

Water Resource Atlas
Fresh Water Ponds
Brewster, Massachusetts



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Introduction



The Horsley Witten Group, Inc. (HW) has completed its mapping of the surface watersheds and groundwater recharge areas to fresh water ponds in Brewster. In all, 42 individual ponds have been mapped. Thirty nine of these are shown on individual maps, and three ponds; Walkers Pond, Upper Mill Pond and Lower Mill Pond, are shown together on one map. In addition, a town-wide map showing all of the mapping information is included.

The maps were prepared using Geographic Information System (GIS) data available for Brewster, provided by the State of Massachusetts, the Cape Cod Commission, and the Town. Mapping for each pond provides information regarding:

- Surface watersheds;
- Groundwater recharge areas (where available);
- Stormwater infrastructure (where available); and
- Septic system management areas.

The goal of the mapping was to identify areas where nutrient pollution, particularly phosphorus, may originate and migrate to a pond. Excess nutrients increase plant and algae growth, and impact the recreational uses for which the ponds are enjoyed. The information provided by the maps can be used by the Town and local residents to plan pond restoration and protection strategies, such as improvements to roads, stormwater facilities, and/or upgrades to septic systems. This section of the atlas provides information on the development of these strategies, along with an analysis of the number of developed or developable parcels within the septic system setbacks that may be affected by changes to the Town's health regulations for septic systems currently being considered by the Board of Health.

Surface Watersheds

The surface watershed for each pond was mapped to identify areas where precipitation falling on the ground surface could flow downhill into a pond. The watershed boundaries are based on the topography of the land surrounding the pond and were mapped using two-foot topographic contours provided by the Town.

Surface watershed boundaries can be used to identify where pollutants, such as lawn fertilizers, agricultural fertilizers, and/or road runoff can potentially migrate to a pond following a rainfall event. In some cases this is directly across the ground surface. In others, it is through the existing stormwater drainage system, provided it had been mapped and could be incorporated into this analysis. Site inspections to approximately 20 ponds were conducted to verify surface watershed boundaries. The inspections also included an evaluation of how stormwater infrastructure changed the boundary of the watershed by directing stormwater to an area that drains to the pond.

Groundwater Recharge Areas

Groundwater recharge areas, or capture areas, are those land areas, upgradient of a pond where precipitation that infiltrates into the ground eventually enters the groundwater system and flows to the pond. It represents the areas where pollutants contained in groundwater can flow into a pond and impact water quality. While phosphorus does not move readily in groundwater, other pollutants such as nitrogen and other hazardous materials do move with groundwater. Knowing the recharge area upgradient of a pond can be useful in identifying potential contamination sources, and in making sure future development does not impact pond water quality.

Groundwater recharge areas are mapped based using data layers developed by the U.S. Geological Survey (Walter, Masterson and Hess, 2004). Some were modified slightly as part of the watershed mapping developed by the Cape Cod Commission and the University of Massachusetts School of Marine Science and Technology (SMASST) as part of the Massachusetts Estuaries Project (MEP). These include the MEP reports for Pleasant Bay (May 2006) and the Herring River (March 2013). The only exception is for Schoolhouse Pond, where the recharge area boundary was mapped based on local groundwater flow measurements taken in the late 1980s.

Stormwater Infrastructure

Where available, data on existing stormwater infrastructure was included on the maps. This includes locations of infiltrating catch basins, overland stormwater discharges to ponds and larger, connected stormwater facilities. The mapping was developed for the Town by Kleinfelder Associates and provided to HW. The infrastructure includes leaching catch basins that infiltrated stormwater into the underlying groundwater, as well as drainage structures or channels that funnel runoff directly into a pond.

Septic System Management Areas

Septic system setbacks or management areas have been mapped around each pond. They include areas within 300 feet upgradient and 100 feet downgradient of a pond. The upgradient and downgradient areas were mapped based on groundwater flow directions provided by the U.S. Geological Survey and contained in GIS data available from the Cape Cod Commission.











These areas were developed to identify areas where phosphorus in wastewater effluent discharged from septic systems could migrate to a pond and impact water quality. Phosphorus in effluent discharged in the 300 foot setback on the upgradient side of the pond can move with groundwater and eventually enter the pond in this manner. On the downgradient side of the pond the setback was developed in recognition that there could be a septic system failure where effluent could flow over the ground surface into a pond. To be conservative, it was also assumed that there could be localized flow from

groundwater into the pond from near shore areas during periods of high groundwater or increased precipitation.

HW identified the number of developed and developable parcels located entirely or partially within the septic system setback and therefore potentially affected by a revised regulation currently being considered by the Board of Health. As of 2014, there are 85 developed parcels located entirely within the septic system setback. 468 developed parcels are located partially within the setback and an additional 55 developable parcels are partially within the setback. In total, 608 parcels could be impacted by a revised regulation.

How To Use These Maps

Each map contains information on the water resource features described above. A legend describing the information is provided on each map and explained below:

-  300/100 foot septic system buffer around each pond. The buffer extends 300 feet from the pond on the upgradient side of the pond, and 100 feet on the downgradient side of the pond.
-  The boundary of the surface watershed around each pond. This is the area that can contribute water to the pond through surface water runoff. When rain hits the ground a portion will run downhill on the ground surface and can enter the pond prior to fully soaking into the ground.
-  The boundary of the groundwater capture area; the area that contributes groundwater to the pond. A portion of the rain falling on the ground surface within this area can soak into the ground, enter the groundwater reservoir, or aquifer, and then flow towards the pond. The groundwater enters the pond through the pond bottom.
-  Existing wetlands as mapped in the Massachusetts GIS database.
-  Existing cranberry bogs shown on the maps.
-  Existing buildings.
-  Streams, ditches or other surface connections through which water flows into and out of the ponds as well as nearby wetlands and cranberry bogs.
-  Land surface elevations in ten-foot intervals.
-  Existing stormwater outfalls that drain into a pond. These outfalls collect stormwater from nearby roads and developed areas and discharge it directly to a pond without any prior treatment. Not every pond has a direct outfall.
-  Catch basins along roads that collect and infiltrate stormwater into the ground, or collect and transmit the stormwater to an outfall as described above.

For More Information

To learn more about Brewster's efforts to restore and protect ponds and to obtain information on the Town's Integrated Water Resource Management Plan, go to:

www.brewster-ma.gov

click on the Water Planning icon.



Cover photo courtesy of Brewster Conservation Trust.

