# Public Meeting
# Farm Brook Sites 1, 2A and 2B

## Watershed Planning and Environmental Assessment

Dam Rehabilitation Project
July 18, 2019

DDK Engineering-JV

CONNECTICUT ENERGY ENVIRONMENT

USDA United States Department of Agriculture

Natural Resources Conservation Service

# Introductions

- Local Sponsor and Owner– CT Department of Energy and Environmental Protection (DEEP)
- Funding, Technical, and Contracting Support – USDA, NRCS in Tolland, CT
- Contractor – DDK Engineering - JV
  - D'Appolonia and DuBois & King, Small Business Joint Venture
  - D'Appolonia is the technical lead

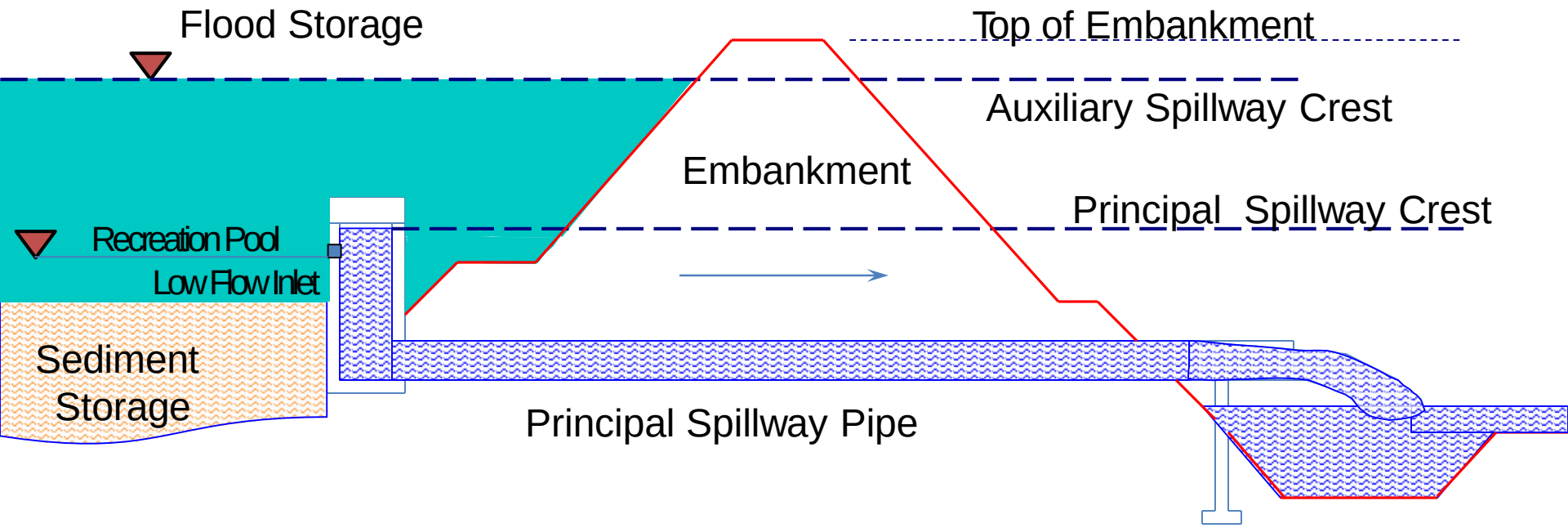
# Meeting Objectives

- Overview of  Dam Rehabilitation Process
- Review Results of Assessments and Purpose and Needs
- Provide Information on Farm Brook Sites 1, 2A and 2B in Hamden, CT
- Review Resources at the Sites (Wetlands, Streams. . .etc.)
- Overview of Potential Remedial Options Identified in Assessments
- Collect and Document Input and Contributions By Public

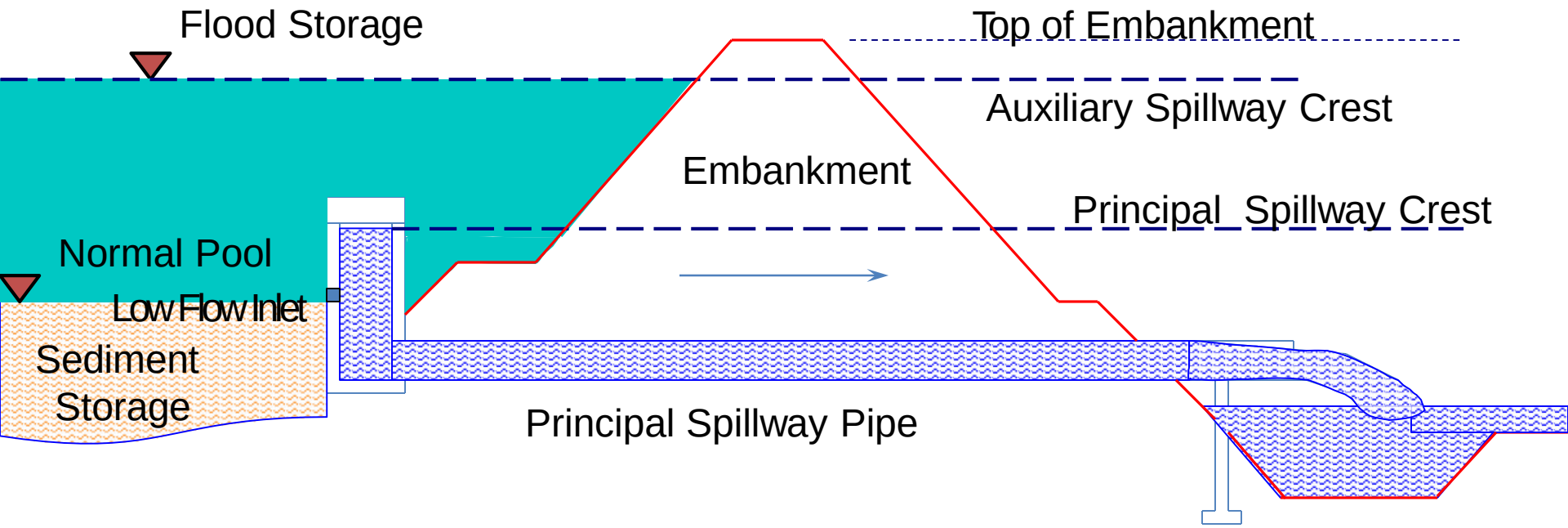
# Dam Rehabilitation Planning and Implementation Process

1. Sponsor requests Dam Assessment
2. Dam Assessment and risk analysis (Duration About 1 Year)
3. Sponsor Application and Ranking of applications
4. Project Planning – Process for the Selection of a Preferred Alternative (Typically Takes 2.5 Years)
5. Design (1.5 to 2 Year Process)
6. Construction

# Typical Cross-Section of Site 1 Floodwater Retarding Structure

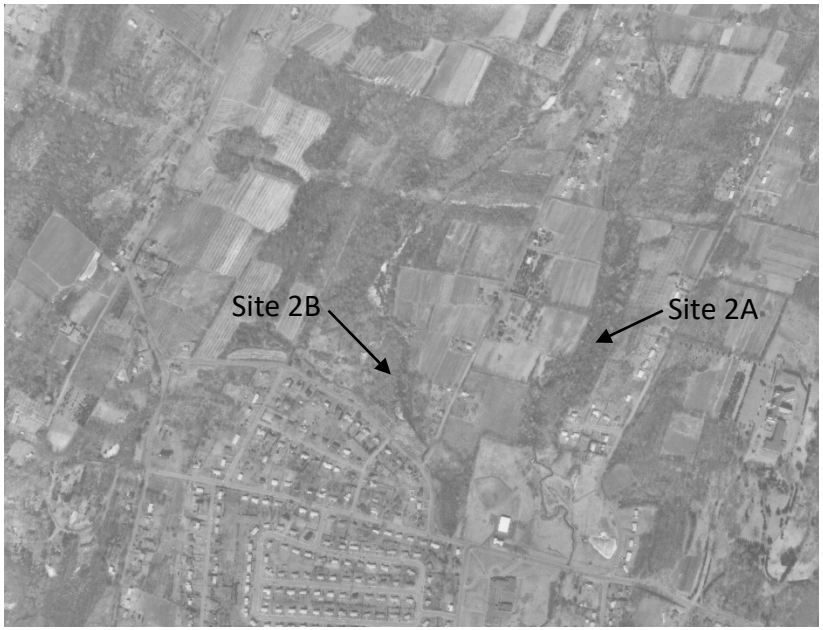


# Typical Cross-Section of Sites 2A & 2B Floodwater Retarding Structure



# Dam Assessment Results (Issues)

- Development Within Watershed Has Increased Runoff Rate and Volume





- Design Criteria has Changed Due to Hazard Class Change
- Design Storms Have Increased Due To New Precipitation Studies and Recorded Events

