Suffolk County Department of Health Services

Peconic Estuary Conceptual Habitat Restoration Design Planning Services

Contract #: 003-4410-4560-00-00007

Land Use Ecological Services
570 Expressway Drive South, Suite 2F
Medford, NY 11763
(631)727-2400

Contact: William Bowman
wbowman@landuse.us

PROJECT SUB-CONTRACTORS

- **Inter-Fluve Inc:**

  Experience: River Restoration, Fish Passage, Stormwater Management
  Focus: Big Reed Pond/Stepping Stones Pond, Narrow River, Main Road
  Nick Nelson (Fluvial Geomorphologist)
  Mike Burke, PE (Water Resources Engineer)

- **LVBrown Studio LLC:**

  Experience: Graphic Design
  Focus: Projects requiring high-quality visual representations of ecological improvements for developing stakeholder consensus and procurement of implementation funding.

INTERIM MEETING TIMELINE

9:00 AM	Iron Point Wetland Restoration
10:00 AM	Main Road- Riverhead Wetland Construction/Restoration
11:00 AM	Lake Montauk Alewife Access and Habitat Enhancement
12:30 PM	Lunch Break
1:30 PM	Narrow River Wetland Restoration (Update)
2:30 PM	Adjourn

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INTERIM MEETING OBJECTIVES

1. Discuss Existing Conditions and Results of Field Investigations
2. Assess Preliminary Restoration Options
3. Obtain Feedback from Project Partners on Preliminary Restoration Options
4. Schedule for Completion of Project Goals and Deliverables

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Conceptual Planning Objectives

1. Evaluate if it is possible/feasible to fulfill restoration objectives
2. Provide visual illustrations of the strategy for ecological restoration
3. Confirm that the strategy for restoration is constructable/buildable
4. Provide preliminary cost estimates for implementation
5. Assess the benefits and risks of restoration alternatives
6. Provide a realistic sense for the possibilities and limitations of restoration.

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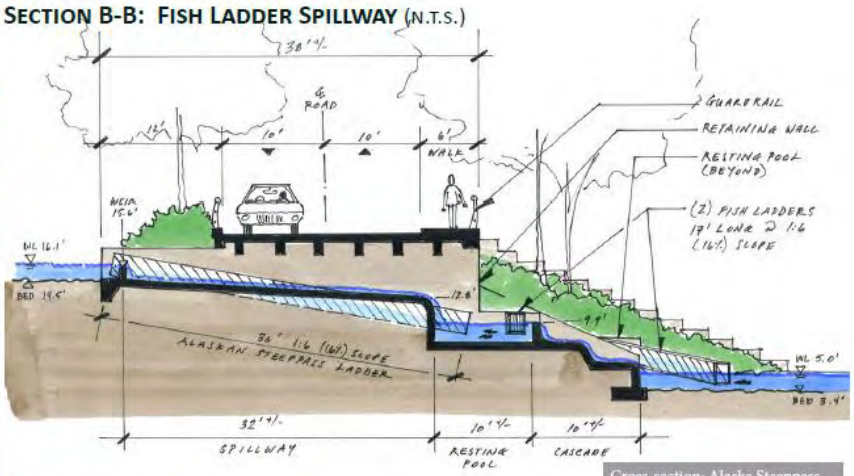
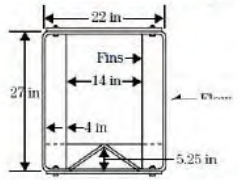
Conceptual Planning Examples: Peconic River (Forge Road)




Installation of Alaska Steeppass ladder at low-head dam

Cross-section: Alaska Steeppass Ladder



Cross section

Peconic Estuary Conceptual Habitat Restoration Design

inter·fluve
301 S. Livingston Street, Suite 200
Madison, WI 53703
p 608.441.0342
www.interfluve.com

Forge Road Dam - Alternative A
Alaskan Steeppass Fish Ladder

Suffolk County, Long Island, NY

0 5 10 20 ft.

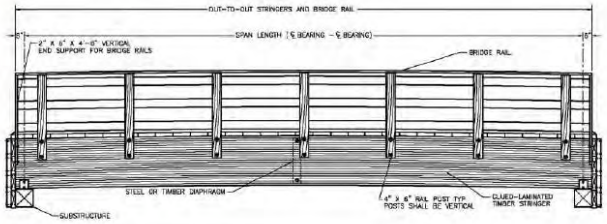
February 2013

Exhibit 3

Conceptual Planning Examples: Ligonee Brook

Pre-fabricated steel truss bridge with wooden deck

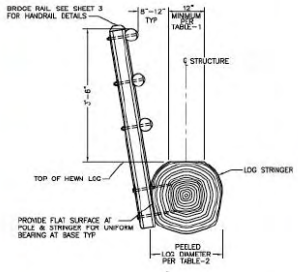
Constructed and Pre-Fabricated Bridge Structures can be used to connect paved paths and to span wider stream crossings, or for crossings with greater foot traffic and accessibility needs. Bridge options include prefabricated steel truss bridges, glu-laminated truss stringer bridges, stringer log bridges with railings, and boardwalk bridge design with wooden curbs.



Glu-laminated stringer bridge

Glu-Laminated Stringer Bridge

Wood deck pedestrian bridge with wooden curb



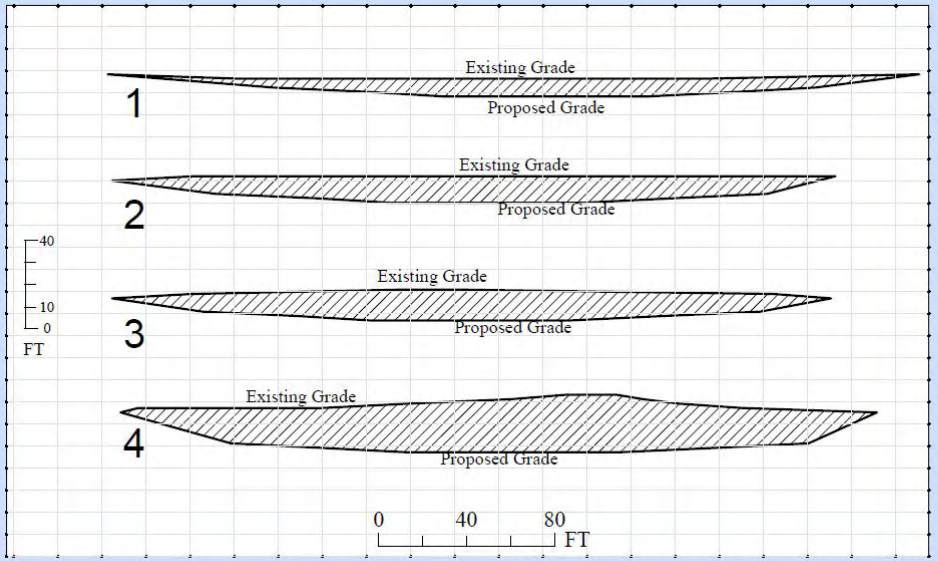
Stringer log bridge

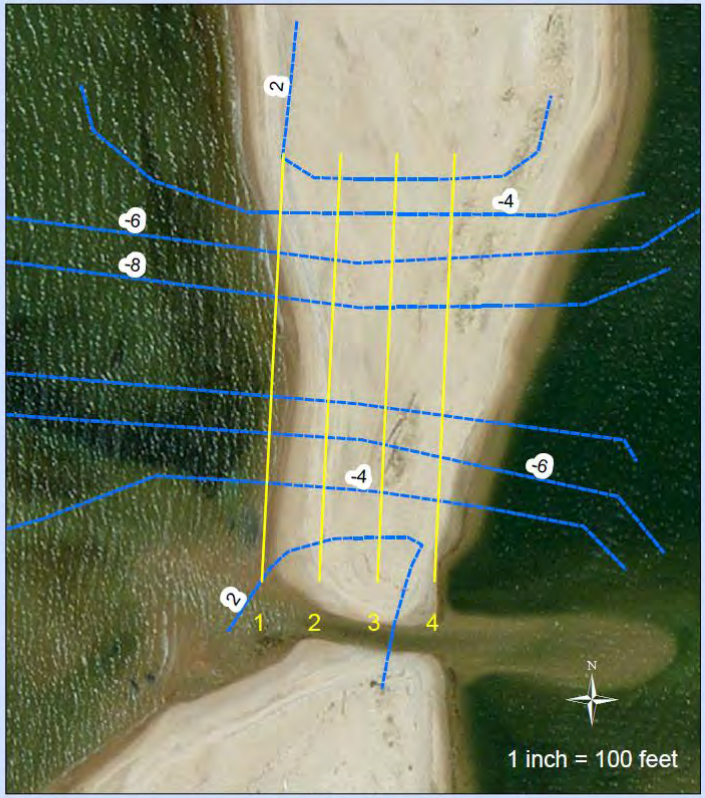
Stringer log bridge with railing

Conceptual Planning Examples: Napeaque Harbor

Figure 17. Conceptual Profile for a Proposed East Inlet

Napeague Harbor, Town of East Hampton





NOTES:
1. Elevation data collected by Land Use Ecological Services, Inc. in May 2012 in accordance with the Quality Assurance Plan adopted by USEPA and Suffolk County Dept. of Health Services.
2. Total estimated dredge and excavation volume is 60,600 cubic yards.
3. Elevations referenced to NGVD 1929.
4. Base Map: 2010 Orthoimage (NYSOCS)
5. Coordinate System: NAD 1983 UTM Zone 18N (equivalent to Long Island State Plane coordinate system)

Proposed East Inlet Contour

Land Use	Prepared By: Land Use Ecological Services, Inc. 570 Expressway Drive South, Suite 2F Medford, NY 11763 Drawn By: K. Risotto Date: 12/17/2012	Project: Napeague Harbor For: Suffolk County Peconic Estuary Program Conceptual Habitat Restoration Project Scale: As Noted Revisions: 2/22/2013	

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Iron Point: Summary of Contracted Work and Technical Approach

Introduction:

The purpose of the project is to restore tidal flow and historical tidal wetlands landward of earthen dikes by excavating at least two (2) cuts within the dike to allow for tidal flow and flooding to the inland wetlands and dredging to the existing panne. Site investigations and conceptual designs should identify location, target elevations, and quantities associated with new cuts; determine potential sediment contamination and implications for dredge disposal; and avoid impacts to adjacent permeable reactive barrier pilot project. Our team shall collect following environmental data and obtain the following available GIS-data:

•Mapping of existing marsh community boundaries, existing elevations of marsh communities, and quantification of relative area of existing marsh communities
•Existing berm gap and ditch dimensions
•Sediment contaminant analysis (2 locations) from sediment borings
•ID access routes with minimum disturbance to high-quality plant communities
•LIDAR-based topographic map

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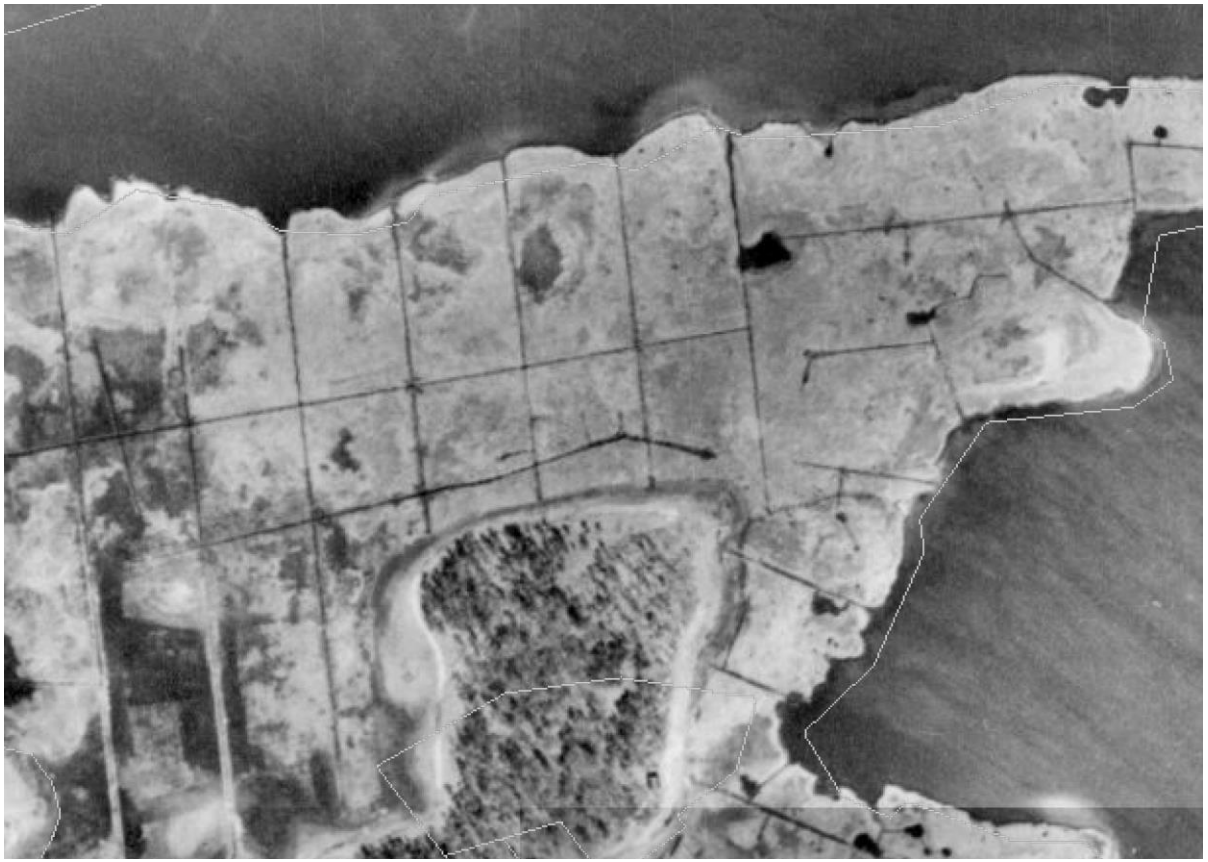
Iron Point: Summary of Contracted Work and Technical Approach

Background:



1962 aerial (Suffolk County GIS)

•Historically, extensive tidal marshes (largely high marsh) along southern shoreline of the Peconic River. Filled between 1962 and 1974.

