

Temple Street Dam Removal

South River Restoration Project
Duxbury and Marshfield, MA



Partners & Support



Major Project Goals

1. Restore natural hydrology to the extent practical while eliminating downstream hydraulic impacts shown to occur in a full dam breach scenario
2. Restore fish and wildlife passage, particularly for river herring, American eel, and other anadromous/riverine fish species
3. Reduce or eliminate the need for dam maintenance by the Duxbury DPW staff
4. Mitigate the impacts of climate change (e.g. reduce risk of flooding due to dam failure, provide flood storage, reduce potential impacts to critical infrastructure like the downstream water main)

Critical Wildlife



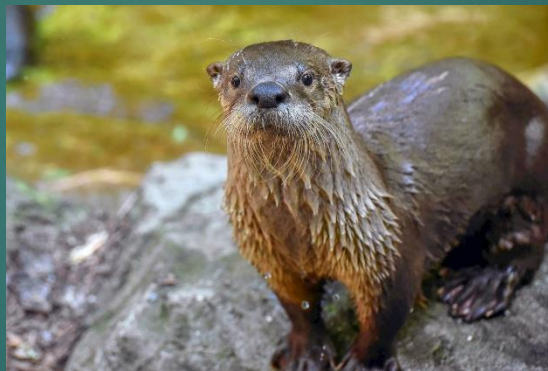
Brook Trout



American Eel



Waterfowl



River Otter



Blue Back

**NHESP Mapped Estimated Priority Habitat of Rare Species
MassDEP Outstanding Resource Water (ORW)**

Dams in Massachusetts

Dam Removal Basemap

DFG Dam Removals



Completed Dam Removals



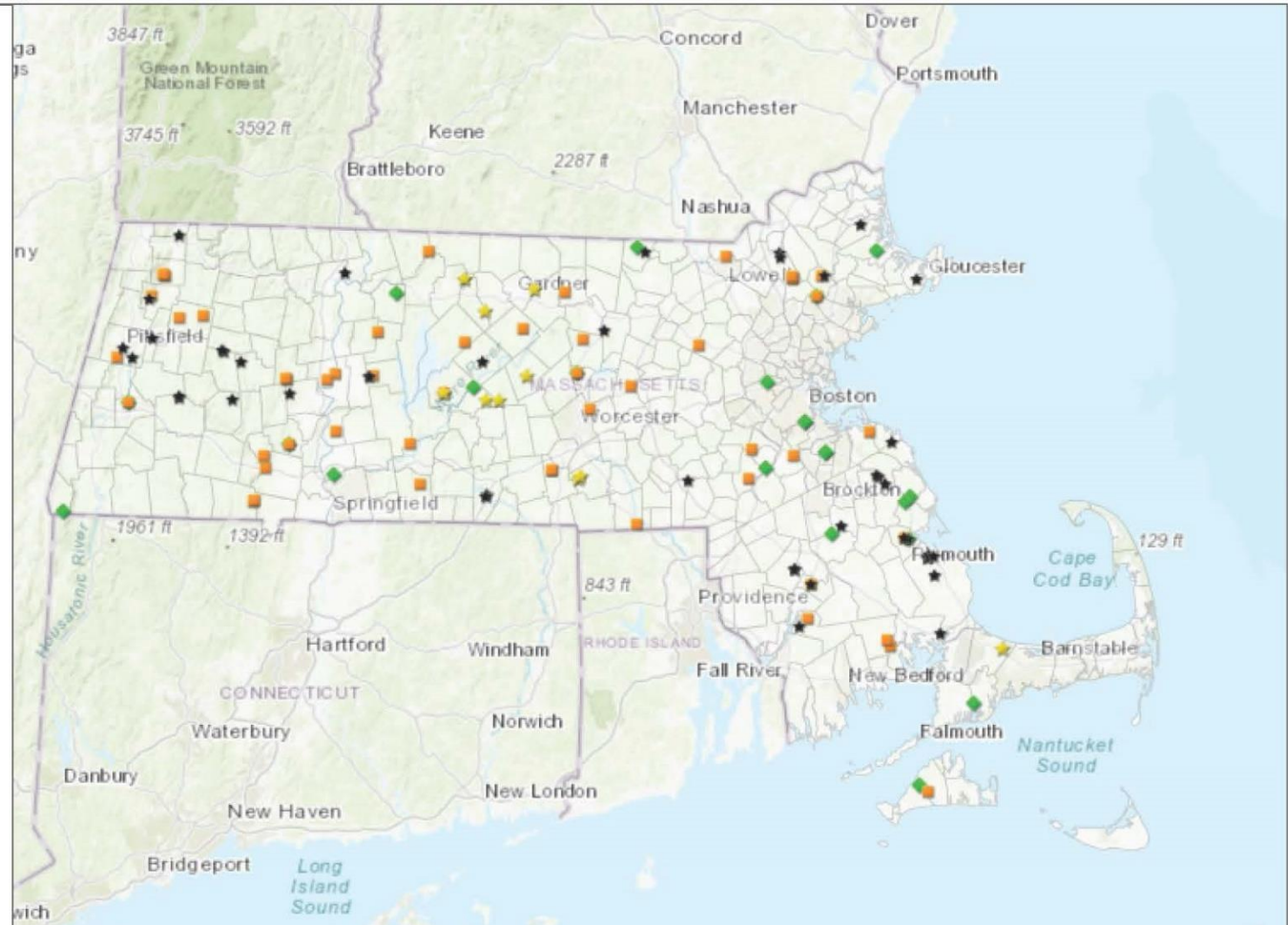
