

Portsmouth Vernal Pool Inventory

Prepared for:

City of Portsmouth, NH
Conservation Commission

Prepared by:



122 Mast Road, Suite 6, Lee, NH 03861

in cooperation with

The City of Portsmouth Planning Department

and



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I. EXECUTIVE SUMMARY

West Environmental, Inc. (WEI) conducted a city-wide Vernal Pool Inventory to locate, document and map vernal pools in Portsmouth. This effort was coordinated with the Portsmouth Planning Department and Conservation Commission to help the City of Portsmouth in vernal pool identification and mapping. The goal of this project was to locate isolated wetlands that provide vernal pool habitat. Currently the City of Portsmouth's wetland regulations exempt wetlands less than 5,000 square feet from the local 100' buffer zone. This study identified smaller wetlands which have the potential to provide vernal pool habitat that may deserve the 100 foot buffer protection. It should be noted that vernal pool habitat can exist in a variety of freshwater wetlands including larger red maple swamps. These areas were also mapped when encountered. A field workshop was held for the Conservation Commission members to give them hands-on training in vernal pool ecology. The results of this Vernal Pool Inventory were presented to the Portsmouth Conservation Commission in July of 2008. Based on the results of this study and the recent revisions to the NHDES Wetlands Bureau regulations which added rules for vernal pool protection, the Portsmouth Conservation Commission has recommended a change to the Article 8 - Environmental Protection Standards of the City of Portsmouth to include vernal pool identification and protection with a 100' buffer.

II. VERNAL POOLS DEFINED

The NHDES wetlands Bureau defines a vernal pool in their Administrative Rules Env-Wt 101.99 as “a surface water or wetland ... which provides breeding habitat for amphibians and invertebrates that have adapted to the unique environment of such pool and which... typically has the following characteristics:

- Cycles annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year;
- Forms a shallow depression or basin;
- Has no permanently flowing outlet;
- Holds water for at least 2 contiguous months following spring ice-out;
- Lacks a viable fish population; and
- Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators”

Primary vernal pool indicators include wood frogs, mole salamanders and fairy shrimp. Secondary indicators include species of aquatic insects including the larvae of caddisfly, dragonfly, and damselfly; fingernail clams and certain aquatic beetles; and other specific species that inhabit vernal pools.

III. METHODOLOGY

This inventory utilized the following methodology to identify and map the vernal pools of Portsmouth:

- Establishment of 10 vernal pool focus areas
- Review and implementation of Spring 2006 color aerial ortho photos
- Evaluation of City-wide topographic overlay onto 2006 color aerial photography
- Spring 2008 field reconnaissance
- Collection of vocalization data
- Collection of physical characteristics of each pool (where possible)
- Identification of specific vernal pool species
- A review of existing site evaluations
- Mapping the limits of identified pools

Aerial photos of each focus area were evaluated to locate the presence of standing water and potential pools were identified. Field reconnaissance was conducted during early breeding season and egg laying (4/16 – 5/12/08) when wood frog vocalization was at its peak. Mapping was performed utilizing 2006 city-wide topography over Spring 2006 color aerial ortho photos. Follow up inspections were conducted to verify pool hydrology in mid- to late-June.

Limitations

This study was partially constrained by access to private property and as a result focused on collection of amphibian vocalization in suitable vernal pool habitat. A complete vernal pool survey was not possible; therefore each pool identified in this study is noted as a potential vernal pool. A Vernal Pool Documentation Sheet was completed for each potential vernal pool. However, typical data collected through dip netting including aquatic invertebrate sampling was not performed. A sample of this form is in Section V.

IV. VERNAL POOL DOCUMENTATION SHEET

Observer's name: _____ Focus Area: _____

Address: _____ Pool ID: _____

Location of Pool: _____

Photos attached: _____ pool _____ animals

Date: _____ Weather: _____ Pool Size: _____ Water Depth: _____
(estimated)

SPECIES

adult
vocalization
amplexus
courtship
spermatophores
eggs
tadpoles/larvae
juveniles
macroinvertebrates

Comments: _____

SITE/TYPE _____ upland-isolated (pool not associated with wetland) Setting:
_____ bottomland-isolated (pool in its floodplain – not a wetland)
_____ wetland complex (pool within or associated with a larger wetland habitat)