References

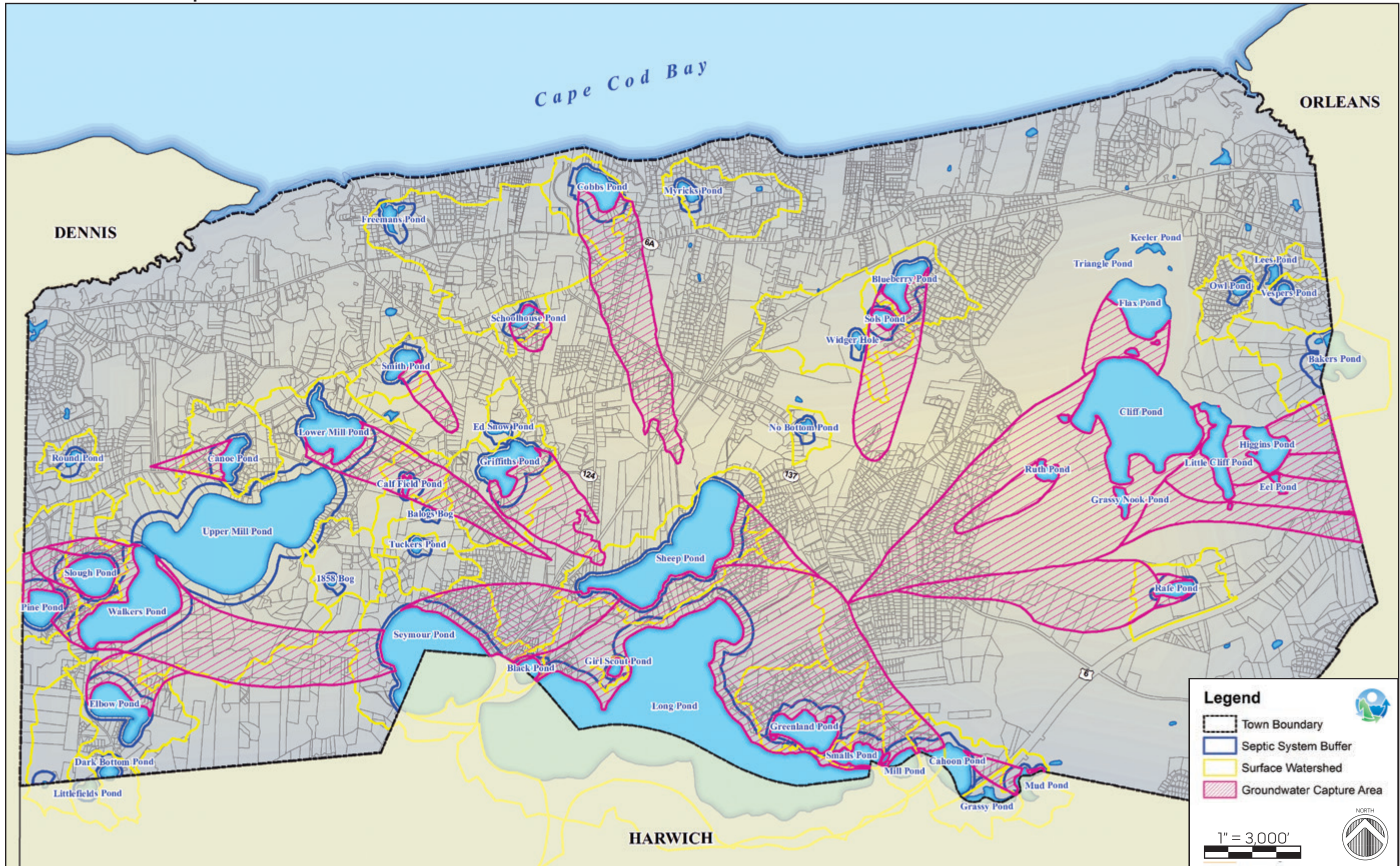
SMAST, May 2006. Massachusetts Estuaries Project - Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Pleasant Bay System, Orleans, Chatham, Brewster, and Harwich, Massachusetts.

SMAST, March 2013. Massachusetts Estuaries Project - Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Herring River Embayment System, Harwich, Massachusetts.

Walter, Donald A., Masterson, John P., and Kathryn M. Hess, 2004. Groundwater Recharge Areas and Travel Times to Pumping Wells, Ponds, Streams, and Coastal Water Bodies, Cape Cod Massachusetts. U.S. Geological Survey Scientific Investigations Map I-2857.