Preliminary Recon



Active Removal Projects

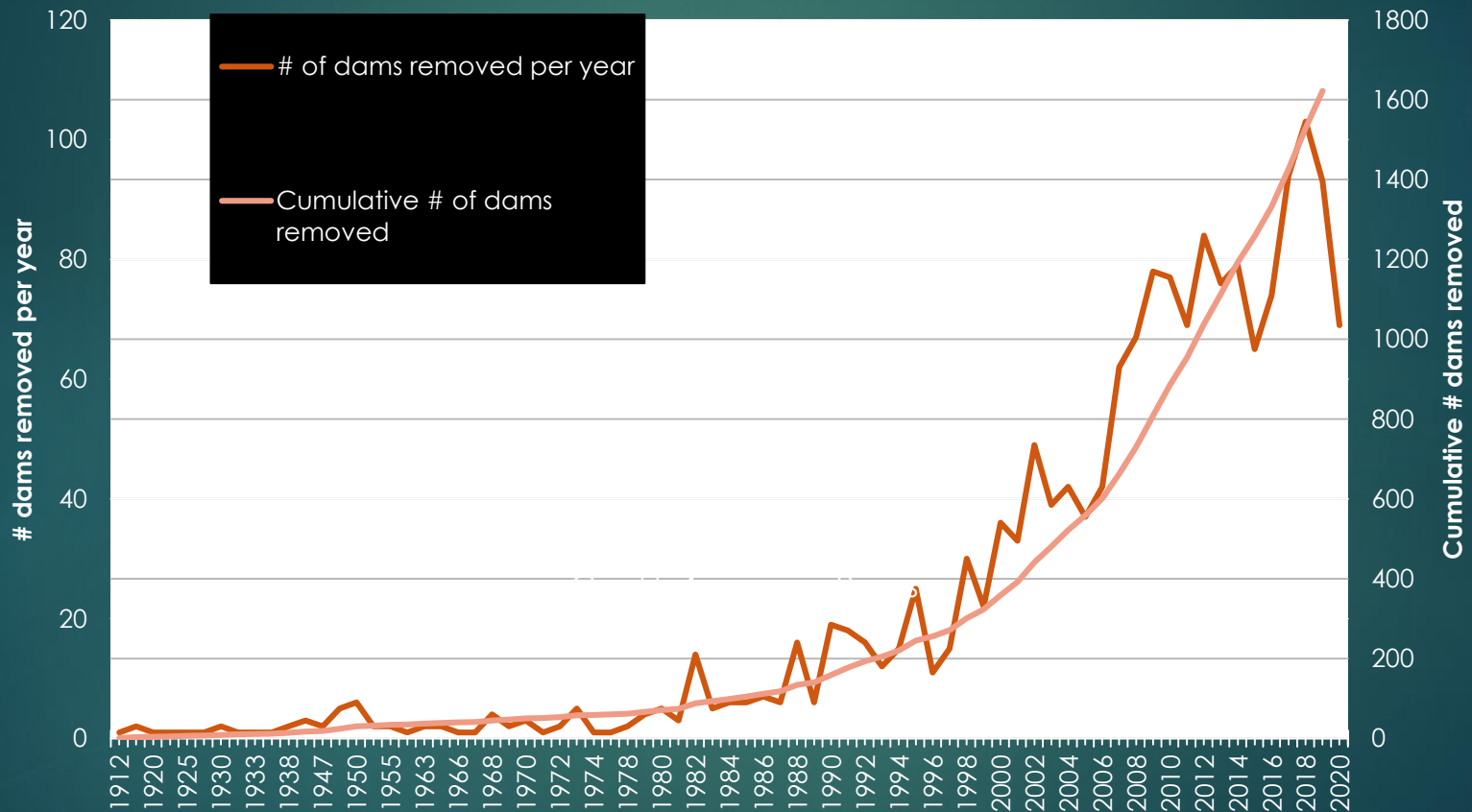


MA Municipalities

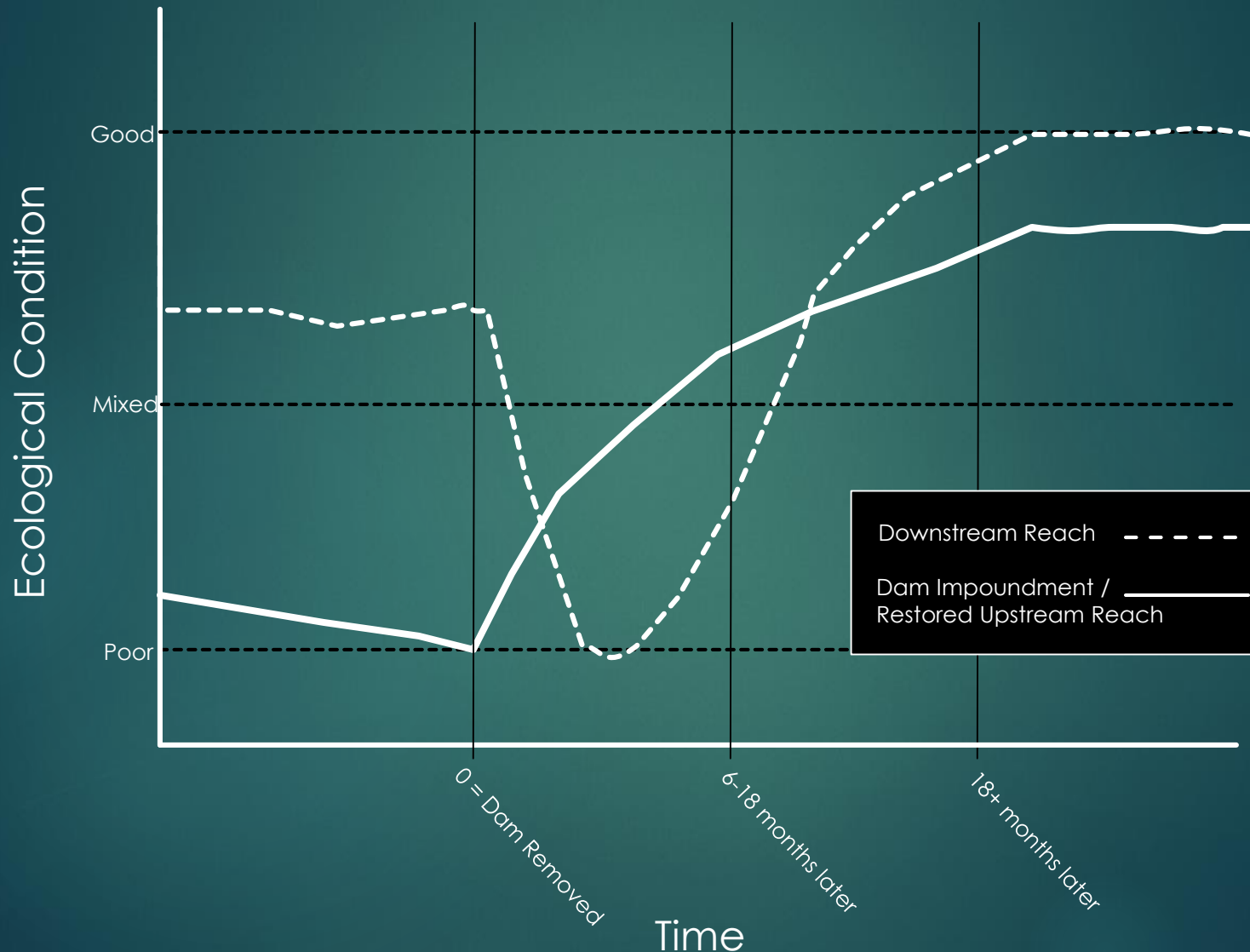


Dam Removal as a Restoration Practice

US Figures

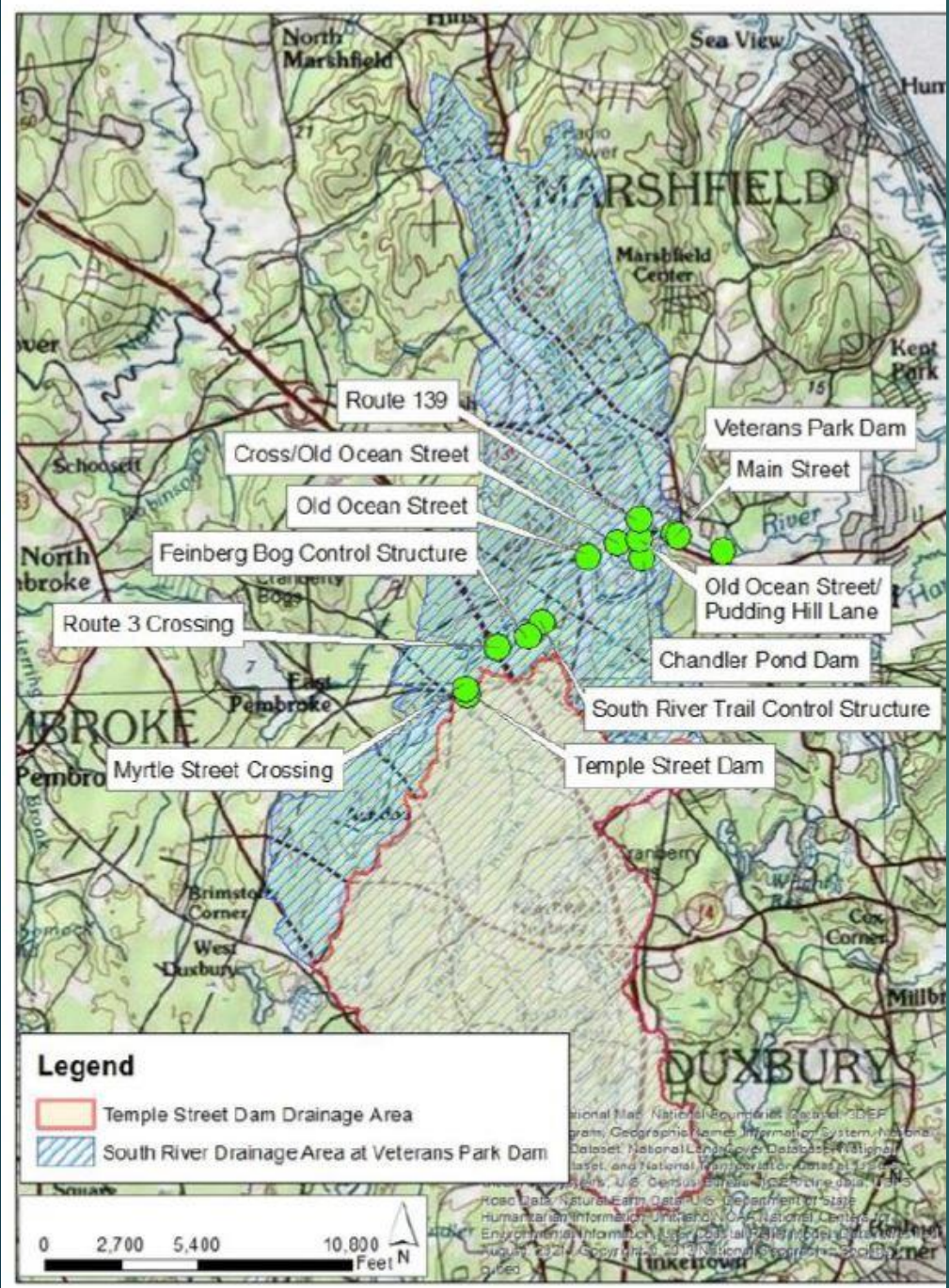


Conceptual River Recovery Model – Post Dam Removal



(This hypothetical timeline is based upon our experience with small to medium sized dams across Massachusetts)

Figure 1.2-1: South River Watershed Map



Project Area

Major Features & Structures Included (upstream to downstream)

- South River Reservoir
- Temple Street Dam
- River Street Crossing (abandoned)
- Myrtle Street
- Route 3 South
- Route 3 North
- Feinberg Bog Control Structure
- South River Trail Control Structure
- Old Ocean Street
- Chandlers Pond Dam Primary/Auxiliary Spillways
- Old Ocean Street/Pudding Hill Lane
- Cross Street/Old Ocean Street
- Route 139 (Plain Street)
- Veterans Memorial Park Dam
- Main Street
- Willow Street
- Francis Keville Bridge
- South River (mouth)

Temple Street Dam & Impoundment



CARE AND DIVERSION OF WATER