HABITAT (estimate % of type)
_____ woodland (specify type) deciduous coniferous mixed
_____ agriculture or open fields
_____ gravel pit
_____ residential
_____ roadside
_____ other

OVERSTORY _____ heavy overstory, >50% shrubs and/or trees
_____ moderate overstory, <50% shrubs and/or trees
_____ open site with grasses, forbs, scattered shrubs

COVER (estimate % of type)	BOTTOM (estimate % of types composing bottom surface)
_____ shrubs	_____ sand
_____ emergent vegetation	_____ mud/soft sediment
_____ branches, twigs	_____ leaf litter
_____ submergent vegetation	_____ submergent vegetation
_____ sphagnum moss	_____ emergent vegetation
_____ other	

Dominant Plants in Pool:

Dominant Plants around Pool:

COMMENTS:

V. FINDINGS AND FOCUS AREA SUMMARIES

A key component to function of vernal pools is the presence of suitable dispersal habitat for amphibians in the form of undeveloped forest. A vernal pool is only viable if the surrounding upland provides a woodland community for the adult amphibians to utilize for the majority of the IV life cycle. Significant portions of the City of Portsmouth have been urbanized and do not have suitable forest to support vernal pool species. These constraints were utilized in the identification of focus areas and major portions of the city were not included in this study due to dense urbanization.

A total of 33 potential vernal pools were identified in this study. There are several clusters of vernal pools located within the less developed portions of Portsmouth. These include a cluster in Focus Area 1 in the vicinity of Walker Bungalow Road and Maritime Cottage Road. This cluster appears to be the most important and includes six vernal pools, three of which are large and could support significant numbers of amphibians. A second cluster is located off Jones Avenue which had been previously identified as part of a site evaluation on a city-owned property. This cluster also includes six vernal pools with only one larger pool and several small satellite pools (smaller pools that may not be utilized every breeding season). Both of these clusters have viable supporting upland habitat and may support additional amphibian species including mole salamanders.

Focus Area 3 had five pools, one of which is a large pool located south of Elwyn Road across from the Urban Forestry Center. This pool is limited by its proximity to both the road and adjacent residential subdivision which decreases the ability of amphibians to utilize the supporting upland habitat. There is also a large area of vernal pool habitat within a forested wetland south of Elwyn Road and east of Harding Road.

The remaining potential pools are scattered throughout six other focus areas and they range from very small isolated wetlands to vernal pool habitat in larger forested wetlands. Some of these pools are in suitable forest habitat and others are in locations that are compromised by adjacent development.

A summary of the field work for each focus area follows. Photos of a few vernal pools are also included in this section. Vernal Pool Data Sheets are included in Appendix A.

Portsmouth Focus Area 1

- #1A**
- Large **vernal pool** with open canopy and bordered by lawn on western boundary
 - 36” standing water
 - Calling wood frogs noted
 - Shrub species include highbush blueberry and dense winterberry
 - Herb species include some grasses and sedges
 - Numerous egg attachment sites present
- #1B**
- Large **vernal pool** with small open canopy area
 - 36” standing water
 - Calling wood frogs noted
 - Connected to #1a upstream
 - Canopy species include red maple and white pine
 - Shrub species include highbush blueberry and winterberry
 - Numerous egg attachment sites present
- #1C**
- Largest **vernal pool**
 - 36” standing water
 - Calling wood frogs noted
 - Egg masses were observed
 - Canopy species include red maple and white pine
 - Shrub species include highbush blueberry and winterberry
 - Open canopy area with dense shrubs
 - Numerous egg attachment sites present
- #1D**
- **Vernal pool** with small open canopy
 - 24” standing water
 - Calling wood frogs noted
 - Canopy species include red maple and white pine
 - Shrub species include highbush blueberry and winterberry
- #1E**
- Not a vernal pool – small wetland pocket
- #1F**
- **Vernal pool** with small open canopy
 - 12” standing water
 - Adult wood frogs and egg masses observed
 - Canopy species include red maple
 - Shrub species include highbush blueberry
 - Herb species include cinnamon fern and sedges
- #1G**
- Stream and associated wetland