# Dam Assessment Results (Impacts)

- Auxiliary spillway crest is lower than the new 100-year 24-hr flood elevation.
- Site 1 Dam Overtops during 6 Hour Freeboard Hydrograph Design Storm
- If Dam at Site 1 Breaches, The Dams at Sites 2A and 2B Potentially Overtop
- Potential for Erosion of Auxiliary Spillways at Sites 1, 2A, and 2B

# Project Needs

- The dams at Sites 1, 2A and 2B do not meet NRCS design criteria and standards when assessing them for current precipitation models

- Rehabilitation is needed to bring dams into compliance with current dam design and safety standards

# Project Purpose

- Perform rehabilitation to reduce risks to life and property from dam failure

- Perform rehabilitation to maintain flood protection

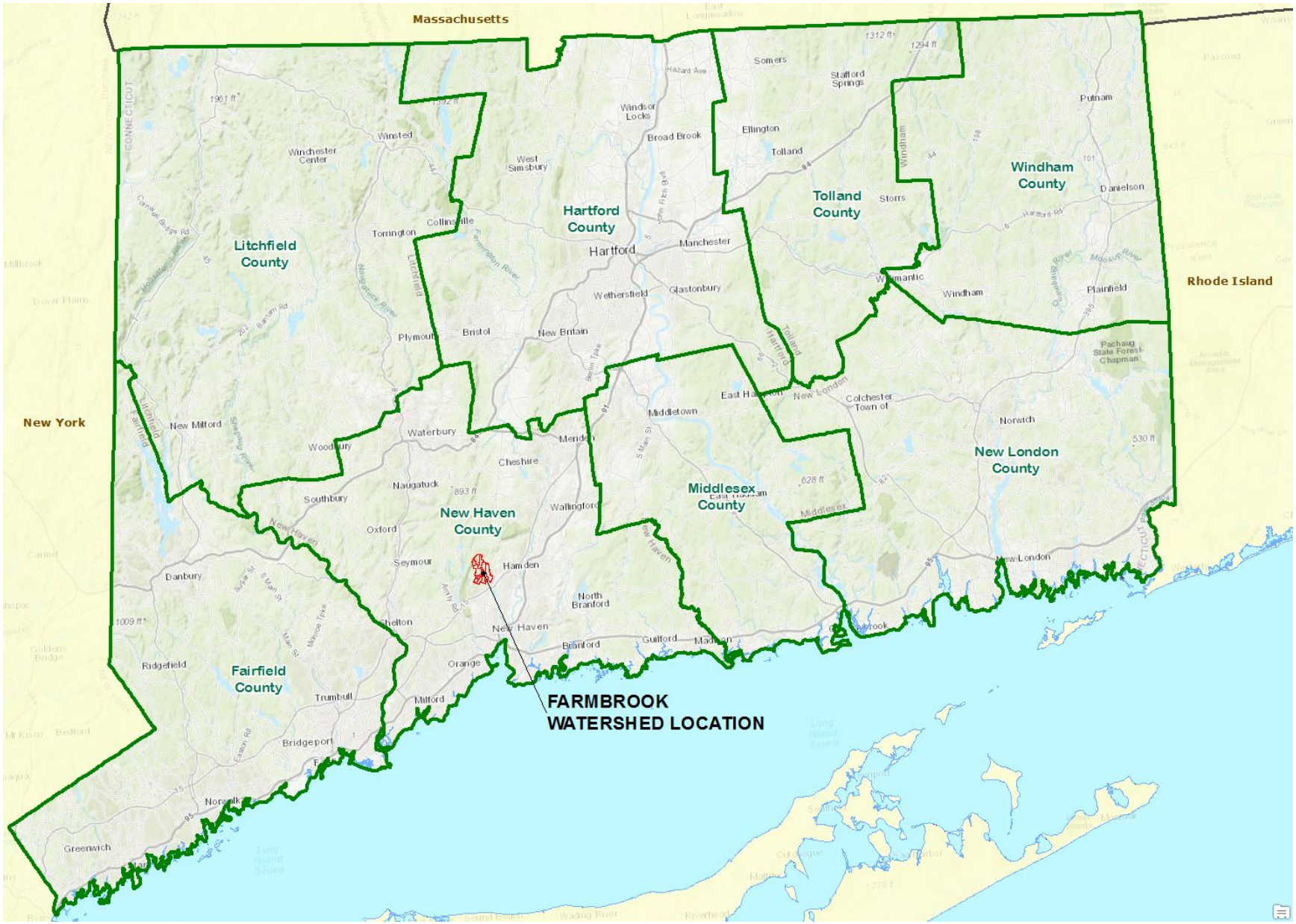
# Resources Inventory and Evaluations

- Streams
- Wetlands
- Water Quality
- Riparian Areas
- Threatened Species
- Endangered Species
- Soils (cropland)
- Aquifers
- Air Quality
- Ecologically Critical Areas
- Potable Water Supply
- Forests
- Natural Areas
- Invasive Species
- Fish and Wildlife
- Migratory Birds
- Public Health and Safety
- Scenic Beauty
- Cultural Resources (Historic Properties)
- Local and Regional Economy
- Environmental Justice and Civil Rights

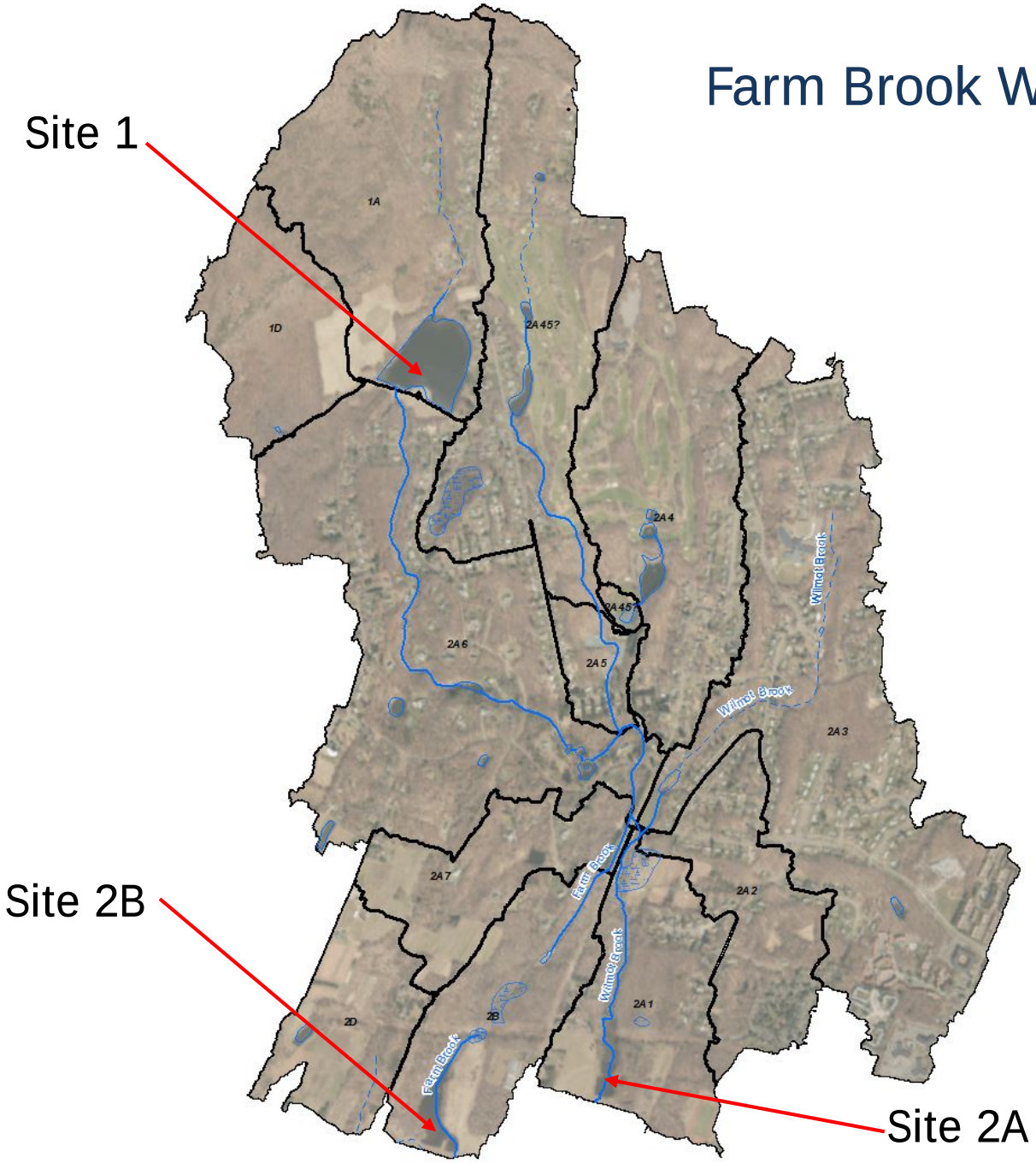
# Engineering Evaluations and Data Collection