- 1 CONTINUED TO HALL, INSIDE WHITE, AND REMOVED ALL
ITEMS, COFFEE, AND THE OTHER AND PLACED
THESE IN THE EAST END OF THE SOUTH
CORRIDOR, THE ROOM DURING
OCCUPATION
- 2 ALL ITEMS, PREVIOUSLY, THAT WERE IN HALL
WAS REMOVED TO THE EAST END OF THE SOUTH
CORRIDOR, THE ROOM DURING THE
OCCUPATION, AND REMOVED TO THE
OCCUPATION
- 3 CONTINUED TO HALL, INSIDE WHITE, AND REMOVED ALL
ITEMS, COFFEE, AND THE OTHER AND PLACED
THESE IN THE EAST END OF THE SOUTH
CORRIDOR, THE ROOM DURING
OCCUPATION
- 4 CONTINUED TO HALL, INSIDE WHITE, AND REMOVED ALL
ITEMS, COFFEE, AND THE OTHER AND PLACED
THESE IN THE EAST END OF THE SOUTH
CORRIDOR, THE ROOM DURING
OCCUPATION
- 5 VERIFIED THE SOUTH END IS APPROXIMATELY 5
FEET FROM THE NORTH END, THROUGH THE EAST
END OF THE SOUTH CORRIDOR, THE ROOM DURING
OCCUPATION, AND REMOVED TO THE
OCCUPATION, AND REMOVED TO THE
OCCUPATION
- 6 NORTH HALL, CONTINUED TO HALL, INSIDE WHITE, AND REMOVED ALL
ITEMS, COFFEE, AND THE OTHER AND PLACED
THESE IN THE EAST END OF THE SOUTH
CORRIDOR, THE ROOM DURING
OCCUPATION