Portsmouth Focus Area 2

#2A

- **Vernal pool** with 24” of standing water
- Calling wood frogs noted
- Canopy species include red maple and red oak
- Shrub species include highbush blueberry and maleberry
- Herb species include some grasses and sedges
- NHSC info - Fairy shrimp, American toad, whirligig beetle, egg strands, caddisfly larvae were noted

#2B

- Possible **vernal pool** with 24” of standing water
- Canopy species include red maple
- Shrub species include highbush blueberry and winterberry
- NHSC info - green frog larvae, water boatman, water strider

#2C

- **Vernal pool** with 12” standing water
- Calling wood frogs noted
- Canopy species include red maple
- Shrub species include highbush blueberry and winterberry
- NHSC info –Wood frog egg masses and larvae and water striders

#2D

- **Vernal pool** with 20+” standing water
- Calling wood frogs noted
- 36 wood frog egg masses, wood frog larvae and water striders noted
- Canopy species include red maple
- NHSC info -Shrub species include highbush blueberry and winterberry

#2E

- **Vernal pool** adjacent Jones Avenue with 12” standing water
- Calling wood frogs noted
- Canopy species include red maple and white ash
- Shrub species include highbush blueberry and winterberry
- NHSC info - Caddisfly larvae and egg masses observed

#2F

- NHSC info - **Vernal pool** with 12” standing water
- Calling wood frogs noted
- Canopy species include red maple
- Shrub species include highbush blueberry and winterberry
- NHSC info-11 wood frog egg masses and wood frog larvae observed

NHSC –

This information comes from a report prepared by NHSC, Inc. entitled Vernal Pool Assessment Jones Avenue Tax Map 228, Lot 1 dated June 2007

Portsmouth Focus Area 3

- #3A** ▪ Man made pond
- #3B** ▪ Shadows, part of larger wetland
- #3C** ▪ Not a wetland
- #3D** ▪ Stream with shadows
- #3E** ▪ Large **vernal pool**
 - Scrub-shrub wetland with open canopy in the middle
 - Canopy species include red maple
 - Shrub species include highbush blueberry, winterberry and buttonbush
 - Peepers and caddisfly larvae noted
 - Calling wood frogs noted
 - Excellent structure numerous egg attachment sites present
- #3F** ▪ Small **vernal pool**
 - Calling wood frogs noted
 - Canopy species include red maple
 - Shrub species include highbush blueberry
 - Ledge bound
- #3G** ▪ pond
- #3H** ▪ Looks like pond (no access)
- #3I** ▪ Looks like pond (no access)
- #3J** ▪ Very small **vernal pool** next to driveway and Elwyn Road
 - Calling wood frogs noted
 - May have water quality issues
- #3K** ▪ Potential **vernal pool**
 - Calling peepers noted
 - Very small
- #3L** ▪ **Vernal pool** habitat within large red maple swamp
 - Many calling wood frogs noted
 - Canopy species include red maple
 - Shrub species include highbush blueberry and winterberry
 - Herb species include cinnamon fern

Portsmouth Focus Area 4

- #4A**
- Not present (aerial photo image possibly caused by a large white pine “signature”)
- #4B**
- Off road to Spring Brook Condominiums – this wetland is situated just east of the tennis court/swimming pool recreational area
 - Depth of water is 3-4’
 - Wetland is more pond-like in character and associated with scrub-shrub wetland along east and south perimeter with much shallower water
 - Depth of water may accommodate fish species
 - Western end is more emergent in character
 - Photo documentation taken
- #4C**
- This wetland was located off Lang Road and adjacent a field
 - PFO1E in character
 - This vernal pool is surrounded by perimeter of hardwoods (red oak, red maple, black birch)
 - Depth of water is 36”
 - 2 wood frog egg masses, 1 giant water beetle, and water striders were observed
 - Habitat features including leaf litter, forested canopy, perimeter of wetland shrubs for egg attachment and adjacent forested tract were observed
 - Indicator species were found
 - Photo documentation taken
- #4D**
- This wetland was located off Lang Road and across from Beechstone Luxury Apartments
 - PFO1/4E in character
 - Mostly surrounded by white pine and red maple – a few internal wetland shrubs of highbush blueberry and winterberry were observed
 - Depth of water is 36”
 - Water striders and mosquito larvae were observed, but no indicator species were present
 - Habitat features including critical water depth, leaf litter, forested canopy, internal shrub vegetation for egg attachment and adjacent forested tract were observed
 - Restraints observed included potential salt contamination from Lang Road, nearby brush pile/debris piles, and scattered trash
 - Photo documentation taken