•Site consists of dredge spoils. Presumably from dredging Peconic River and nearby waterbodies (i.e. removal of duck sludge)

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Iron Point: Summary of Contracted Work and Technical Approach

Background:

1978 aerial (Suffolk County GIS)

•Historically, extensive tidal marshes (largely high marsh) along southern shoreline of the Peconic River. Filled between 1962 and 1974.

•Site consists of dredge spoils. Presumably from dredging Peconic River and nearby waterbodies (i.e. removal of duck sludge)

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Iron Point: Summary of Contracted Work and Technical Approach

Background:

1960s-early 1970s Duck Sludge Dredging in Seatuck Cove (Suffolk County Planning)

•Historically, extensive tidal marshes (largely high marsh) along southern shoreline of the Peconic River. Filled between 1962 and 1974.

• Site consists of dredge spoils. Presumably from dredging Peconic River and nearby waterbodies (i.e. removal of duck sludge)

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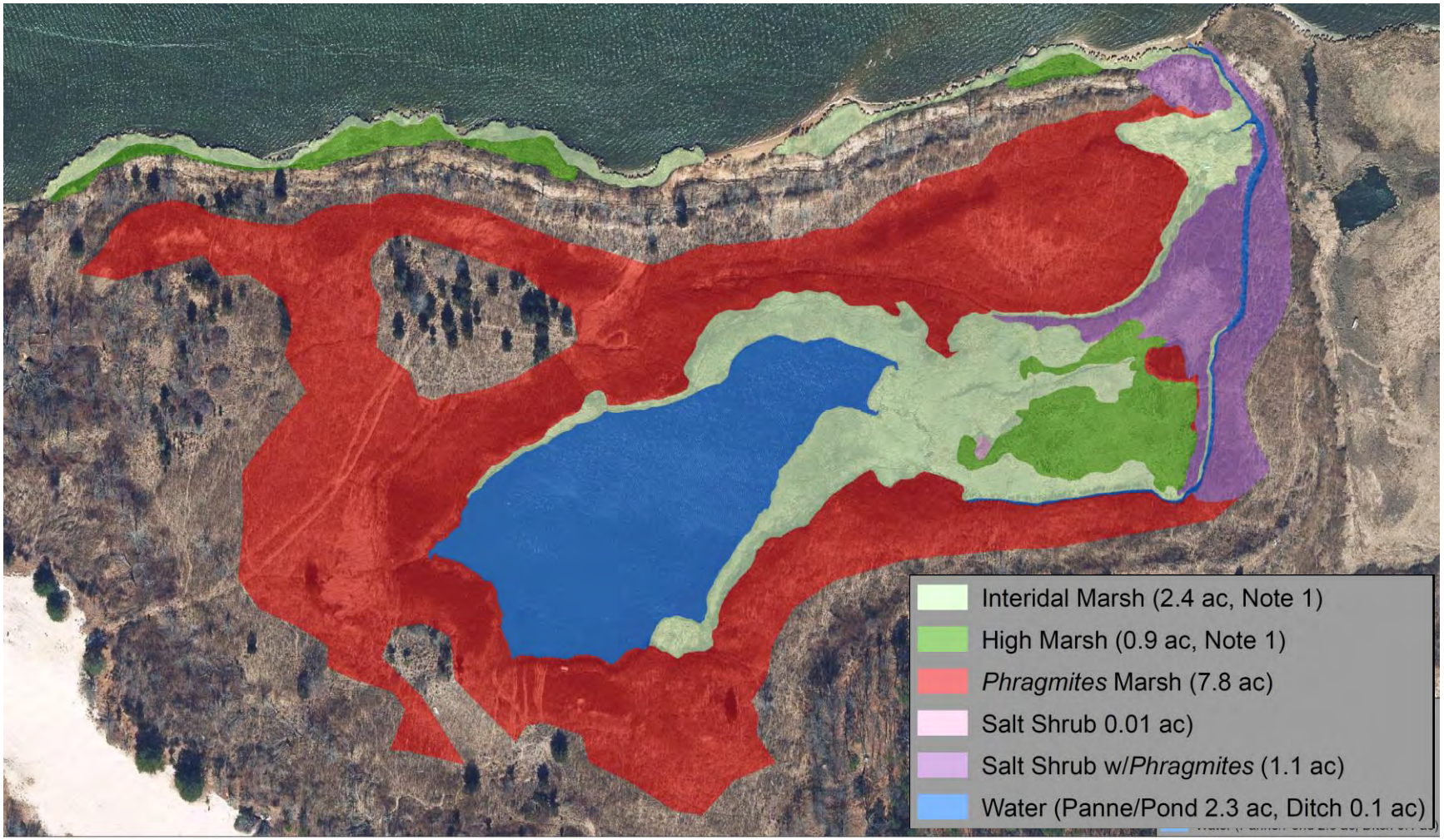
Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:



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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions: Berm and Channel Profiles

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Peconic River Shoreline

Earthen Berm (to left)

Dimension:
~2.5 to 6.0 ft above Tidal Wetlands

~50 ft wide

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Phragmites Marsh

Salt Panne with
Intertidal Marsh Fringe

Photo Looking West

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Panne looking east (left) and west (right):

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Intertidal Marsh:
Surrounding Panne (left)
Near Mouth of Marsh (right)

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

High Marsh:

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Southern Ditch

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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

Ditch Outfall to Peconic River:
Looking Upsteam (top)
Looking Downstream (bottom)

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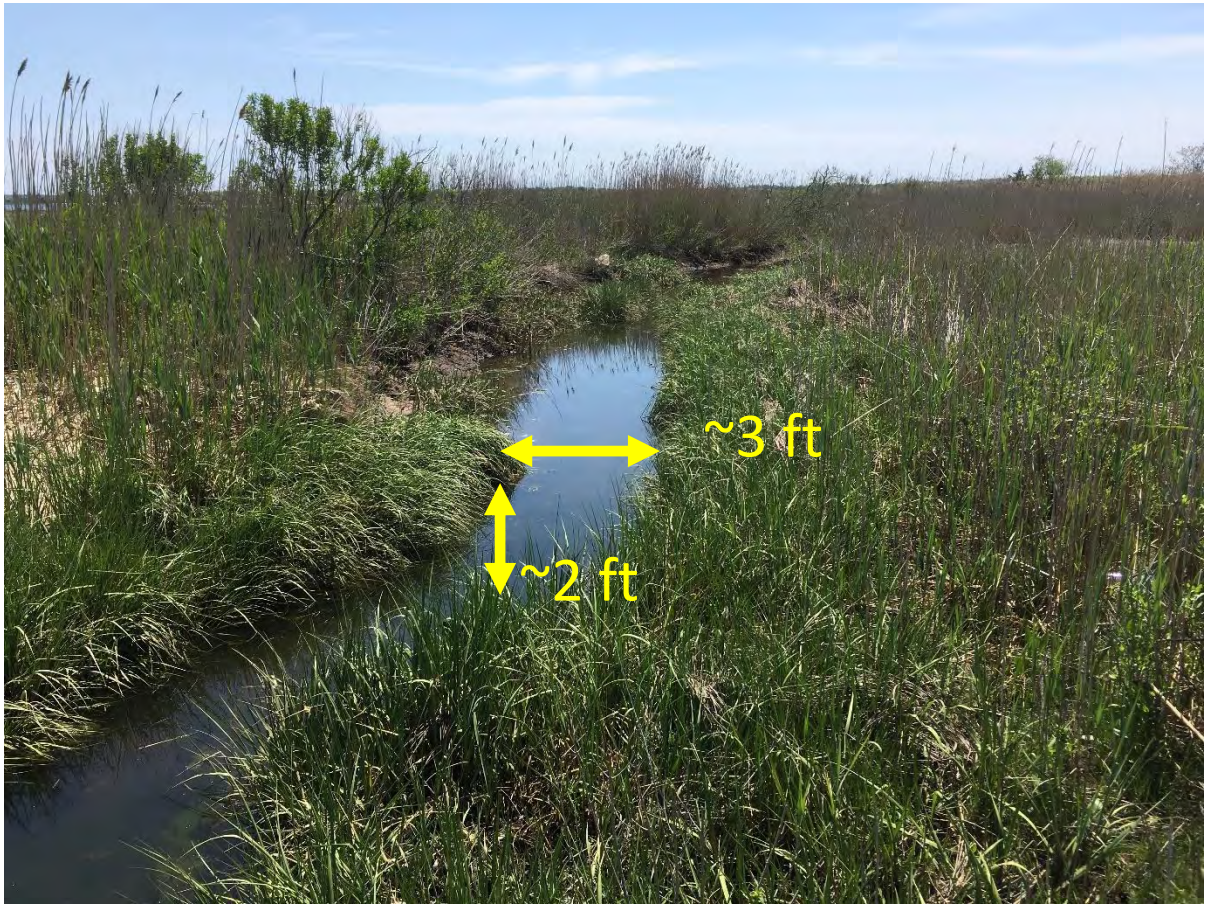
Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:



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Iron Point: Summary of Contracted Work and Technical Approach

Existing Conditions:

New York Natural Heritage Program indicates that Mexican Seaside Goldenrod (NYS Endangered) is known to occur at Iron Point. None were observed during surveys in October 2018 in suitable high marsh habitats.

Mexican Seaside Goldenrod in nearby Flanders Marsh complex.

Iron Point: Marsh Restoration Alternatives for Consideration

1. Construction of 2-3 new "cuts" within earthen berm (as per RFP)
   - Existing cut is approximately 70 ft wide (only ~20 ft) consists of marsh/tidal channel
   - Existing tidal channel/ditch is approximately 3 ft wide and 1.5-2.0 ft deep
   - Would require new channels to convey tide waters into marsh and through *Phragmites*
   - *Drawback: Tidal Prism Capture*
2. Complete removal of earthen berm
   - Similar to marsh shoreline to eastern section of Iron Point marsh
   - *Drawback: Large Excavation Volume*
3. Enlarge existing cut and create more extensive channel network by enlarging existing ditches and adding new channels.
   - Channel dimensions based on reference marshes
   - Efficient means of increasing tidal flow into the marsh
   - Following existing flow paths in marsh; site new creek tributaries within *Phragmites*
   - *Drawback: Greater Disturbance in Existing Native Marsh Areas*

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Iron Point: Marsh Restoration Alternatives for Consideration

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   - Existing cut is approximately 70 ft wide (only ~20 ft) consists of marsh/tidal channel
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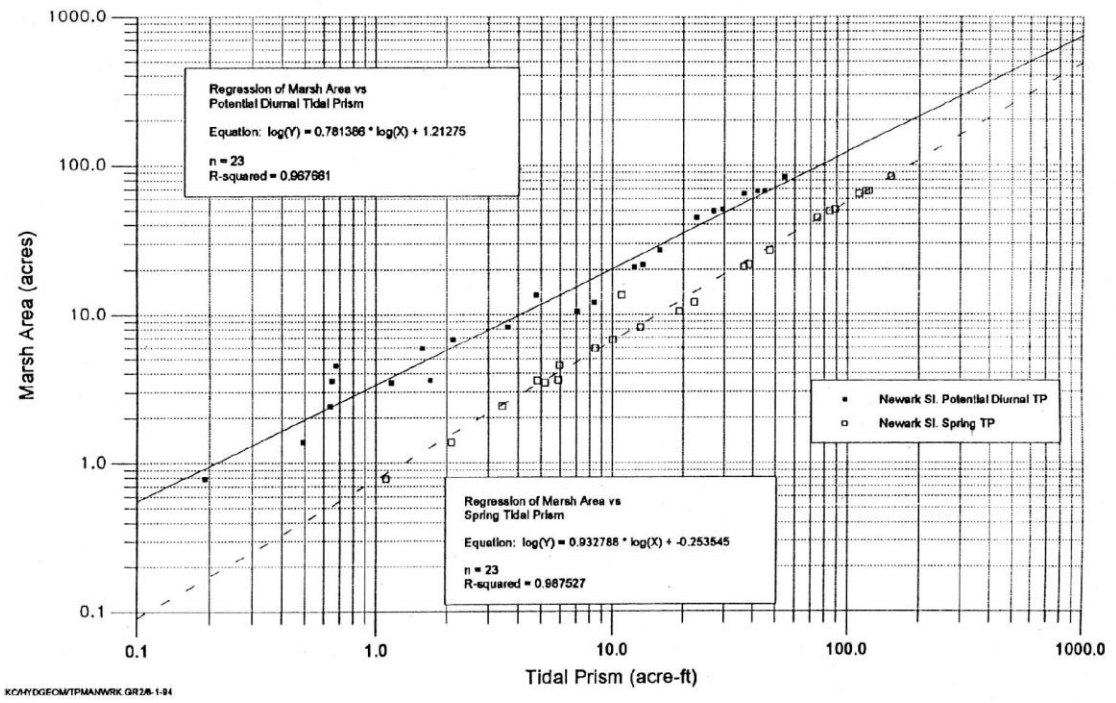
   - Would require new channels to convey tide waters into marsh and through *Phragmites*
   - *Drawback: Tidal Prism Capture*

A marsh's area is determines the volume of water that enters/exits the marsh on each tidal cycle.