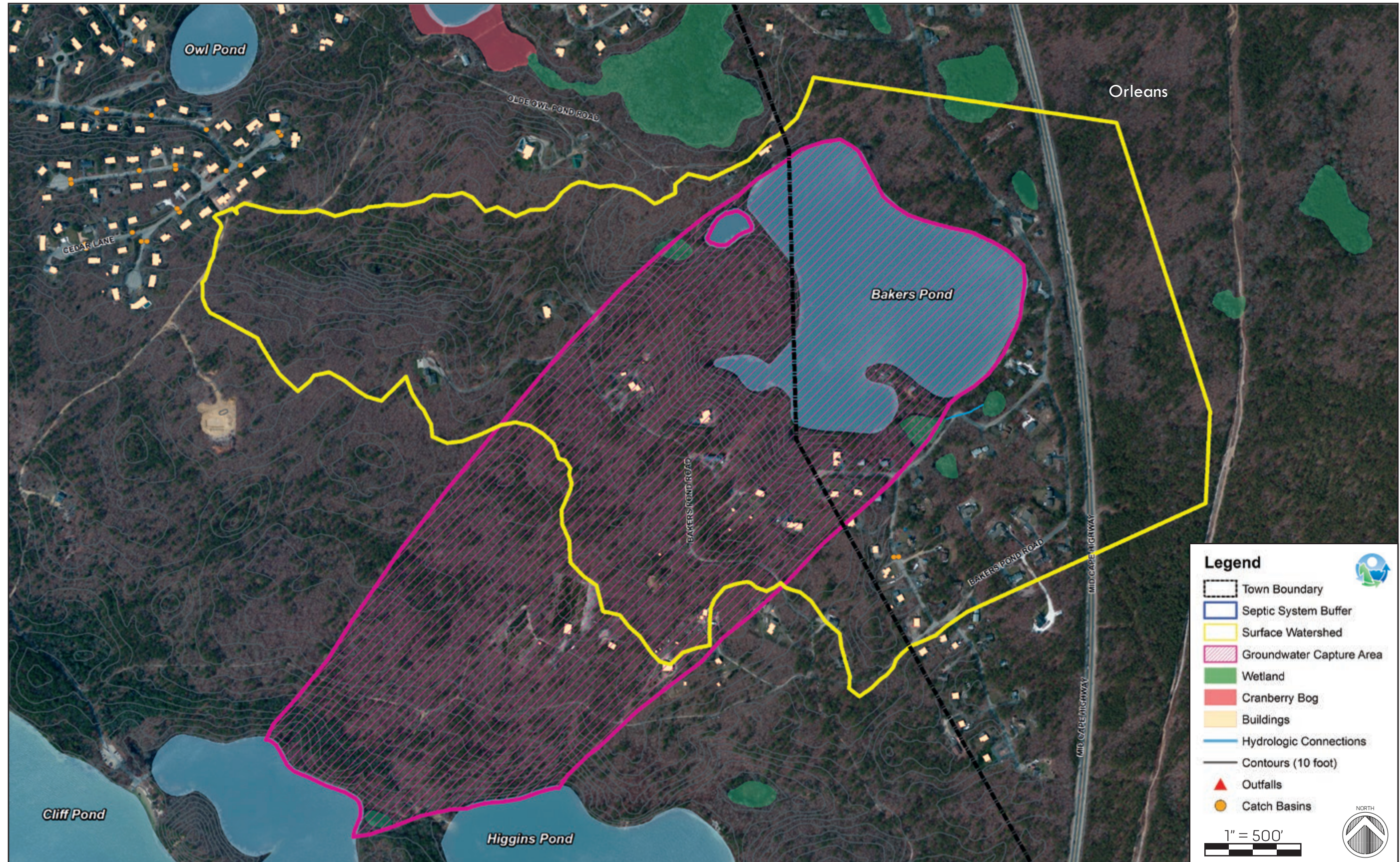
Town-wide Map



1858 Bog



Bakers Pond



Balog's Bog



Black Pond



Blueberry Pond



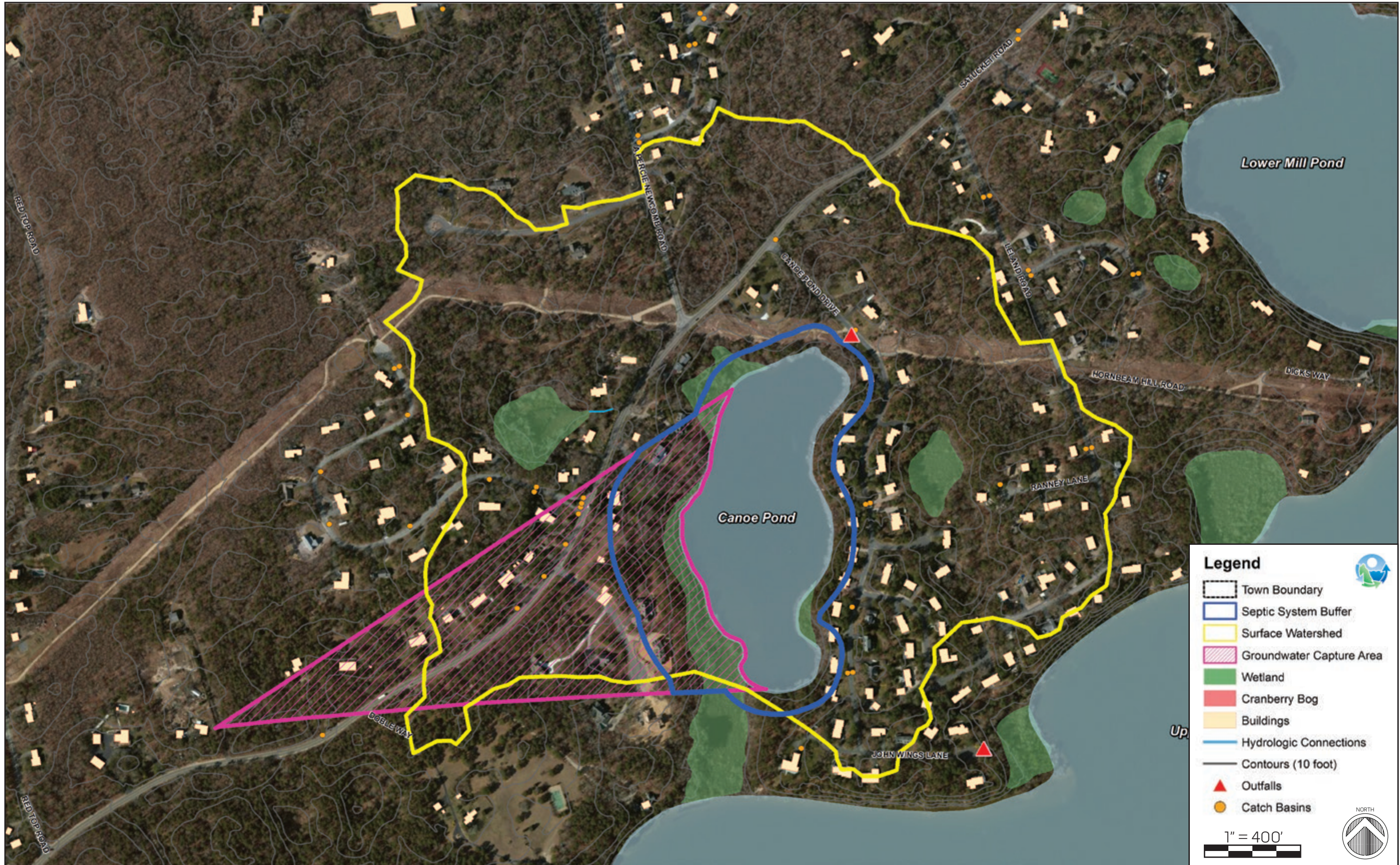