Portsmouth Focus Area 5

#5A

- Access via a nearby power line (off Ocean Road)
- PEM1E in character
- Vegetation is chiefly comprised of broad-leaved cattails, sensitive fern, and interspersed meadowsweet shrubs
- There is an overflow structure located at the center of the wetland – it is unclear if wetland is also serving in stormwater collection
- Pool depth was approximated at 4’
- Usage by vernal pool species was questioned due to the wetland’s position with commercial development and Ocean Road
- Wetland may actually be located in Greenland
- Photo documentation taken

#5B

- Access via Ocean Village Development (off Ocean Road)
- Pond-like in character
- Incoming/outgoing flowage
- Average depth was estimated at 4-5’
- Perimeter of eastern hemlock and red maple
- Appears that water depth may support a fish population
- Hydrologically connected with red maple/skunk cabbage swamp on the north and by an emergent pool (#5c) on the south
- Photo documentation taken

#5C

- PEM1E in character
- This pool has an Atlantic white cedar and red maple perimeter
- The core vegetation is comprised of wetland grasses with an interspersed meadowsweet shrubs
- Water depth was estimated at 12-14’
- Incoming/outgoing flowage
- Mosquito larvae and water striders were noted
- The wetland appears to have the potential to support vernal pool species
- The wetland is hydrologically connected with #5d on the south
- Photo documentation taken

#5D

- PFO4/1E in character
- This is an Atlantic white cedar/white pine/red maple forested wetland
- There is an interspersed highbush blueberry shrub component
- Flowage was evidenced outgoing
- Water depth was estimated at 12-14’
- The topography was pit & mound
- Mosquito larvae and water striders were observed
- This pool also appears to be capable of supporting vernal pool activity
- Photo documentation taken

Portsmouth Focus Area 6

- #6A**
- Not present (aerial photo image possibly caused by white pine “signature” along with an elevation change in the topography)
- #6BB**
- Observed a forested-scrub/shrub wetland with approximately 6” of pooled water with pit & mound topography
 - No visual evidence of any indicator species
 - Observed the following macroinvertebrates: water striders, mosquito larvae, whirligig beetles
 - #6BB may provide potential vernal pool habitat
 - Leaf litter, an adjacent tree canopy, and internal shrubs/detritus for egg attachment are present
 - Potential may be restrained by proximity to commercial development, Heritage Road, and active railroad tracks
 - Calling barred owls were heard in the adjacent white pine forest
- #6B**
- Appears this wetland may have been part of #6b prior to the railroad track installation
 - Observations made were similar to #6b
- #6C**
- This wetland was emergent in character (PEM1E) being chiefly comprised of broad-leaved cattails with perimeter of sapling trees
 - Average depth of pooled water was 8”
 - There was no evidence of vernal pool indicator species
 - A green frog was heard
- #6D**
- Not a vernal pool
 - Part of a larger red maple swamp
- #6DD**
- This wetland contains a pooled area just south and adjacent the access road providing access to the nearby ball field
 - The wetland is scrub-shrub in character surrounded by white pine
 - No indicator species were observed
 - The depth of pooled water was approximately 12”
- #6E**
- Old test pit in red maple swamp
 - Vernal pool in forested wetland
- #6F**
- Calling wood frogs noted
 - Canopy species include red maple and eastern hemlock
 - Shrub species include winterberry, highbush blueberry, and speckled alder
 - Herb species include cinnamon fern, Canada mayflower
 - Closed canopy
- #6G**
- Last two photos
 - Squeezed between railroad and Banfield Road
 - See notes in yellow folder

Portsmouth Focus Area 7

- #7A**
 - Possible vernal pool
 - Part of wetland drainageway
 - Water depth of 6”

- #7B**
 - Possible vernal pool
 - Water depths of 8+”

- #7C**
 - Vernal pool
 - Part of red maple swamp
 - Canopy species include red maple
 - Shrub species include highbush blueberry, winterberry and maleberry
 - Herb species include cinnamon fern and Canada mayflower
 - Calling wood frogs noted