- Land Use Classification
- Floodplain Characterization
- Hydrology and Hydraulics Analyses
  - Existing Conditions
  - Proposed Conditions
  - Breach Analyses
- Geologic/Geotechnical Explorations
- Topographic Surveys of Existing Conditions
- Evaluation of Existing Structure Conditions
  - Drain Pipes
  - Principal Spillway Pipes
  - Auxiliary Spillway
- Development of Alternatives for Rehabilitation Alternatives
  - Decommissioning
  - Non-Structural
  - Future Without Project
  - Projects Costs & Economics

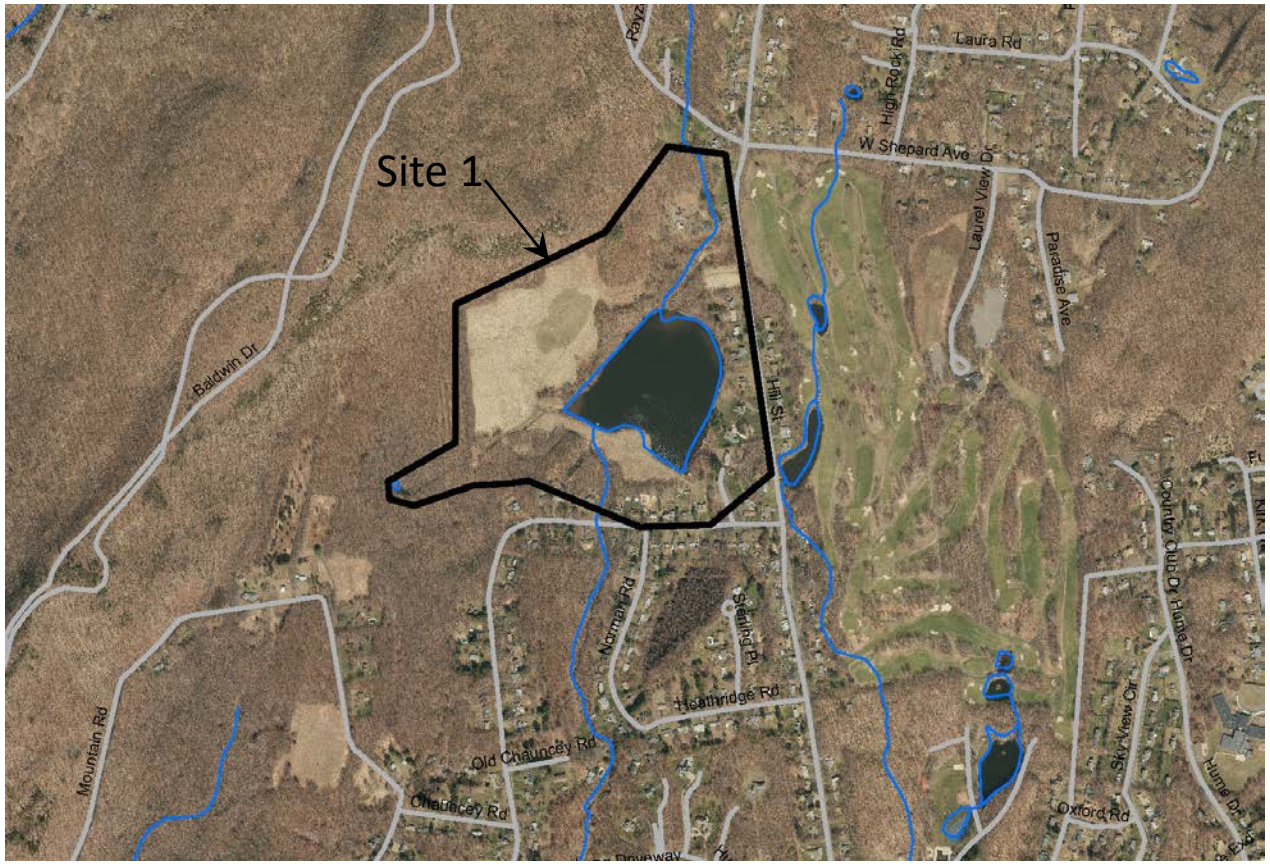
# Farm Brook Watershed Location



# Farm Brook Watershed



# Site 1


Site 1
Laura Rd
High Rock Rd
W Shepard Ave
Laurel View Dr
Paradise Ave
Baldwin Dr
Hill St
Normal Rd
Sterling Pl
Heathridge Rd
Old Chauncey Rd
Chauncey Rd
Mountain Rd
Country Club Dr
Hume Dr
Sky View Cir
Oxford Rd

# Site 1 Pertinent Data

- Built in 1974
- Drainage area = 266 acres, including diversion ditch area
- Normal pool surface area (El. 286) = 18 acres, serves as a recreational pool
- Design high water surface area (El. 289) = 21 acres
- Top of dam water surface (El. 291) = 25 acres
- Length = 550 feet (Embankment 1) and 600 feet (Embankment 2)
- Height = 12 feet
- Class C Dam (NRCS High Hazard)
- Recreation and Flood Control

# Site 1 Photos

# Site 1 – Crest

# Site 1 – Upstream Portion of Auxiliary Spillway

# Site 1 – Downstream Portion of Auxiliary Spillway

# Site 1 – Principal Spillway Inlet

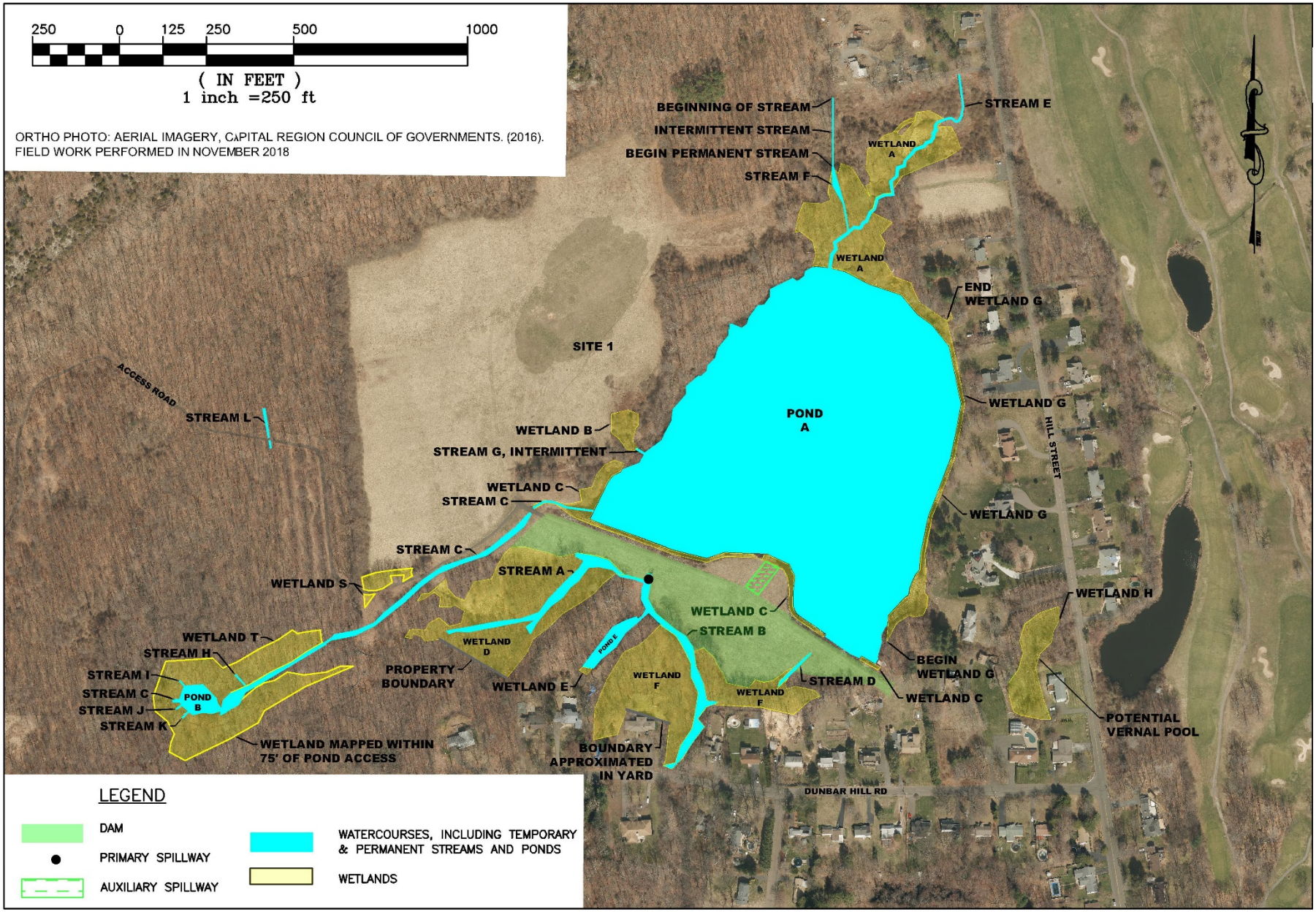
# Site 1 – Downstream Slope & Outlet Works