Cahoon Pond



Calf Field Pond



Canoe Pond



Cobbs Pond



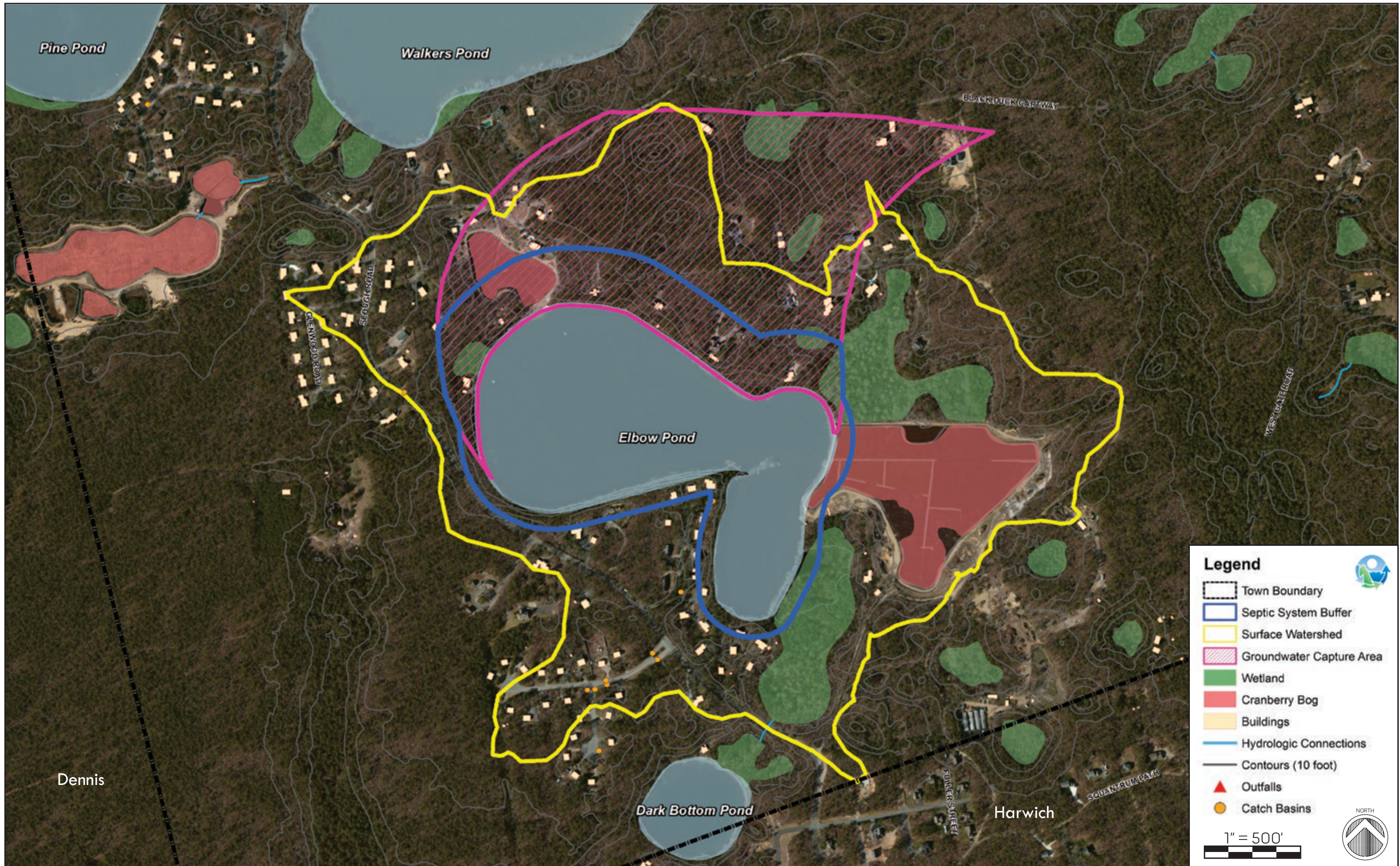
Dark Bottom Pond



Ed Snow Pond



Elbow Pond



