

A Partnership Approach to Restoring the Maidford River

SNEP Symposium
May 18, 2022

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Fuss & O'Neill

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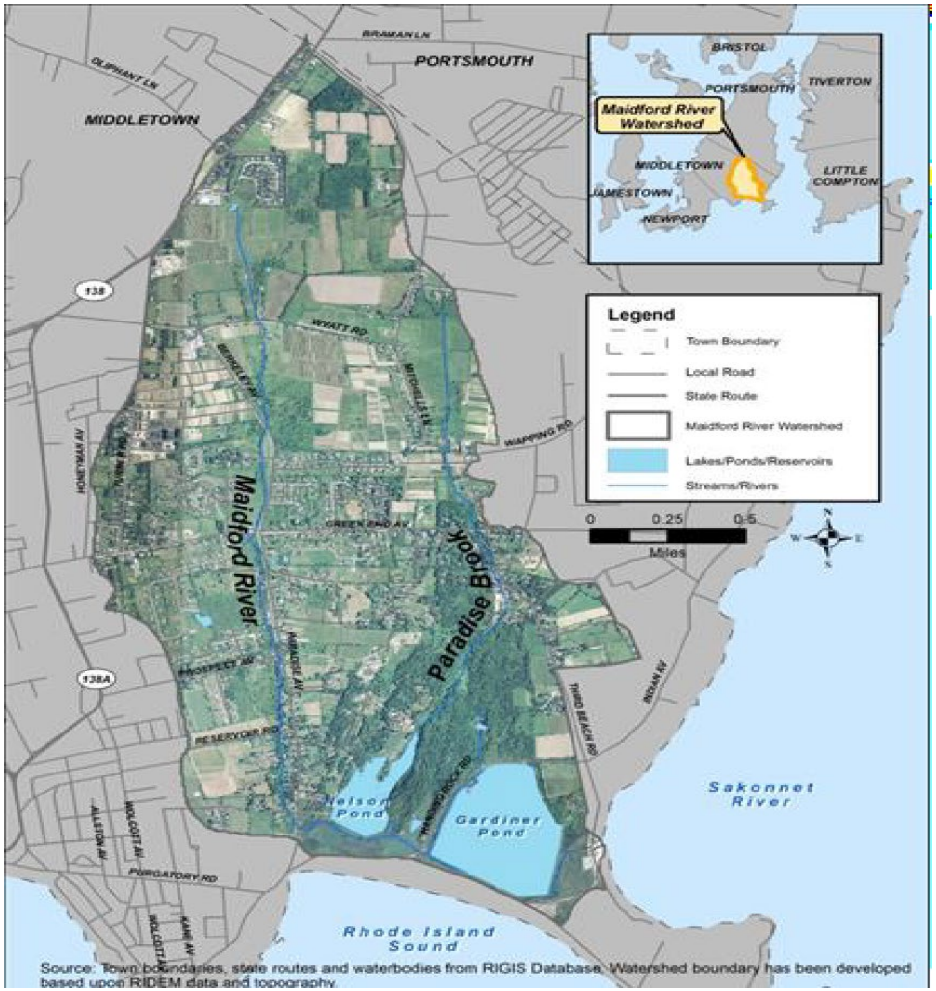
MAIDFORD RIVER RESTORATION PROJECT

With support from the Southeast New England Program Network, the Town of Middletown and its partners are advancing plans to restore the Maidford River to reduce flooding and improve water quality and habitat.



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PROJECT PARTNERS

The Southeast New England Program Network is providing support for this project with funding made possible by a grant from US EPA to New England Environmental Finance Center.

MIDDLETOWN
Rhode Island

Aquidneck Land Trust

SAVE THE BAY
NARRAGANSETT BAY
est. 1970

ELIZABETH SCOTT CONSULTING

New England Environmental Finance Center

FUSS & O'NEILL

Eastern Rhode Island Conservation District

WATERSHED ALTERATIONS HAVE BEEN DECADES IN THE MAKING



1972



Spring 2020

Source: RIDEM

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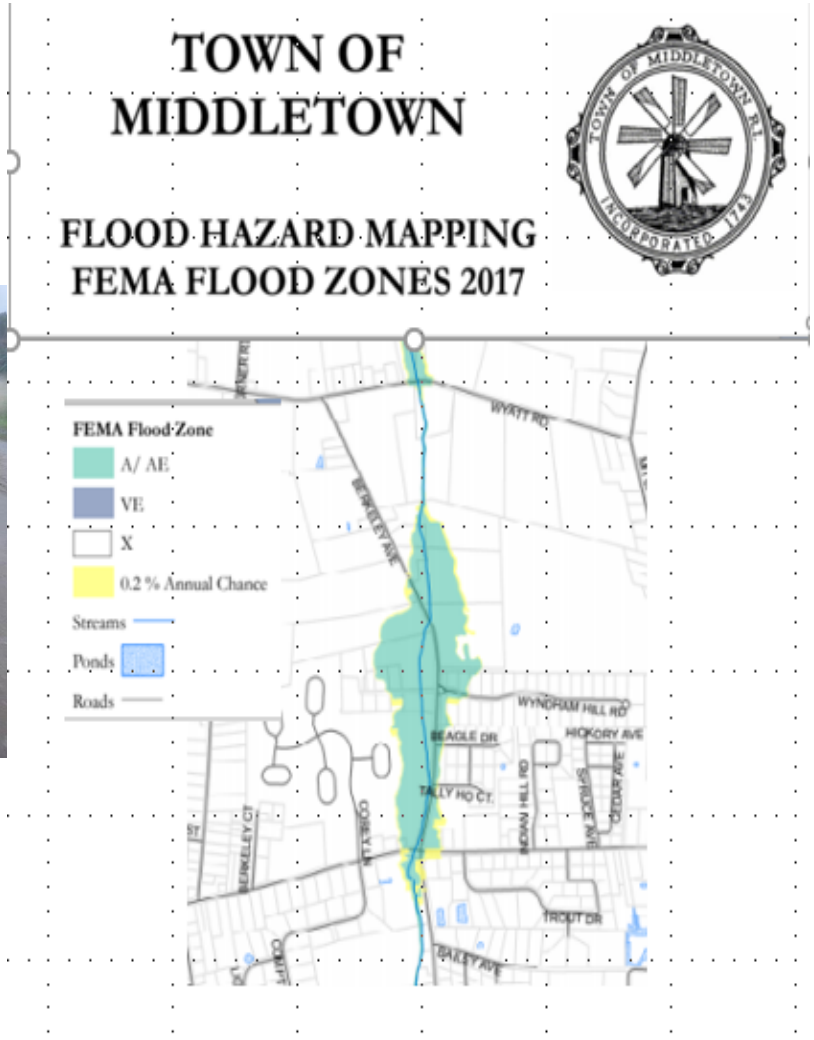
MAIDFORD RIVER FLOODING









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WATER QUALITY ISSUES

Maidford River is impaired by bacteria, nutrients, and suspended solids. It contributes to:

- Degraded water quality in Nelson & Gardiner Ponds – two water supply reservoirs which experience cyanobacteria blooms;
- Degraded habitat of Sachuest marsh home to the saltmarsh sparrow, a species of high conservation concern;
- Threatened recreational and shellfishing uses in near coastal waters of Sakonnet River including Third Beach.



