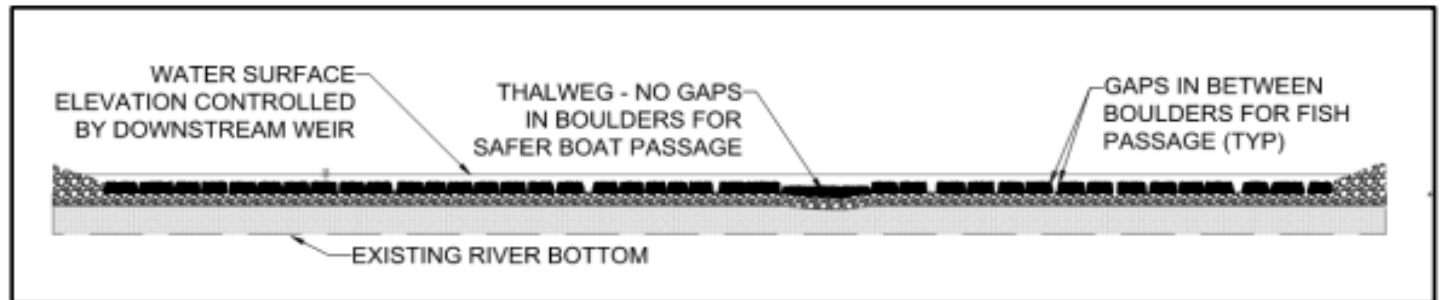


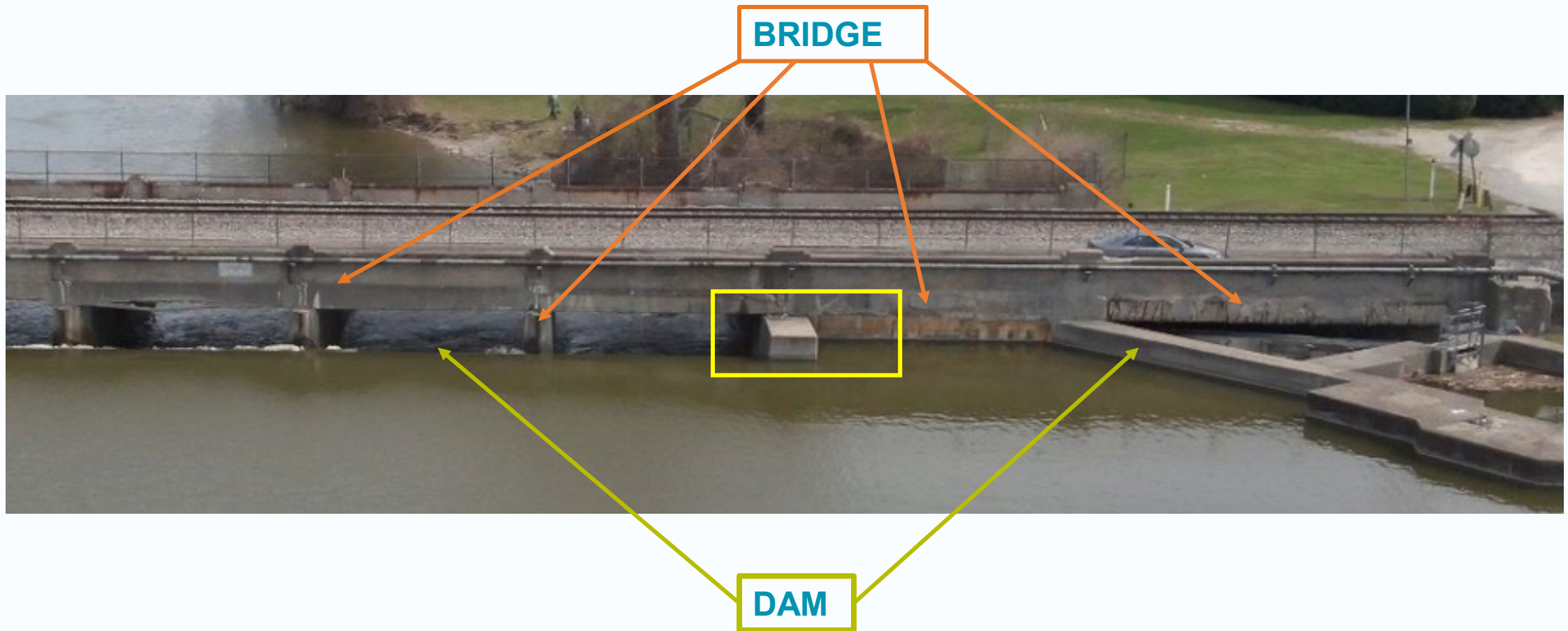
Figure 13: Partial Dam Removal - Cross Section of Rock Arch Rapids Weir