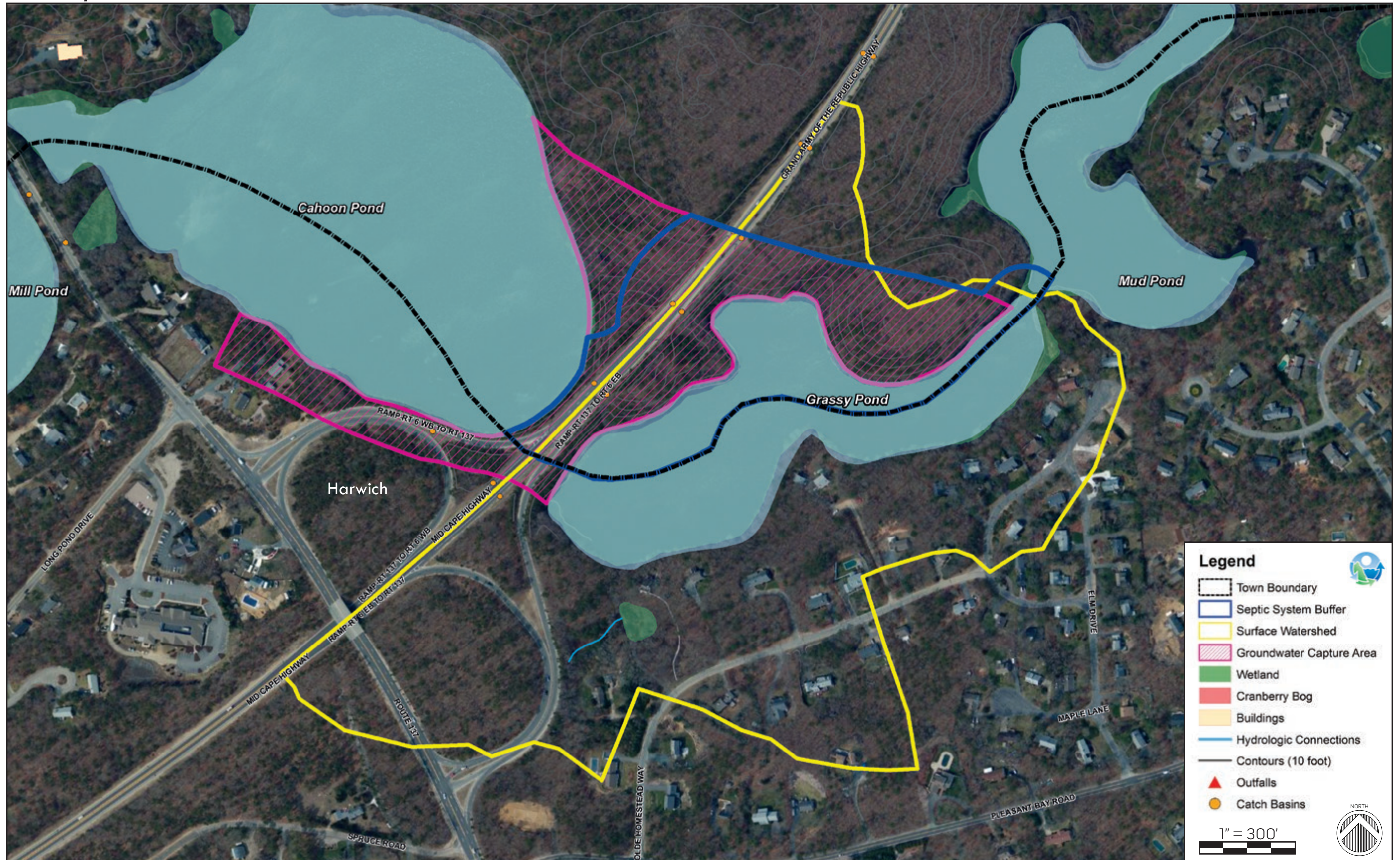
Freemans Pond



Girl Scout Pond



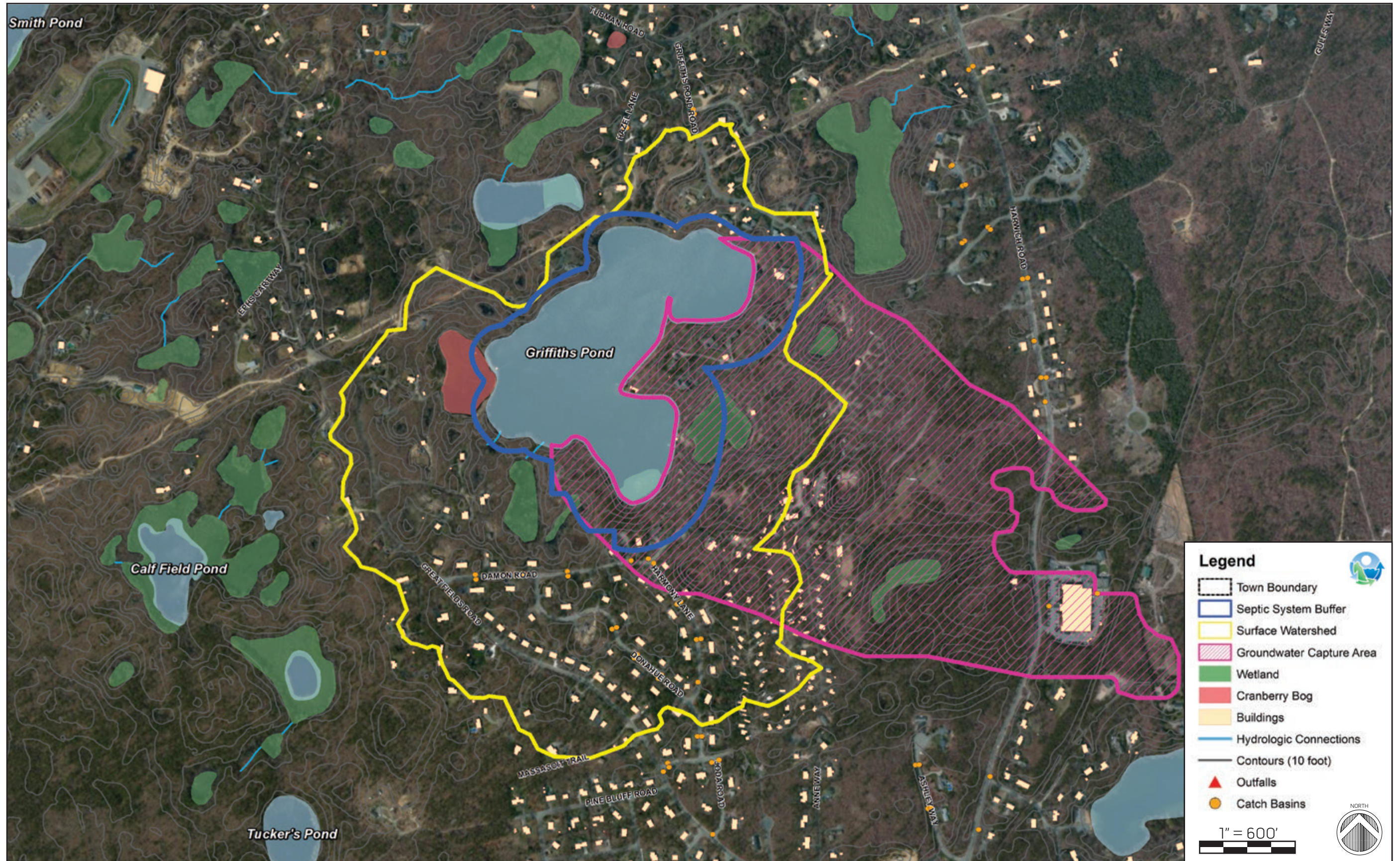
Grassy Pond



Greenland Pond



Griffiths Pond