Portsmouth Focus Area 8

- #8A**
 - Not a vernal pool
 - Man made pond in sand pit
 - Bullfrogs observed

- #8B**
 - Dense area of large white pine

Portsmouth Focus Area 9

- #9A**
 - Detention basin

- #9B**
 - Detention basin

- #9C**
 - Mitigation basin

- #9D**
 - Mitigation basin

- #9E**
 - Detention basin

Portsmouth Focus Area 10

- #10A**
 - Potential vernal pool
 - Water depth of 12+”
 - Canopy species include red maple and white pine
 - Shrub species are sparse
 - Closed canopy
 - Adult wood frogs noted

- #10B**
 - Potential vernal pool
 - Adult wood frogs noted
 - Canopy species include red maple and dense white pine
 - Shrub species are sparse
 - Water depth of 12+”



1. This is a view of Pool 7C which is vernal pool habitat within a forested wetland. These types of pools are typically larger in size but have a shallow water depth.



2. This is a view of Pool 6F off of Ocean Road. This is a small pool with thick shrub habitat surrounding it.



3. This is a view of Pool 4C north of Lang Road. Vernal pools often have a mixed canopy around them which provides shading in portions of the pool.



4. This is a view of Pool 6DD. Some pools have water depth exceeding 36 inches during spring high water.



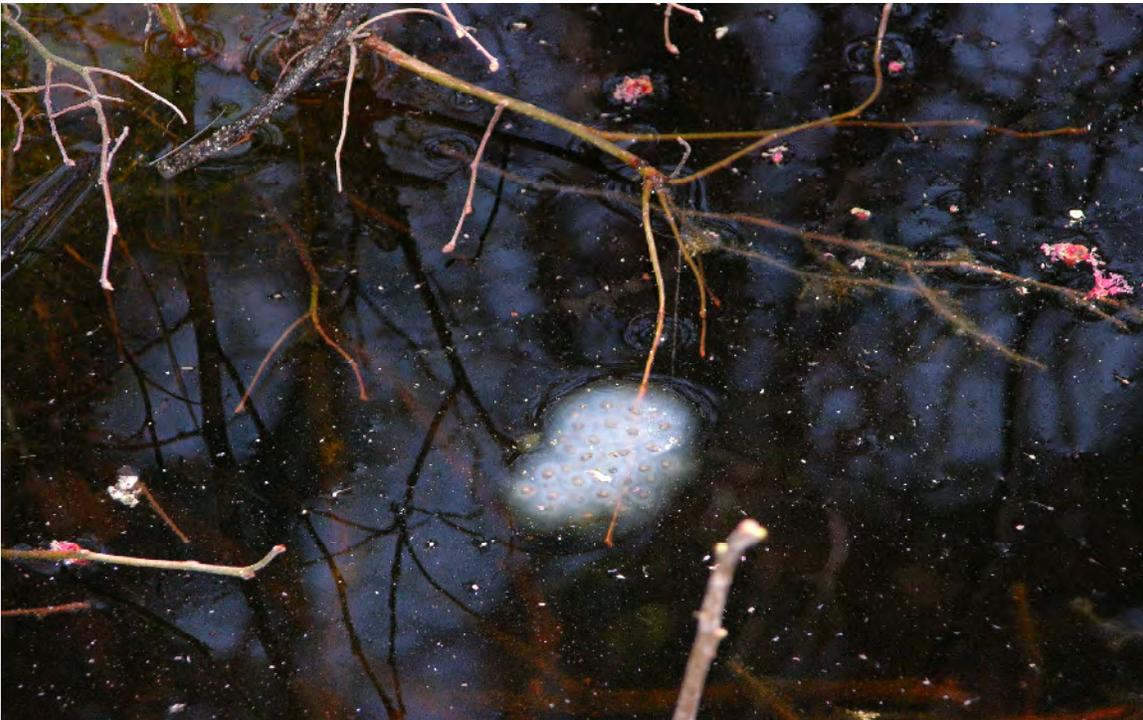
5. This is a spotted salamander which is a primary indicator species.



6. Wood frogs are a primary indicator species and were the most common species identified in this inventory.



7. This is a view of a wood frog egg mass at the pool surface attached to a shrub branch which is typical for this species.