LEGEND

- ```

--30-- N-DEG. CONTR.
--28-- MINOR CONTR.
--26-- T- F RANK TOL/AN-H/H/H
--24-- 100-LEAF PLACED LWS
--22-- ATLAND BOUNDARY
--20-- T-AT P-DEB.
--18-- APPROX-TE TH-L-ES
--16-- 100-SETLAND B-FFE
--14-- T-EBU-E
--12-- E-NE-T-S-AN-LOC-T-TP

```



POND LIMITS - HOW - RAINFALL FLOW 110 CFS - BL 37.6 +/-  
[SCOR RECURRENT INTERNAL  
TIP - F OAK TON]  
UEAN ABUNDANT HIGH WATER (MAH)  
DRAINAGE HIGH WATER (MAH)

## SURVEY CONTROL

| POINT NO. | NORTHING   | EASTING   | ELEVATION | DESCRIPTIVE |
|-----------|------------|-----------|-----------|-------------|
| 1         | 2655083.59 | 860968.52 | 35.93     | REBAR       |
| 2         | 2654893.52 | 860960.75 | 36.42     | REBAR       |
| 3         | 2655090.16 | 860776.22 | 35.46     | REBAR       |

△ SURVEY

PRELIMINARY  
NOT FOR  
CONSTRUCTION

|                 |   |              |               |
|-----------------|---|--------------|---------------|
| 6/30/22         | 1 | 75% DRAWINGS | SAS           |
| DATE            | # | DESCRIPTIONS | BY            |
| DRAWN BY: SAS   |   |              |               |
| CHECKED BY: KJC |   |              |               |
| APPROVED BY:    |   |              |               |
| PROJECT NO.     |   | 7596         | DATE: 6/30/22 |

TEMPLE STREET DAM REMOVAL/ SOUTH RIVER RESTORATION PROJECT

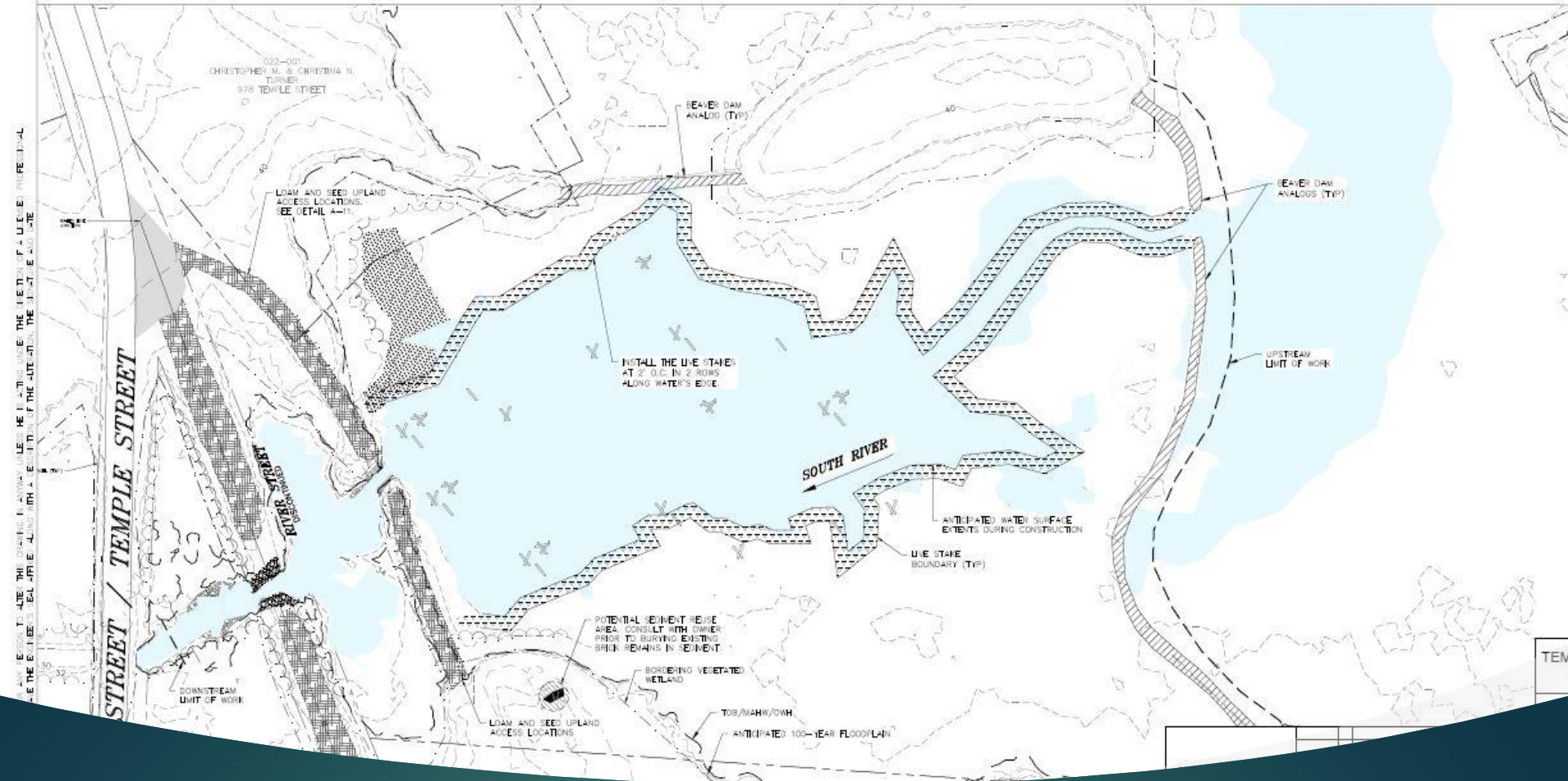
EXISTING CONDITIONS,  
ACCESS, EROSION CONTROL,  
AND WATER CONTROL PLAN

|                                                                                          |                                                                                                   |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Massachusetts Division Of Ecological<br>Restoration                                      | Gomez and Sullivan Engineers, D.P.C.<br>41 Liberty Hill Road<br>PO Box 2179<br>Hanniker, NH 03042 |
| Massachusetts Dept. of Fish & Game<br>251 Causeway Street, Suite 400<br>Boston, MA 02124 |                                                                                                   |

|                 |          |   |
|-----------------|----------|---|
| SCALE: 1" = 20' | DRAWING: | 4 |
|-----------------|----------|---|