ALT #2: SEA LAMPREY BARRIER

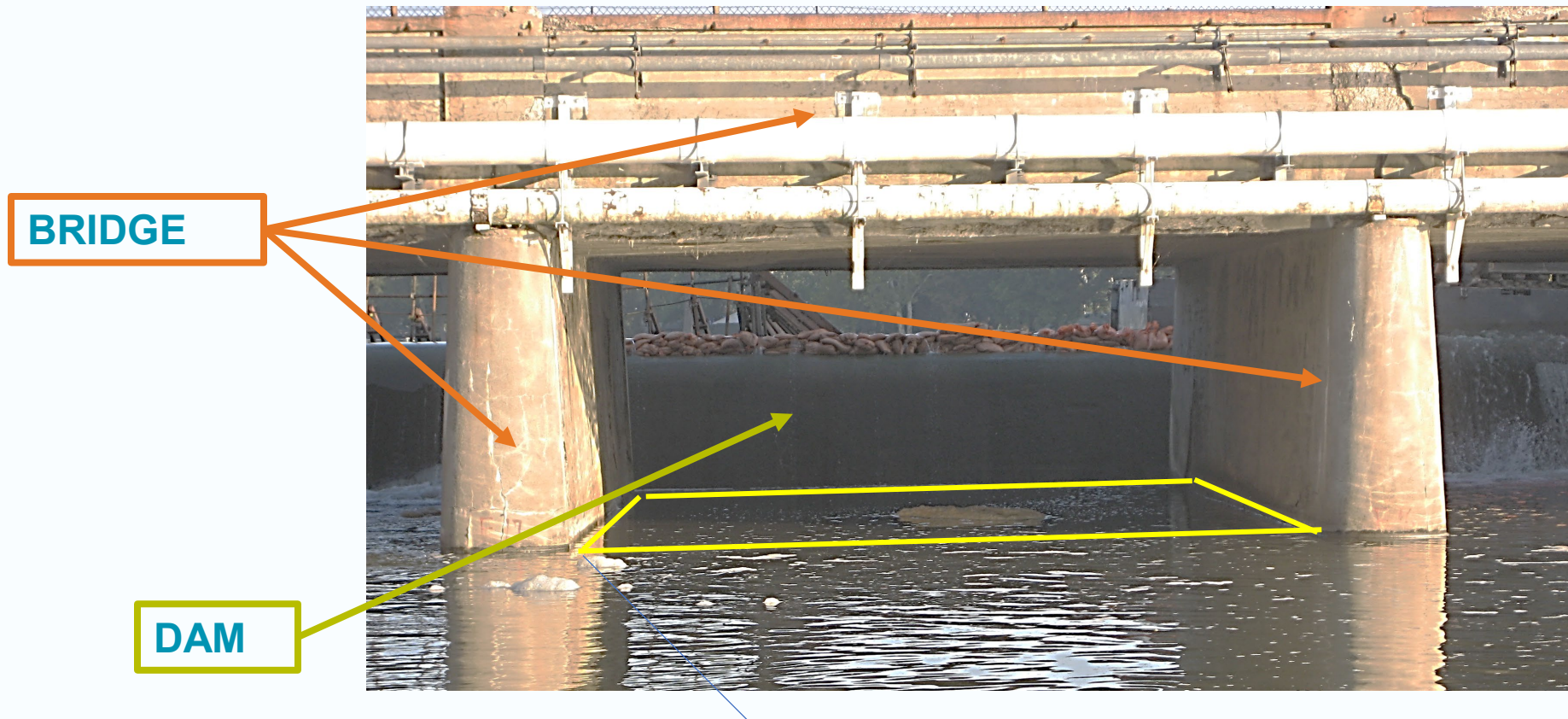
- The U.S. Fish and Wildlife Service (USFWS) has determined Sea Lamprey production potential in the Huron River to be low.
- The USFWS would continue Sea Lamprey monitoring efforts and determine the need for a sea lamprey barrier in the case that an infestation were detected.