8. This is a spotted salamander egg mass which has a cloudy white tinge to it and is also attached to a twig in the pool.



9. This is a view of a large wood frog egg mass which can contain up to 1,000 eggs.



10. This is a view of a hatching egg mass of wood frogs. Individual egg masses within a pool can hatch at different times based on water depth and shade from the surrounding forest canopy.



11. This is a view of a single fairy shrimp which is also a primary vernal pool indicator.



12. This is a view of caddisfly larvae which looks like a little pine cone and is typically constructed by very small twigs that provide a protective home for the larvae.

VI. FOCUS AREA AND POOL LOCATION MAPS

VII. REFERENCES

Burne, Matthew R. and Leo P. Kenney. A Field Guide to the Animals of Vernal Pools. Massachusetts Division of Fisheries & Wildlife. May 2000.

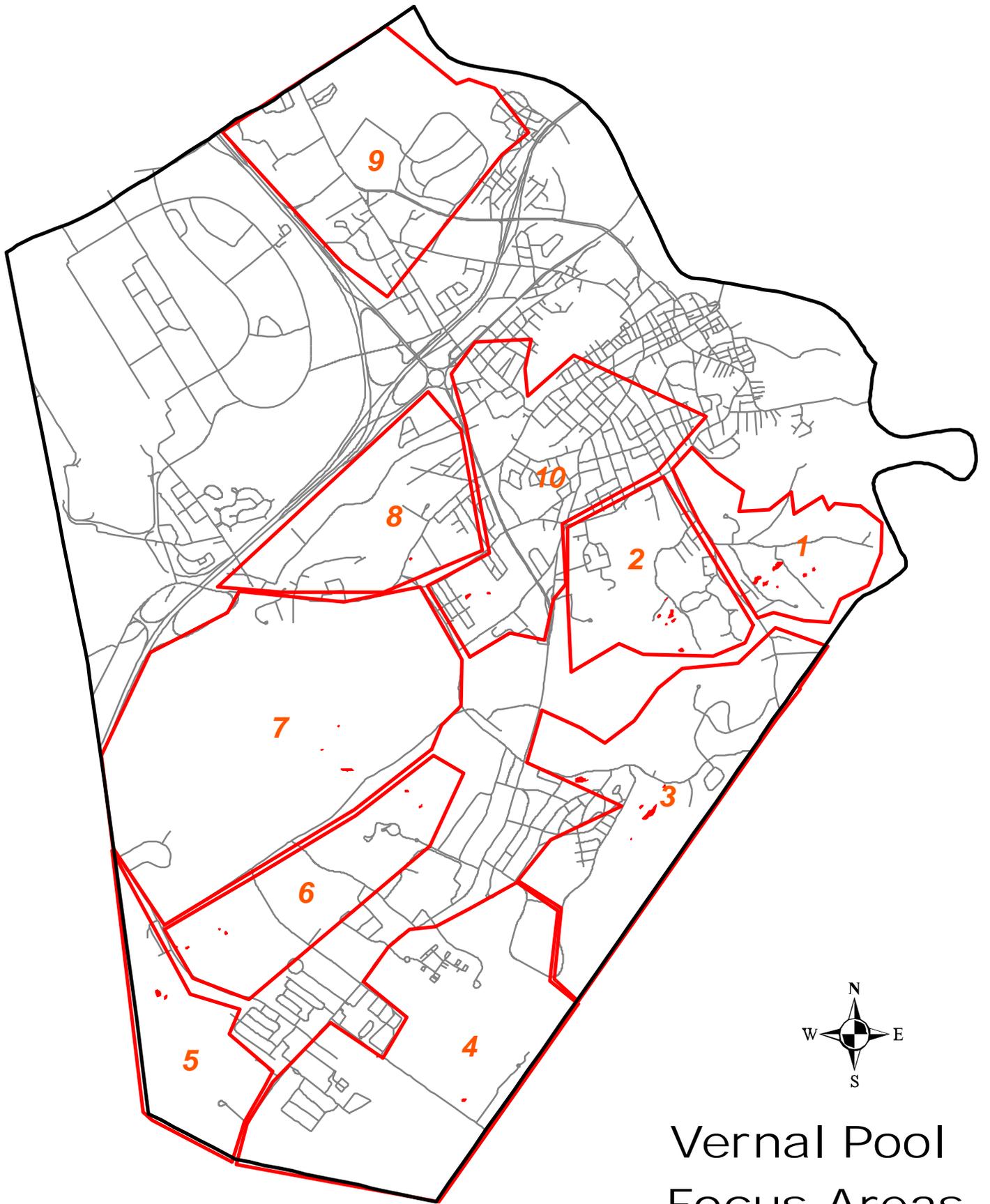
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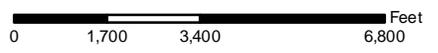
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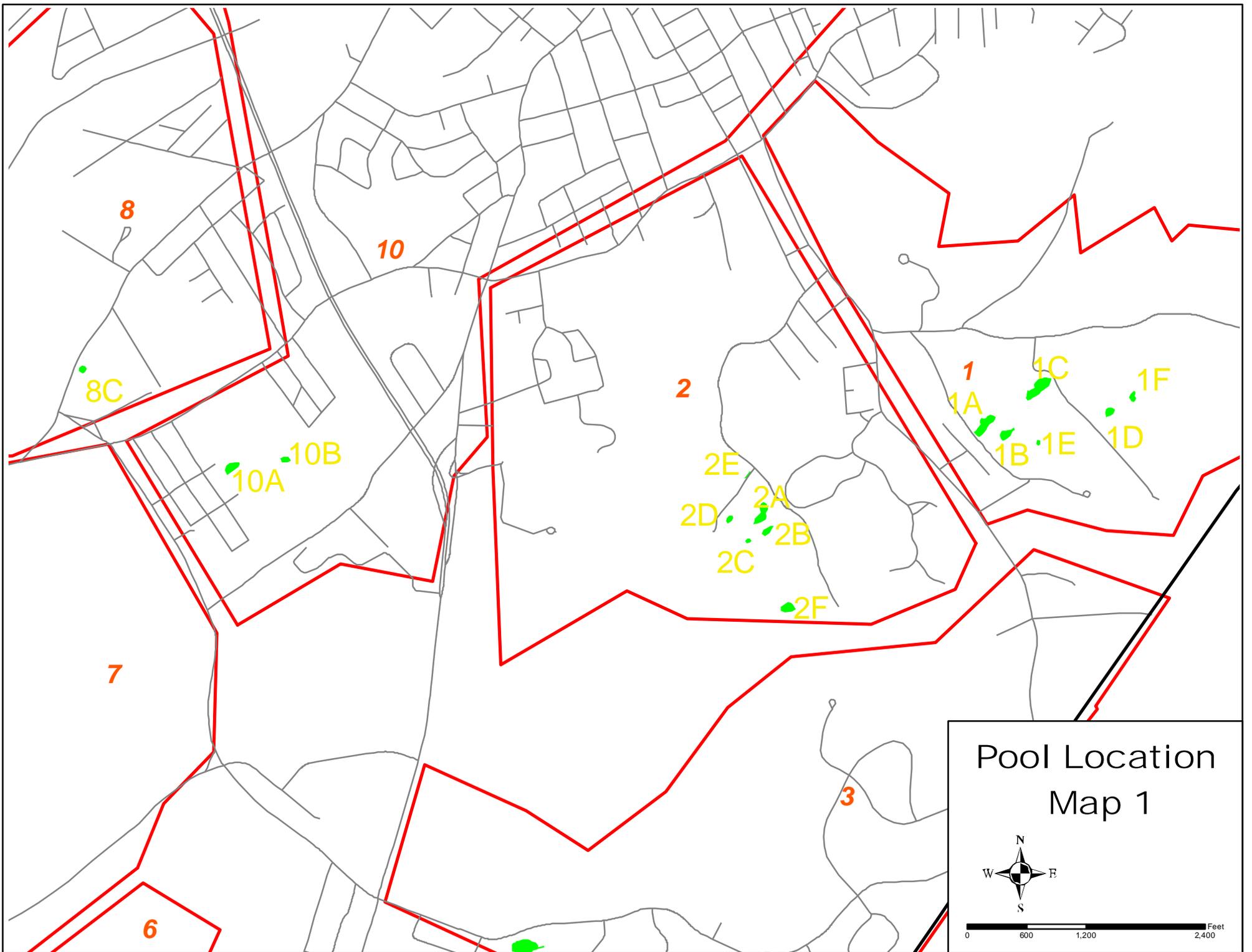
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Vernal Pool Focus Areas