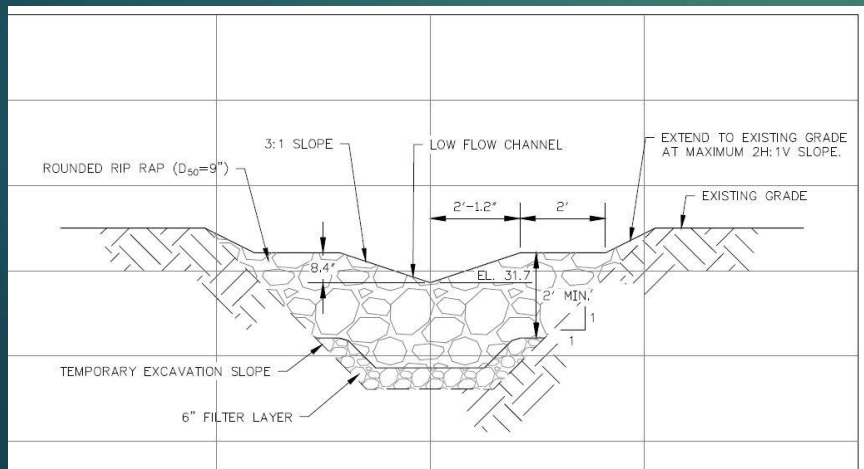




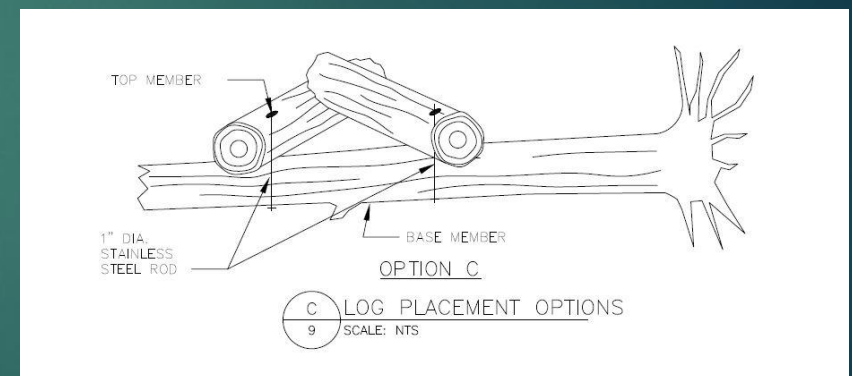


# Removal Restoration Plans

# Key Design Details



Constructed Rock Riffle



Large Wood - logs/root wads



# 75% Design – Wetlands Existing vs Proposed Conditions

Figure 2.3-1: Regulated Wetland Resource Areas – Existing Conditions

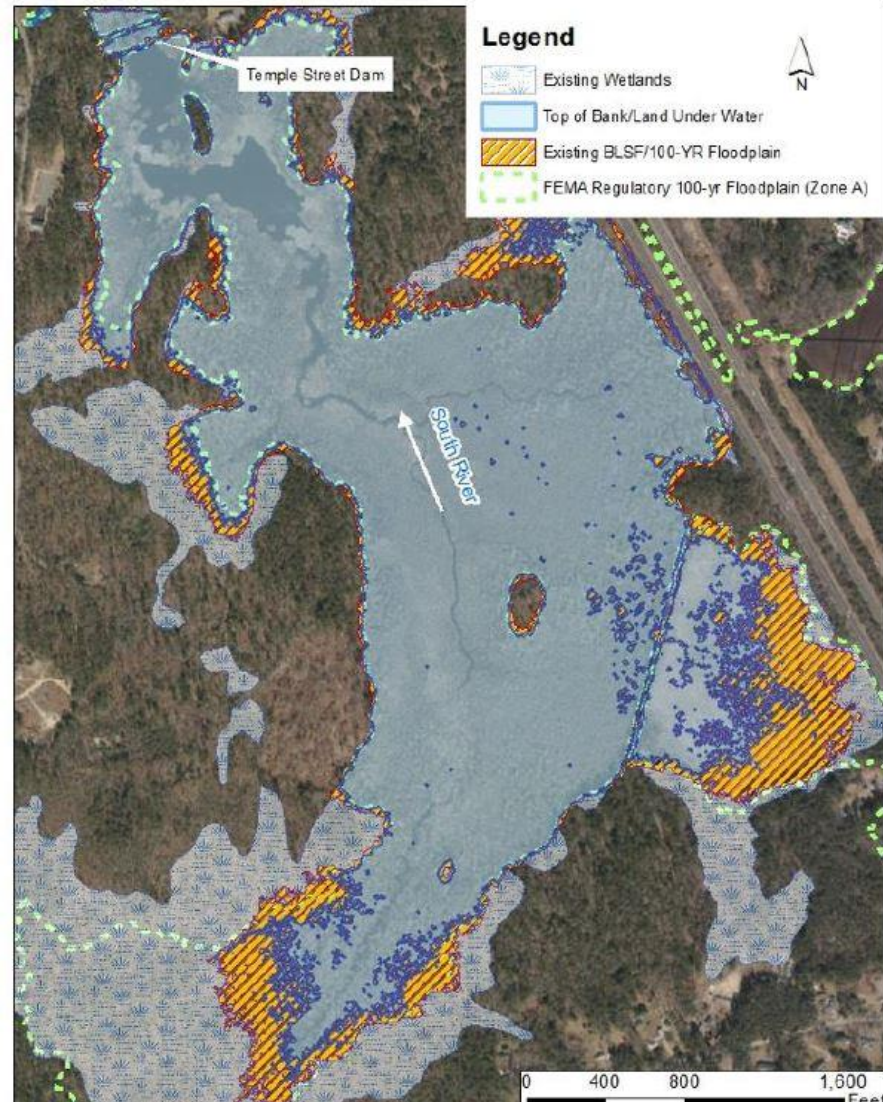
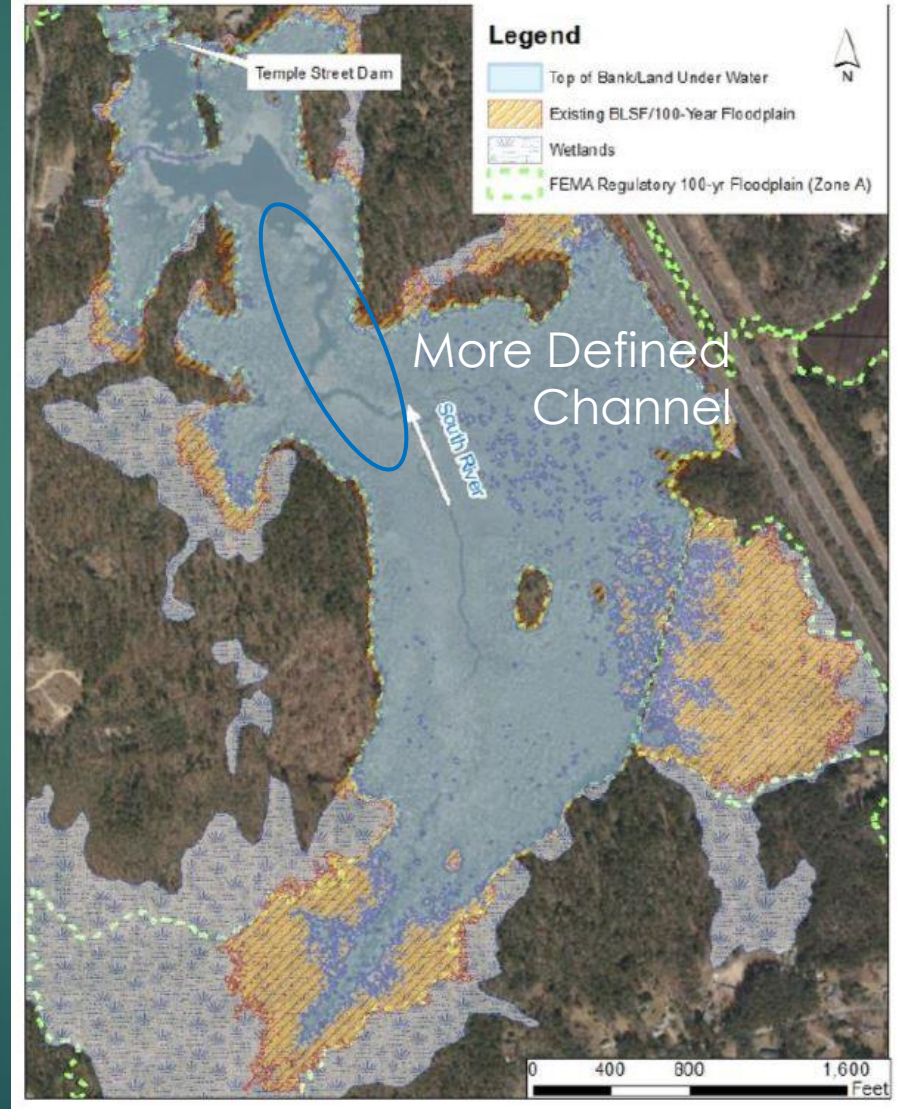


Figure 2.3-2: Regulated Wetland Resource Areas – Proposed Conditions





# H&H Model Takeaways

Table 2.6.1-3: Hydraulic Model Results at Select Residential Structures under **Current Climate Conditions**

| Model Condition                             | Parameter         | Current 5-Year Storm Event (20% ACE) |                  |                 | Current 25-Year Storm Event (4% ACE) |                  |                 | Current 100-Year Storm Event (1% ACE) |                  |                 |
|---------------------------------------------|-------------------|--------------------------------------|------------------|-----------------|--------------------------------------|------------------|-----------------|---------------------------------------|------------------|-----------------|
|                                             |                   | 229 Old Ocean Street                 | 108 Cross Street | 60 Cross Street | 229 Old Ocean Street                 | 108 Cross Street | 60 Cross Street | 229 Old Ocean Street                  | 108 Cross Street | 60 Cross Street |
| FFE                                         |                   | 28.63                                | 17.05            | 13.06           | 28.63                                | 17.05            | 13.06           | 28.63                                 | 17.05            | 13.06           |
| Existing Conditions                         | Peak WSE (NAVD88) | 28.11                                | 13.62            | 12.75           | 28.73                                | 14.05            | 13.21           | 29.37                                 | 14.86            | 13.61           |
|                                             | Freeboard (ft)    | 0.52                                 | 3.43             | 0.31            | -0.10                                | 3.00             | -0.15           | -0.74                                 | 2.19             | -0.55           |
| Proposed Conditions                         | Peak WSE (NAVD88) | 28.27                                | 13.72            | 12.78           | 28.81                                | 14.13            | 13.23           | 29.35                                 | 14.80            | 13.62           |
|                                             | Freeboard (ft)    | 0.36                                 | 3.33             | 0.28            | -0.18                                | 2.92             | -0.17           | -0.72                                 | 2.25             | -0.56           |
| WSEL Change due to Proposed Conditions (ft) |                   | 0.16                                 | 0.1              | 0.03            | 0.08                                 | 0.08             | 0.02            | -0.02                                 | -0.06            | 0.01            |

H&H Results show a slight increase (mostly less 0.1 foot) in WSEL at 3 properties under the 5 & 25-yr storm event and essential no change at 100-yr storm event.