Coats et al (1995)

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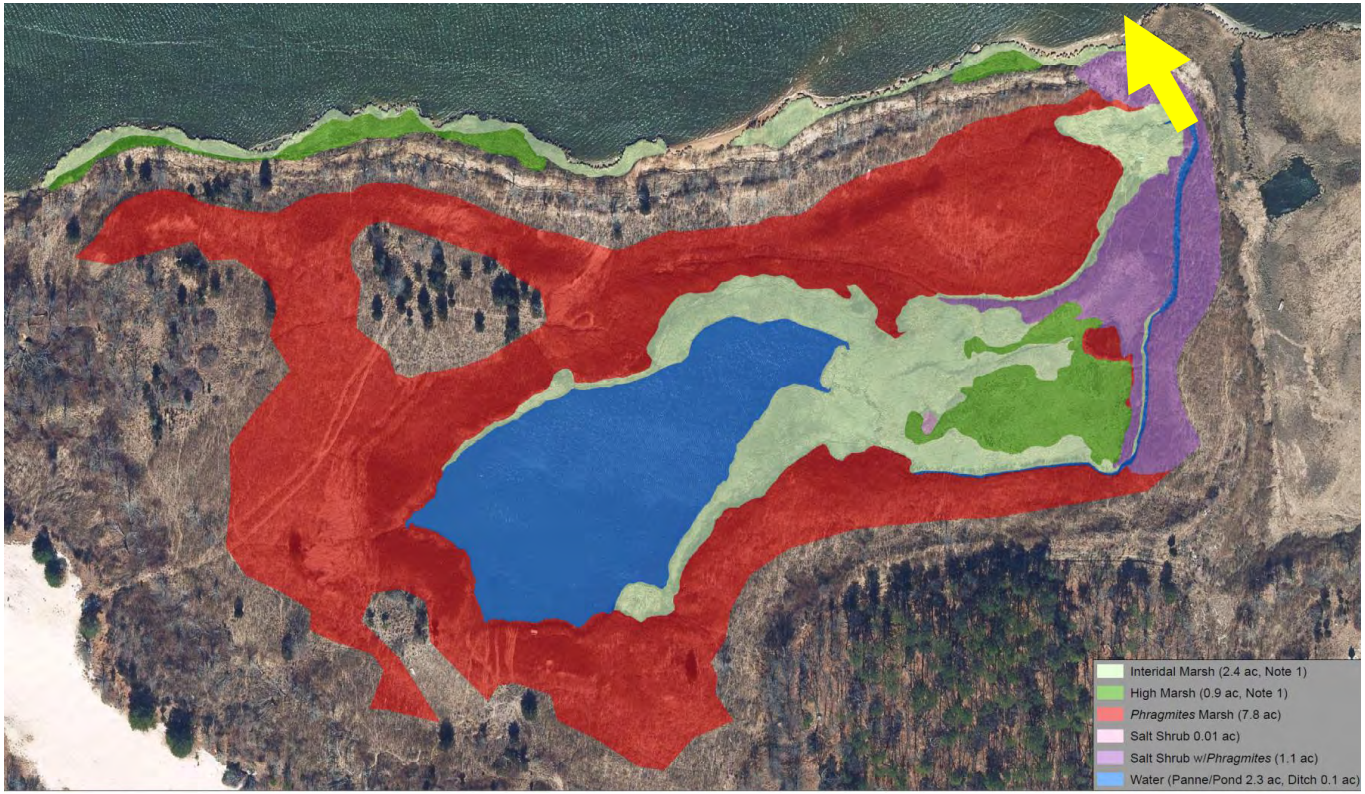
Iron Point: Marsh Restoration Alternatives for Consideration

1. Construction of 2-3 new "cuts" within earthen berm
   - *Drawback: Tidal Prism Capture*
   - 'Fixed' Tidal Prism Volume of Iron Point marsh is divided between multiple channels. The reduced water volume through each channel, may result in insufficient volume/velocity to flush sediments from channel mouth, resulting in sedimentation of the channel mouth.



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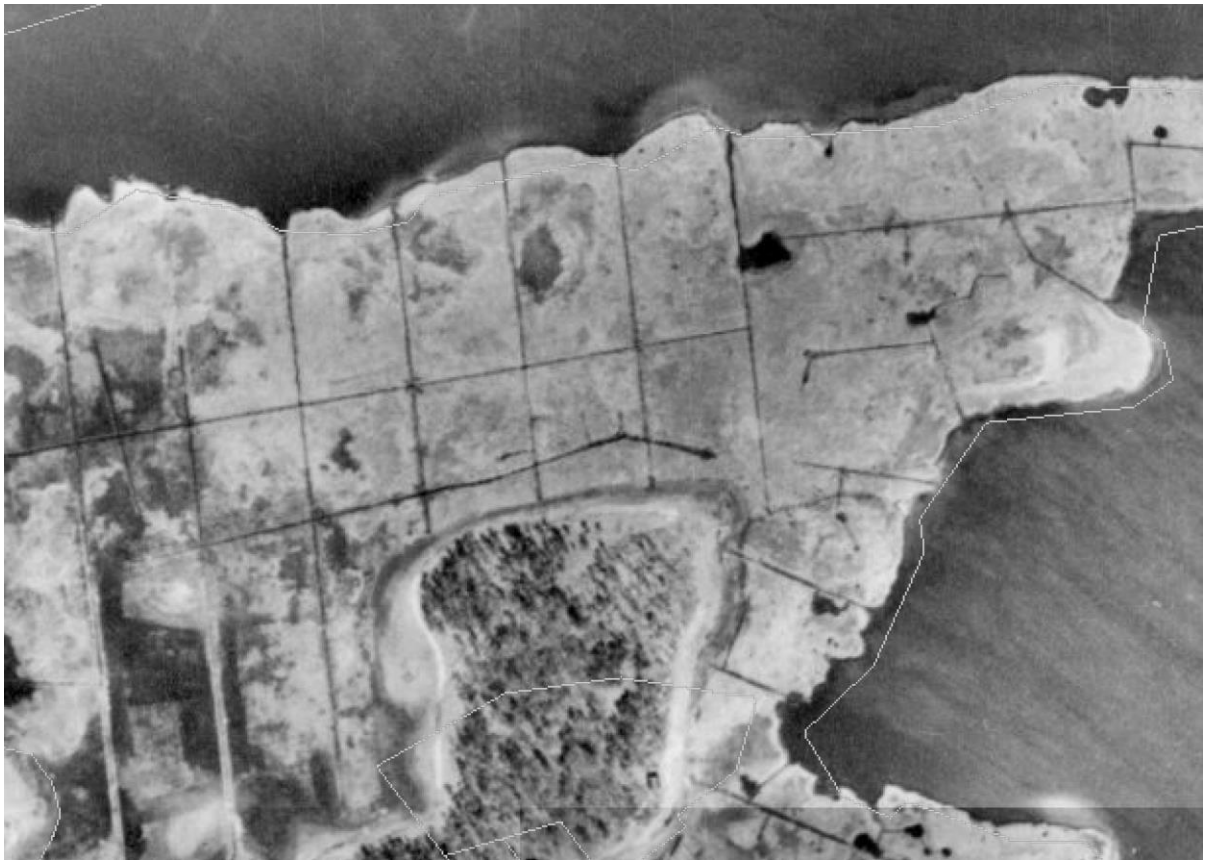
Iron Point: Marsh Restoration Alternatives for Consideration

1. Construction of 2-3 new "cuts" within earthen berm
   - *Drawback: Tidal Prism Capture*
   - 'Fixed' Tidal Prism Volume of Iron Point marsh is divided between multiple channels. The reduced water volume through each channel, may result in insufficient volume/velocity to flush sediments from channel mouth, resulting in sedimentation of the channel mouth.

Iron Point: Marsh Restoration Alternatives for Consideration

2. Complete removal of earthen berm
   - Similar to marsh shoreline to eastern section of Iron Point marsh
   - *Drawback: Large Excavation Volume; May Still Need Marsh Channels*



1962 aerial (Suffolk County GIS)

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Iron Point: Marsh Restoration Alternatives for Consideration

2. Complete removal of earthen berm
   - Similar to marsh shoreline to eastern section of Iron Point marsh
   - *Drawback: Large Excavation Volume; May Still Need Marsh Channels*

2007 aerial (Suffolk County GIS)

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Iron Point: Marsh Restoration Alternatives for Consideration

2. Complete removal of earthen berm
   - Similar to marsh shoreline to eastern section of Iron Point marsh
   - *Drawback: Large Excavation Volume; May Still Need Marsh Channels*

Iron Point Berm (left):
Berm Removal at Sawmill Creek (NYC Parks, 2018)

Iron Point: Marsh Restoration Alternatives for Consideration

3. RECOMMENDED ALTERNATIVE: Expand existing berm cut and Create more extensive channel network by enlarging existing ditches and adding new channels.
   - Efficient means of increasing tidal flow into the marsh (in terms of excavation quantity)
   - Utilize existing flow paths in marsh; site new creek tributaries within *Phragmites* as much as feasible
   - Channel dimensions shall be based on reference marshes, technical manuals
   - *Drawback: Greater Disturbance in Existing Native Marsh Areas*

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Iron Point: Schematic Plan for Marsh Restoration Actions

Legend:

1. Increase Channel Mouth Width by 300%
2. Increase Size of Berm Cut
3. Provide Consistent Ditch Slope from Panne to River
4. Provide More Extensive Creek Network

4a. New Channel between Panne and southern Ditch

4b. Enlarge northern Ditch

4c. Provide new Tributary Channel

5. Maintain Portion of Panne as Marsh Pond
6. Construction Access
7. Option: Partial Berm Cuts Stabilized with Bio-Engineering

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Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 1: Increase Channel Mouth Cross-Sectional Area by 300%

- Maintain and expand the one existing berm cut and channel to maximize tidal flood/ebb to marsh and maximize flushing of sediments from channel mouth.
- Increase cross-sectional area of cut/channel below MHW.
- Channel dimensions to be based on technical manuals and reference wetlands.

Ditch Outfall to Peconic River:
Looking Upstream (top)
Looking Downstream (bottom)

Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 2: Increase Size of Existing Berm Cut

- Convert upland berm to salt shrub/high marsh. Excavate 80 feet of upland berm to salt shrub/high marsh elevation.
- Convert 5200 square feet of salt shrub habitat to intertidal marsh by excavation and re-planting.

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Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 3: Re-Grade Channel to Provide Consistent Slope from Panne to Peconic River

- Remove blockages and high points in channel profile to provide improve drainage and flushing of the marsh at low tide.

Main Ditch to Peconic River:
Obstruction Looking Upstream (top)
Obstruction Looking Downstream (bottom)

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Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 4: Provide More Extensive Network of Marsh Creek Channels to Increase Flood/Ebb of Tide Waters into Marsh

- Channel network layout (i.e. density and length based on reference wetlands and technical manuals).
- For example, channels recommended within 100 feet of marsh locations (NYC Parks, 2016).
- Construct channel between panne and southern ditch
- Restore/enlarge/extend northern ditch
- Provide new tributary channel into *Phragmites* depression.
- Re-plant disturbed areas and new channel banks with *Spartina alterniflora*

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Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Actions 1, 2, and 4: Use Reference Marshes to Inform Channel Dimensions

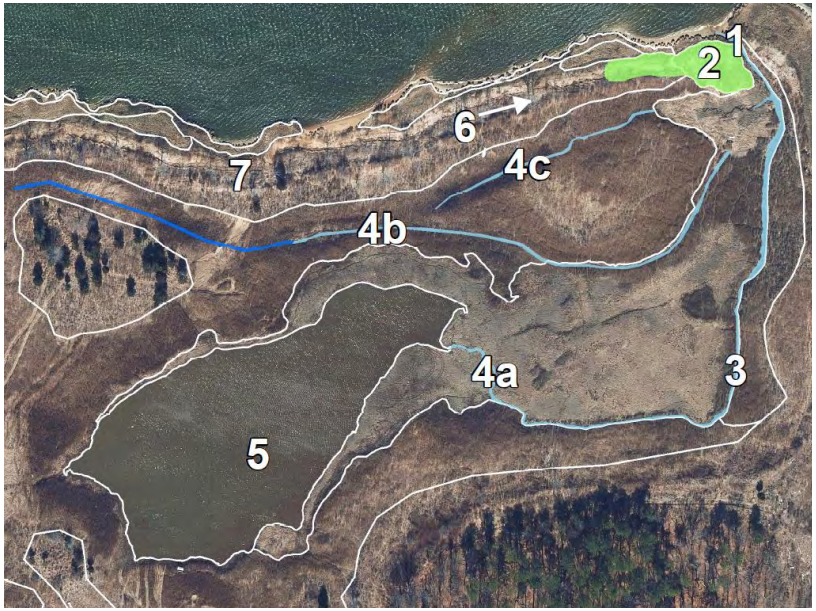
Potential Reference Marshes:

Reeves Bay marsh near Big Duck, Flanders (left)
Headwaters of Goose Creek, Flanders (right)

Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 5: Maintain Portion of Panne as Marsh Pond

- The recommended channel (4a) does not extend into lowest elevation of panne to maintain pond/panne habitat.



Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 6: Construction Access Along Top of Existing Berm

- 12’ access route requiring clearing of upland trees, shrubs, and vines.
- Re-plant/re-seed access route with native maritime plants
- Marsh can be accessed for construction without potential impacts to CCE Pilot Reactive Barrier location.

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Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 7 (Option): Partial Berm Cuts Stabilized with Bio-Engineering Practices

- Allow additional flood waters to enter marsh during spring high tides.
- Higher elevation within cuts to force waters to drain through main channel.
- To prevent scouring/ erosion, cut would need to be stabilized by erosion control measures such as:
  - Dense native shrubs plantings
  - Coir blankets, etc.

Iron Point: Schematic Plan for Marsh Restoration Actions

Restoration Action 7 (Option): Partial Berm Cuts Stabilized with Bio-Engineering Practices

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Projected Deliverables for Iron Point Wetland Restoration

Final Report on Recommendations and Conceptual Plans

The report shall be presented at the *Final Presentation/Wrap-Up Meeting*:

General Outline of Final Report on Recommendations and Conceptual Plans

a. Existing Conditions: Summary report on findings of field observations and data analysis.

b. Recommended Solutions: Recommendations for tidal flow enhancement at Iron Point, reasoning for recommendations, and expected obstacles and advantages for implementation.

c. Design and Construction Considerations: The report shall present:

- Preliminary cost estimates for design and construction
- Identification of access routes and work staging areas
- Sediment contaminant concentrations from two sediment borings in areas recommended for excavation of new marsh channels and implications for disposal of excavated marsh sediments
- Environmental permitting requirements and additional sediment testing requirements for regulatory approval

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Projected Deliverables for Iron Point Wetland Restoration

Final Report on Recommendations and Conceptual Plans

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General Outline of Final Report on Recommendations and Conceptual Plans

d. Project Concept Drawings: Concept plan sheets below may be adjusted as necessary to fit within budget constraints, yet still fulfill the project objectives. A general description of expected plan sheets is presented below:

- Sheet 1 – Overview aerial of entire project area noting existing proposed conditions;
- Sheets 2-3– Plan and section views of proposed condition including recommended berm gaps and marsh channels, access routes, work limits, sensitive ecological resources and infrastructure, and property boundaries;
- Sheet 4- Typical details of proposed work.

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Project Timeline

Task	*Completion Date*
Kick-off Meeting (Task 5)	April 18, 2018
QAPP Approval Procurement (Task 1)	August 23, 2018
Research and Site Analysis (Task 2)	September-December 2018
Visioning and Schematic Design (Task 3)	December 2018-January 2019
Interim Progress Meeting (Task 5)	February 13, 2019
Recommendations and Conceptual Restoration Plans (Task 4)	February 15, 2019- June 15, 2019
Presentation of *Draft Final Report* at Final Wrap-up Meeting (Task 5)	June 15, 2019
Submission of *Final Report* (Task 6)	July 15, 2019

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Meetinghouse Creek- Main Road Wetland: Summary of Contracted Work and Technical Approach

Introduction:

The purpose of the project is to provide a 0.6 acre stormwater treatment wetland to receive flow from an existing outlet structure. The wetland is proposed to treat the water quality volume from a 1.2 inch rainfall with flows exceeding this rain event will transverse an emergency spillway to the existing NYSDEC-regulated Phragmites marsh. Our team shall collect following environmental data and obtain the following availble GIS-data:

•Topographic data required to prepare conceptual plan for recommended sediment forebay
•GPS locations of existing stormwater drainage infrastructure;
•Location, dimensions, materials, and condition of existing stormwater outfall;
•Locations of existing utility infrastructure;
•GPS locations of freshwater wetland boundary;
•GPS locations of upland and wetland community boundaries and invasive plant stands;
•LIDAR or digital elevation model data to assess general site topography, and;
•Suffolk County real property records

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Meetinghouse Creek- Main Road Wetland: Summary of Contracted Work and Technical Approach

Critical Questions (Identified Prior to Commencement of Field Work:

•How much upland area is located on the site (regulatory agencies will not authorize using an existing wetland for stormwater treatment)?

•Is there sufficient upland area with adequate elevation to construct the Town's recommended 0.6 acre stormwater wetland?

- Because this project is a retrofit of an existing stormwater system and is not being developed as the direct result of a new construction project, the proposed best management practice is not subject to the full suite of stormwater management standards in the New York Stormwater Management Design Manual.

•Does sufficient upland area with adequate elevation exist to increase the forebay area to treat the now required 1.4 inch rainfall event, per the New York State Stormwater Design Manual (original Town recommendations were based on previous version of NYS Stormwater Design Manual)?

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Meetinghouse Creek- Main Road Wetland:

Background: A 2.61 acre Town of Riverhead property bordered by the Aquebogue Cemetery (to the west) and private property to east & south including the Crescent Duck Farm downstream of the site.

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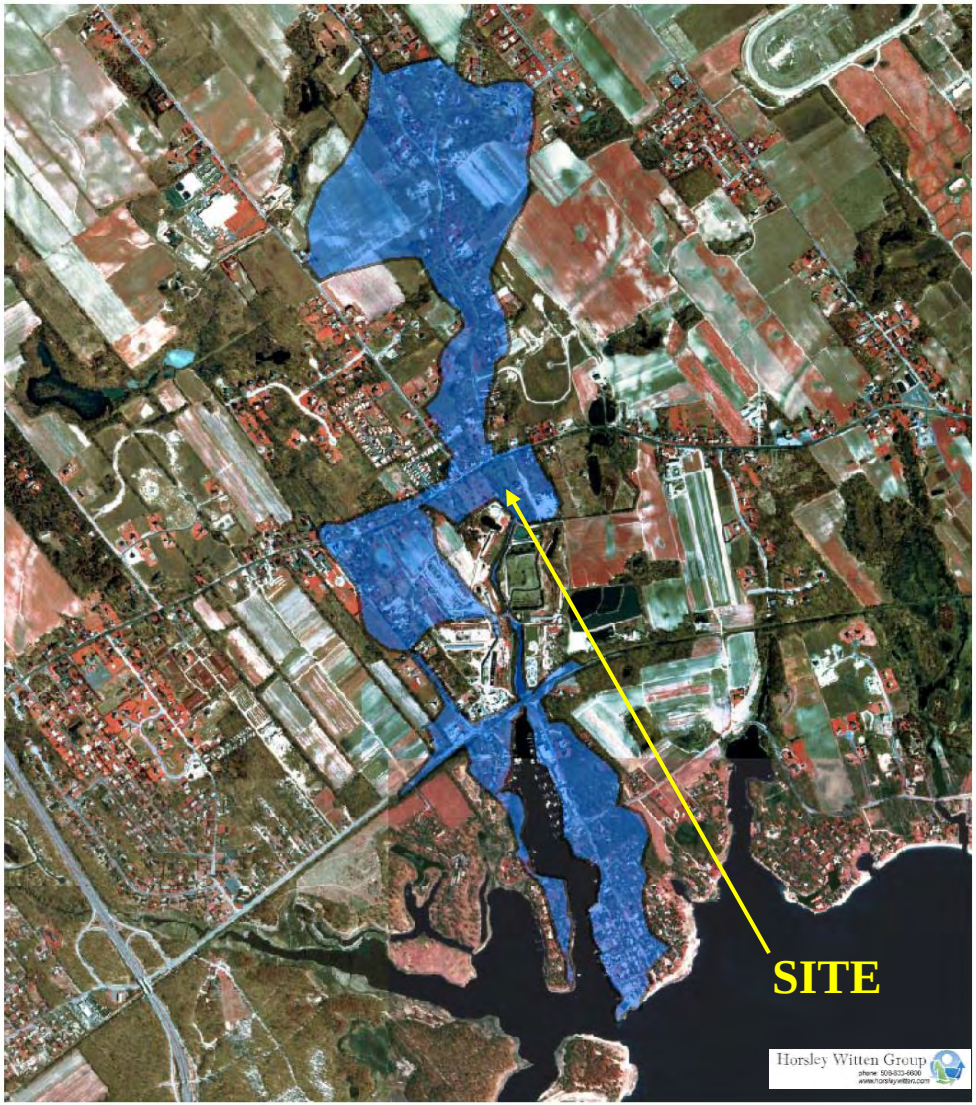
Meetinghouse Creek- Main Road Wetland:

Background: A site is the upstream limit of surface waters associated with Meetinghouse Creek (which empties in Flanders Bay approximately 1.2 miles to the south).

Watershed extends much farther north encompassing 32.1 acres north of Main Road.

The stormwater wetland is intended to reduce sedimentation and improve water quality a 5.6 acre section of the Meetinghouse Creek watershed.

Meetinghouse Creek Watershed Management Plan completed by Horsley Witten Group (2006).



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The stormwater wetland is intended to improve in a 5.6 acre section of the Meetinghouse Creek watershed.

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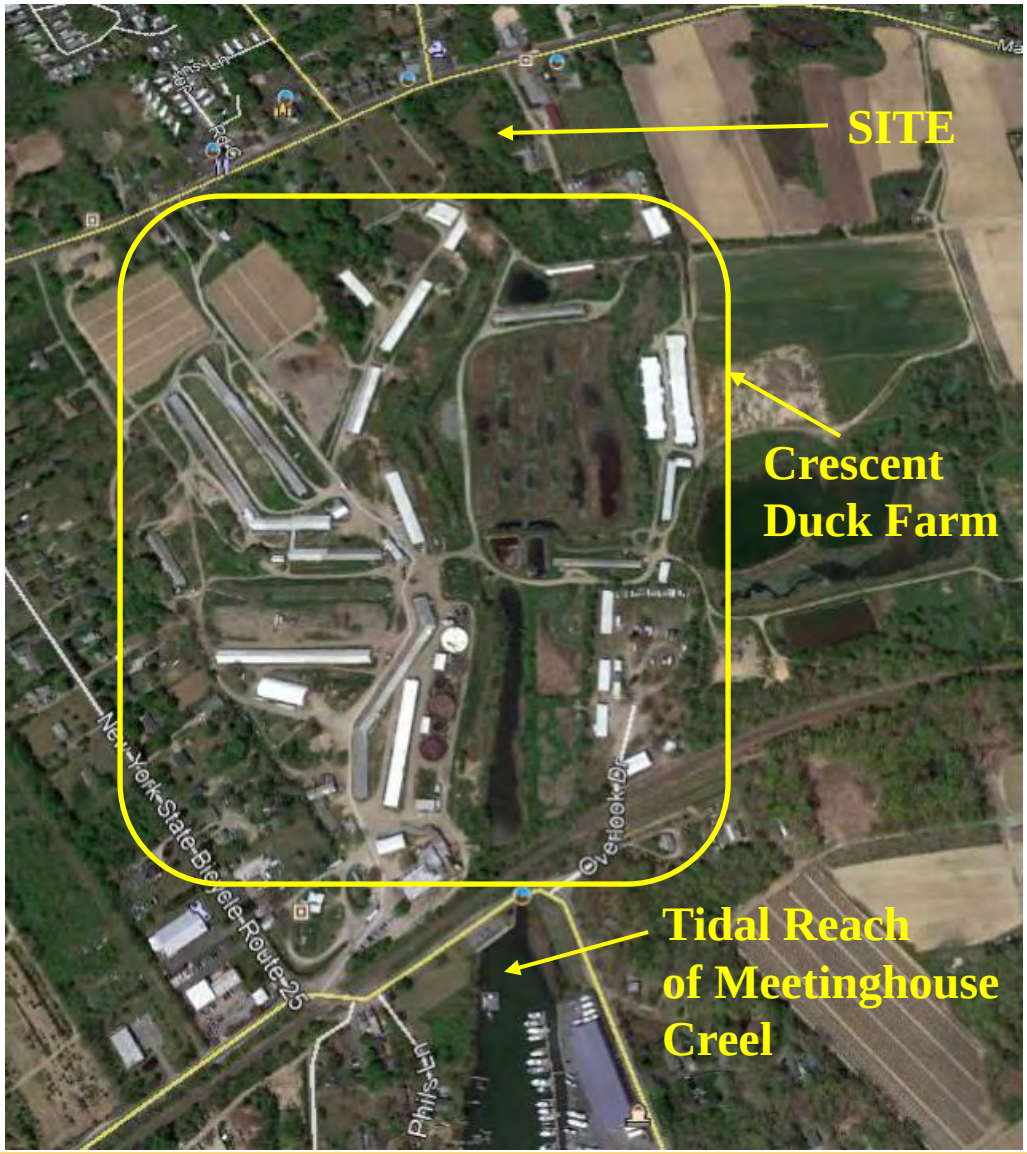