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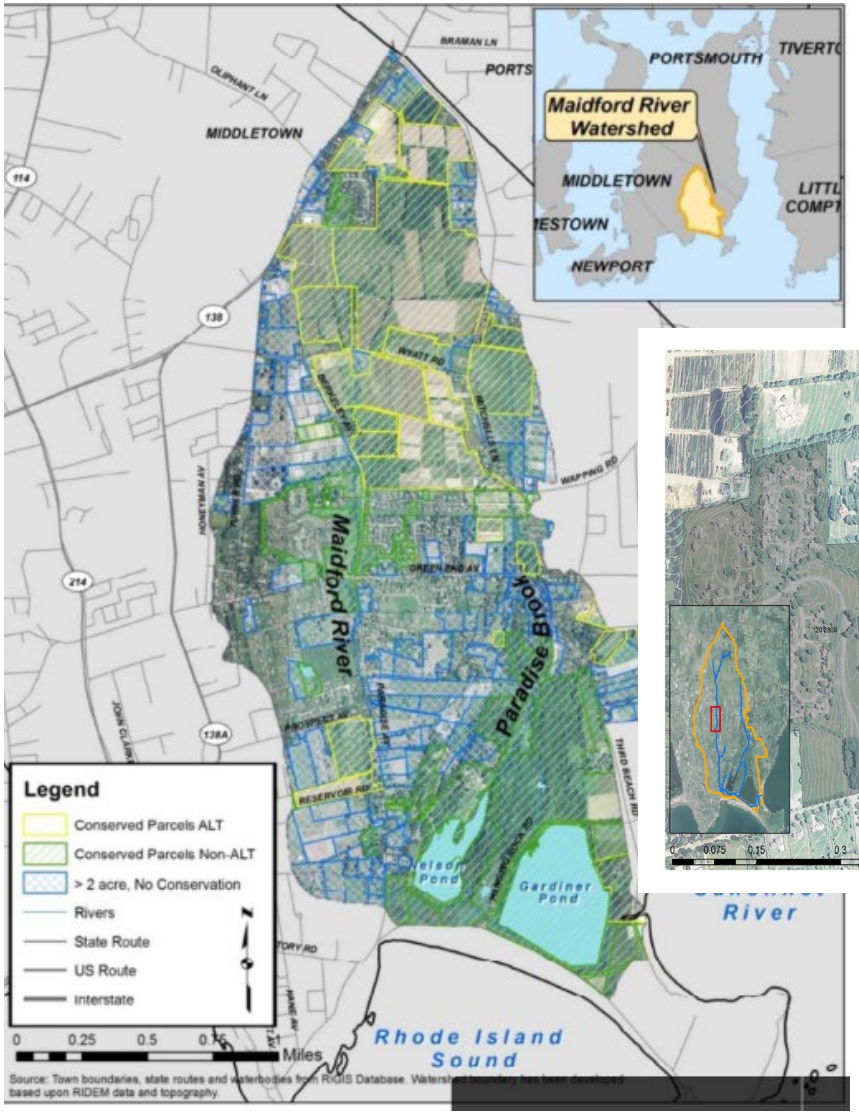
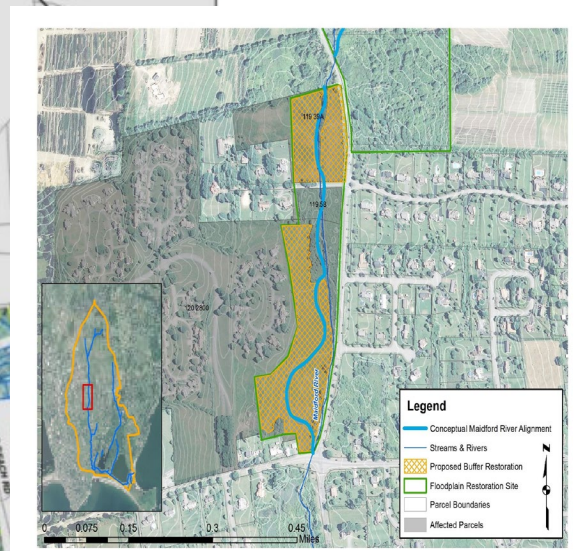
FLOODPLAIN RESTORATION: BEGINNING CONCEPT

Project builds upon ongoing watershed protection and stormwater management efforts by ALT & Middletown

Design Concept proposed in Maidford River Conservation Plan (2017) prepared for ALT by Fuss & O'Neill





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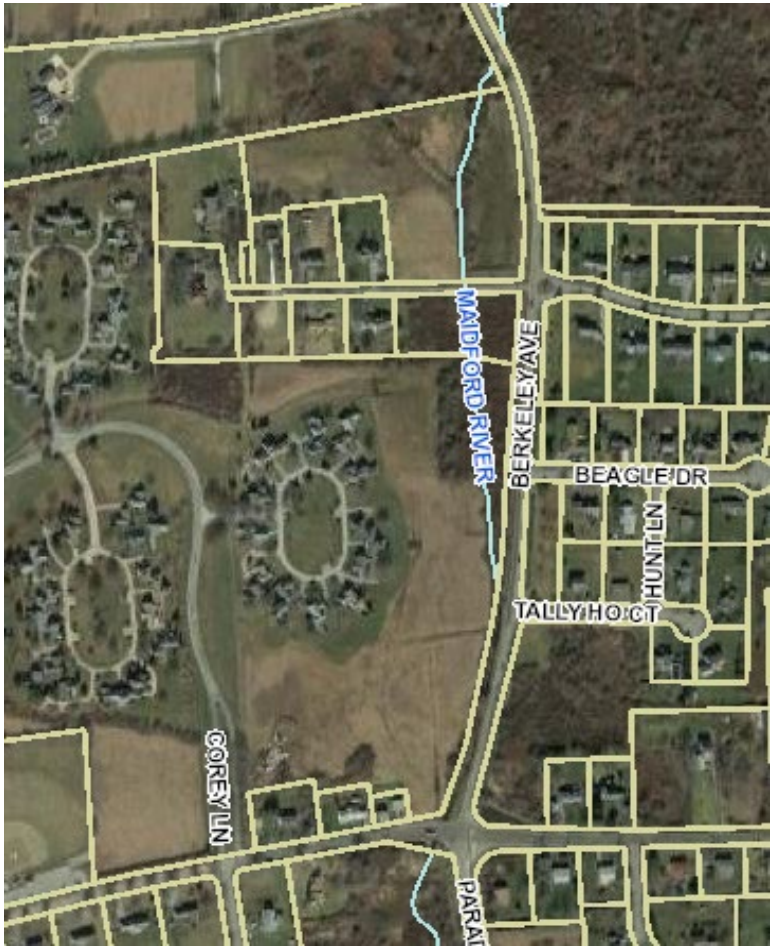
RIVER & FLOODPLAIN RESTORATION PROJECT APPROACH