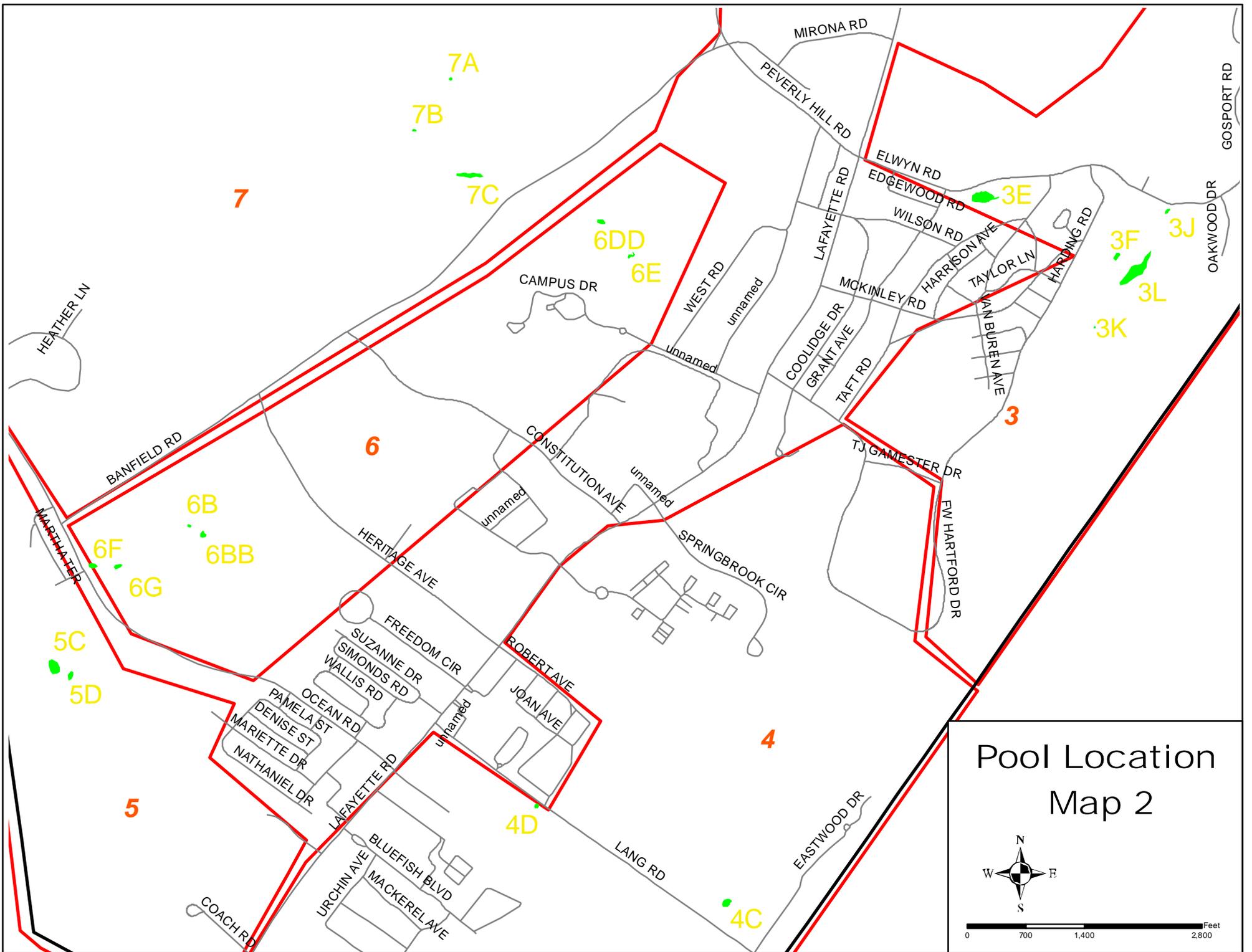




Pool Location Map 1



0 600 1,200 2,400 Feet



Pool Location Map 2