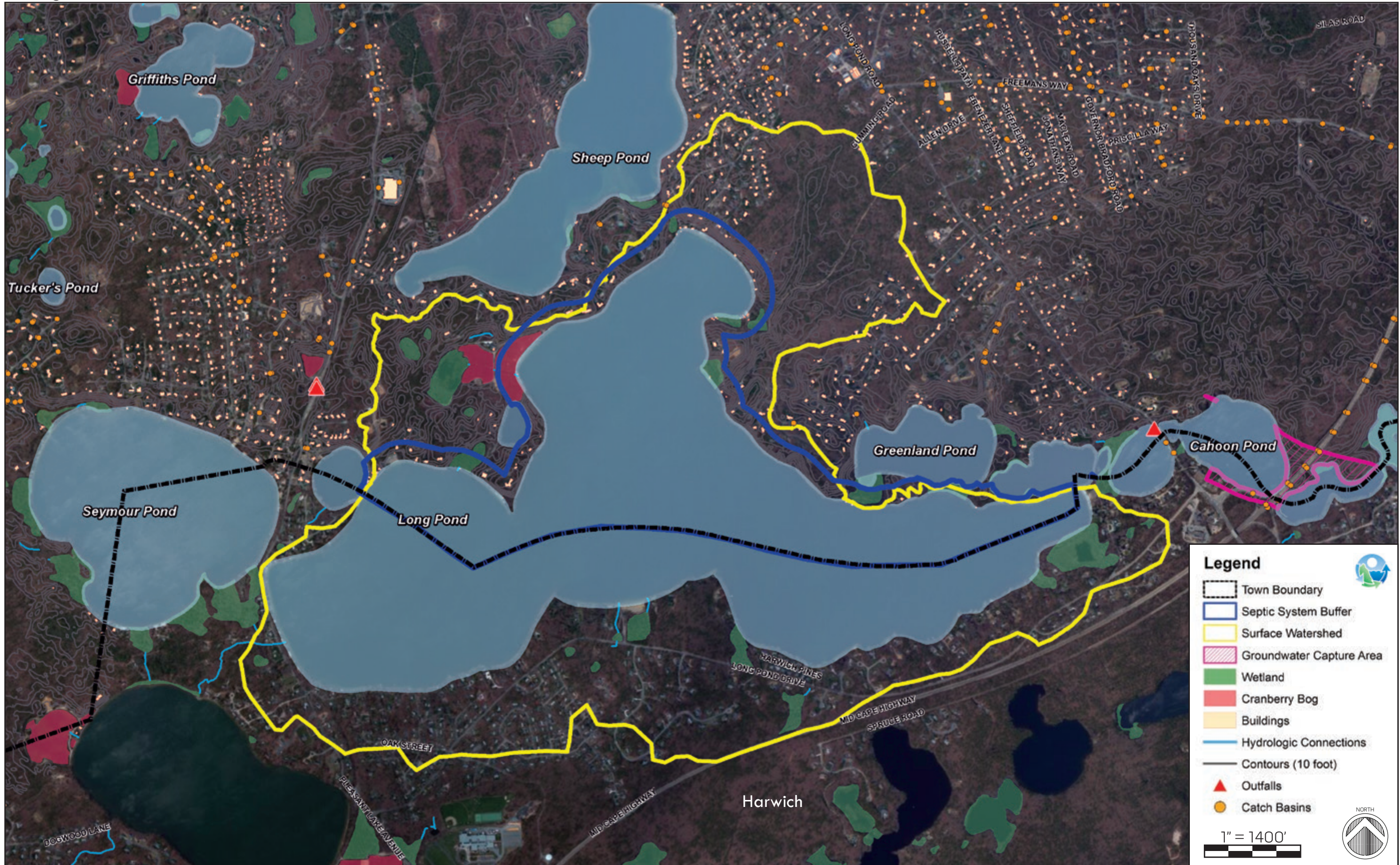
Lee's Pond



Littlefields Pond



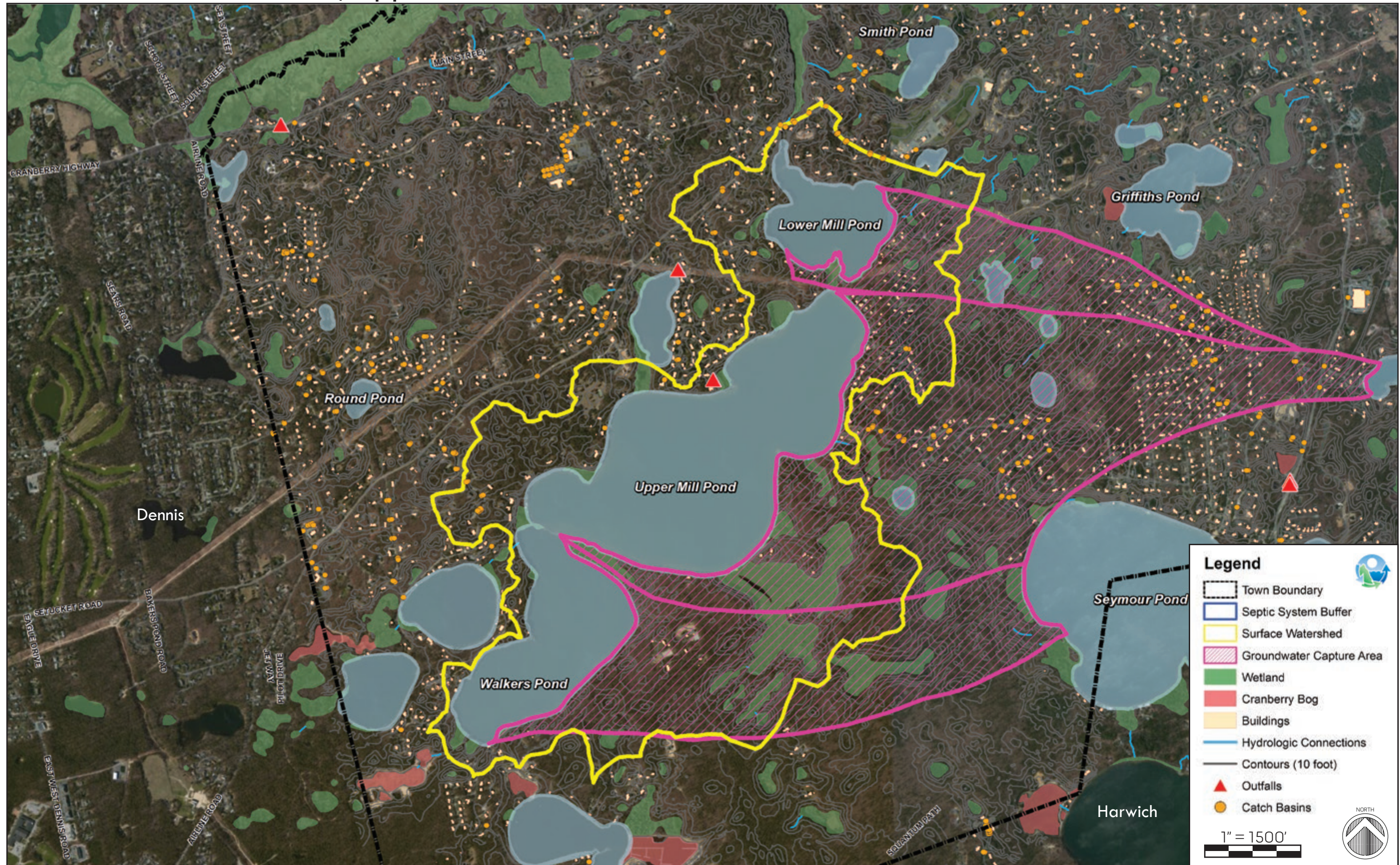
Long Pond



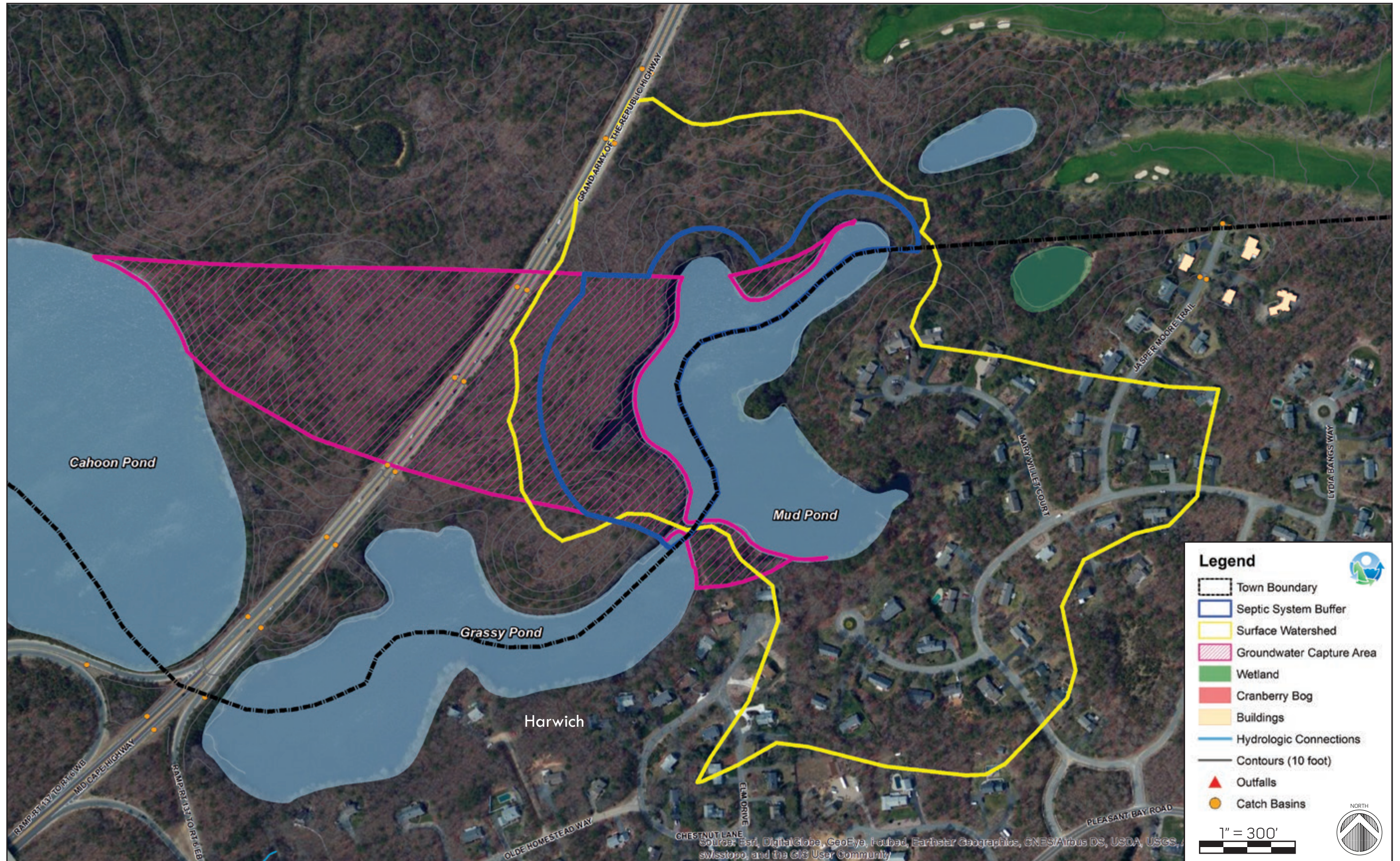
Mill Pond (Small)