- Project objectives:
  - Restore natural stream and floodplain processes and habitats,
  - Reduce the frequency and magnitude of local fluvial-induced flooding, and
  - Improve stream water quality
- Project team with support from Fuss & O'Neill has utilized modeling results to evaluate flood mitigation alternatives & to evaluate the benefits of the selected alternative.
- Project partner, Save the Bay has mapped wetlands boundaries to initiate permitting & dialogue with RIDEM
- Inter-Fluve conducted geomorphological reconnaissance survey to develop detailed design plans to meet water quality & habitat improvement goals



River & Floodplain Restoration Project Area

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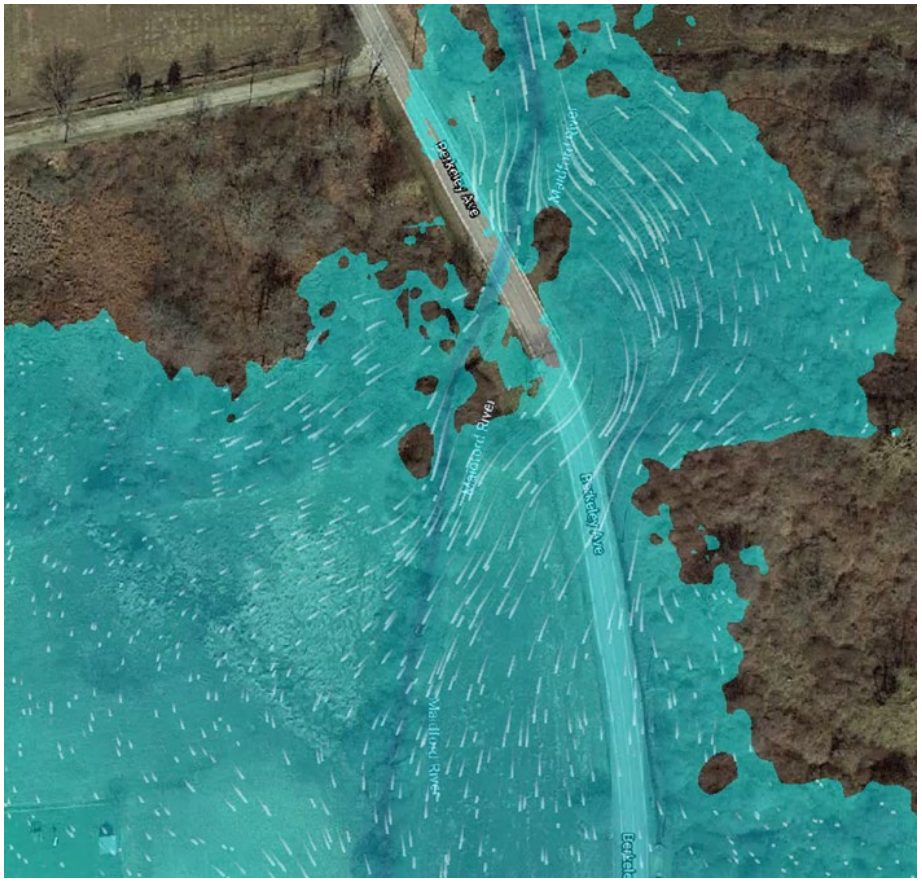
PHASE I: FLOODPLAIN RESTORATION DESIGNS EVALUATED

Using information collected from field assessments, historical topographic maps, and modeling, various floodplain restoration designs were evaluated for their flood mitigation and water quality benefits.



Preliminary HEC-RAS 2-Dimensional Hydraulic Model Output

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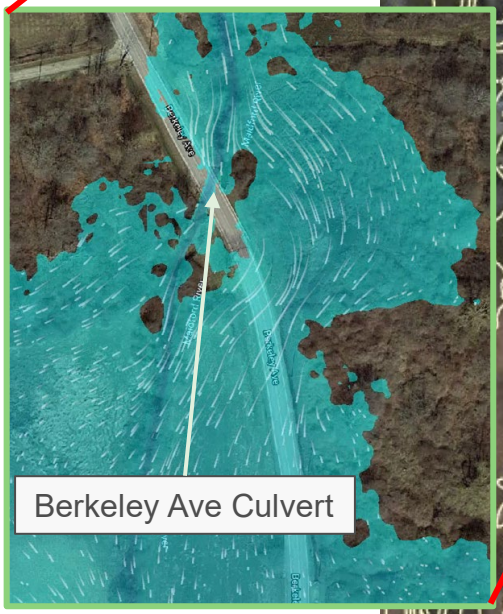
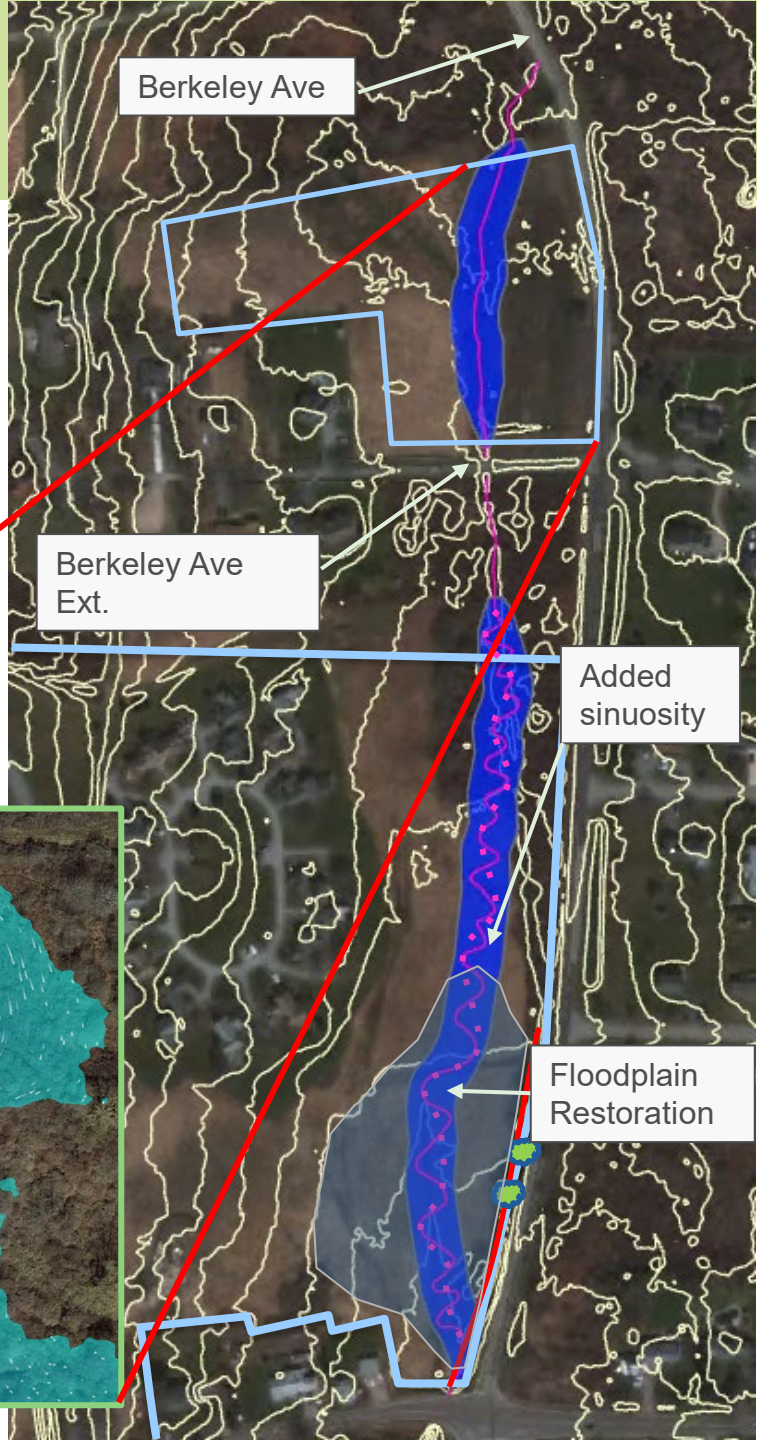
Overview of Phase I outcomes