DAM AND BRIDGE SECTIONS



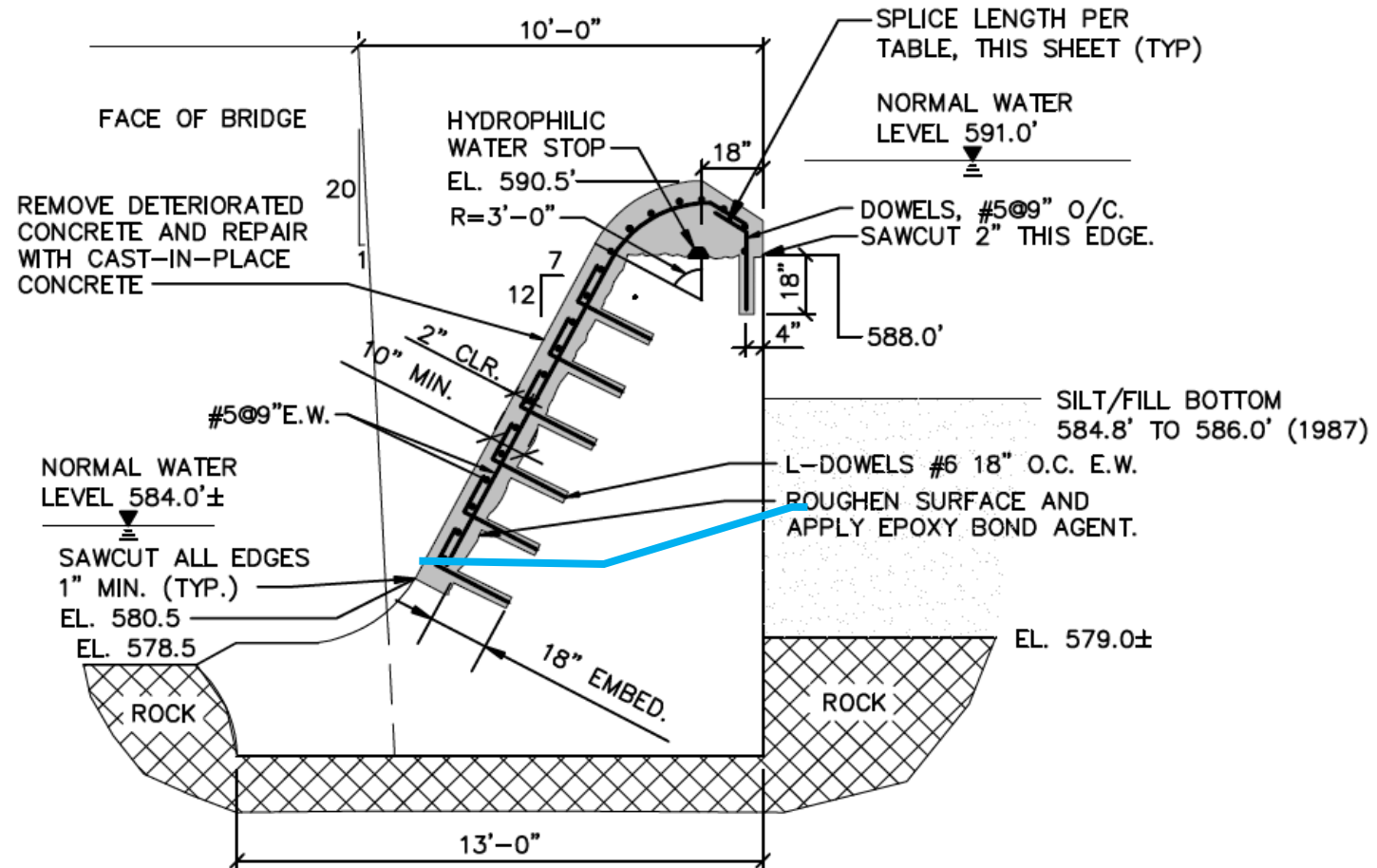
DAM AND BRIDGE SECTIONS



DAM CONCRETE REPAIRS 2008