Mill Ponds - Walkers Pond, Upper Mill Pond and Lower Mill Pond



Mud Pond



Myricks Pond



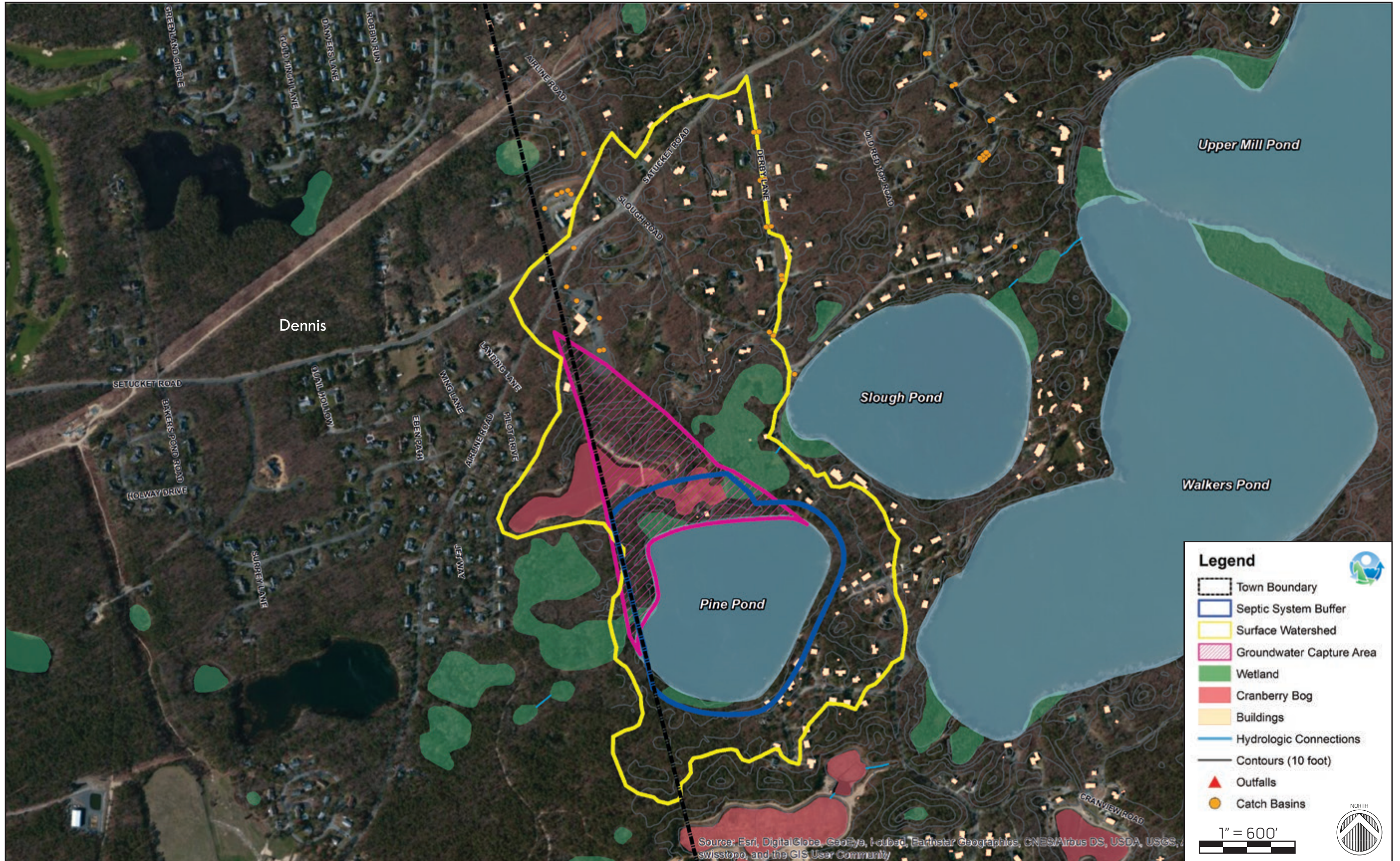
No Bottom Pond



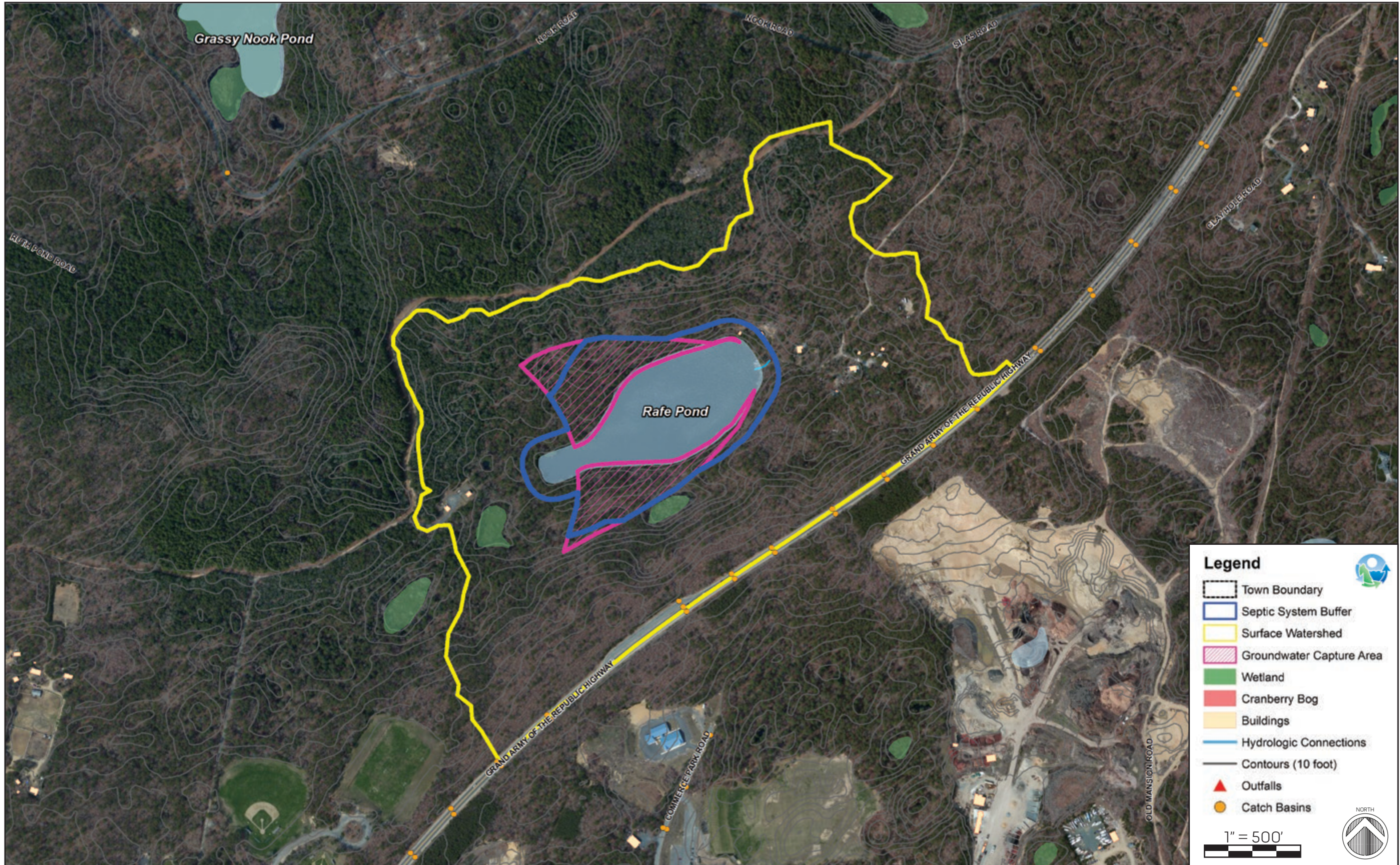
Owl Pond



Pine Pond



Rafe Pond



Round Pond



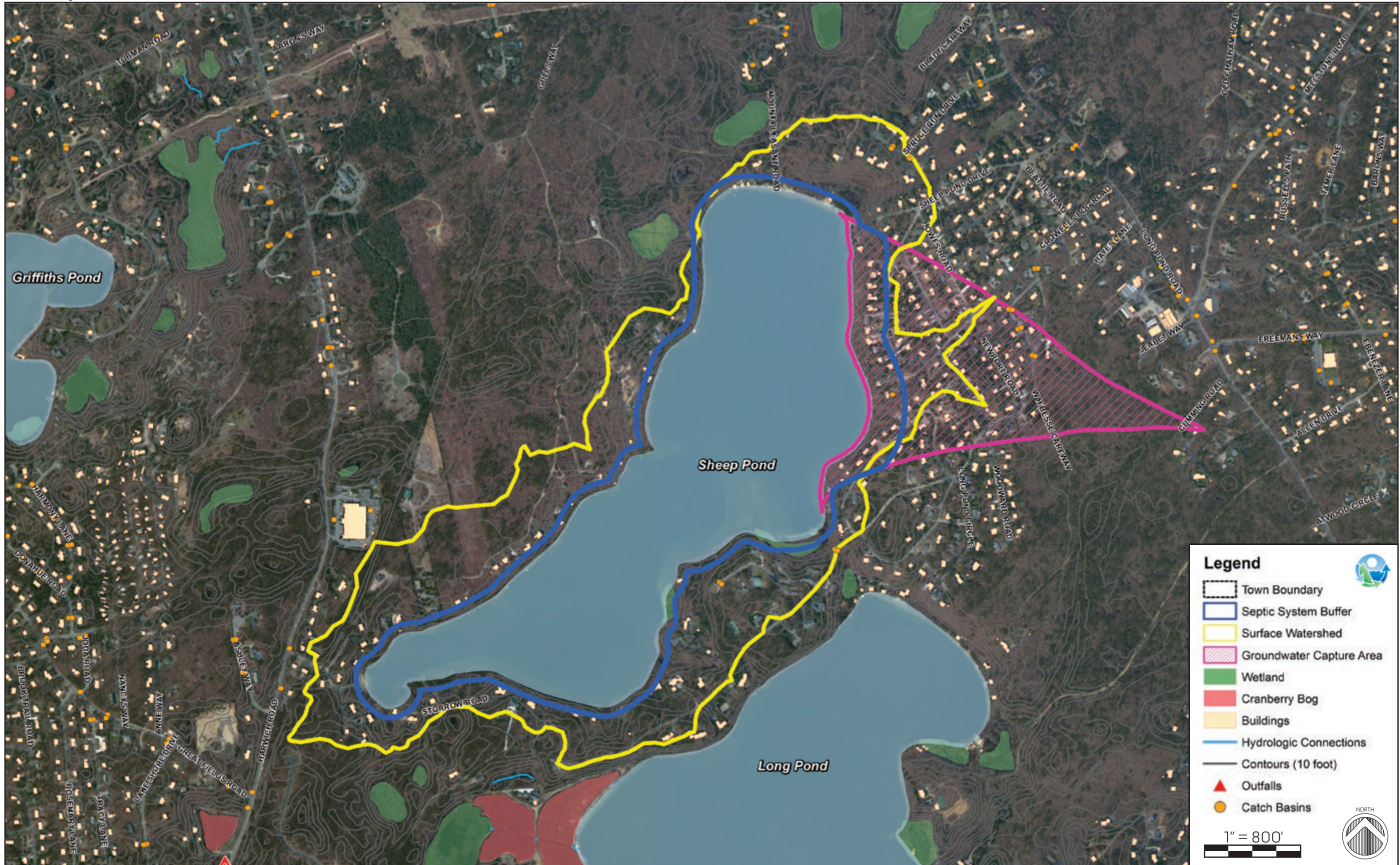