Phase I outcomes informing Conceptual Design:

- **Flow restriction:** Berkeley Ave is overtopping from limited culvert capacity at Berkeley Ave. and from backwater effects from Berkeley Ave Ext. culvert
- **River/Floodplain Restoration:** Moving river channel and adding sinuosity as part of floodplain restoration (upstream of Green End Ave) has water quality & habitat benefits but limited flood mitigation benefits





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Phase I Conceptual Design



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Phase II: Alternatives Analysis – Modeling/Design Objectives

- Determine feasible solutions to provide flood benefits
- Identify possible flood protections from design storms up to 100-year return storms
- Improve ecological and water quality benefits
- Ensure there is no net increase (vertical or horizontal) in flooding for the 100-year storm that would adversely affect existing development



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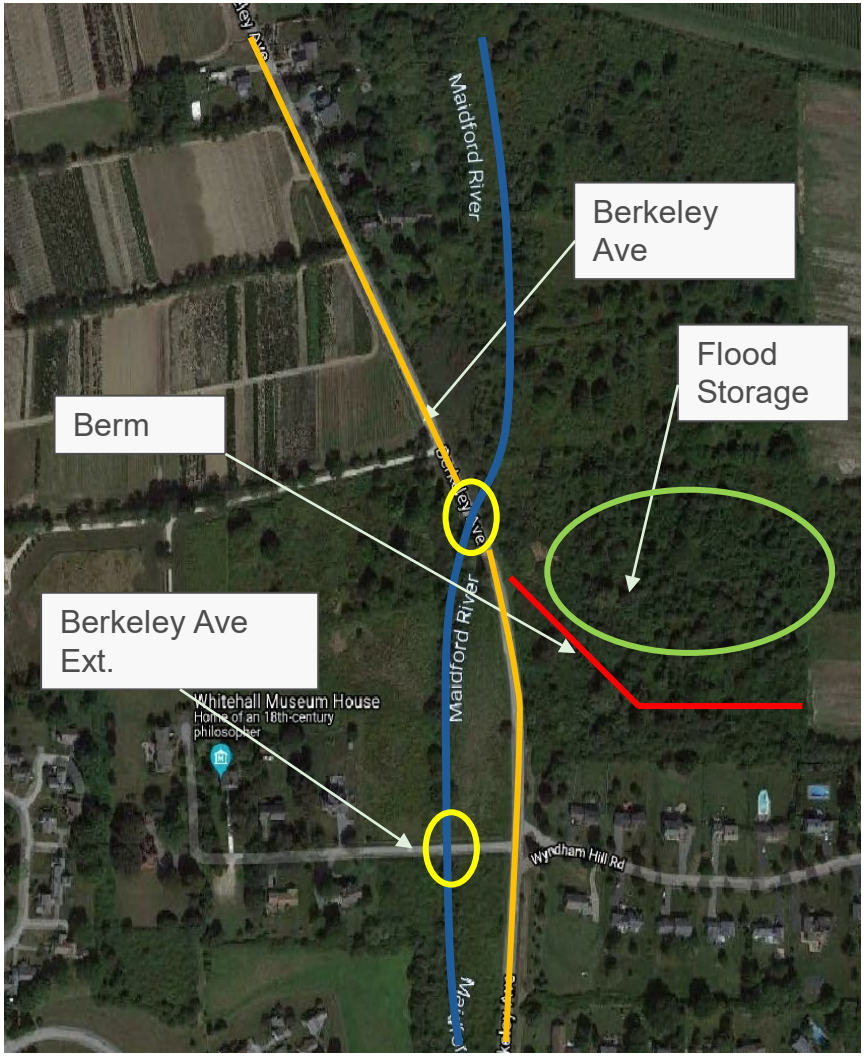
Alternatives Analysis – Key Design Factors

Build, refine, and improve key design factors to maximize flood mitigation benefits

Key design factors:

- Enlarge the culverts at Berkeley Avenue Ext. and/or Berkeley Avenue (yellow)
- Add a berm on Sweet Berry Farm (red)
- Raise Berkeley Avenue (orange)*
- Adding flood storage on Sweet Berry Farm (green)

*Raising Berkeley Ave includes raising all or a part of intersecting roads to tie into new elevations