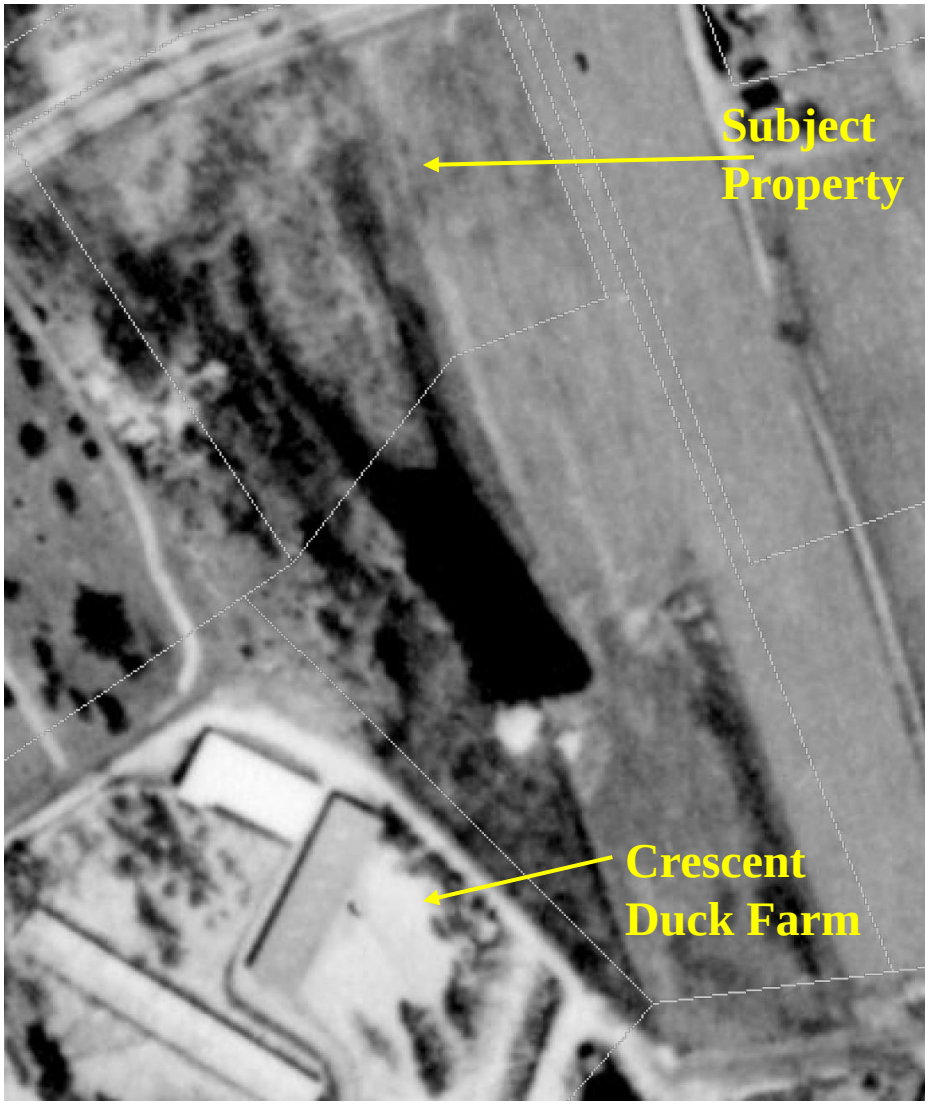
Meetinghouse Creek- Main Road Wetland:

Background:

In 1962, the pond appears highly manipulated with a channelized approach to the duck farm.

The two existing flow paths for water in the current marsh are relics of the upper branches of this pond.

Source: Suffolk County GIS Mapper



Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions: Upland Area (1.6 acres); Freshwater Wetland (1.0 acres)

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Main Road looking towards wetland.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Main Road Stormwater Outfall Culvert:

Existing 24” reinforced concrete pipe outfall and headwall

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Main Road Stormwater Outfall Culvert:

Flow path to wetlands from outfall.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Successional forest between Main Road and wetland.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Successional forest located to east of wetland.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Successional forest located to east of wetland.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Successional forest located to east of wetland.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

‘Stream’ flowing from *Phragmites* marsh (Southwest corner of marsh)

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Downstream end of eastern ditch in *Phragmites* marsh (Southeast corner of marsh)

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

Saturated, mucky soils with watercress where flow paths converge (to south of marsh)

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Existing Conditions:

'Stream' exiting *Phragmites* marsh to pond on adjacent property to south.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Meetinghouse Creek- Main Road Wetland:

Critical Questions or Assumptions Impacting Project Feasibility (Post Field Work):

•Will the water quality improvement benefits of a stormwater wetland be realized downstream of the existing duck farm (currently featuring a waste treatment plant)? How much upland area is located on the site (regulatory agencies will not authorize using an existing wetland for stormwater treatment)?

•Shallow water zones of the stormwater wetland will be highly susceptible to colonization by *Phragmites*. Creation of additional wetland area is environmentally beneficial and the adjacent uplands do not feature high-quality native plant communities. However, over the long-term, the stormwater wetland will likely not provide high quality wetland habitat for plants or wildlife.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Meetinghouse Creek- Main Road Wetland:

Options to Consider:

•Alternative 1: Provide 0.4 (0.87 acre-feet) acre stormwater wetland with sediment forebay (not including buffer). Will likely not meet all NYSDEC Design Standards, but may accommodate standard Water Quality Volume. Discharge to existing *Phragmites* marsh. Higher Construction Cost. Greater water quality improvement, i.e. greater settlement of fine sediments and pollutant (pathogens and nutrients) due to increase wetland length. Pathogens and nutrients are the priority pollutants for Meetinghouse Creek (as per Meetinghouse Creek Watershed Management Plan (Horsely Witten, 2006).

•Alternative 2: Provide sediment forebay only to accommodate entire Water Quality Volume and maintenance access. Lower construction costs due to reduce clearing, excavation, construction. Less water quality benefits to downstream surface waters. Sediment removal only. Note: Sediment forebay only was original recommendation in the Meetinghouse Creek Watershed Management Plan.

•Alternative 3: Hybrid. Alternative 1 with forebay. Location of forebay and maintenance access selected/designed such that it could be constructed without larger stormwater wetland.

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Projected Deliverables for Meetinghouse Creek- Main Road Wetland Project

Final Report on Recommendations and Conceptual Plans

The report shall be presented at the *Final Presentation/Wrap-Up Meeting*:

General Outline of Final Report on Recommendations and Conceptual Plans

a. Existing Conditions: Summary report on findings of field observations and data analysis.

b. Recommended Solutions: Stormwater management and habitat enhancement recommendations, and expected obstacles and advantages for implementation.

c. Design and Construction Consideration: The final report shall present:

- Preliminary cost estimates for design and construction;
- Identification of construction staging areas;
- Identification of permanent access area/route to allow for annual removal of accumulated sediments within forebay and micropool maintenance;
- Identification of unavoidable deviations from 2015 NYS Stormwater Design Manual
- Environmental permitting requirements;
- Sediment testing requirements (if any).

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Projected Deliverables for Meetinghouse Creek- Main Road Wetland Project

Final Report on Recommendations and Conceptual Plans

The report shall be presented at the *Final Presentation/Wrap-Up Meeting*:

General Outline of Final Report on Recommendations and Conceptual Plans

d. Project Concept Drawings: Concept drawings for the stormwater wetland and/or sediment forebay updated to meet updated to meet the design standards contained in the 2015 NYS Stormwater Design Manual (NYSDEC, January 2015). Plan sheets below may be adjusted as necessary to fit within budget constraints, yet still fulfill the project objectives. A general description of expected plan sheets is presented below:

- Sheet 1 – Overview aerial of entire project area;
- Sheets 2-3– Existing and proposed conditions including infrastructure, maintenance access locations/routes, freshwater wetland boundary, potential mitigation areas to compensate for wetland disturbance, limits of clearing and ground disturbance, and property boundaries;
- Sheet 4- Typical details of proposed work.

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Project Timeline

Task	*Completion Date*
Kick-off Meeting (Task 5)	April 18, 2018
QAPP Approval Procurement (Task 1)	August 23, 2018
Research and Site Analysis (Task 2)	September-December 2018
Visioning and Schematic Design (Task 3)	December 2018-January 2019
Interim Progress Meeting (Task 5)	February 13, 2019
Recommendations and Conceptual Restoration Plans (Task 4)	February 15, 2019- June 15, 2019
Presentation of *Draft Final Report* at Final Wrap-up Meeting (Task 5)	June 15, 2019
Submission of *Final Report* (Task 6)	July 15, 2019

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk Alewife Access and Habitat Enhancement: Summary of Contracted Work and Technical Approach

Introduction:

According to RFP, the purpose of the project is to restore alewife access to Stepping Stones Pond on the southwestern end of Lake Montauk and restore the historic flow in and out of Big Reed Pond by replacing an undersized impassible culvert and/or Phragmites removal.

Our contract specifies the evaluation of barriers to fish passage and development of schematic and conceptual designs and recommendations for fish passage improvements at Big Reed Pond and Stepping Stones Pond.

Subsequent discussions with Peconic Estuary Program and Suffolk County Parks have indicated that actions to correct a well-documented harmful blue-green algae (Aphanacapsa) bloom in Big Reed Pond are also an important priority.

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk Alewife Access and Habitat Enhancement: Summary of Contracted Work and Technical Approach

Evaluate Fish Passage Conditions at Stepping Stones Pond and Big/Little Reed Pond; Prepare Schematic Designs:

•Determine actual barriers to fish passage by evaluating physical and hydraulic conditions at potential barriers.
•Collect ecological information on wetland and ecological community boundaries, significant ecological communities & habitats for rare species, potential site access routes.
•Utilize available GIS data including LIDAR/DEM, aerials, and property ownership.
•Prepare schematic design for each observed fish barrier. Schematic designs will likely be drawn on existing aerial photographs with sufficient detail to promote discussion and a thorough understanding of the proposed approach, but not the finished, presentation quality of the final concept drawings.

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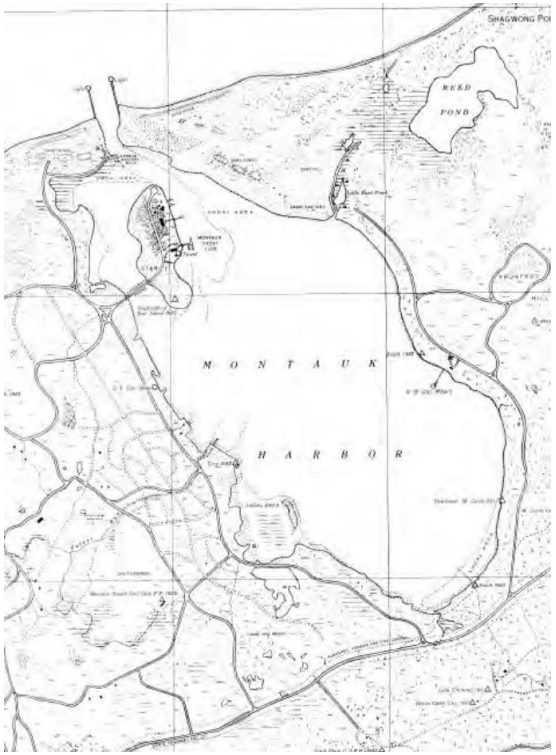
Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk Alewife Access and Habitat Enhancement:

Background:



Left: 1902 map of Great Pond (i.e. Lake Montauk

Right: Post-dredging map

Both maps from Liddle and Abramson (2011)

Lake Montauk was historically a freshwater lake separated from Gardiners Bay by a narrow isthmus. It was opened to Gardiners Bay in 1927 for development purposes.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk Alewife Access and Habitat Enhancement:

Background:

Alewife Migrations in Lake Montauk:

<u>Big Reed Pond</u>

- Anecdotal reports of alewife run in Big Reed Pond in 1990s (L. Penny?)
- NYSDEC Freshwater Fisheries surveys have found juvenile alewives in Big Reed Pond, but not adults. Therefore, alewife population run may occur. Otherwise, landlocked population may exist.

<u>Stepping Stones Pond</u>

- In 2018, first documentation of alewife attempting to enter Stepping Stone Pond by Kate Rossi-Snook.
- Alewife scales (3) observed by Land Use on May 4, 2018 on downstream side of culvert.