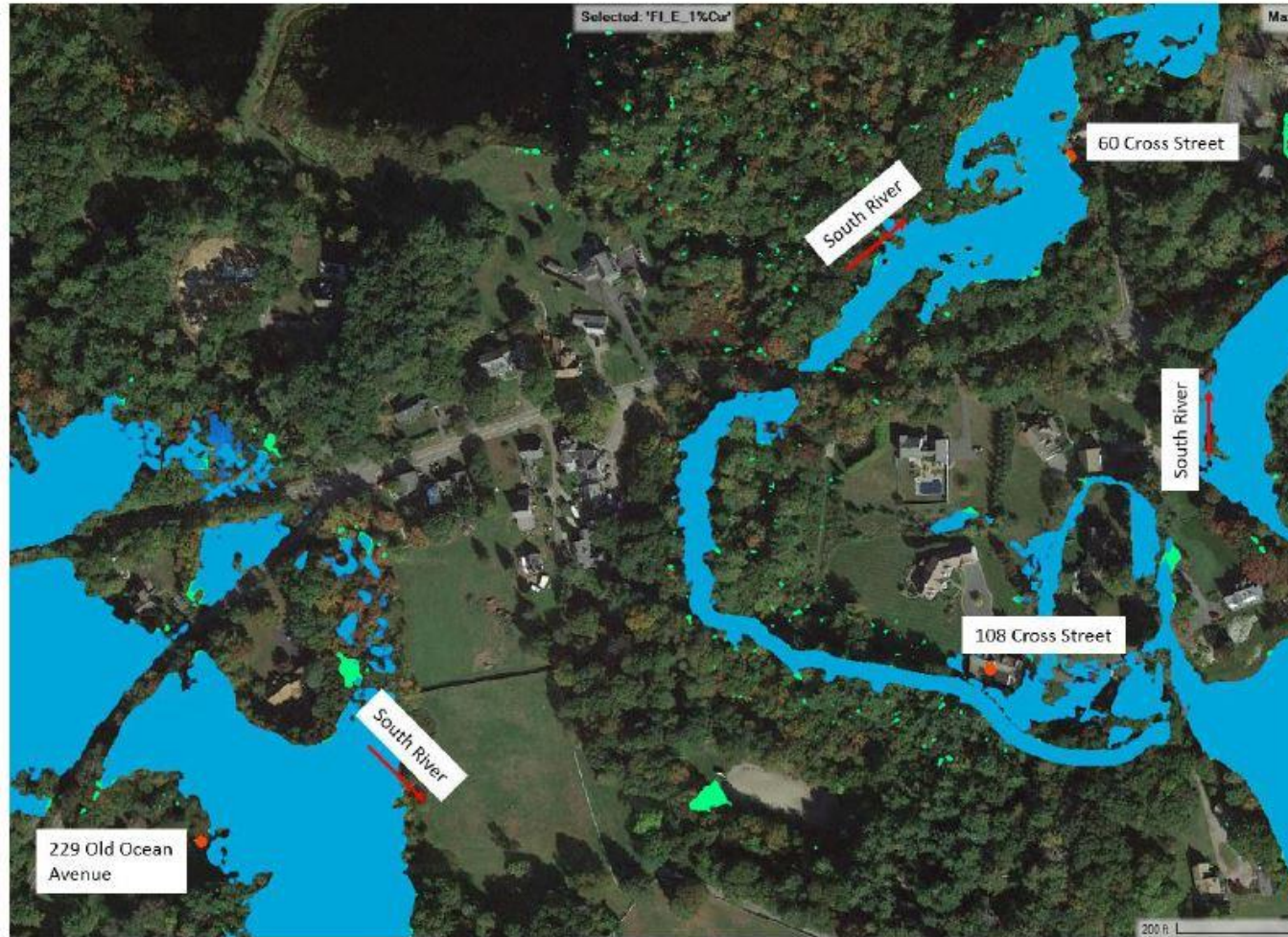
Vary small changes (less than 0.1 inch) are shown to occur when accounting for climate change. This is showing predicted change in WSEL at these structures as a result of the Temple Steet project.

Table 2.6.1-4: Hydraulic Model Results at Select Residential Structures under **Projected Climate Conditions**

| Model Condition                             | Parameter          | Projected 5-Year Storm Event (20% ACE) |                  |                 | Projected 25-Year Storm Event (4% ACE) |                  |                 | Projected 100-Year Storm Event (1% ACE) |                  |                 |
|---------------------------------------------|--------------------|----------------------------------------|------------------|-----------------|----------------------------------------|------------------|-----------------|-----------------------------------------|------------------|-----------------|
|                                             |                    | 229 Old Ocean Street                   | 108 Cross Street | 60 Cross Street | 229 Old Ocean Street                   | 108 Cross Street | 60 Cross Street | 229 Old Ocean Street                    | 108 Cross Street | 60 Cross Street |
| FFE                                         |                    | 28.63                                  | 17.05            | 13.06           | 28.63                                  | 17.05            | 13.06           | 28.63                                   | 17.05            | 13.06           |
| Existing Conditions                         | Peak WSEL (NAVD88) | 28.22                                  | 13.71            | 12.84           | 28.78                                  | 14.13            | 13.33           | 29.65                                   | 15.57            | 14.12           |
|                                             | Freeboard (ft)     | 0.41                                   | 3.34             | 0.22            | -0.15                                  | 2.92             | -0.27           | -1.02                                   | 1.48             | -1.06           |
| Proposed Conditions                         | Peak WSEL (NAVD88) | 28.39                                  | 13.81            | 12.86           | 28.85                                  | 14.17            | 13.34           | 29.62                                   | 15.49            | 14.04           |
|                                             | Freeboard (ft)     | 0.24                                   | 3.24             | 0.2             | -0.22                                  | 2.88             | -0.28           | -0.99                                   | 1.56             | -0.98           |
| WSEL Change due to Proposed Conditions (ft) |                    | 0.17                                   | 0.1              | 0.02            | 0.07                                   | 0.04             | 0.01            | -0.03                                   | -0.08            | -0.08           |

# H&H Takeaways (continued)

Figure 2.6.1-15 – Water Surface Extents – 1% Recurrence Interval - Existing (Blue) VS. Proposed (Green) Conditions



Shows visually what the modeled WSEL extents look like on the land.

Largest storm but smallest change between proposed vs predicted.