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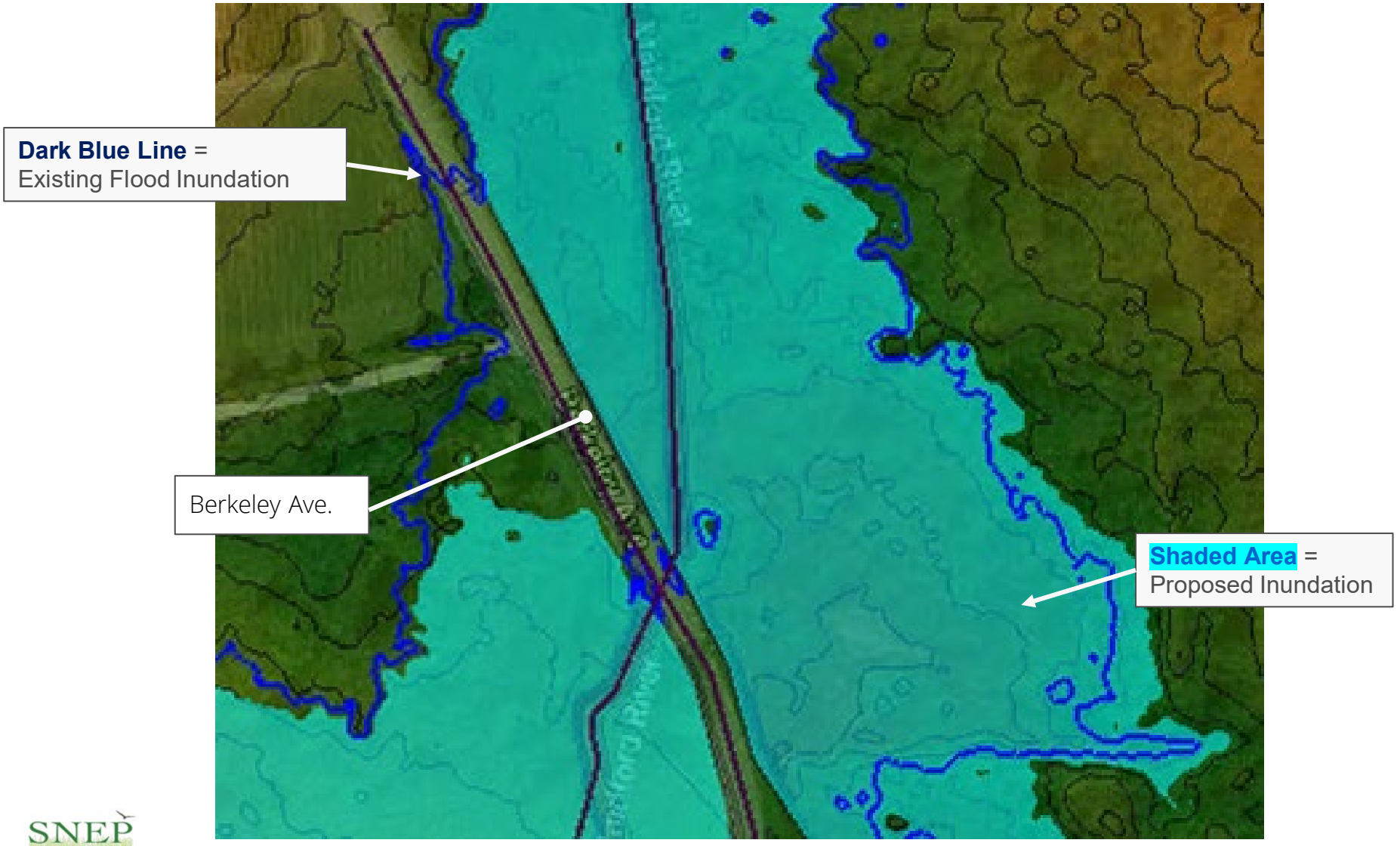
Model Output Key



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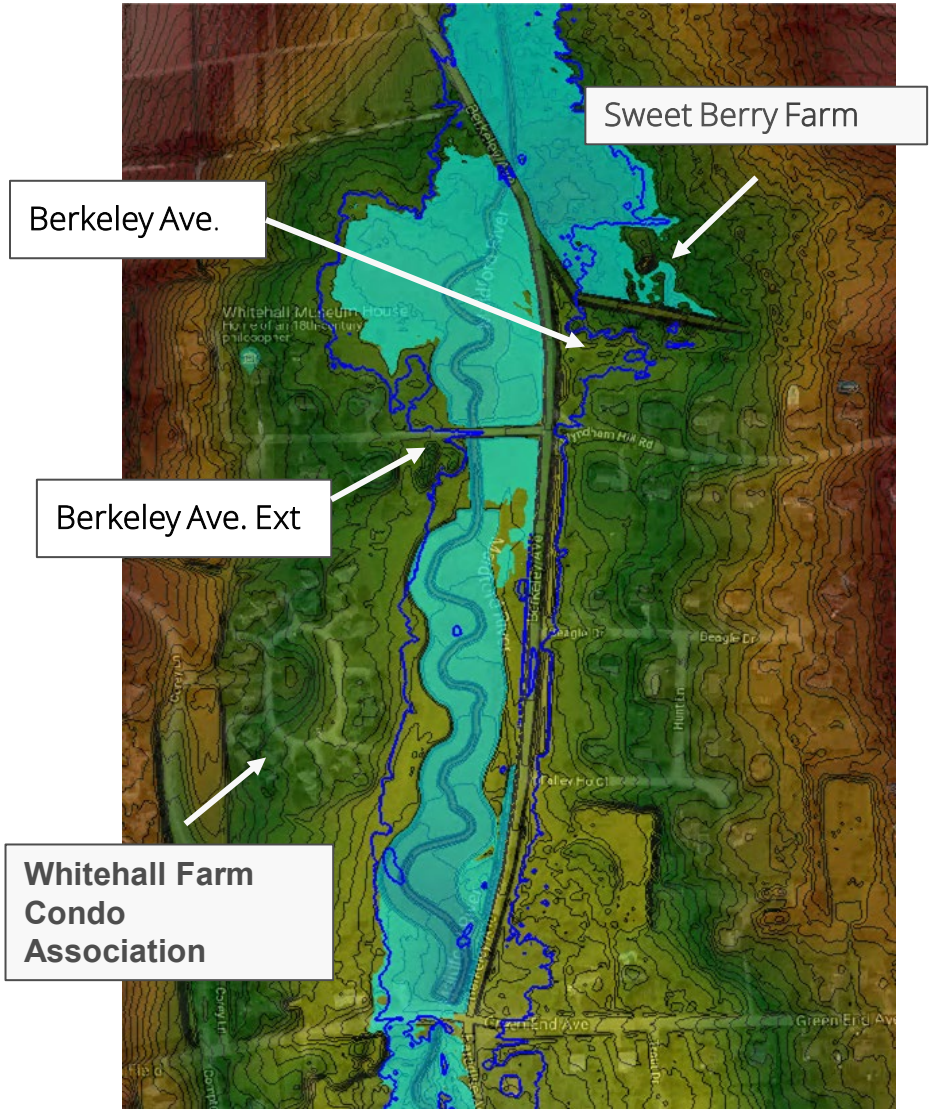
Preferred Alternative: 100-year Storm Event

Design Elements:

- Raise Berkeley Ave road (~2.5 ft)
- Add berm on Sweet Berry Farm property (2-3 ft)
- Increase culvert capacity at Berkeley Ave and Berkeley Ave Ext. (35-ft)
- Modeling includes floodplain restoration modification