# Site 1 – Principal Spillway Outlet Structure

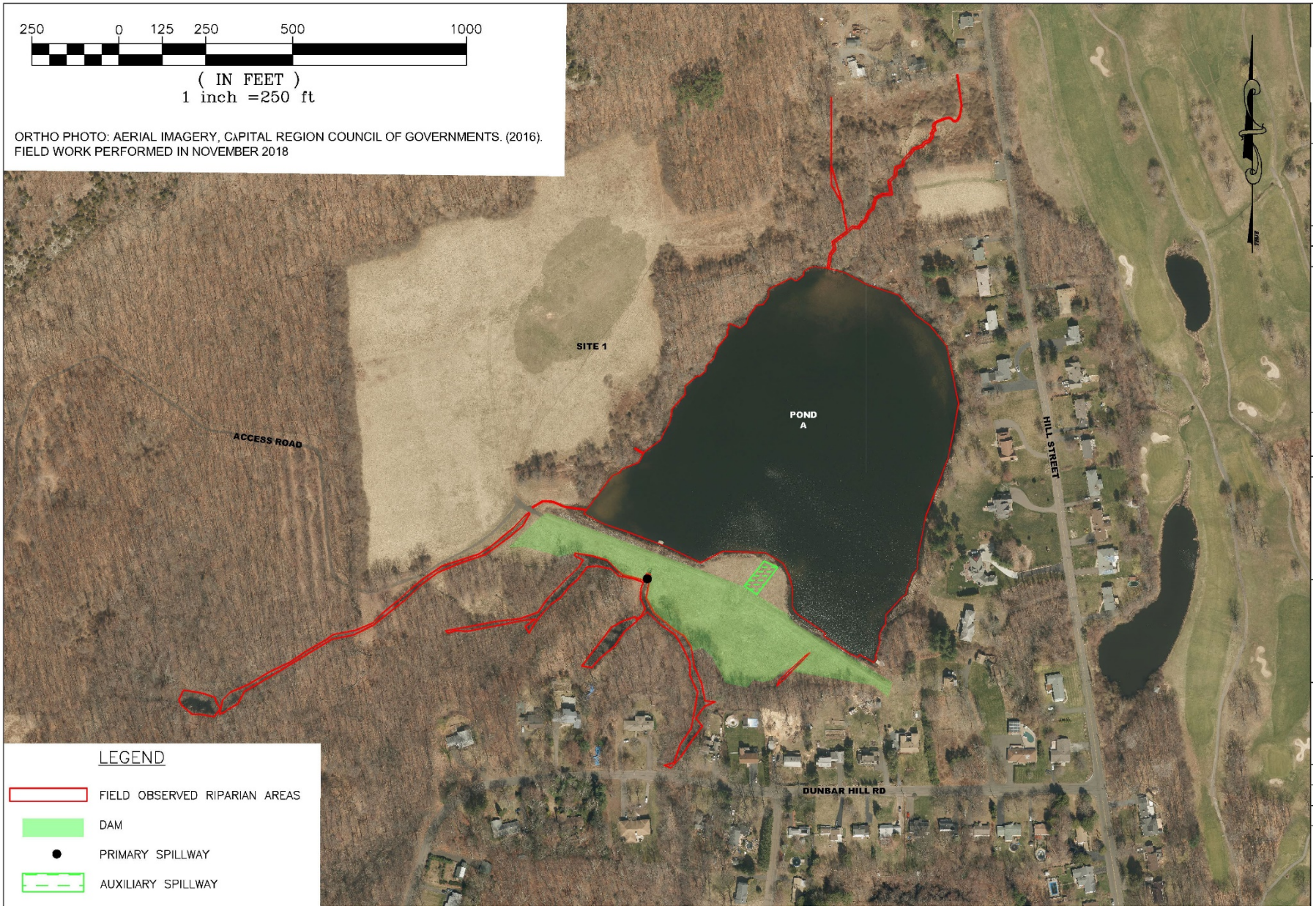
# Site 1 – Diversion Ditch

# Site 1 Resources

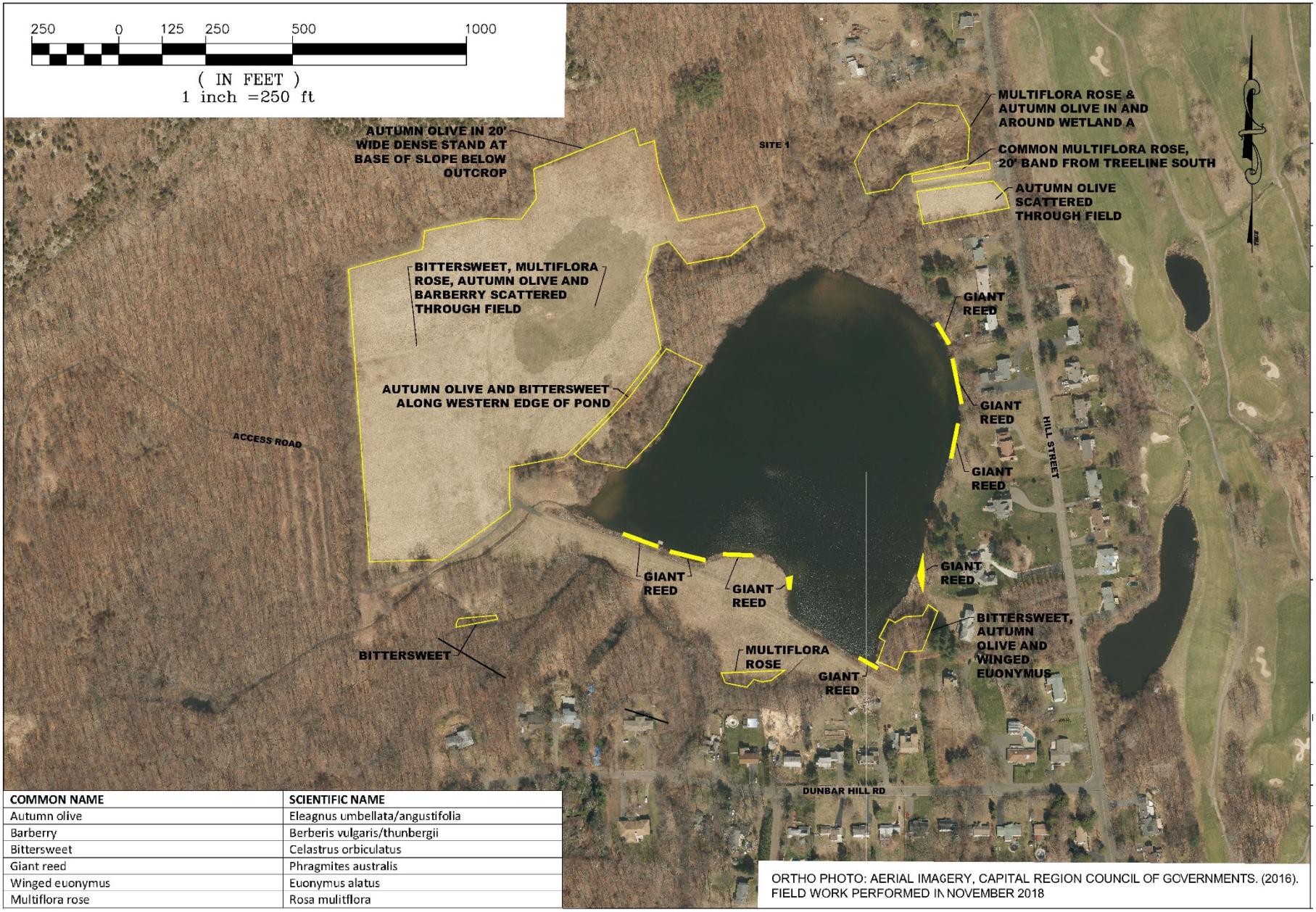
# Site 1 Aquatic Resources



# Site 1 Riparian Areas

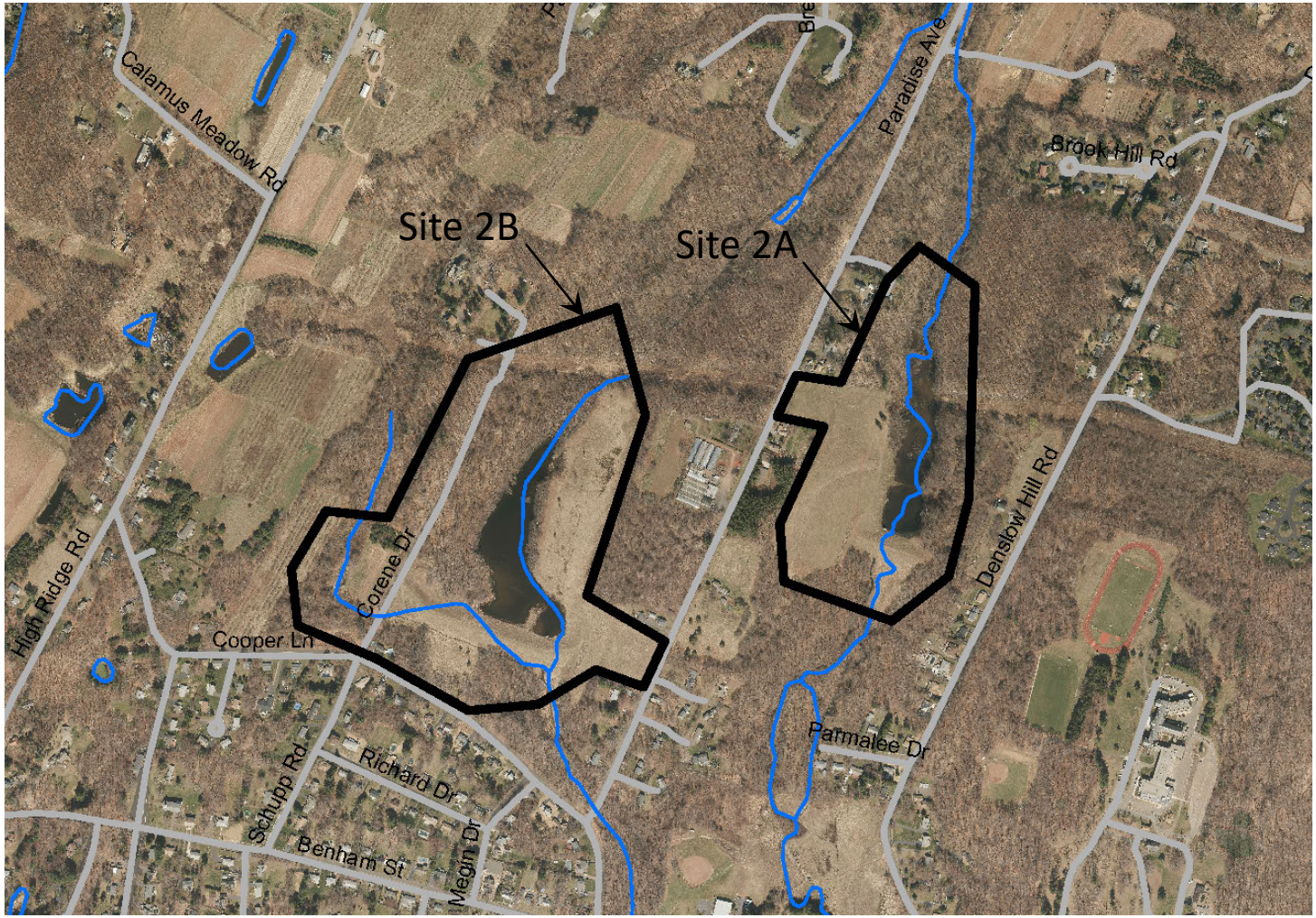


# Site 1 Invasive Species




| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| Autumn olive | Eleagnus umbellata/angustifolia |
| Barberry | Berberis vulgaris/thunbergii |
| Bittersweet | Celastrus orbiculatus |
| Giant reed | Phragmites australis |
| Winged euonymus | Euonymus alatus |
| Multiflora rose | Rosa mulitflora |

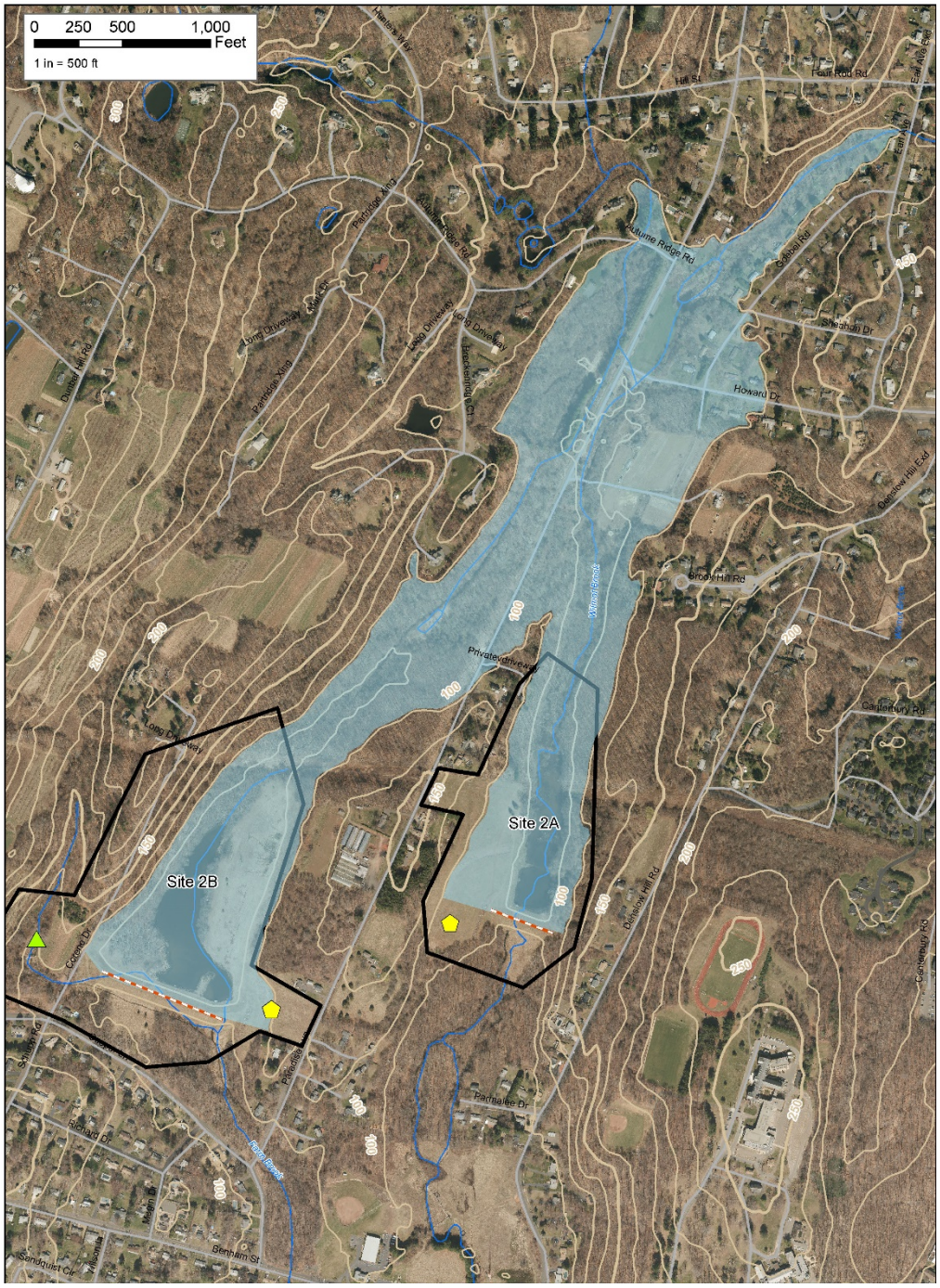
# Site 2


Calamus Meadow Rd
Paradise Ave
Brook Hill Rd
Site 2B
Site 2A
Corene Dr
High Ridge Rd
Cooper Ln
Schupp Rd
Richard Dr
Benham St
Megin Dr
Parmalee Dr
Denslow Hill Rd

# Site 2A Pertinent Data

- Built in 1977
- Drainage area = 1,680 acres,
- During flooding events, pool of reservoirs at Sites 2A and 2B combine
- Normal pool surface area (El. 83.5) = 12.5 acres
- Pool at Auxiliary Crest (El. 101.3) = 80 acres
- Design high water surface area (El. 106) = 105 acres
- Top of dam water surface (El. 108) = 110 acres
- Length = 437 feet
- Height = approximately 29 feet
- Class C Dam (NRCS High Hazard)
- Main purpose is for flood control
- Limited Recreation Use