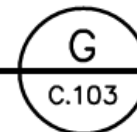


DAM SPILLWAY SECTION REPAIRS 2008

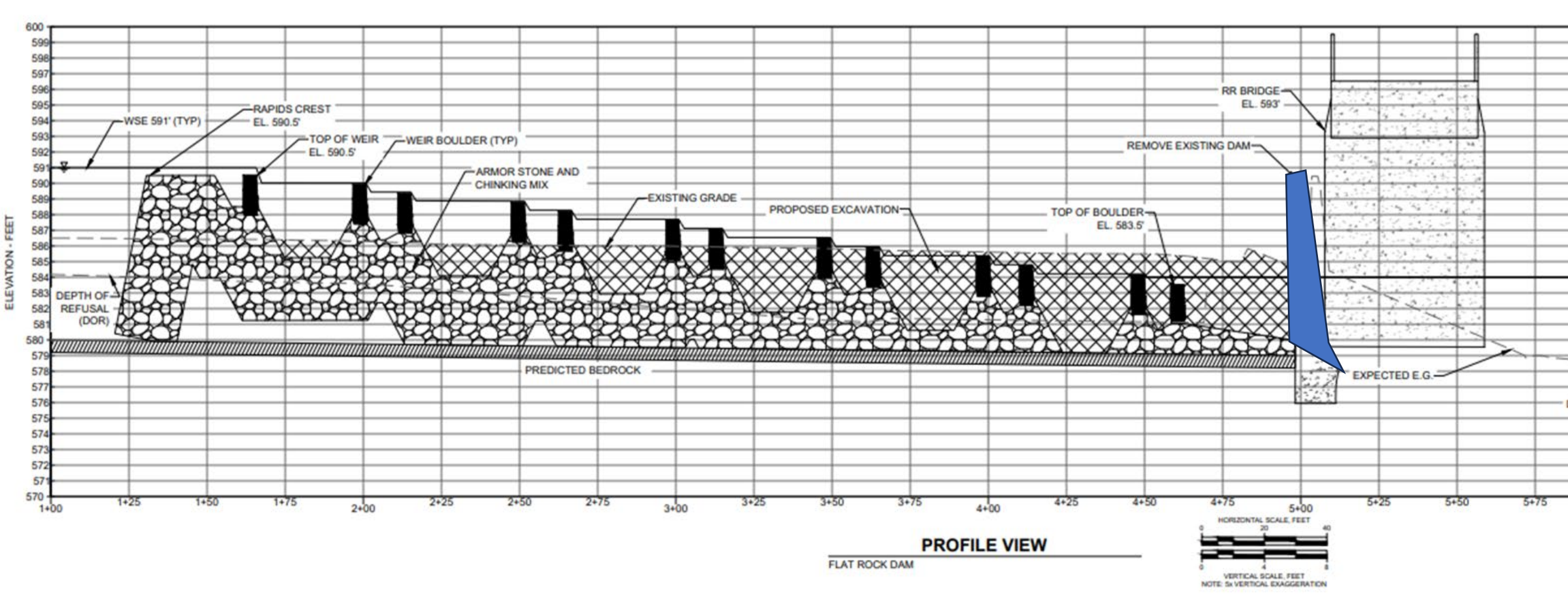


REPAIR TO SPILLWAY CREST
AND OGEE SECTION

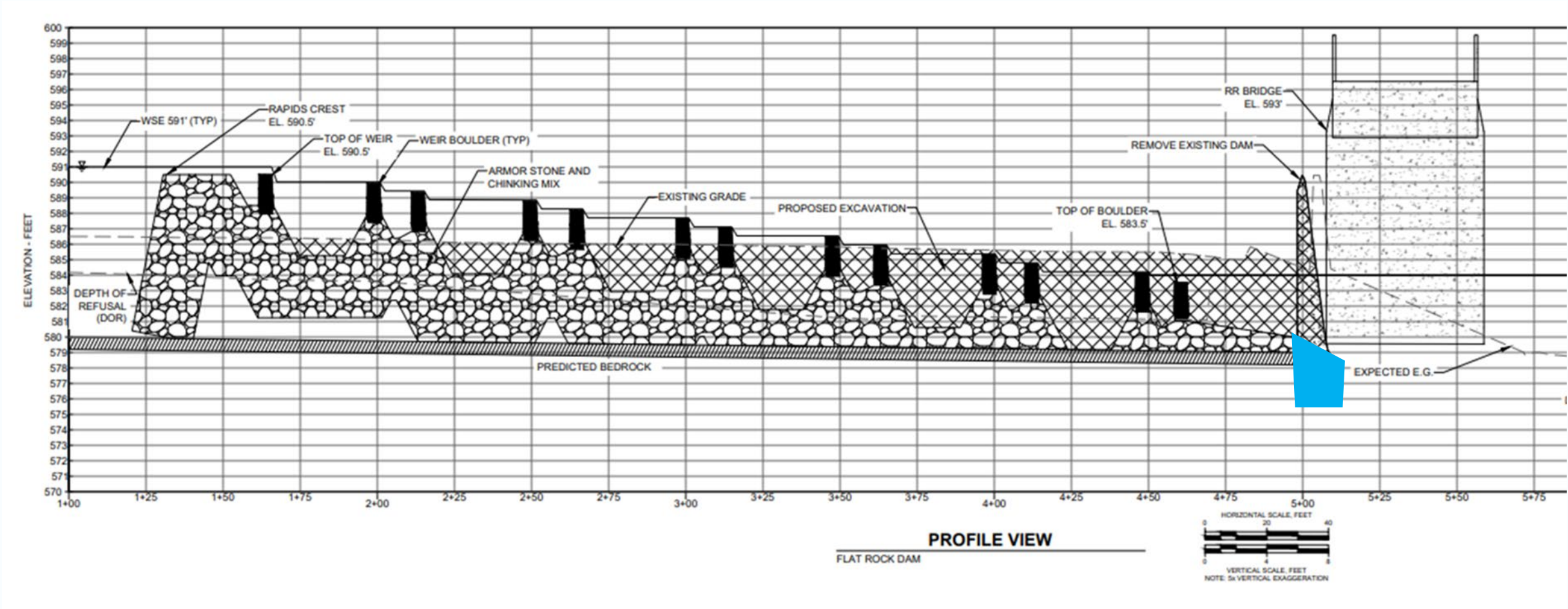
