Silver Brook Watershed Restoration Plan

7th Annual Water Monitoring and Education Summit

November 18 and 19, 2009
Rutgers EcoComplex, Bordentown, NJ

Great Swamp Watershed Association

Acknowledgements

- The Watershed Institute
- AKRF, Inc.
- GSWA Stream Team Volunteers

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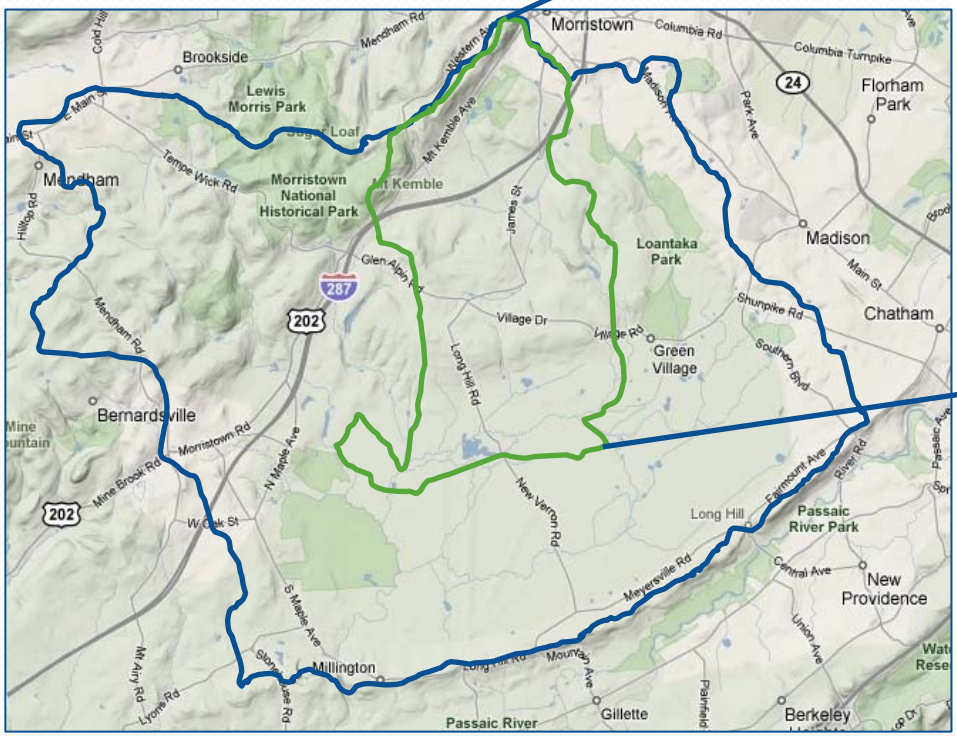
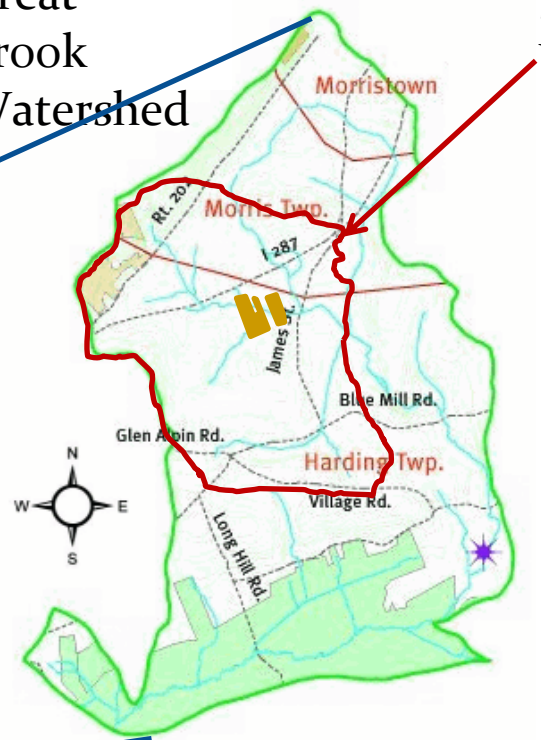
Project Location