# Site 2A & 2B Combined Pool at Approximate Crest El. 108



# Site 2A Photos

# Site 2A – Crest

# Site 2A – Upstream Slope

# Site 2A – Downstream Slope

# Site 2A – Principal Spillway Intake

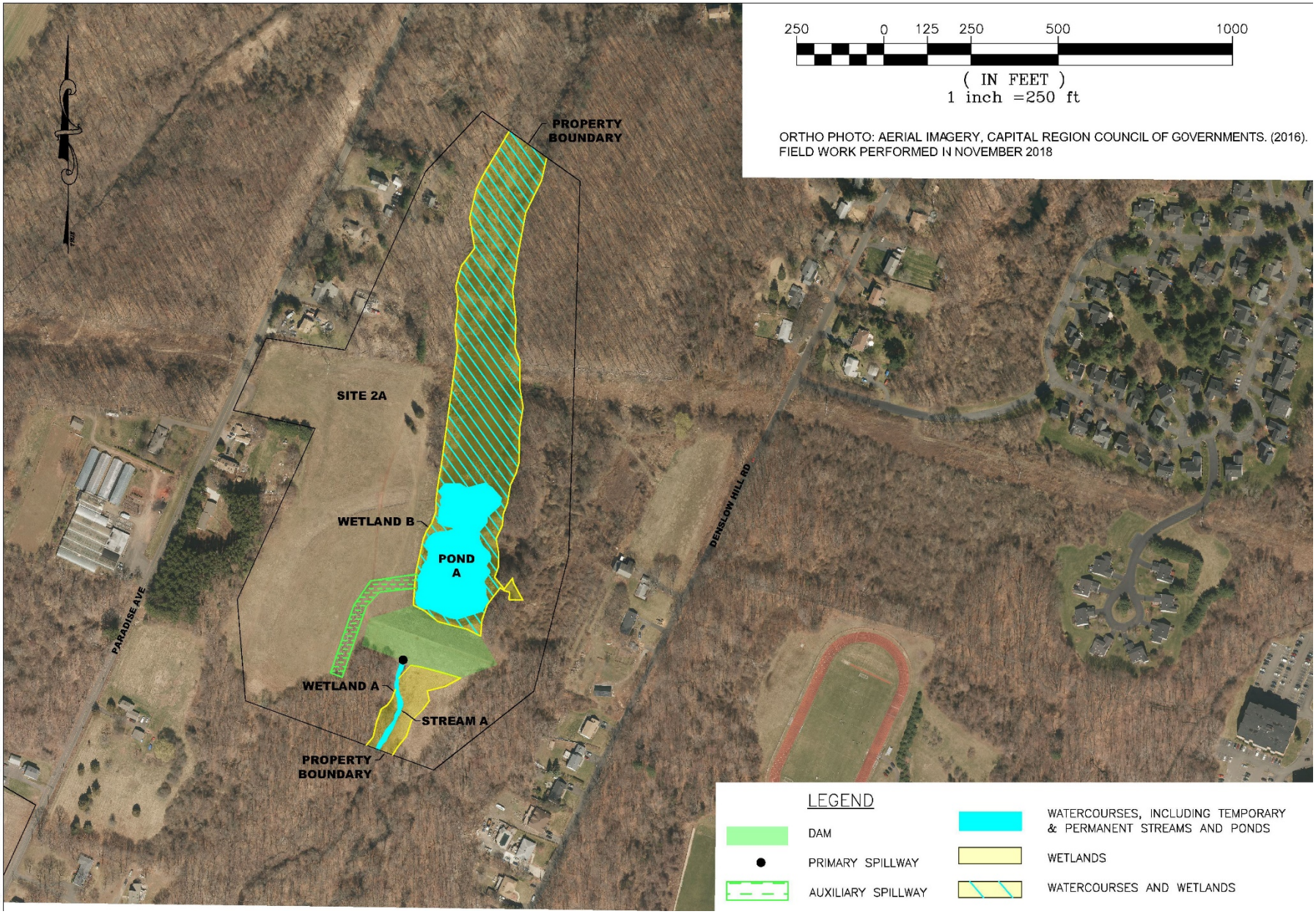
# Site 2A – Principal Spillway Outlet

# Site 2A – Upstream Portion of Auxiliary Spillway

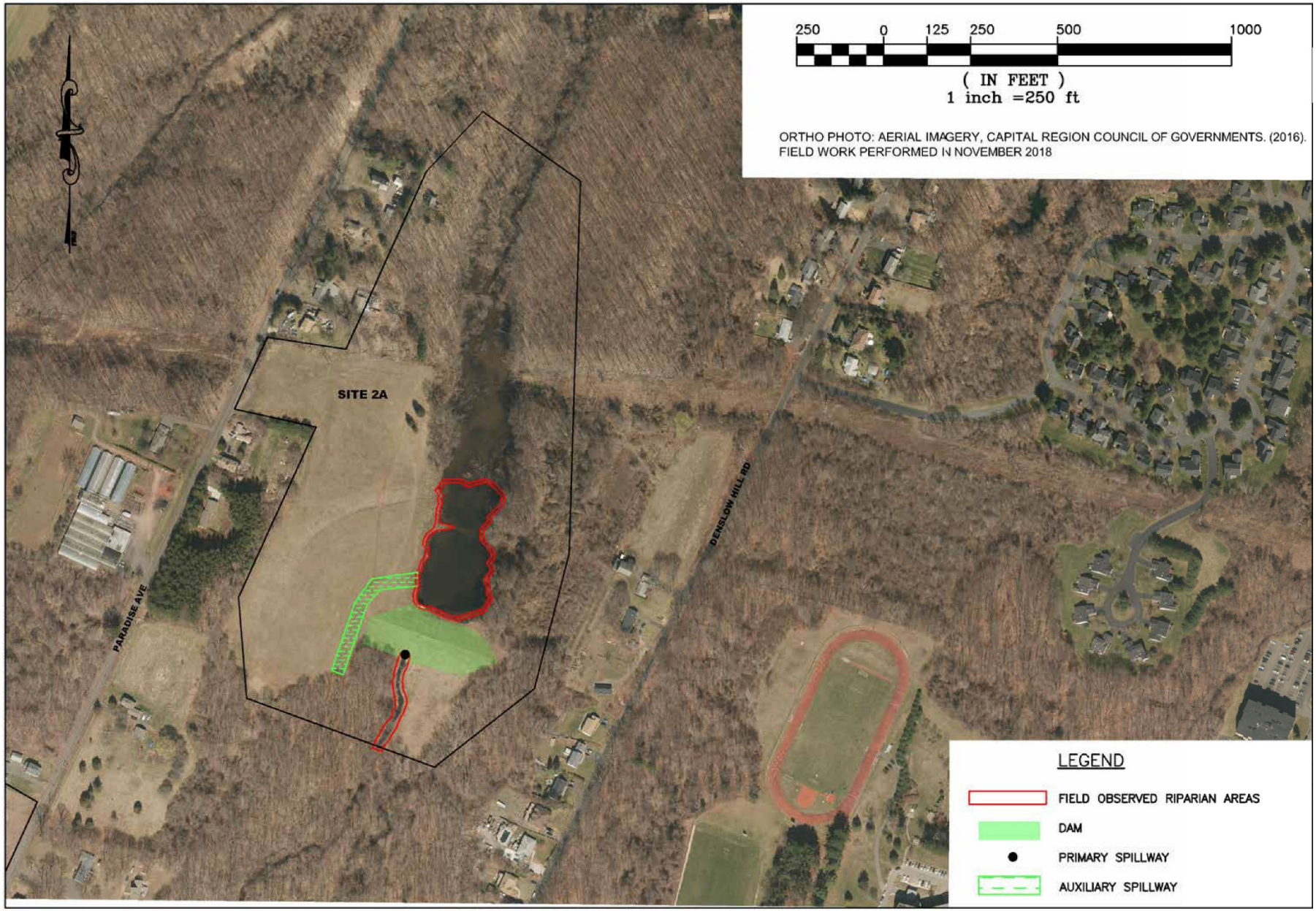
# Site 2A – Downstream Portion of Auxiliary Spillway