# H&H Takeaways (continued)

Figure 2.6.1-13— Water Surface Extents – 20% Recurrence Interval - Existing (Blue) VS. Proposed (Green) Conditions



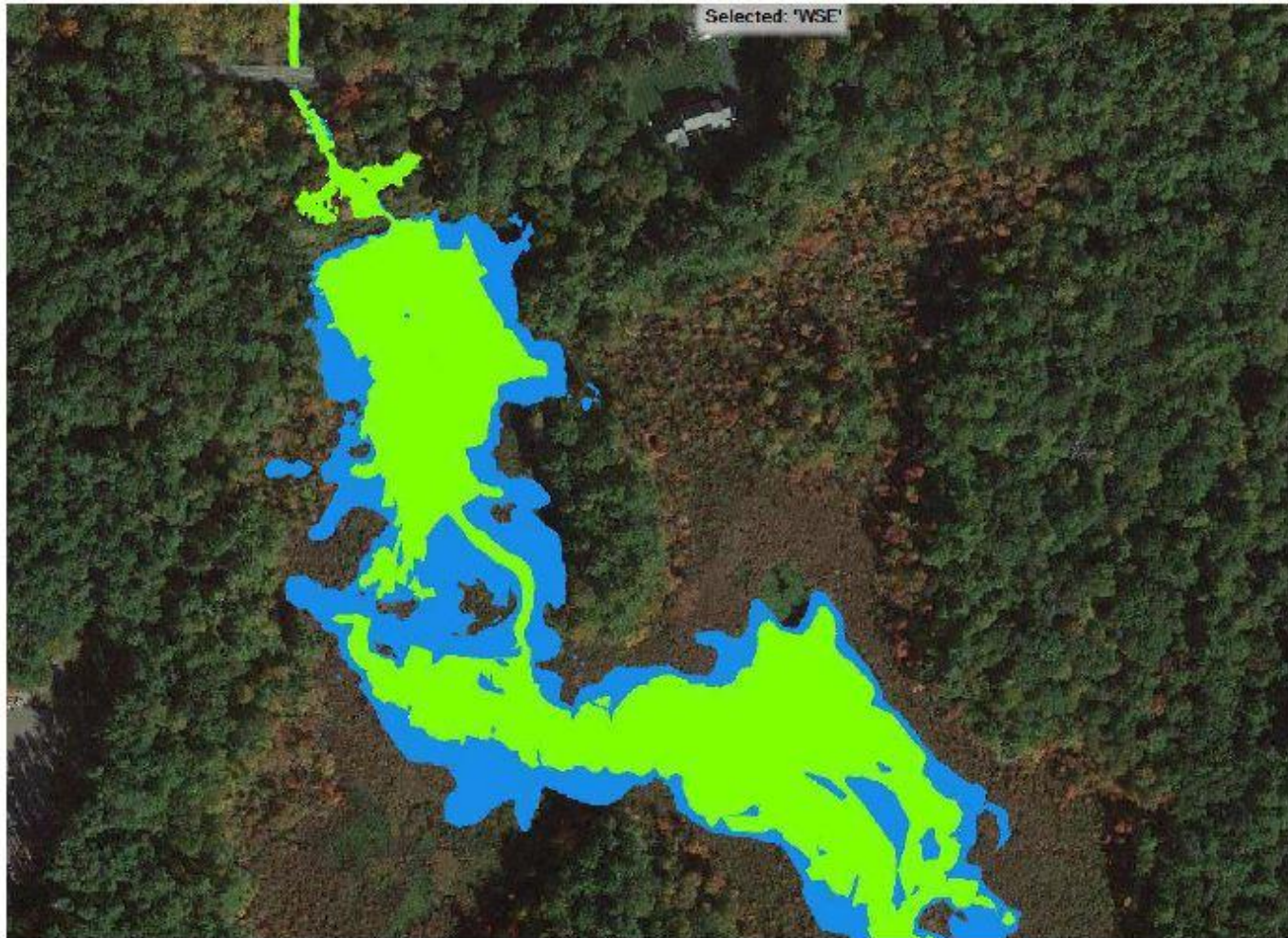
Shows visually what the modeled WSEL extents look like on the land.

Smallest storm but largest change between proposed vs predicted.



# Balancing for Waterfowl

Figure 2.5.3-6 – Water Surface Extents – Median Duck Hunting Season Flow (5 cfs) (Oct. 10 – Nov. 26)– WSE Map – Existing (Blue) VS. Proposed (Green) Conditions



# Sediment Management Consideration

- ▶ Get to know the site, sediment and setting
- ▶ Assess sediment-related risk – ecological, infrastructure/flooding, and human health and safety
- ▶ Consider different sediment management approaches (mechanical removal or passive release, upland disposal or off-site)
- ▶ Select and implement a preferred approach

**The sediment is clean and we have a DEP approved Sediment Management Plan**



# Project Timeline

## Work Completed

- ▶ 2016 Site Reconnaissance & Preliminary Evaluation by Pare Corporation
- ▶ 2018 H&H Study of Upper South River by Pare Corporation
- ▶ 2020 Expanded H&H Study & Alternatives Analysis by Pare Corporation
- ▶ 2021 Conceptual Design, Data Collection and Modeling by Inter-Fluve, Inc. (Pare sub-consultant)
- ▶ 2022 Preliminary (75%) Design and Analysis by Gomez and Sullivan

## Future Work – *anticipated timeline*

- ▶ 2022/3 Regulatory Review/Permitting – public meetings
- ▶ 2023/4 Final Design and Bidding
- ▶ 2024/5 Construction and Post Monitoring (beyond)

## \*\*Other South River Restoration Projects – 2022/3

- ▶ Chandler Pond Dam Removal – Preliminary Design and Feasibility (GZA)
- ▶ Veteran's Park Dam Removal – Complete Permits and 75% Design

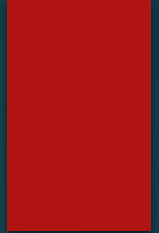


# Permits Required

- ▶ MEPA – Expanded Ecological Notification From (EENF) & Environmental Impact Report (EIR) Waiver - MA DEP
- ▶ Chapter 91 dredge permit - MA DEP
- ▶ Section 401 Water Quality Cert - MA DEP
- ▶ Wetland Protection Act Notice of Intent/Order Of Conditions - Duxbury ConCom
- ▶ Section 404 dredge and fill permit - US ACOE
- ▶ LOMR – FEMA (*Maybe Required*)
- ▶ Section 106 Historical Review– MHC (*Maybe Required*)

\*\*Public meetings/site walks will be held for MEPA, 401 and NOI/OC

# Thank you!



- ▶ Nancy Rufo, Duxbury Conservation Commission
- ▶ Samantha Wood, North and South River Watershed Association
- ▶ Sara Grady, North and South River Watershed Association and MassBays Partnership Program
- ▶ Joseph Gould, Massachusetts Fish and Game, DER