Schoolhouse Pond



Seymour Pond



Sheep Pond



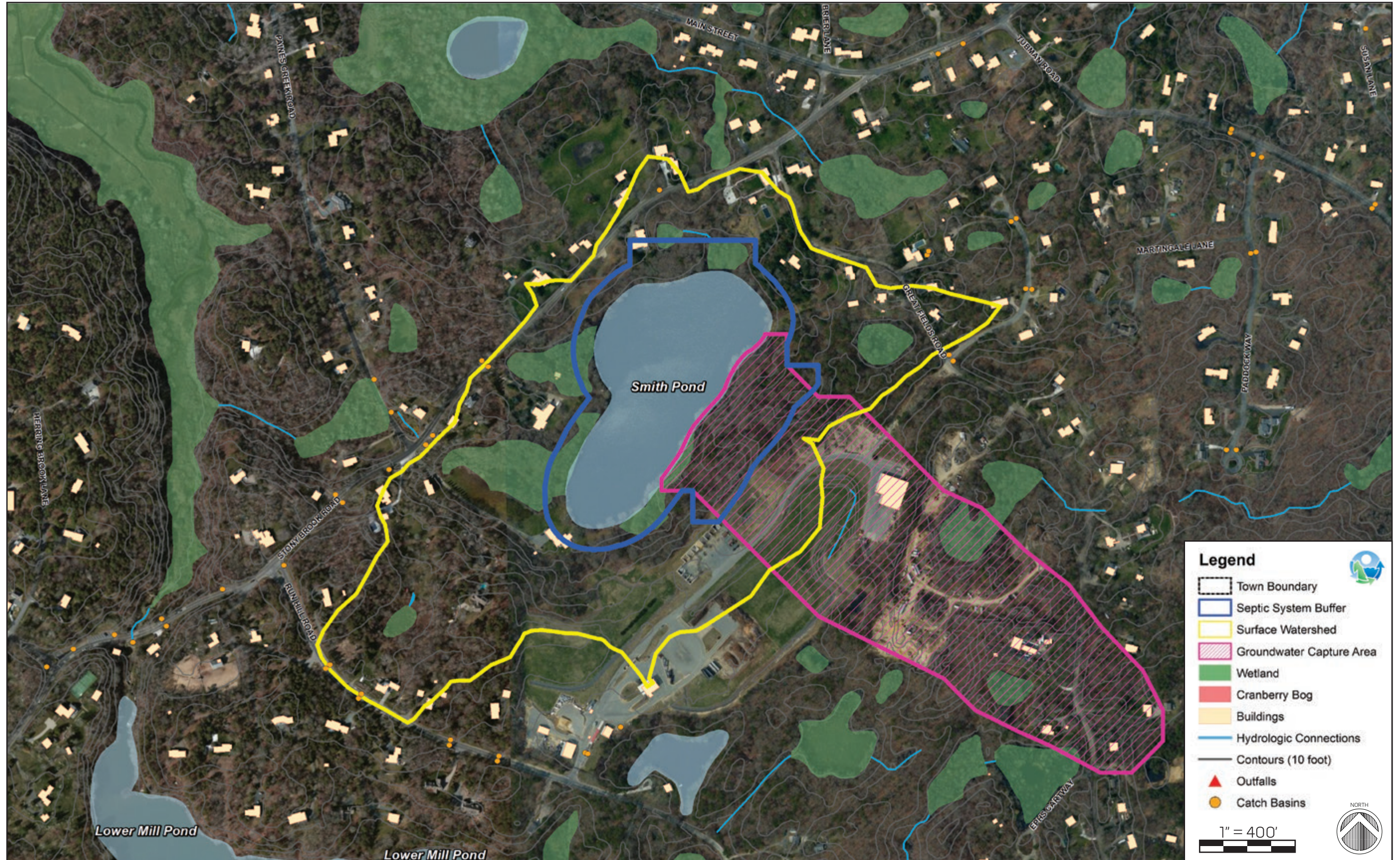
Slough Pond



Smalls Pond



Smith Pond



Sol's Pond



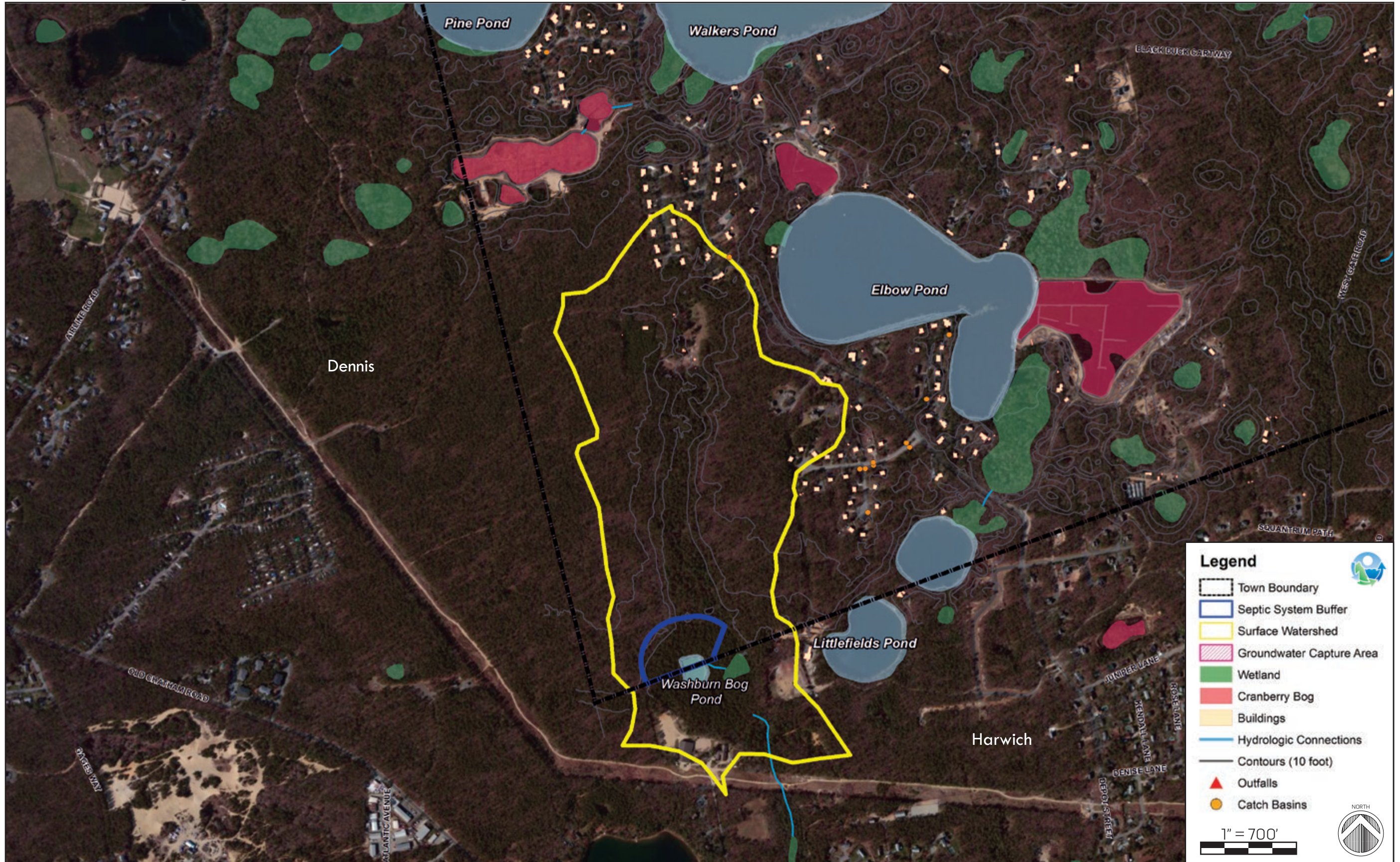
Tucker's Pond



Vespers Pond



Washburn Bog Pond



Widgeon Hole