# Site 2A Resources

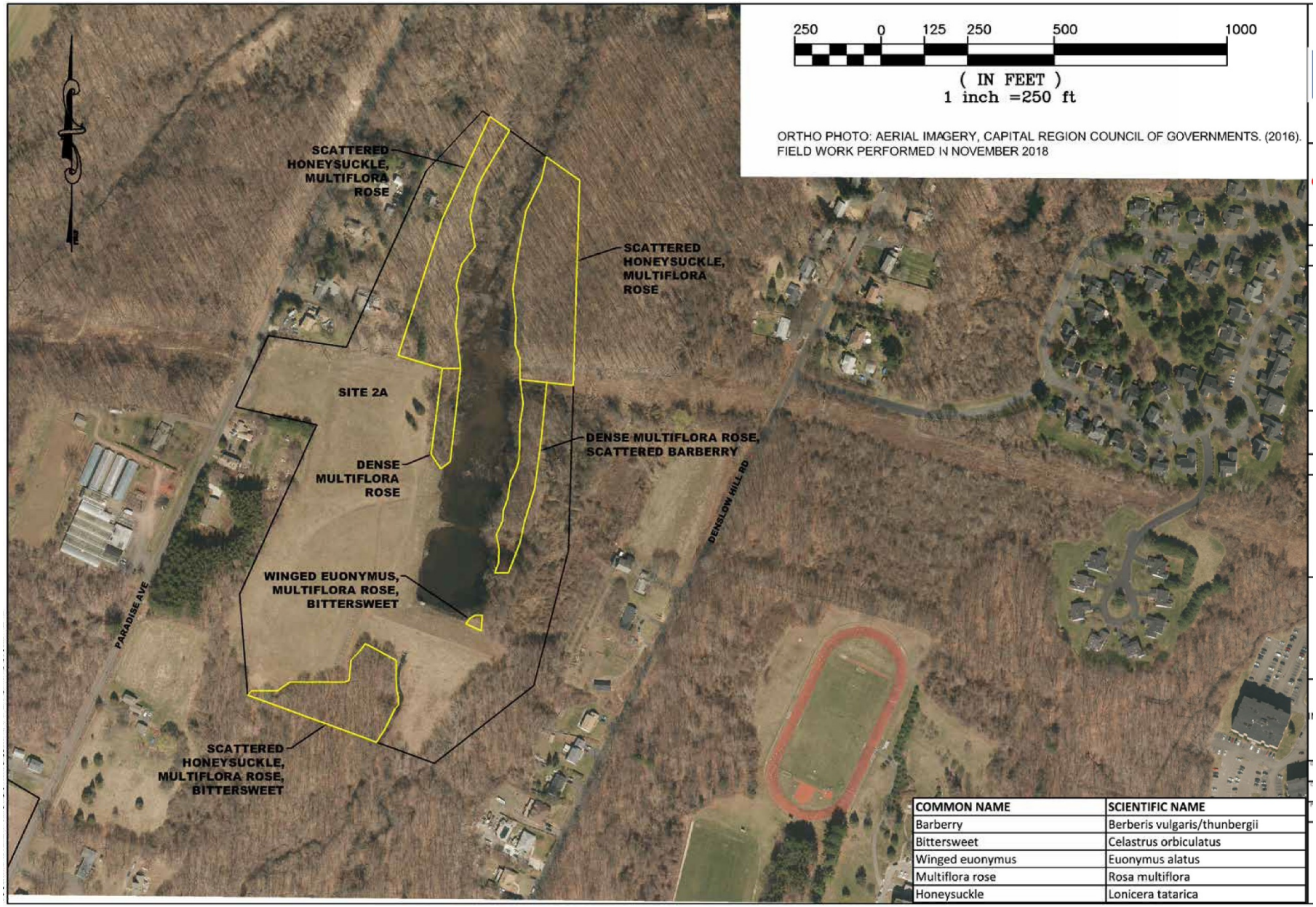
# Site 2A Aquatic Resources



# Site 2A Riparian Areas



# Site 2A Invasive Species




| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| Barberry | Berberis vulgaris/thunbergii |
| Bittersweet | Celastrus orbiculatus |
| Winged euonymus | Euonymus alatus |
| Multiflora rose | Rosa multiflora |
| Honeysuckle | Lonicera tatarica |

# Site 2B Pertinent Data

- Built in 1977
- Drainage area = 1,680 acres, combined Site 2A and 2B due to common pools
- Normal pool surface area (El. 85.5) = 13 acres
- Pool at Auxiliary Crest (El. 101.3) = 80 acres
- Design high water surface area (El. 106) = 105 acres
- Top of dam water surface (El. 108) = 110 acres
- Length = 1,015 feet
- Height = approximately 29 feet
- Class C Dam (NRCS High Hazard)
- Main purpose is for flood control
- Limited Recreation Use

# Site 2B Photos

# Site 2B – Crest

# Site 2B – Downstream Slope

# Site 2B – Upstream Slope

# Site 2B – Principal Spillway Intake

# Site 2B – Principal Spillway Outlet

# Site 2B – Principal Spillway Outlet

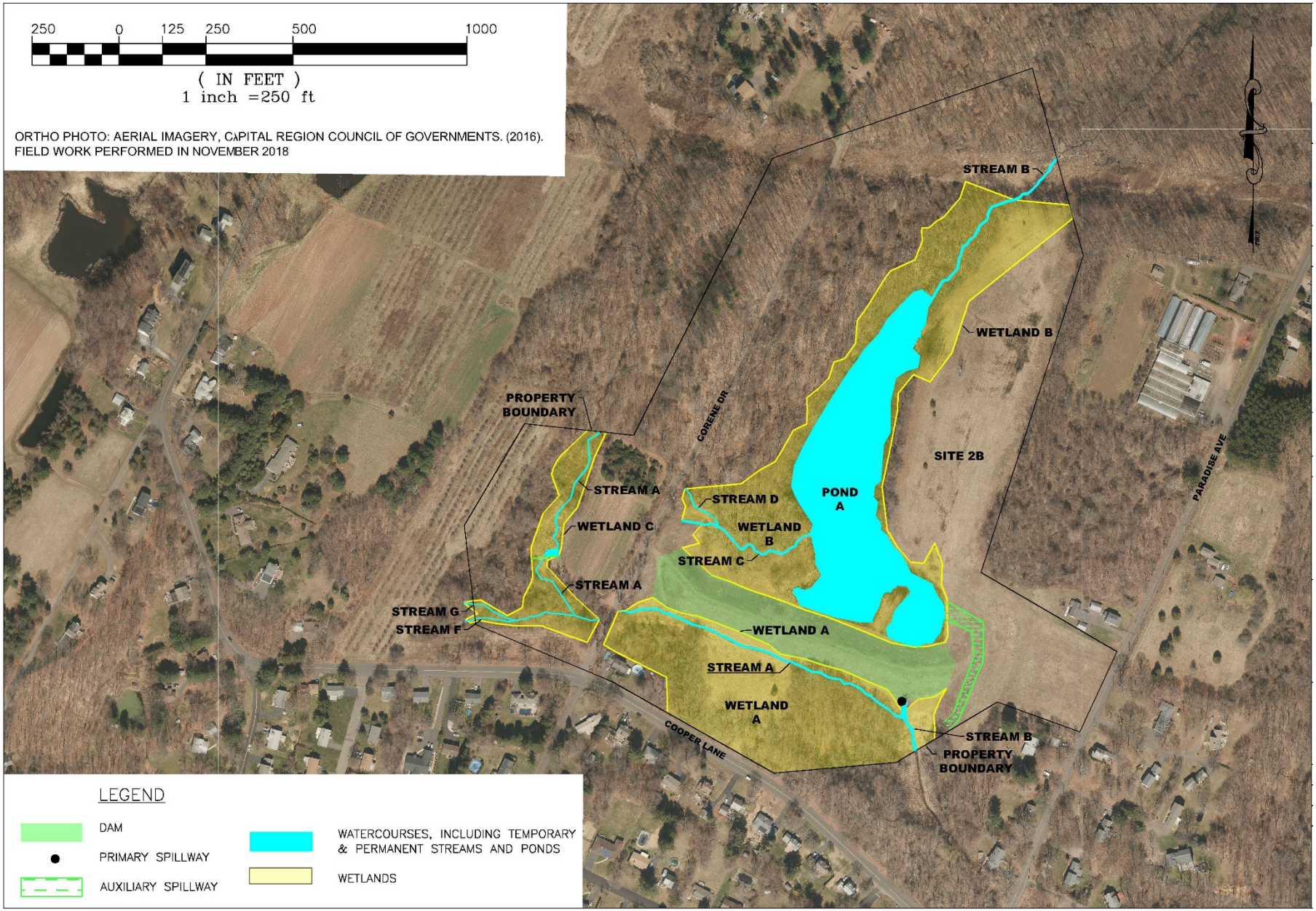
# Site 2B – Upstream Portion of Auxiliary Spillway