Great Brook Watershed

Silver Brook Watershed

Great Swamp Watershed





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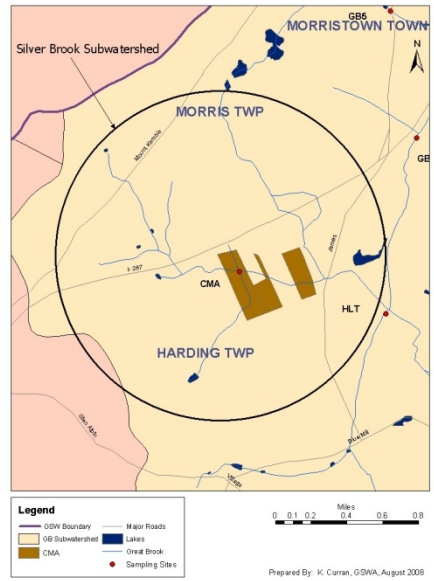
Background—Silver Brook



- Reports and Studies
  - Great Swamp Watershed Management Plan (June 1997)
  - Nonpoint Source Inventory of the Great Brook Watershed (December 2001)
  - Silver Brook Watershed Management (SBW) Plan
- GSWA Conservation Management Area
  - Land preservation
  - Ecological restoration
  - Education
- Highlands Planning Area

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Study Objectives

- Summarize existing conditions
- Assess root causes of observed impairments
- Define management goals for SBW
- Identify specific project opportunities
  - In-stream flow improvement
  - Water quality enhancement
  - Channel habitat improvements

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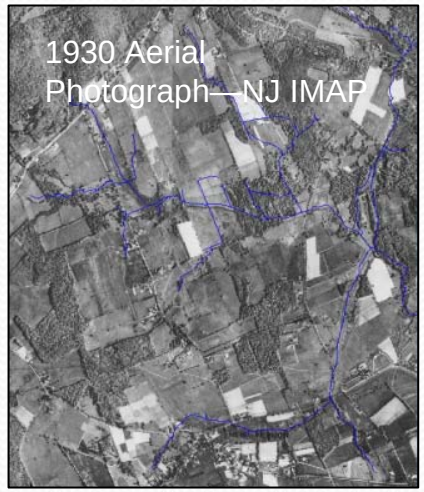
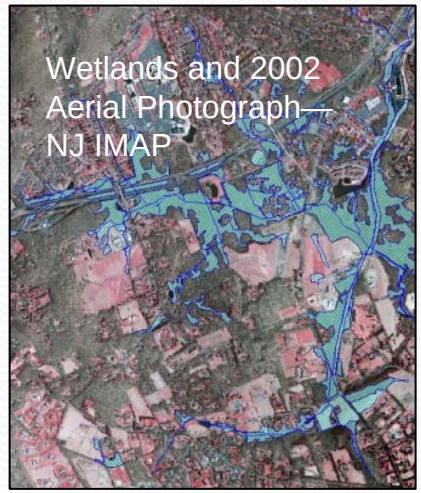
Background Data Collection

- Past Studies
  - Great Swamp basin and outfall inventory
  - Stream assessments (GSWA volunteers)
  - Water quality monitoring
  - Great Brook Nonpoint Source Inventory Report
- Aerial photography
- Geo-referenced data





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Watershed Reconnaissance

- Landuse patterns
- Road Crossings
- Stormwater management
  - Basin retrofit assessment
- Riparian condition

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Stream Corridor Assessment

- Stream channel characterization
- Channel stability
- Identification of problem areas