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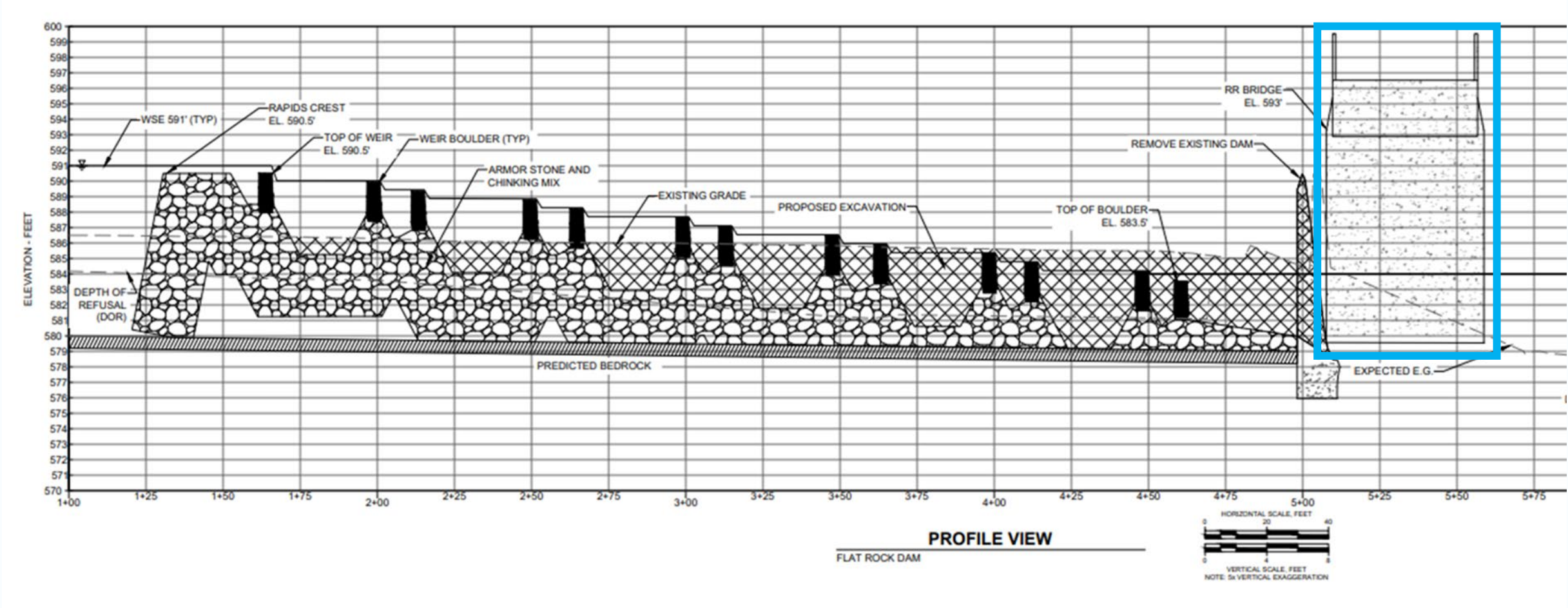
PARTIAL REMOVAL



