



PORTSMOUTH OPEN SPACE PLAN

# EXISTING CONDITIONS SUMMARY

April 2019



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*Note: This is a technical document summarizing the materials/data gathered and analyzed so far in this open space planning project for the City of Portsmouth. This material will be refined and incorporated into a final Open Space Plan later on this year.*

# WHAT IS OPEN SPACE?

Open space is often referred to as the “**green infrastructure**” of a city, playing an important role in enhancing quality of life for residents, protecting the city’s natural assets, and determining the character of the urban environment.

Additionally, high-quality and interconnected green infrastructure offers tremendous potential to help the city increase its resilience related to climate change, food security, and the health of its ecosystems. Open space can also be defined as both privately and publicly owned undeveloped or lightly developed land and recreation areas. An open space network includes:

- Natural Areas (such as forests grasslands, or floodplain habitat)
- Blue Infrastructure (such as lakes, ponds, rivers, wetlands, or coastline)
- Parks and Recreation (such as playgrounds, schoolyards, or trails/greenways)
- Working Landscapes (lands that are intentionally cultivated such as agricultural land, forestry/timber production, community gardens, or for energy production)
- Urban Green Space (such as street trees, pocket parks, vegetated buffers, green stormwater infrastructure, and pollinator strips)

These open space types are not mutually exclusive and, in some cases, can be seen on a single site. For Portsmouth to create a complete network of open space, the city will need to connect different types and scales of open space assets throughout the city. Additionally, the expansion, connection, and stewardship of Portsmouth’s open space network provides opportunities to weave in goals related to recreation, environmental education, economic activity, and environmental protection and restoration.





Open Space serves a number of functions including:

### SOCIAL SERVICES

- Provides opportunities for recreation and play
- Improves health of residents and visitors by increasing access to physical activity, providing space for food production, filtering air pollution, and moderating temperature
- Improves psychological well-being by connecting people to nature and green space
- Enhances sense of community and social fabric - open spaces can foster social interaction and create places for neighbors to gather and connect

### ECONOMIC SERVICES

- Increases nearby property values and, subsequently, tax revenue
- Contributes to the city's tourism industry by expanding outdoor recreation opportunities and offering diverse ways to enjoy Portsmouth
- Improves the overall attractiveness and livability of the city

### ECOLOGICAL SERVICES

- Improves air quality
- Reduces urban heat island effect
- Mitigates climate change through carbon sequestration (i.e. trees and vegetation)
- Reduces flooding, filters stormwater, and protects water quality
- Provides habitat and biodiversity
- Protects valuable soil resources

### Portsmouth's Open Space network should:

- Be *accessible* to the community (many access points, equitable distribution of open space assets, serve the entire population regardless of capabilities, etc.)
- Be *connected* to neighborhoods, work place areas, and other green spaces
- Be *well-managed* using sustainable stewardship practices
- Increase the city's *resilience* (climate, storms, food, etc.)

### This network will be developed through a planning process that includes:

- Prioritization of undeveloped land for acquisition/protection
- Utilizing a "level of service" approach to evaluating open space assets in Portsmouth
- Creating Open Space stewardship and management guidelines
- Identifying opportunities to improve connectivity between open space assets neighborhoods, and trails
- Identifying key areas for open space amenities in highly developed areas of the city
- Identifying opportunities to protect or regenerate critical ecosystem services
- Exploring of public/private partnerships

## VISION

*As articulated in the City's Master Plan: **Portsmouth's Parks and Open Spaces provide a wide range of active and passive recreational opportunities, as well as protecting valuable wetlands and wildlife. By 2025:***

- Residents will have even better access to neighborhood and regional parks and playgrounds.
- An extensive trail network will provide off-road connections throughout the city, increasing access to other neighborhoods and services.
- Regional greenways, bikeways and hiking trails will connect communities along the length of the Seacoast to Massachusetts, as well as north into Maine.
- Numerous public lookouts and boat launches along the Piscataqua River, Sagamore Creek and other waterbodies will provide both physical and visual access to the water.
- Valuable open spaces will be preserved and acquired in order to protect water quality, provide wildlife habitat and corridors, and make the City more resilient to the impacts of climate change.