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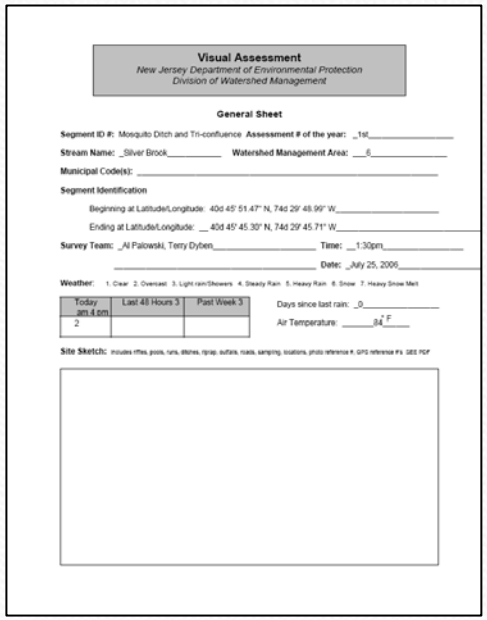
GSWA Volunteer Stream Visual Assessments



Visual Assessment
New Jersey Department of Environmental Protection
Division of Watershed Management

General Sheet

Segment ID #: Mosquito Ditch and Tri-confluence **Assessment # of the year:** _1st_____

Stream Name: _Silver Brook_____ **Watershed Management Area:** ___6_____

Municipal Code(s): _____

Segment Identification

Beginning at Latitude/Longitude: 40d 45' 51.47" N, 74d 29' 48.99" W_____

Ending at Latitude/Longitude: __ 40d 45' 45.30" N, 74d 29' 45.71" W_____

Survey Team: _Al Palowski, Terry Dyben_____ **Time:** __1:30pm_____

_____ **Date:** _July 25, 2006_____

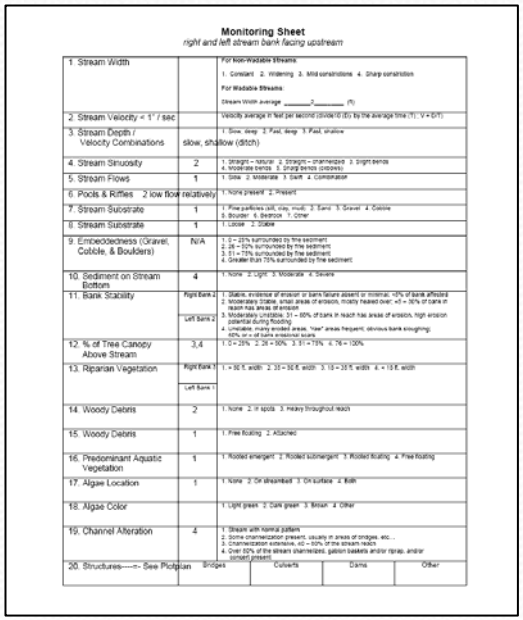
Weather: 1. Clear 2. Overcast 3. Light rain/Showers 4. Steady Rain 5. Heavy Rain 6. Snow 7. Heavy Snow Melt

Today am 4 pm	Last 48 Hours 3	Past Week 3
2		

Days since last rain: _0_____

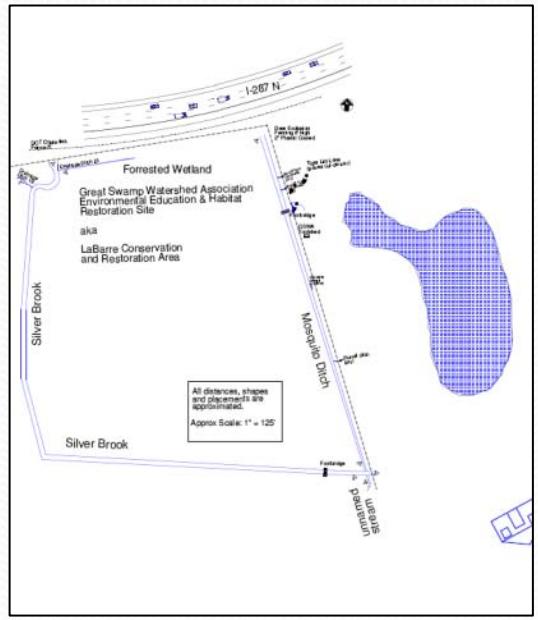
Air Temperature: _____84 ° F_____

Site Sketch: Includes riffles, pools, runs, ditches, riprap, outfalls, roads, sampling, locations, photo reference #, GPS reference #'s GEE PDF