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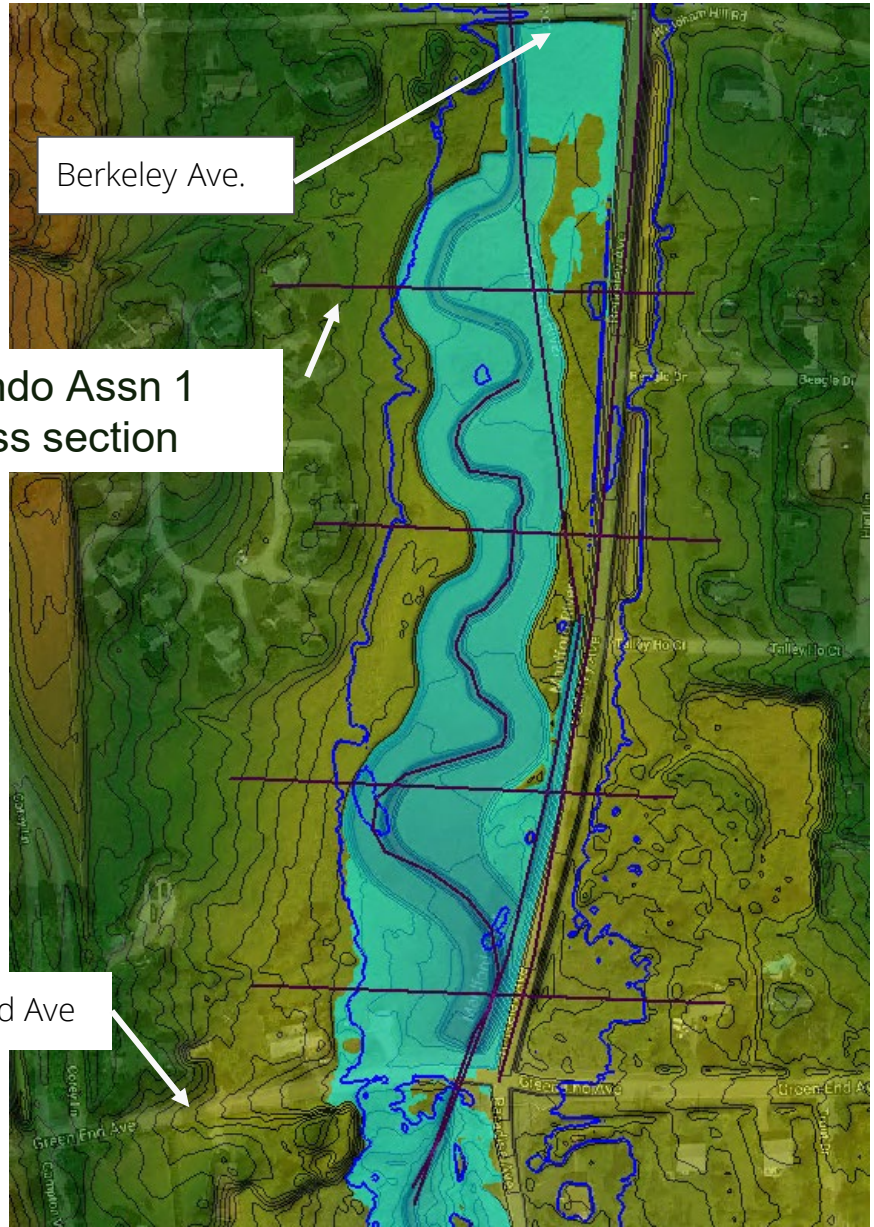
Whitehall Farm Condo Association (100 yr)



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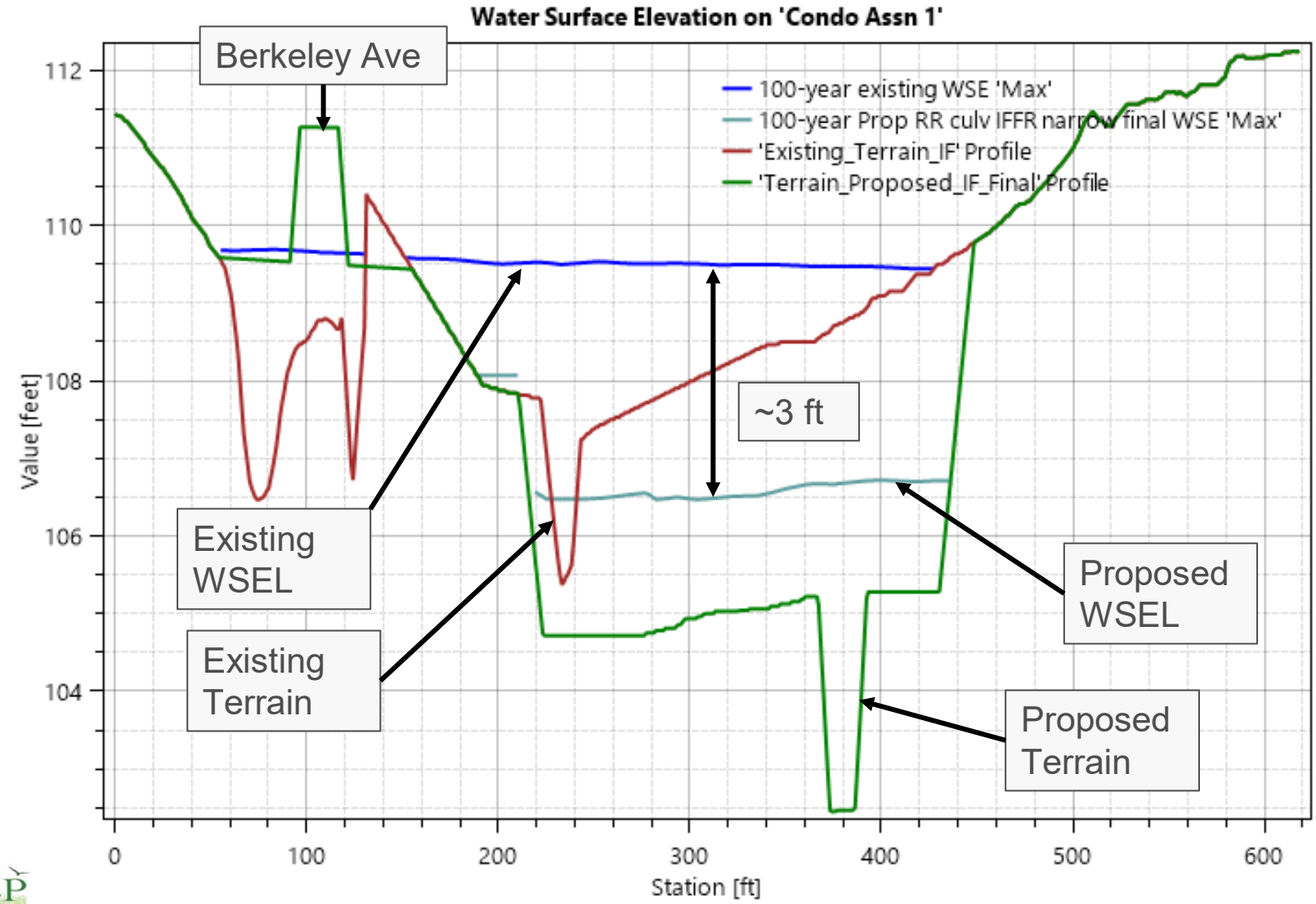
Condo Assn Cross Section 1 – 100-year