Stepping Stones Pond

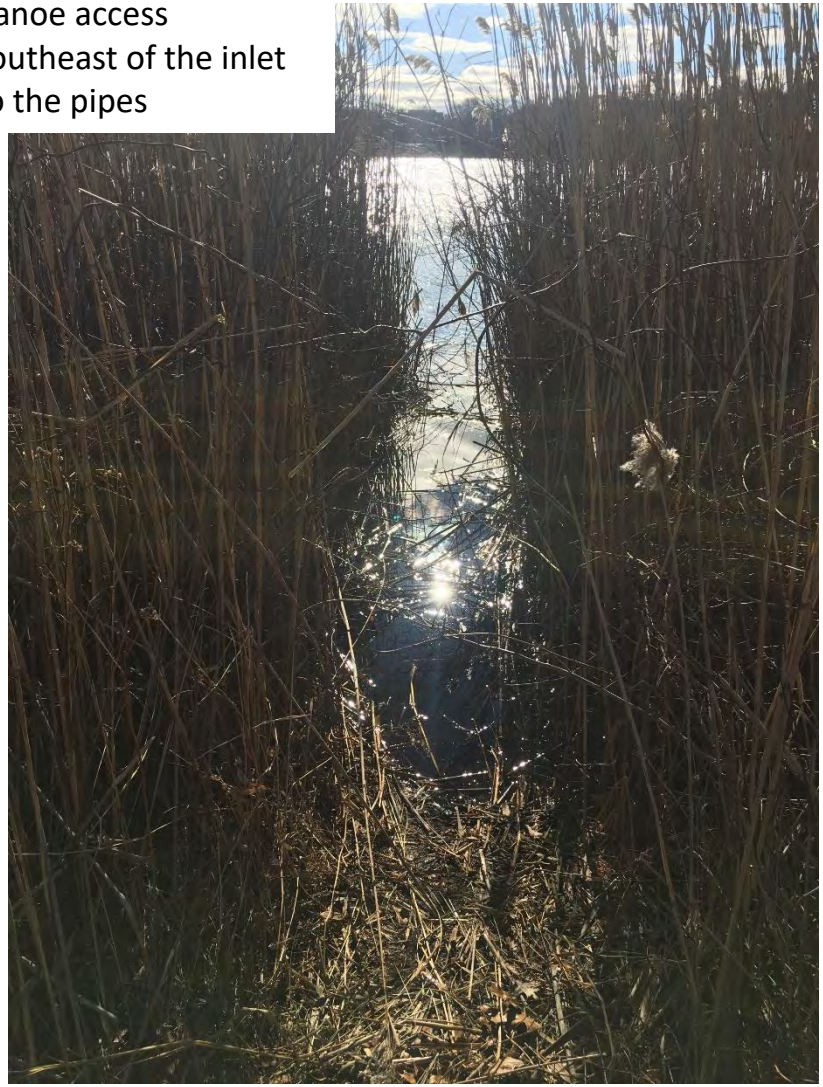
Stepping Stones Pond

- 2, 12-inch pipes

Stepping Stones Pond

- Fish passage barrier
  - Perched during certain flows
  - Undersized with no roughness
  - Velocity barrier during most tides/flows
  - Depth barrier – usually only a couple inches of water, which is not enough for herring – needs to be >1.5 times the body height (~3 inches)

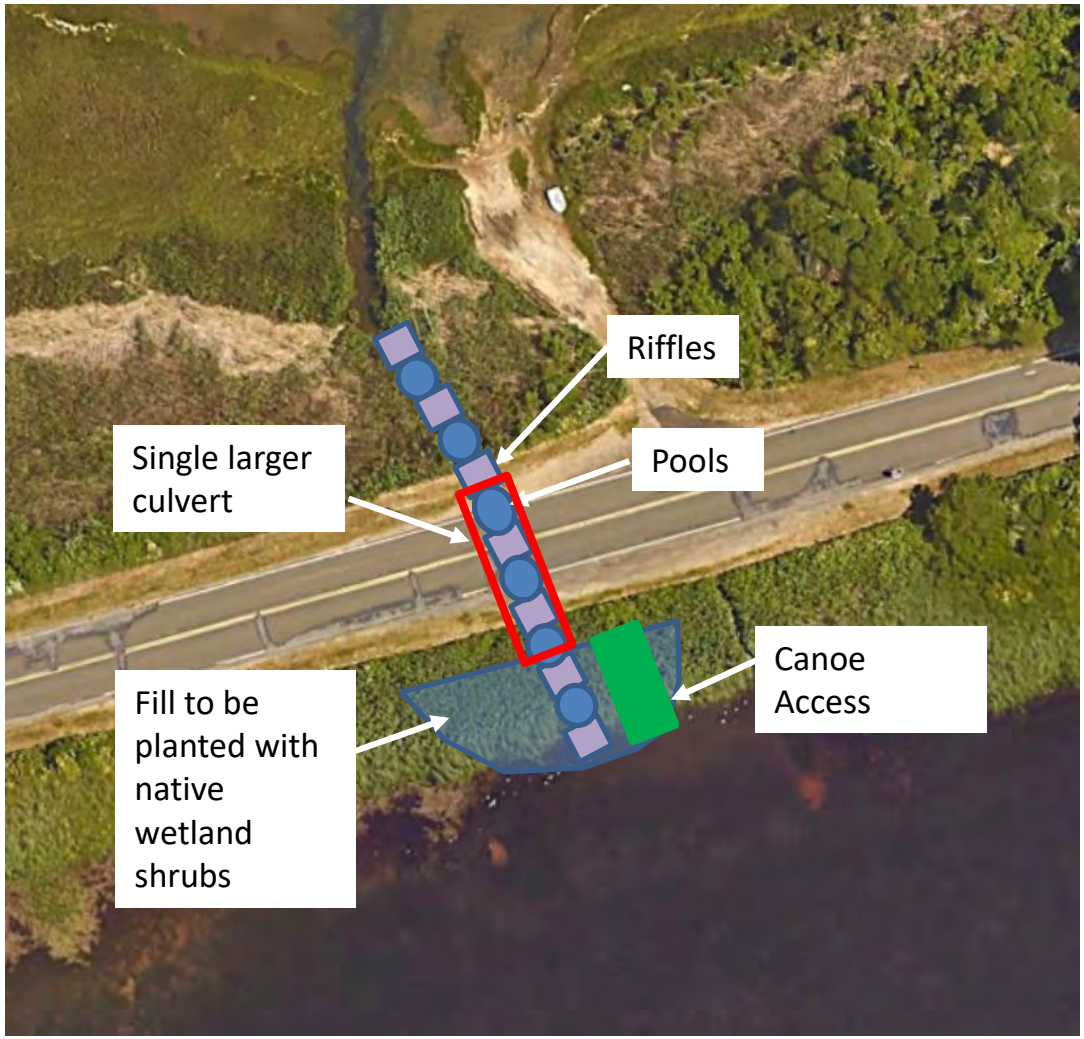
Canoe access southeast of the inlet to the pipes



Stepping Stones Pond, Survey data collected

Stepping Stones Pond

- Goal: improve organism passage **while maintaining Pond elevation to prevent intrusion from tides**
  - Herring, American eel
- Replace culverts with single larger box culvert with natural substrate
- Construct riffle so that riffle crest is at desired elevation to keep tides out, but also not flood the road
- 7-8 riffle-pool sequences to make up 3.5 feet of elevation over ~110 feet of channel length
- Each riffle ~0.5ft high, 15ft long
- Proposed slope ~3%
- Move canoe access to fill area
- Mitigation location for fill to be identified, if required by NYSDEC/Town of East Hampton



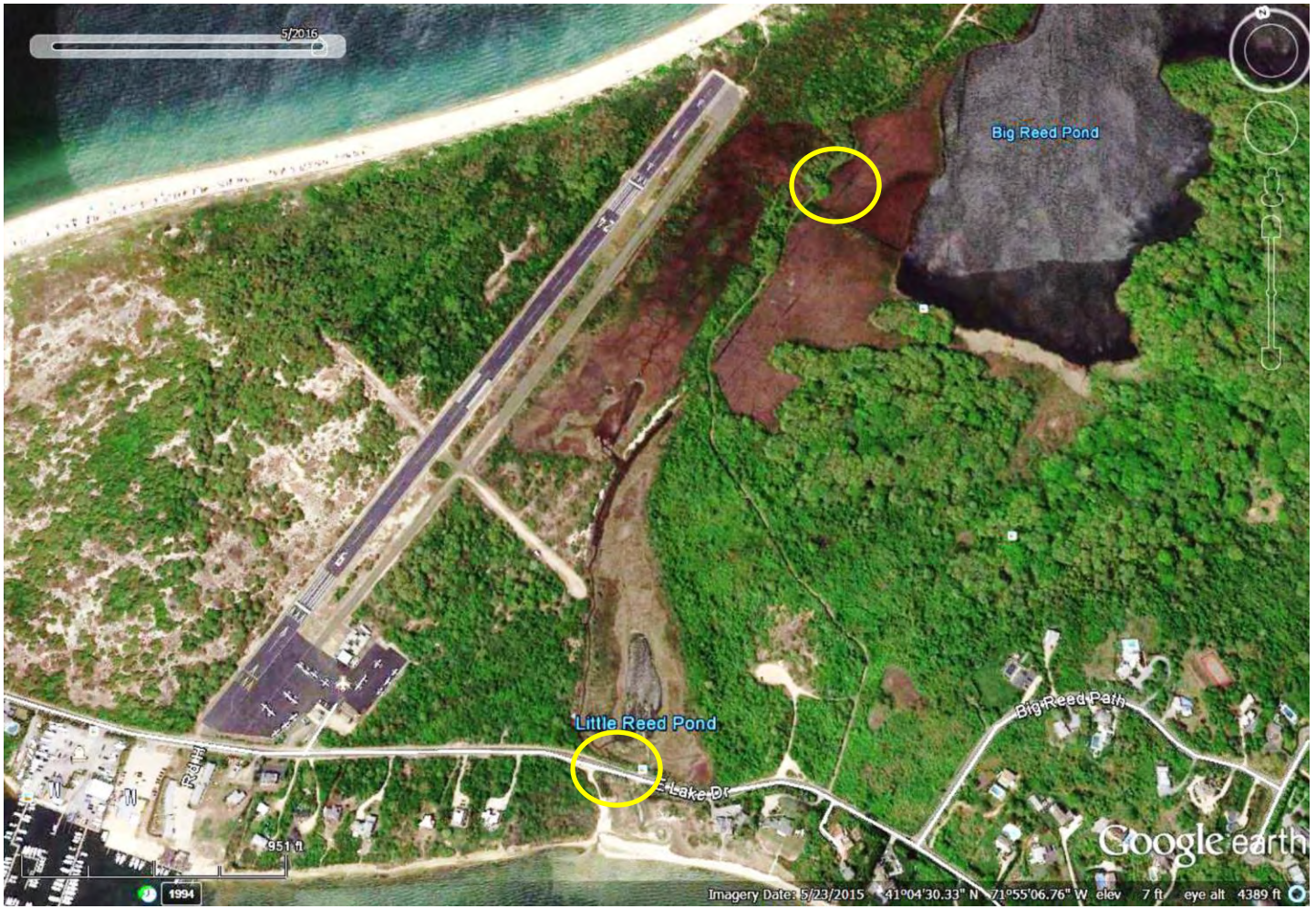
Wellingsley Brook Dam Removals, Plymouth, MA

Riffle-Pool Design; ~3% slope

Sawmill Dam Removal, Plymouth, MA
Riffle-Pool Design; ~3% slope

Eel River Culvert Replacement, Plymouth, MA
Natural bottom box culvert with habitat

Big Reed Pond culvert locations



Little Reed Pond

- 3-ft pipe is not a fish passage barrier
- Continuous flow
- Sufficient depth

Little Reed Pond Culvert

Big Reed Pond

- 12-inch plastic pipe flush with ground
- Passable except during low flows, but there's an attractant issue – small entrance is intimidating for fish
- Solution: 2ft pipe buried would provide greater width and space without impacting the road elevation or lake elevation

Big Reed Pond,
Survey data collected

Suffolk County Parks road on earthen berm separating Big Reed Pond from downstream waters.

Big Reed Pond looking upstream (east) from culvert.

Big Reed Pond looking downstream (west) from culvert.

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk-Alewife Access and Habitat Enhancement: Summary of Contracted Work and Technical Approach

Harmful Blue-Green Algae Bloom and Fish Kill:

• Harmful Blue Green Algae Blooms 2010-2015; Fish Kill in 2010.

• At Kick-off Meeting, Land Use requested authorization from PEP and stakeholders to investigate the potential for fish community manipulation (e.g. white perch removal) to reduce algae blooms through trophic effects. PEP and SC Parks indicated that this would be acceptable.

• The NYSDEC fisheries data has been reviewed and, at this time, there is not enough data to support a definitive link between white perch abundance and blue-green algae blooms. Additional surveys and data are necessary to conclude that the blooms are impacted by the structure of the fisheries community and (if trophic effects are a cause) develop a plan for white perch removal.

• Our Final Report will include recommendations for additional biological monitoring/surveys needed to assess the potential impact of white perch abundance on algal biomass/ composition along with other factors that could contribute to the blue-green algae blooms and fish kill including continued water quality data and evidence of saltwater intrusion.