Monitoring Sheet
right and left stream bank facing upstream

1. Stream Width		For Non-Wadable Streams: 1. Constant 2. Widening 3. Mild constrictions 4. Sharp constriction For Wadable Streams: Stream Width Average _____2_____ (ft)
2. Stream Velocity < 1' / sec		Velocity average in feet per second (divide 60 (ft) by the average time (T): V = D/T)
3. Stream Depth / Velocity Combinations	slow, shallow (ditch)	1. Slow, deep 2. Fast, deep 3. Fast, shallow
4. Stream Sinuosity	2	1. Straight – natural 2. Straight – channelized 3. Slight bends 4. Moderate bends 5. Sharp bends (crooked)
5. Stream Flows	1	1. Slow 2. Moderate 3. Swift 4. Combination
6. Pools & Riffles 2 low flow relatively		1. None present 2. Present
7. Stream Substrate	1	1. Fine particles (silt, clay, mud) 2. Sand 3. Gravel 4. Cobble 5. Boulder 6. Bedrock 7. Other
8. Stream Substrate	1	1. Loose 2. Cobble
9. Embeddedness (Gravel, Cobble, & Boulders)	N/A	1. 0 – 25% surrounded by fine sediment 2. 26 – 50% surrounded by fine sediment 3. 51 – 75% surrounded by fine sediment 4. Greater than 75% surrounded by fine sediment
10. Sediment on Stream Bottom	4	1. None 2. Light 3. Moderate 4. Severe
11. Bank Stability	Right Bank 2	1. Stable, evidence of erosion or bank failure absent or minimal; <5% of bank affected 2. Moderately Stable, small areas of erosion, mostly healed over; <5 – 30% of bank in reach has areas of erosion 3. Moderately Unstable; 31 – 60% of bank in reach has areas of erosion, high erosion potential during flooding 4. Unstable, many eroded areas, "raw" areas frequent; obvious bank sloughing; 60% or > of bank erosional scars
	Left Bank 2	
12. % of Tree Canopy Above Stream	3,4	1. 0 – 25% 2. 26 – 50% 3. 51 – 75% 4. 76 – 100%
13. Riparian Vegetation	Right Bank 1	1. < 30 ft. width 2. 30 – 50 ft. width 3. 10 – 30 ft. width 4. < 10 ft. width
	Left Bank 1	
14. Woody Debris	2	1. None 2. In spots 3. Heavy throughout reach
15. Woody Debris	1	1. Free floating 2. Attached
16. Predominant Aquatic Vegetation	1	1. Rooted emergent 2. Rooted submergent 3. Rooted floating 4. Free floating
17. Algae Location	1	1. None 2. On streambed 3. On surface 4. Both
18. Algae Color		1. Light green 2. Dark green 3. Brown 4. Other
19. Channel Alteration	4	1. Stream with normal pattern 2. Some channelization present, usually in areas of bridges, etc... 3. Channelization extensive, >50 – 80% of the stream reach 4. Over 80% of the stream channelized, gabion baskets and/or riprap, and/or concert present
20. Structures-----<- See Pic/plan	Bridges	Culverts / Dams / Other



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Assessment Results—Watershed

- Watershed divided by major roads
- Landuse
  - Historic
    - Primarily agricultural
  - Current
    - Mixture of commercial, residential and undeveloped
- Stormwater management
  - Unmanaged or Phase I detention
- Riparian areas
  - Extensive wetland complexes on mainstem