## PURPOSE

The Purpose of this project is to create an Open Space Plan for the City of Portsmouth, NH to improve public access to, increase use and stewardship of, and improve connectivity between open space assets city-wide.

## GOALS

Improve management of open lands.

Improve future connections between open spaces and integrate pedestrian and bicycle access.

Increase the open space network while addressing resiliency (climate, urban heat, storms, food, etc.)



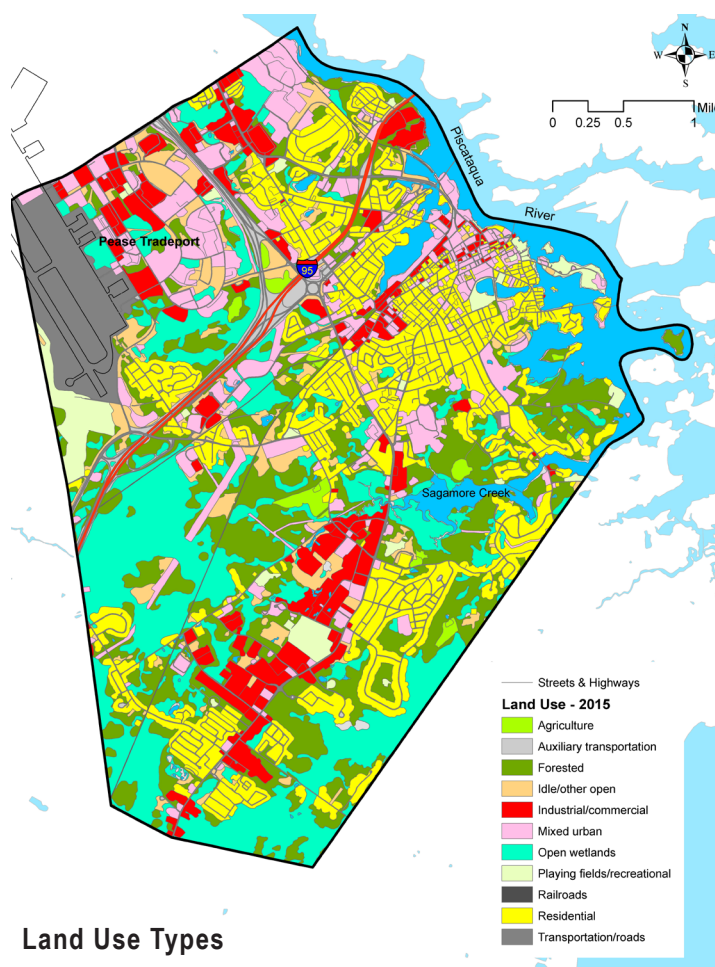
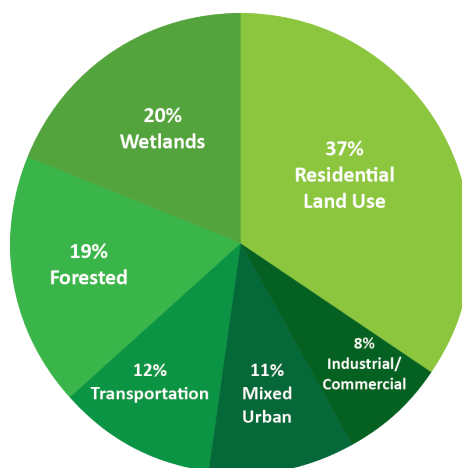
The following narrative represents a summary of initial findings of existing conditions in the City of Portsmouth relevant to open space planning. As such, this report is preliminary in nature and will be subject to further study and revisions over the coming months. However, as part of the discovery phase of this project, each topic addressed below is important to the final open space plan framework and will inform detailed recommendations.