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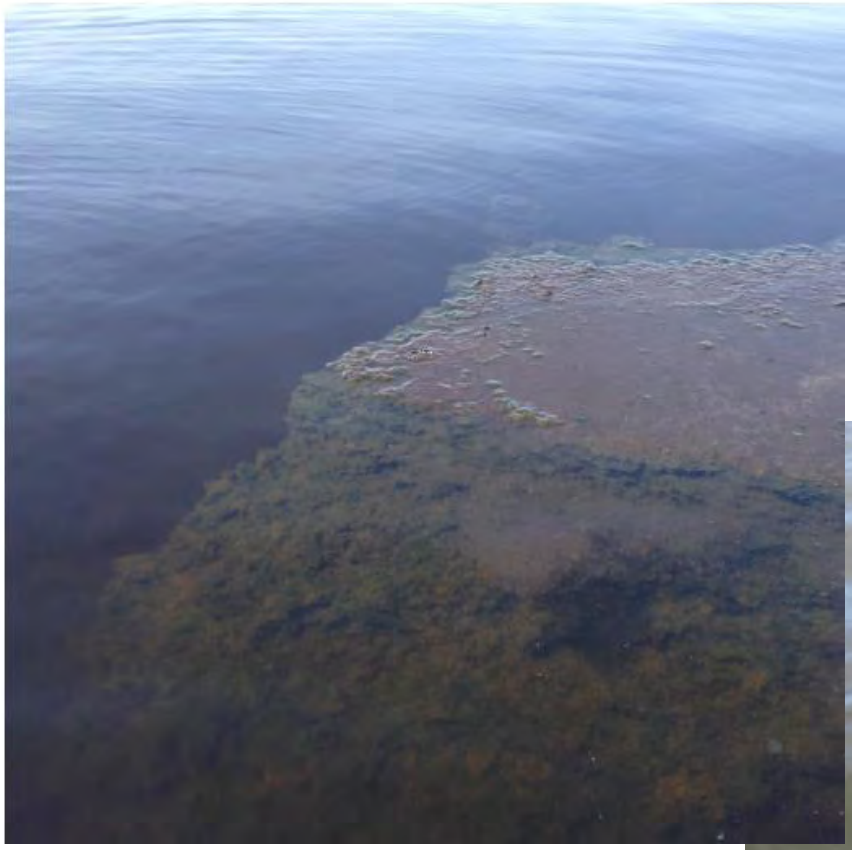
Big Reed Pond and Stepping Stones Pond: Significant Natural Resources and Rare/Protected Species, as per NYNHP

Natural Resource	NYS Status	Habitat	Location
Clustered Bluets	Endangered	Coastal Plain Pondshores	Big Reed Pond
Whorled Marsh Pennywort	Endangered	Coastal Plain Pondshores	Big Reed Pond
Sandplain Wild Flax	Threatened	Maritime dunes, shrublands, and grasslands	Big Reed Pond and Stepping Stone Pond
Southern Arrowwood	Threatened	Maritime dunes, shrublands, and grasslands	Big Reed Pond and Stepping Stone Pond
Salt-marsh Spike Rush	Threatened	Coastal Plain Pondshores	Stepping Stones Pond
Long-tubercled Spike Rush	Threatened	Coastal Plain Pondshores, High Salt Marshes	Stepping Stones Pond

Big Reed Pond: Harmful Blue-Green Algae Bloom



Photos from Third House Nature Center

Big Reed Pond: Trophic Cascade--another explanation for the algae bloom?

Bioremediation Study of a Shallow Lake in South-Central Maine:

Combining top-down and bottom-up approaches to improve water quality

Haliwell and Evers (2010)

Figure 1. Nuisance blue-green algal bloom on East Pond (Alden Camps) during late summer 2006 (photo credit: Dave Halliwell, Maine DEP).

Warmwater Shallow Lake Trophic Cascade

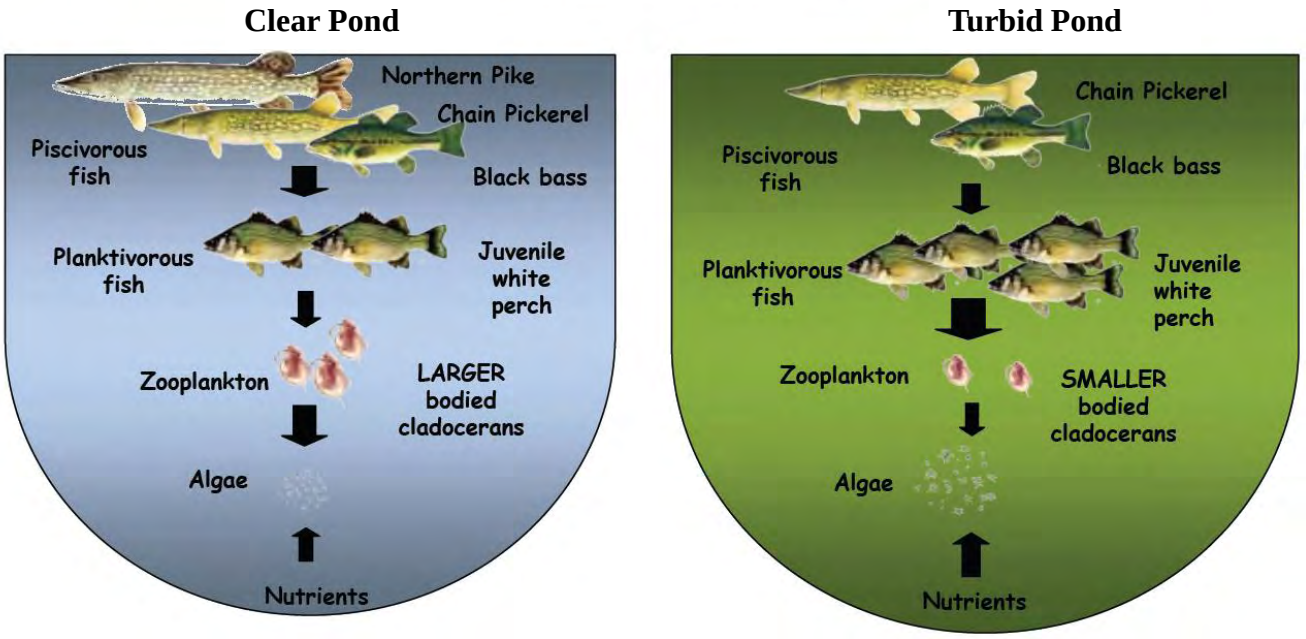


Figure 2. Boatload of adult white perch captured by trap-netting and removed from East Pond during the early spring of 2007 (photo credit: Ryan Burton, Maine DEP).

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Lake Montauk-Alewife Access and Habitat Enhancement: Summary of Contracted Work and Technical Approach

Harmful Blue-Green Algae Bloom and Fish Kill:

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Projected Deliverables for Lake Montauk-Alewife Access and Habitat Enhancement:

Final Report on Recommendations and Conceptual Plans
The report shall be presented at the *Final Presentation/Wrap-Up Meeting*:

General Outline of Final Report on Recommendations and Conceptual Plans for Alewife Access Improvements

a. Existing Conditions: Report on findings of field observations and data analysis.

b. Recommended Solutions: Enhancement recommendations for each identified fish obstruction, reasoning for recommendations, and expected obstacles and advantages for implementation.

c. Recommendations for Additional Biological Monitoring to Support Fisheries Managment
d. Design and Construction Considerations: The report shall present:

- Preliminary cost estimates for design and construction of each project
- Identification of access routes and work staging areas
- Environmental permitting requirements
- Sediment testing requirements (if any).

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Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Projected Deliverables for Lake Montauk-Alewife Access and Habitat Enhancement:

Final Report on Recommendations and Conceptual Plans
The report shall be presented at the *Final Presentation/Wrap-Up Meeting*:

General Outline of Final Report on Recommendations and Conceptual Plans

e. Project Concept Drawings: Plan sheets below may be adjusted as necessary to fit within budget constraints, yet still fulfill the project objectives. A general description of expected plan sheets is presented below:

- Sheet 1 – Overview aerial of entire project area noting the location of individual sites
- Sheets 2-5– Close-up of each site showing existing and proposed conditions including infrastructure, access routes, potential remediation work areas, work limits, sensitive ecological resources, and property boundaries
- Sheet 6- Typical details of proposed work.

LUNCH

Interim Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Narrow River: Summary of Contracted Work and Technical Approach

Introduction: Project purpose is to improve tidal flow within Broad Meadows Marsh and hydraulic and ecological connectivity to Whitcomb Marsh.

Left: Broad Meadows Marsh

Center: Culverts with Tide Gate

Right: Whitcomb Marsh

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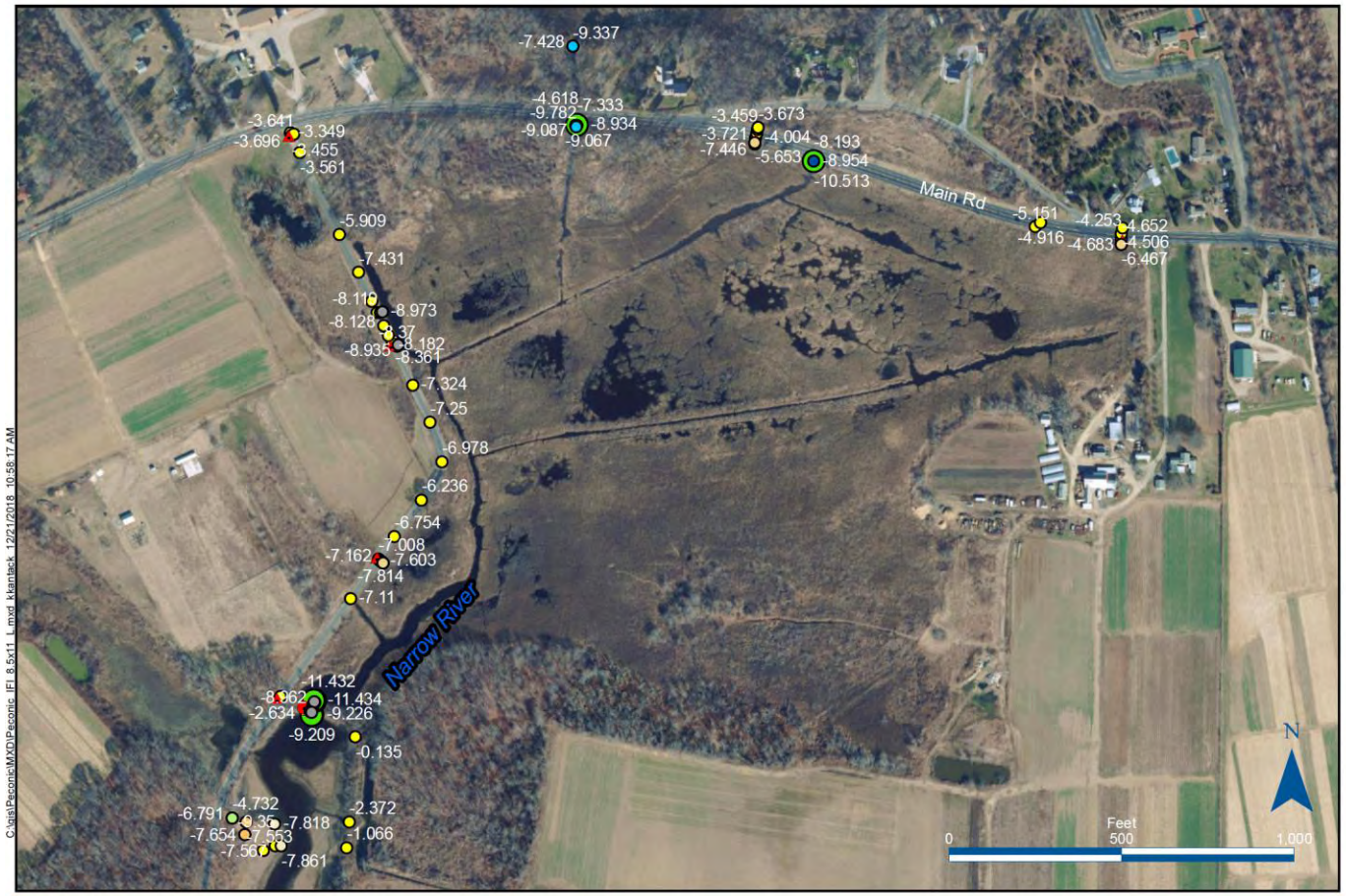
Kick-Off Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Project Update: Background/Existing Studies/Reports Obtained

Information/Data	Obtained/ Still Needed	Source
Existing data and information related to culverts, previously developed concept plans, and information from previous stakeholder meetings (referenced in RFP and Addendum #3)	Obtained	Cornell Cooperative Extension
Plans and permits for previously issued NYSDEC and/or Town permits for corrective actions to culverts and/berms.	Obtained	NYSDEC

Kick-Off Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Project Update: Preliminary Elevation Data Collected



Peconic Estuary Assessment

Narrow River

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DRAFT

Culvert	Edge of Phragmites	Spring High Water
Bed	Edge of Tidal Marsh	Top of Bank
Water Surface Elevation	Edge of Water	Ground
Edge of High Marsh	Observed High Water	Control Point
Edge of Low Marsh	Ordinary High Water	Base Station

Notes:

1.Elevations (feet) are listed next to points. Point locations and elevations relative and uncorrected.