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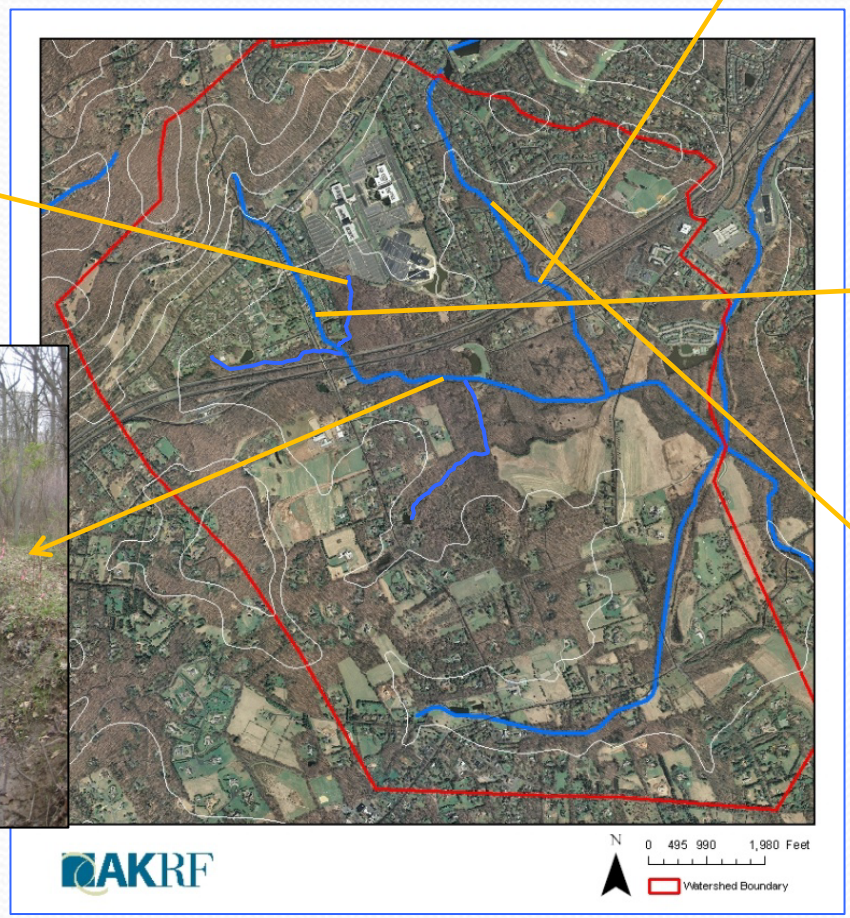
Assessment Results—Characteristic Reaches

Upstream I287

Downstream Commercial Park

Residential Reaches

Mainstem—CMA



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Assessment Results—Stream Corridor

- Residential and undeveloped in good condition
- Segmented by roads
- Instability and active incision
  - Upstream of I-287
  - Downstream of commercial basins
- Lack of woody debris
- Main stem downstream of I-287
  - Historically channelized
  - Sediment aggradation from upstream incision

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Management Plan Components

- Definition of framework and goals
- Assessment of existing conditions
  - Landscape
  - Stream corridor
- Assessment of design constraints
- Development of management strategy
- Identification of restoration project sites

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Management Strategy

- Mitigate untreated or minimally-treated stormwater runoff
  - Stormwater basin retrofits on commercial properties
  - Upstream of actively incising streams

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Management Strategy

- Restore forested riparian buffers where absent or denuded
  - Add large woody debris to replace natural inputs during buffer establishment

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Management Strategy

- Actively restore incising channel segments in headwater reaches
  - Increase bank resistance through vegetative reinforcement