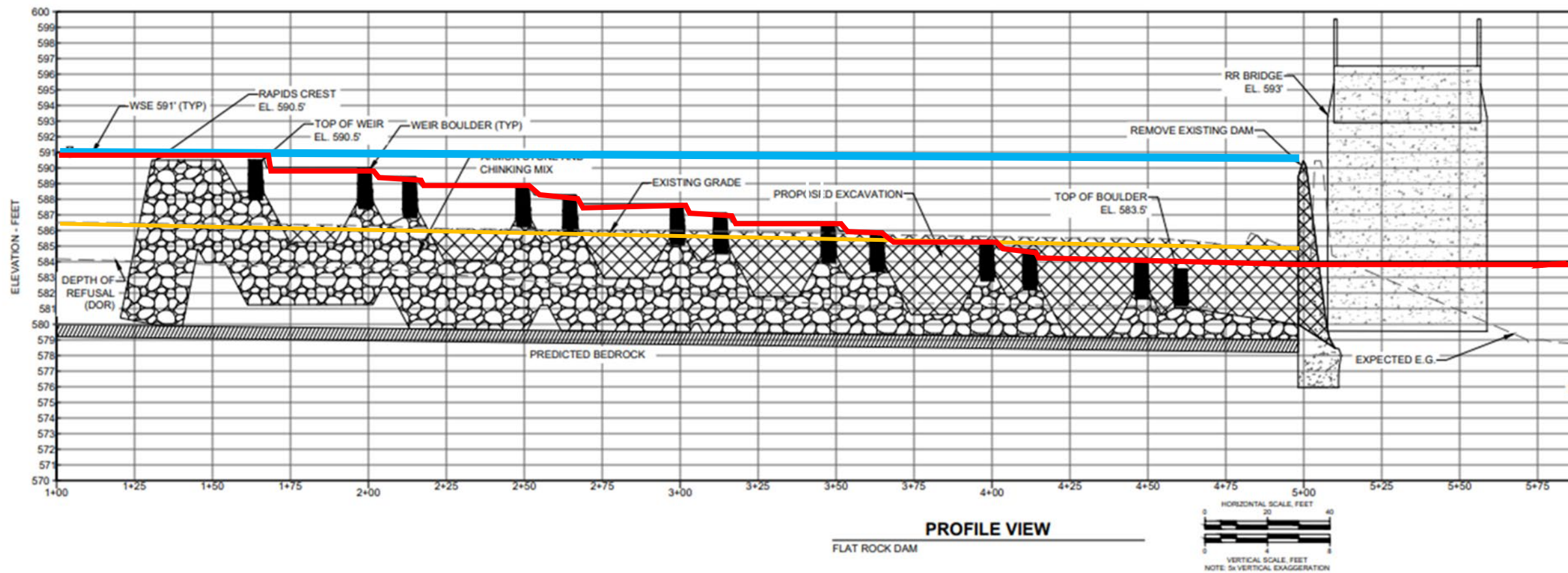
PARTIAL REMOVAL



PARTIAL REMOVAL



PARTIAL REMOVAL



PHASE II ENVIRONMENTAL SITE ASSESSMENT

- The final Phase II ESA conducted by Pinchin, hired by the City of Flat Rock (2026), resulted in very similar results as the preliminary sediment testing as part of the feasibility study (Sept 2023)
- The site investigation included:
 - 3 upland soil borings to 10 ft below ground surface (bgs)
 - 1 temporary monitoring well
 - 3 soil samples
 - 1 groundwater sample for laboratory analysis of VOCs, PNAs, PCBs, and the Michigan 10 metals.
 - Completed additional subsurface investigation to assess river sediment upstream of the Flat Rock Dam consisting of 22 sediment cores up to 9 ft bgs.

PHASE II ENVIRONMENTAL SITE ASSESSMENT

- Soil Analytical Results: No concentrations of VOCs, PNAs, and/or PCBs were detected in any of the soil samples analyzed exceeding the laboratory minimum detection limits (MDL)
- Groundwater Analytical Results: No concentrations of VOCs, PNAs, PCBs, and/or MI-10 metals were detected exceeding the laboratory MDLs
- Sediment Analytical Results: No concentrations of metals, VOCs, or PCBs were detected in any of the sediment samples analyzed exceeding MDLs and/or the USEPA PEC.

However, if Alternative #3 or #4 were selected, there is potential risks to conceptual receptors if the current river sediment were to become permanent unsaturated land.

Concentrations of arsenic, mercury, and zinc were detected in a river sediment sample exceeding EGLE Part 201 GCC – so if the sediments were exposed at a later date (i.e. became dry land) additional testing and characterization would be needed.