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Intermediate Conclusions



- Culvert size needs to be increased at Berkeley Ave to prevent flooding
- If the culvert at Berkeley Ave is increased, the Berkeley Ave Ext. culvert will also need to be increased to prevent additional backwater flooding (more than existing conditions)
- Berm upstream of Berkeley Ave (regardless of design storm) is required
- Storage on Sweet Berry Farm does not provide significant, additional flood mitigation benefits
- Floodway increase upstream of project area must be further evaluated
- Decisions made:
  - 100-year storm event selected as Design Storm
  - Increase culvert dimension to 35 ft width to accommodate existing flood flows
  - Plan design in anticipation of projected changes in precipitation due to climate change

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30% Design Plans for Floodplain Restoration



Fuss & O'Neill and Inter-Fluve:

- Created an existing conditions surface in CAD by combining topographic survey data and LiDAR
- Developed an existing conditions longitudinal profile and determine a proposed conditions longitudinal profile and culvert invert elevations
- Created a proposed conditions surface in CAD that reflects the proposed changes to the channel and floodplain to be vetted in the hydrologic and hydraulic model
- Produced river and floodplain restoration designs to the 30% completion level sufficient to facilitate initial discussions with project partners and permitting agencies

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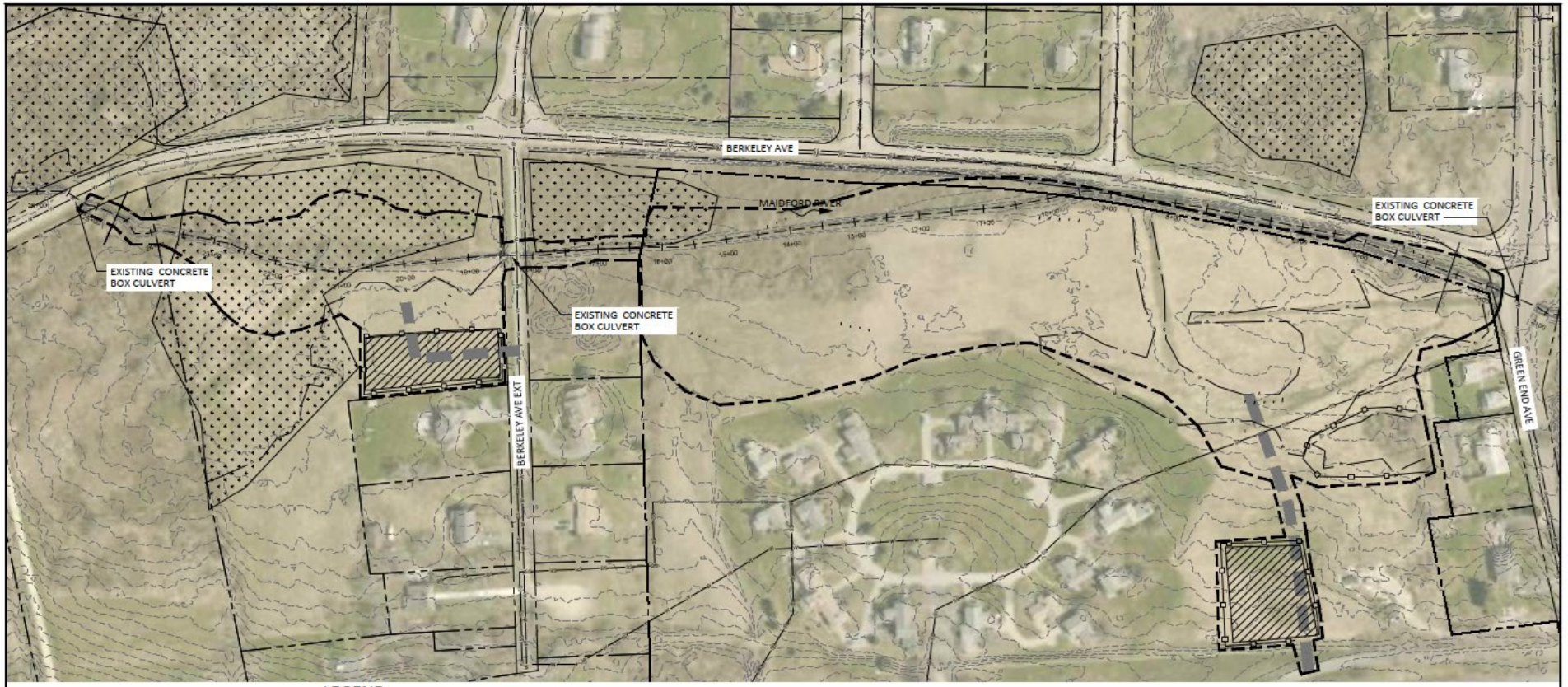

LEGEND

- TEMPORARY ACCESS
- LIMITS OF DISTURBANCE
- STAGING AREA
- TAX PARCEL
- SILT FENCE
- EXISTING 1FT CONTOUR
- EXISTING ALIGNMENT (10+00 — 11+00)
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- NATIONAL WETLAND INVENTORY WETLAND
- DELINEATED WETLAND BOUNDARY

NOTES:

1. TOPOGRAPHIC SURVEYS WERE PERFORMED BY INTER-FLUVE MAY 14, AND JUNE 22, 2021.
2. FOR SURROUNDING TOPOGRAPHY, 1 FT CONTOURS ARE FROM USGS, COLLECTED WITH AIRBORNE LIDAR TECHNOLOGY AFTER HURRICANE SANDY AND RELEASED IN 2014.
3. PARCEL DATA WAS OBTAINED FROM RIGIS.
4. THE HORIZONTAL COORDINATE SYSTEM IS THE NORTH AMERICAN DATUM OF 1983, RHODE ISLAND STATE PLANE, US FEET.
5. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988, US FEET.
6. AERIAL COLLECTED IN SPRING OF 2018 AND WAS OBTAINED FROM RIGIS.
7. ALL UTILITY LOCATIONS ARE APPROXIMATE. EXACT LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR. SANITARY SEWER LINES APPEAR TO CROSS THE LIMIT OF DISTURBANCE.