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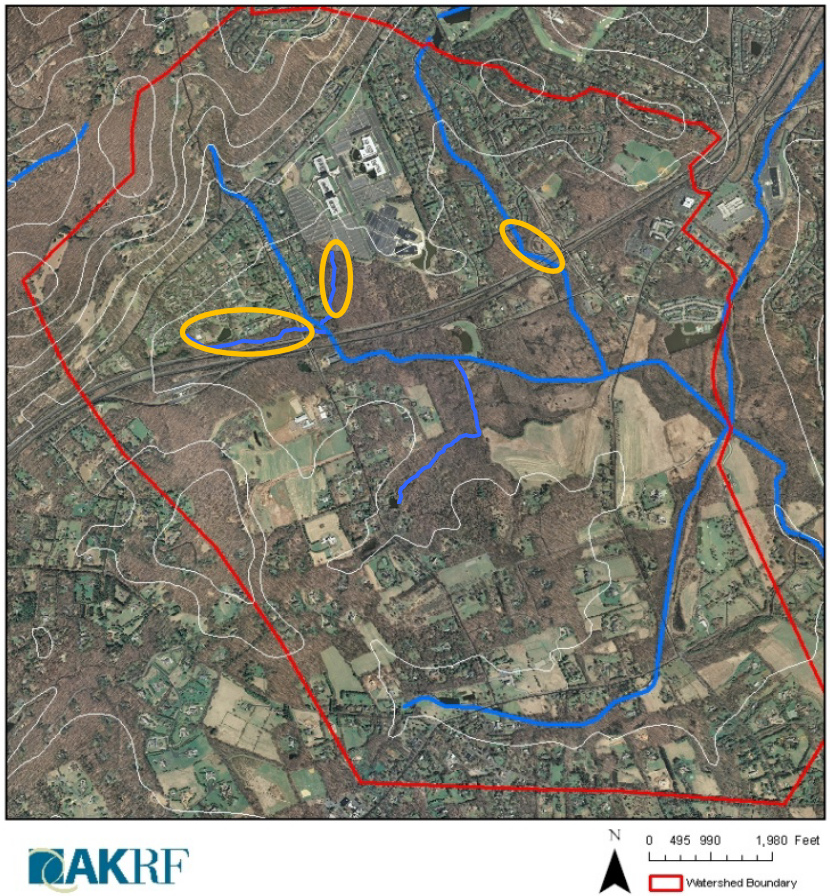
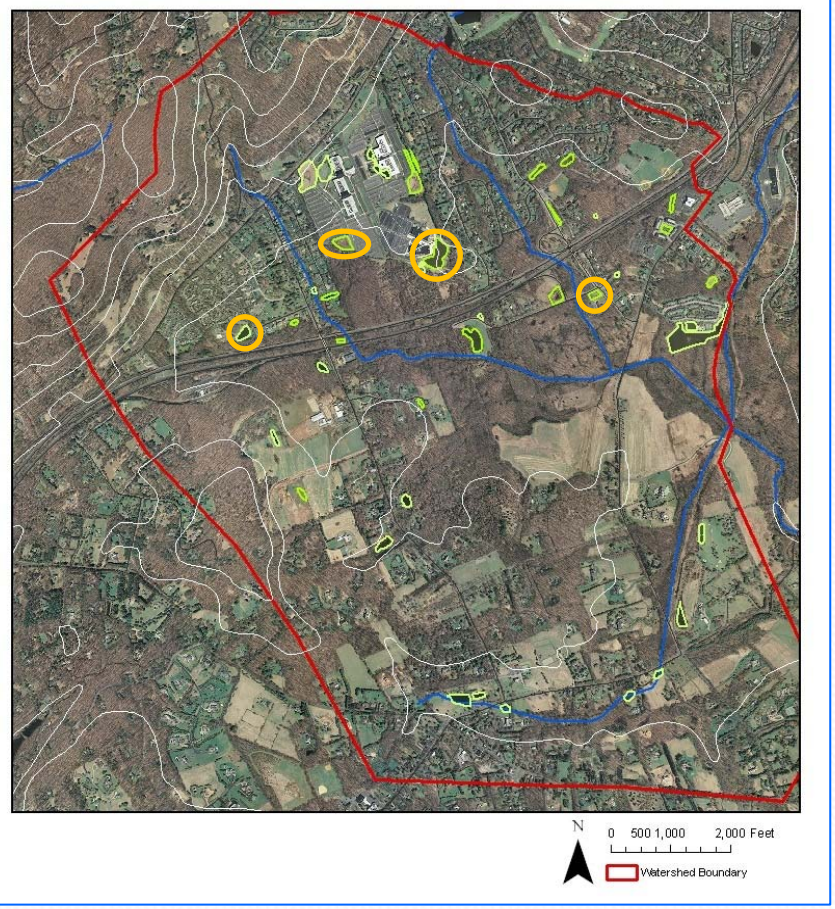
Specific Project Recommendations