# Site 2B – Central Portion of Auxiliary Spillway

# Site 2B – Downstream Portion of Auxiliary Spillway

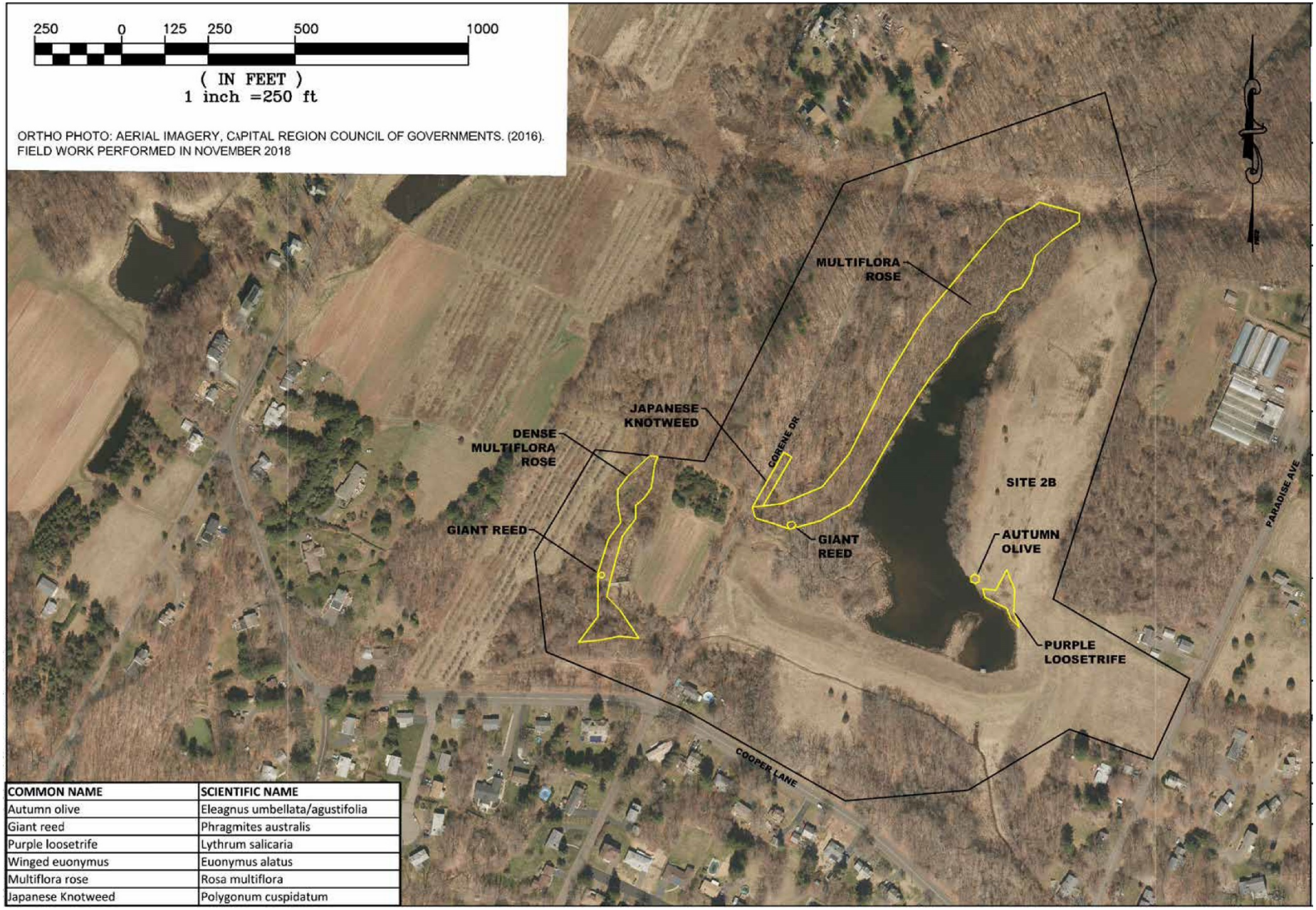
# Site 2B Resources

# Site 2B Aquatic Resources



# Site 2B Riparian Areas

# Site 2B Invasive Species




| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| Autumn olive | Eleagnus umbellata/agustifolia |
| Giant reed | Phragmites australis |
| Purple loosetrife | Lythrum salicaria |
| Winged euonymus | Euonymus alatus |
| Multiflora rose | Rosa multiflora |
| Japanese Knotweed | Polygonum cuspidatum |

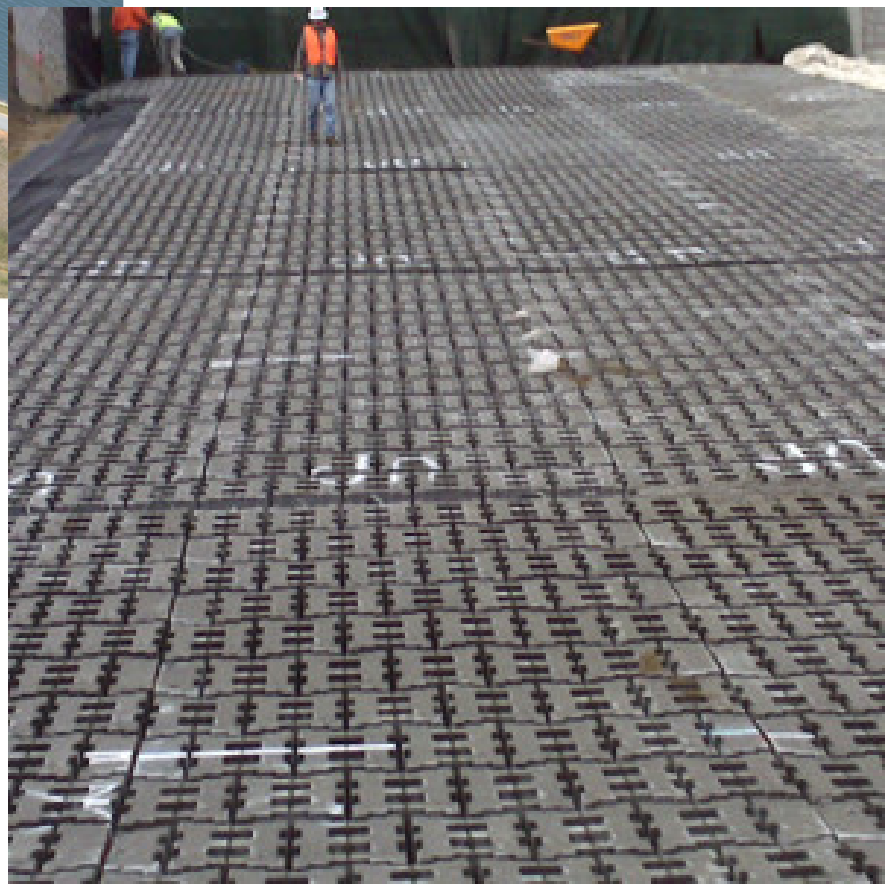
# Rehab. Alternatives Considered During Assessment of the Dams

- Overtopping Protection of the Dam
  - Typically not supported by NRCS
- Raising the Top of Elevation of Dams
  - Maybe only needed at Site 1. Models will confirm
- Lower Recreation Pool—provides more storage for flood events

# Other Rehab. Alternatives Under Consideration

- Increasing the Auxiliary Spillway Capacities
  - Enlargement or use of Labyrinth Weirs
- Armoring of Auxiliary Spillways
  - Reduces Erosion Potential and Increases Capacity
  - Articulated Concrete Blocks (ACBs)
- Removing the Dams (Decommissioning)
  - Only considered if assessments concludes presence of dam does not provide adequate downstream flooding protection to offset cost of rehabilitation
  - Not likely an option

Labyrinth



Articulated Concrete Blocks

# Required Alternatives to be Considered

- Structural Rehabilitation to current dam safety criteria
- Decommissioning (removal)
- NED Alternative (Alternative from above that maximizes Net Economic Benefits)
- No Federal Action—State Funded to Address Dams Safety Concerns

# Planning Process Steps

- Identify concerns and opportunities
- Inventory and forecast resource conditions
- Formulate alternative plans
- Evaluate alternative plans
- Compare alternative plans to determine “NED” alternative
- Select final plan
- Submit request for funding

# Concerns

- Human Health and Safety
- Dam Safety
- Flood Damages
- Floodplain Management
- Sedimentation
- Environmental Justice and Civil Rights
- Environmental Issues
- Cultural Resources

# It’s Early in Planning Phase Now

- Additional Work is Needed Before a Solution is Finalized:
  - Engineering - Detailed Studies and Analyses
  - Environmental and Cultural Resources - Concerns and Impacts
  - Economics – Impacts, Benefits and Costs
  - Human – Social and Cultural Issues

# Overall Estimated Rehabilitation Schedule (subject to change)

- The schedule for planning is :
  - Collection and Analysis of Data completed End of Summer 2019
  - Formulation and Evaluation of Alternatives completed by Summer 2020
  - Draft Plan completed End of Summer 2020
  - Second Public Meeting Fall 2020
  - Final Plan completed Winter 2020

# Future Actions

- DEEP and NRCS will manage planning process and conduct technical reviews of each phase
- Once alternatives have been fully evaluated and a preferred alternative is being considered:
  - Information presented at a 2nd public meeting
  - Reviews by Federal and State agencies
  - Reviews by local public and interested parties
- DEEP and NRCS State Conservationist sign plan
- Request plan authorization from NRCS Chief
- Request design and construction funds

# We Need Your Help

- If you have any specific information or data on the overall watershed, upstream or downstream, adjacent properties, or the embankment, reservoir, etc., please let us know.

# Points of Contact

- CT DEEP Contact is Dan Biron
  - Water Management and Planning Division
  - (860) 424-3892
  - Dan.Biron@ct.gov
- NRCS is Kristin Walker
  - Project Engineer
  - (860) 871-4033
  - Kristin.Walker@ct.usda.gov

# More Information about Dam Rehabilitation

## NRCS dam rehabilitation website is:

http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wr/

# THANK YOU!

We appreciate your participation today and your input and assistance during the development of this rehabilitation plan.

# QUESTIONS AND COMMENTS?

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