COMMUNITY CONSIDERATIONS

- Maintains current level of impoundment
- Improves safety by mitigating structural risks
- Exhibits fiduciary responsibility for local community and Southeast Michigan

ALT #2: COST ANALYSIS

Consideration	Alternative 1 – No Action: Fish Passage Improvements	Alternative 2 – Partial Dam Removal of the Flat Rock and Huroc Dams	Alternative 3 – Full Dam Removal of the Flat Rock and Huroc Dams with Active Restoration	Alternative 4 – Full Dam Removal of the Flat Rock and Huroc Dams with Passive Restoration
		rock arch rapids or utilize safer, easier to access portage route adjacent to river.		
Regulation Change Considerations	Potential dam regulation changes may add \$3.5 million to maintenance costs over 50 years.	Potential dam regulation changes may add \$600,000 to maintenance costs over 50 years.	Flat Rock Dam removed and no longer regulated by EGLE. No long- term maintenance costs anticipated.	
Initial Cost to Construct Estimate	Flat Rock Dam – \$2.6 Million Huroc Dam – \$750,000 Total – \$3.35 Million	Flat Rock Dam – \$11.35 Million Huroc Dam – \$1.23 Million Total – \$12.57 Million	Flat Rock Dam – \$37.09 Million Huroc Dam – \$2.84 Million Total – \$39.93 Million	Flat Rock Dam – \$29.57 Million Huroc Dam – \$1.73 Million Total – \$31.30 Million
Additional 50-year Life Cycle Cost Estimate (2024 Dollars and Future Dollars based on annual 4% interest rate)	<i>2024 Dollars:</i> \$2.5 Million (No Legislation Change) / \$6 Million (Legislation Change) <i>Future Dollars:</i> \$13.85 Million (No Legislation Change) / \$21.86 Million (Legislation Change)	<i>2024 Dollars:</i> \$2.5 Million (No Legislation Change) / \$3.1 Million (Legislation Change) <i>Future Dollars:</i> \$13.84 Million (No Legislation Change) / \$15.77 Million (Legislation Change)	<i>2024 Dollars:</i> \$1.37 Million <i>Future Dollars:</i> \$3.40 Million	<i>2024 Dollars: \$1.62 Million</i> <i>Future Dollars: \$3.70 Million</i>

ALT #2: PERMITTING PROCESS

- Alternative #2, partial dam removal will require an EGLE Joint Permit. This joint permit application process is a coordinated approach to streamline the agencies and number of permits as part of a process. The U.S. Army Corps and EGLE are the primary permitting agencies, but also typically consult with the Michigan DNR and the U.S. Fish and Wildlife Service. It includes:
 - Part 315 Dam Safety: for constructing, repairing, or removing dams to make sure they meet safety requirements
 - Part 31 Water Resources Protection (Floodplains): For activities related to water use and discharge, protecting floodplain functions, and minimizing flooding impacts

ALT #2: PERMITTING PROCESS

- Part 301: Inland Lakes and Streams: For activities like dredging, filling or constructing structures in or near inland lakes and streams
- Part 303: Wetlands Protection: For activities that may alter or impact wetlands
- Part 91: Soil Erosion and Sedimentation Control: For earth changes that disturb one or more acres of land or are within 500 feet of a lake or stream.

As part of the permitting process, there will be additional opportunities for community input. As owners of the dam, the Metroparks would be the permit applicant and holder.

NEXT STEPS

- The Metroparks can formally accept the funding for the future design work already secured through the NOAA grant award and issue a change order to GEI's contract

For Alternative #2:

- It is expected that design could take up to two years
- Review of the design with permitting agencies would be expected to take at least six to nine months after design is complete
- Concurrently, funds would have to be raised by securing grants, and budgeting for matching funds appropriately
- At that time, once permits are secured, the project could be put out for competitive bidding for potential construction contractors (2-3 month process).

For Alternatives #3 and #4: Construction would take 2x as long

THANK YOU.