In-stream Restoration Sites

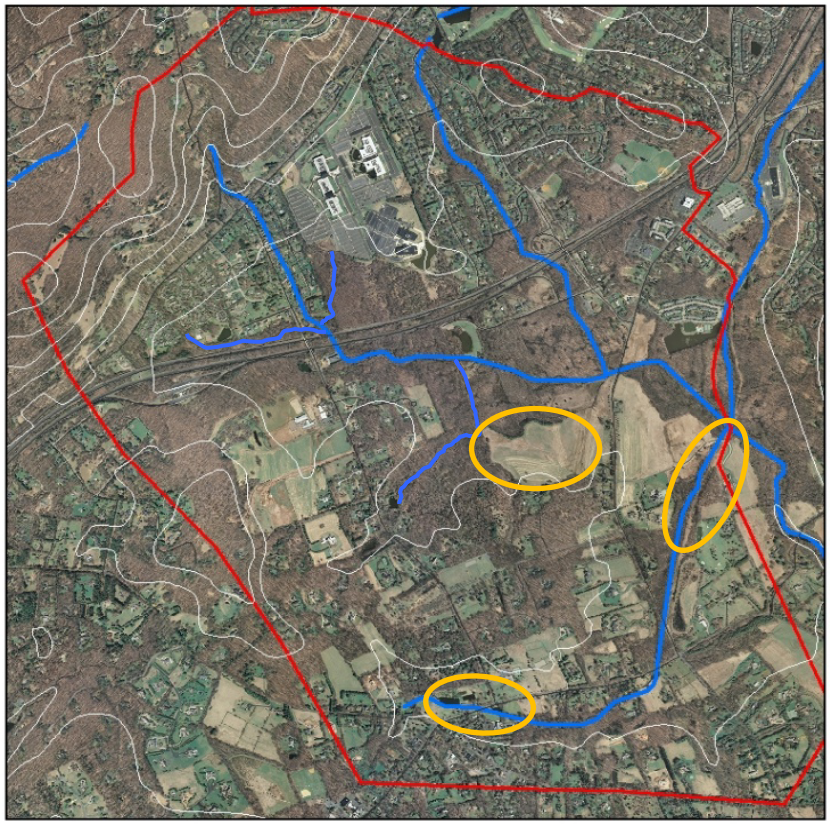


Basin Retrofit Opportunities



Additional Recommendations

- Establish riparian buffers
- Preserve forested areas and open space
- Reforest old field and former agricultural sites
- Develop stream friendly outreach program for homeowners



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Conclusions

- Numerous opportunities for management
  - Large and simple retrofits
  - Unstable headwaters
  - Land use management
- Strategies will improve
  - In-stream flow
  - Water quality
  - Channel habitat
- Follows Ten Towns Great Swamp Watershed Plan
- Model for other Great Brook subwatersheds

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SBW Management Plan

- Finalized July 2009
- 9 priority restoration projects identified
- Estimated construction costs range from:

  $25,000 - $1,340,000
- Seeking DEP approval of the Plan
- Project implementations

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Questions?

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