2. Satellite imagery from ESRI,

Project Update: Ducks Unlimited Survey Scope (Original)

General Data Need	Detailed Description
Spot Elevation Data along Route 25 and Narrow River Road.	Spot Elevations at six (6) Control Points needed at hard-surface locations on Rt 25 and Narrow River Road. Points have been identified in the field by survey nails in road surface marked by flagging tape/paint.
Elevation Transects from roads through Phragmites marsh to open water. **Data needed to groundtruth LIDAR Data in dense Phragmites marsh.**	5 Transects from Infrastructure or Upland features to Top/Toe of Creek through Phragmites marsh. Elevation of organic soil surface (below accumulated thatch) needed. Transects ~150-350 feet long. Elevations should be taken at approximately 20-50 foot intervals along transect. All transects shall be established/marked in the field by Land Use with survey nails in road, stakes, or equivalent prior to DU mobilization. Land Use staff shall be on-site during survey work to assist.
Elevation Profile at Double Culvert and Route 25 Culvert	1. Double Culvert Data Needed: Current Elevations for Downstream and upstream Toe of Berm, Downstream and upstream Apparent Low Water (ALW), Downstream and upstream Apparent High Water (AHW), Downstream and upstream invert elevations, Top of Berm 2. Route 25 Culvert Data Needed: Current Elevations for downstream Toe/Top of Bank, Downstream and upstream Ordinary Water Level (OWL), Downstream and upstream Apparent High Water (AHW), and Route 25 road elevation. Stakes at various tidal water levels shall be placed in the field prior to DU mobilization.
Culvert Invert Elevations	Upstream and Downstream Invert Elevations at two (2) Narrow River Road culverts and one (1) Old Main Road culvert
Marsh Ditch Section at east end of Earthen Berm	A small channel has been cut in the earthen berm approximately 200 feet to the east of the double culvert. A section profile of this channel is needed. Elevation Data Needed: Current elevations for Top of Bank, Toe of Bank, Ordinary Water Level (OWL), Bed of Ditch

Project Update: Ducks Unlimited Survey Scope (Original)

Project Update: Ducks Unlimited Survey Scope (Revised)

General Data Need	Detailed Description
Spot Elevation Data along Route 25 and Narrow River Road.	Spot Elevations at six (6) Control Points needed at hard-surface locations on Rt 25 and Narrow River Road. Points have been identified in the field by survey nails in road surface marked by flagging tape/paint.
Accessible locations between within Phragmites marsh between roads and open water. **Data needed to groundtruth LIDAR Data in dense Phragmites marsh.**	5 Transects from Infrastructure or Upland features to Top/Toe of Creek through Phragmites marsh. Elevation of organic soil surface (below accumulated thatch) needed. Transects ~150-350 feet long. Elevations should be taken at approximately 20-50 foot intervals along transect. All transects shall be established/marked in the field by Land Use with survey nails in road, stakes, or equivalent prior to DU mobilization. Land Use staff shall be on-site during survey work to assist.
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Culvert Invert Elevations	Upstream and Downstream Invert Elevations at two (2) Narrow River Road culverts and one (1) Old Main Road culvert
Marsh Ditch Section at east end of Earthen Berm	A small channel has been cut in the earthen berm approximately 200 feet to the east of the double culvert. A section profile of this channel is needed. Elevation Data Needed: Current elevations for Top of Bank, Toe of Bank, Ordinary Water Level (OWL), Bed of Ditch

Narrow River Project Timeline

Task	*Completion Date*
NYSDEC Clearing/Mowing *Phragmites* Transects	Mid-February, 2019
Ducks Unlimited Survey	Late March-Early April, 2019
DU provides Survey Data to Land Use	Early- Mid April, 2019
Schematic Design (Task 3)	April 30, 2019
Recommendations and Conceptual Restoration Plans (Task 4)	April 30 – June 15, 2019
Presentation of *Draft Final Report* at Final Wrap-up Meeting (Task 5)	June 15, 2019
Submission of *Final Report* (Task 6)	July 15, 2019

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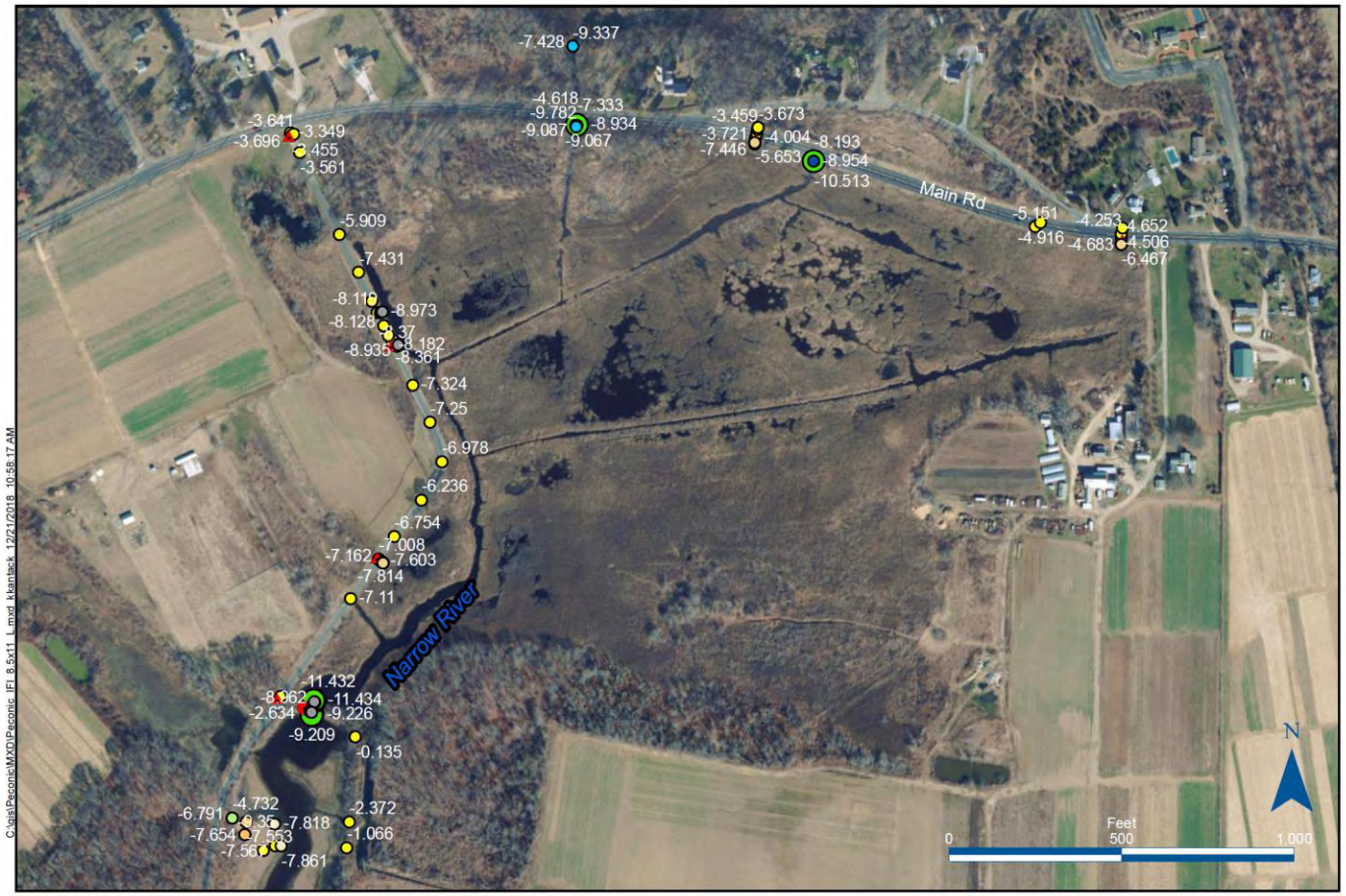
Kick-Off Meeting *(Peconic Estuary Habitat Restoration Conceptual Design Planning Services)*

Project Update: Preliminary Elevation Data Collected



Peconic Estuary Assessment

Narrow River

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DRAFT

Culvert	Edge of Phragmites	Spring High Water
Bed	Edge of Tidal Marsh	Top of Bank
Water Surface Elevation	Edge of Water	Ground
Edge of High Marsh	Observed High Water	Control Point
Edge of Low Marsh	Ordinary High Water	Base Station

Notes:

1.Elevations (feet) are listed next to points. Point locations and elevations relative and uncorrected.

2. Satellite imagery from ESRI,

Project Update: Preliminary Elevation Data Collected

Marsh/Site Feature	Elevation (Relative ft)
Top of Earthen Berm	-2.9
Route 25 (Low Point by Old Main Road)	-4.0
Tidal Wetland Boundary (Downstream of Berm)	-4.7 to -6.8
Narrow River Road (~1,450 ft south of Rt 25)	-7.2
High Marsh El. (Upper) (Downstream of Berm)	-7.5
Narrow River Road (~450 ft south of Rt 25)	-8.2
Low Marsh El. (Upper) (Downstream of Berm)	-7.8 to -8.8
Double Culvert	-9.0 (Top) -11.4 (Bottom Invert)

Project Update: Preliminary Elevation Data Collected

Marsh/Site Feature	Elevation (Relative ft)
Top of Earthen Berm	-2.9
Route 25 (Low Point by Old Main Road)	-4.0
Tidal Wetland Boundary (Downstream of Berm)	-4.7 to -6.8
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Narrow River Road (~450 ft south of Rt 25)	-8.2
Low Marsh El. (Upper) (Downstream of Berm)	-7.8 to -8.8
Double Culvert	-9.0 (Top) -11.4 (Bottom Invert)

Preliminary Conclusion:

Culvert Removal would result in result in an unacceptable level of flooding risk to Narrow River Road (and possibly Route 25).

Conceptual Culvert Designs will need to provide for a self-regulating culvert (or equivalent) to mitigate flooding that would result from routine storm events and astronomical high tides.

Narrow River Project Timeline

Task	*Completion Date*
Ducks Unlimited Survey	Late March-Early April, 2019
DU provides Survey Data to Land Use	Early- Mid April, 2019
Schematic Design (Task 3)	April 30, 2019
Recommendations and Conceptual Restoration Plans (Task 4)	April 30 – June 15, 2019
Presentation of *Draft Final Report* at Final Wrap-up Meeting (Task 5)	June 15, 2019
Submission of *Final Report* (Task 6)	July 15, 2019

THANK YOU.

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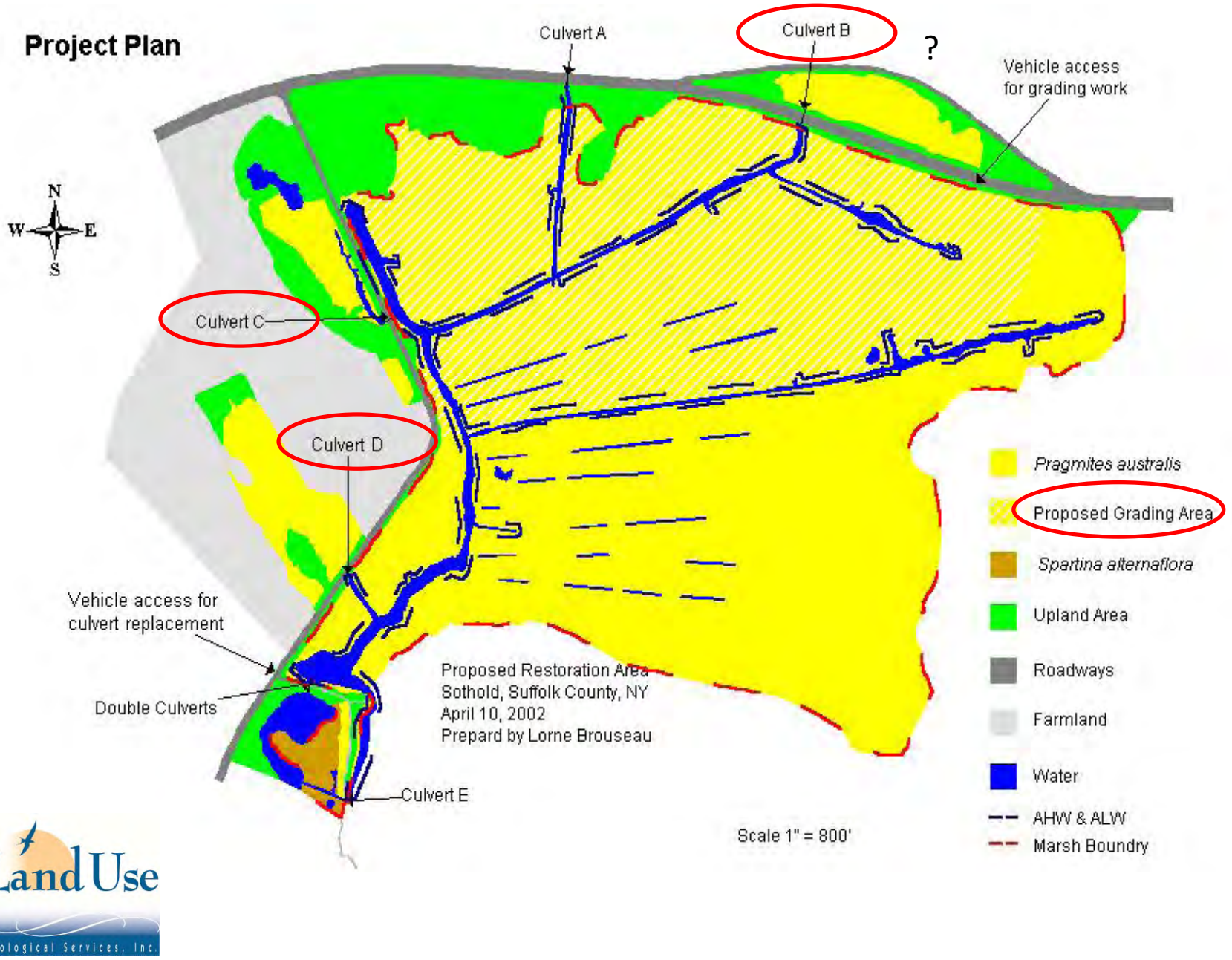

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NOTES:
1. 2016 parcel data from Suffolk County Real Property Tax Service Agency, used with permission.
2. 2016 orthoimage from NYS GIS Clearinghouse (gis.ny.gov).

N
1 in = 300 ft
0 80 160 320
Feet

Land Use

Prepared By: Land Use Ecological Services, Inc.
570 Expressway Drive South, Suite 2F
Medford, NY 11763

Project: Narrow River - Town of Southold
For: Peconic Estuary Program

Date: 3/20/2018 | Revised: | Scale: As Noted | Sheet: Base

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