0 150 300
SCALE IN FEET

NO.	BY	DATE	REVISION DESCRIPTION

MYS	SS, NN, CC	CC, MH
DRAWN	DESIGNED	CHECKED
----	11-29-2021	21-05-14
APPROVED	DATE	PROJECT

TOWN OF MIDDLETON RI
MAIDFORD RIVER RESTORATION
30% DESIGN

Inter-Fluve
220 Concord Avenue, 2nd Floor
Cambridge, MA 02136
617.714.5537
www.interfluve.com

EXISTING CONDITIONS, ACCESS, AND STAGING

SHEET 2 OF 8

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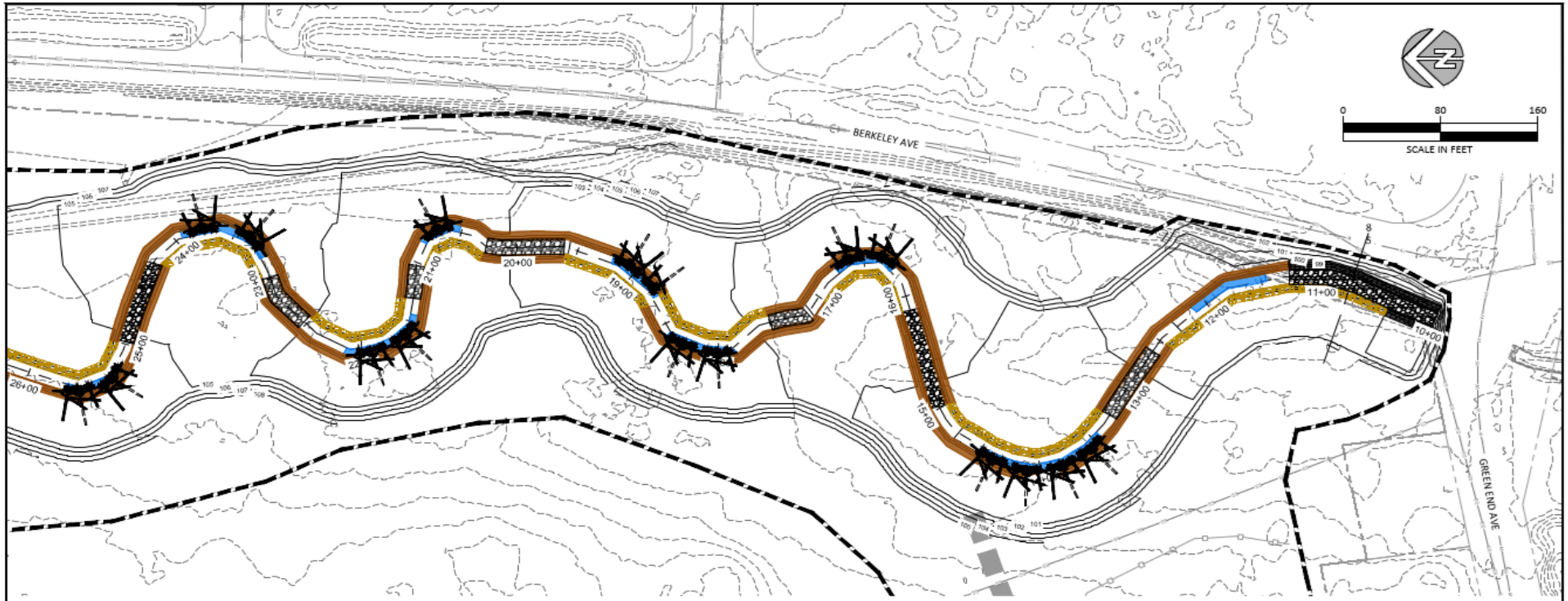

LEGEND

- TEMPORARY ACCESS
- LIMITS OF DISTURBANCE
- STAGING AREA
- TAX PARCEL
- SILT FENCE
- EXISTING 1FT CONTOUR
- PROPOSED 1FT CONTOUR
- PROPOSED ALIGNMENT (10+00 — 11+00)
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- POOL
- FES LIFTS
- SURFACE FABRIC
- GRADE CONTROL RIFFLE
- CHANNEL BANK RIPRAP
- LARGE WOOD BANK STABILIZATION

NO.	BY	DATE	REVISION DESCRIPTION

DRAWN	DESIGNED	CHECKED
MYS	SS, NN, CC	CC, MH
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----	11-29-2021	21-05-14

TOWN OF MIDDLETON RI
MAIDFORD RIVER RESTORATION
30% DESIGN

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TREATMENT PLAN (2 OF 2)

SHEET 7 OF 8

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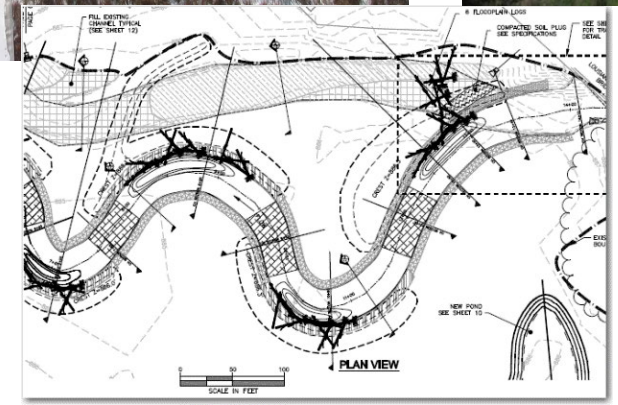
MEANDER RESTORATION







Photos courtesy of Inter-Fluve

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LARGE WOOD BANK STABILIZATION





Photos courtesy of Inter-Fluve

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FLOODPLAIN/BACKWATER WETLANDS





Photos courtesy of Inter-Fluve

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FES LIFTS AND RIFFLES



Photo courtesy of Inter-Fluve

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GRADE CONTROL RIFFLE



Photo courtesy of Inter-Fluve

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WETLAND HABITAT





Wetland habitat

- Microtopography grading
- Oxbow ponds
- Side channels
- Anastamosing channels
- Natural levees



Photos courtesy of Inter-Fluve

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NEXT STEPS

- Town is working with property owners to secure approval to move the project to the next phase of site assessment and design and engineering
  - Next steps entail development of soil sampling plan to assess the quality of soils in the project area and develop a soils management plan
- Town has received grant from Restore America's Estuaries to advance the project to 60% design and engineering, and is seeking other sources of funds to advance the project
- Eastern RI Conservation District has begun meeting with property owners to discuss implementation of restoration initiatives as part of $ 1 Million Regional Conservation Partnership Program grant.

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TO LEARN MORE



To learn more, visit the Maidford River Restoration Project webpage on the SNEP Network's website:

https://snepnetwork.org/maidford/

Or contact project leads:

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