## GENERAL OVERVIEW

The land area of Portsmouth is **9,975 acres** with all water bodies within the municipality removed. In the Seacoast region, this puts Portsmouth in the mid-range of other nearby towns. However, with an estimated 2017 population of nearly 22,000, and a population density of about 1,400 persons per square mile, Portsmouth is the **most densely settled** municipality in Rockingham County and the Seacoast.

2015 land use mapping<sup>1</sup> for Rockingham County shows Portsmouth is presently 55% developed, with about 19% of its area in forests (including urban tree cover) and 20% in open wetlands<sup>2</sup>. 37% of the developed land area is residential land use, 8% is industrial/commercial, 11% is mixed urban, and 12% is utilized for various types of transportation, including the air field at the Pease Tradeport. The pie chart on the upper right corner of the page shows the breakdown of land use by type.

Land Use Types



Land Use Types

<sup>1</sup> Land Use 2015 – Southeastern NH; UNH Earth Systems Research Center, Rockingham Planning Commission, Strafford Regional Planning Commission; 2017. Bases on 1-foot color aerial imagery.

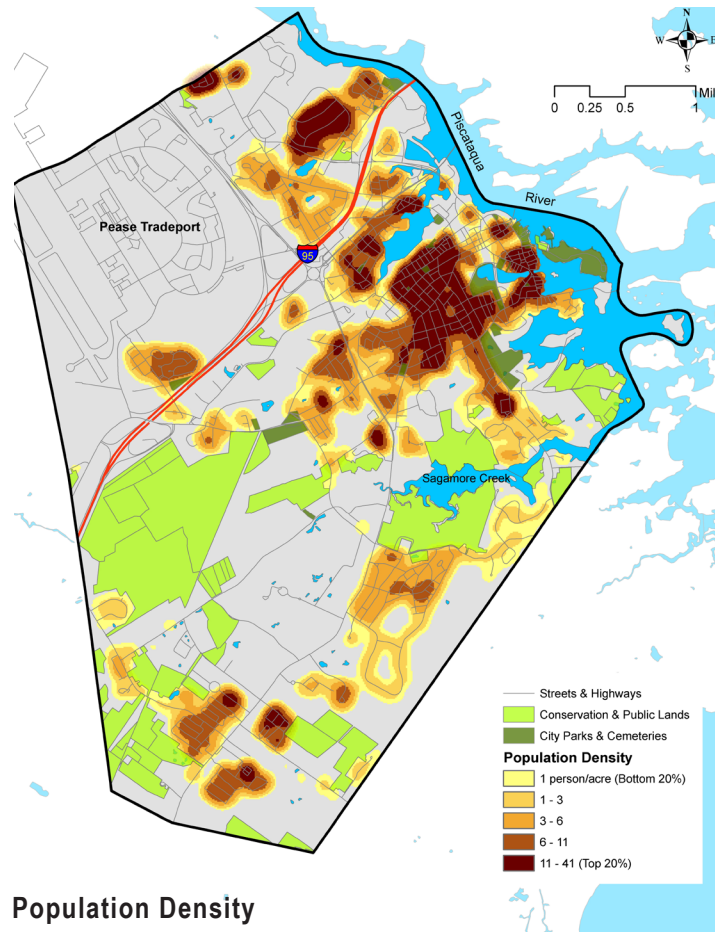
<sup>2</sup> See also section of Wetlands below for more detailed analysis and statistics.

Note in the land use map on the previous page how developed land is concentrated in the northern half of the City, and along Route 1 in the southern half. The wetlands and forested land area comprises the majority of remaining open space in Portsmouth.

## POPULATION DENSITY

In order to evaluate the equity of public access to various open space assets in Portsmouth, an analysis has been conducted to reasonably estimate the range of **population density** across Portsmouth. This was done by mapping residential building footprints and assigning a typical household size to each residential unit type. Generally, single family dwellings were rated at 2.5 persons per unit, and multi-family dwellings were typically rated by the number of units in each building. This data was converted to a data layer of points representing the estimated population coded for each point. The points were then processed to generate a GIS-based “surface” representing the gradations of population density across the City.

The map below shows the results of this analysis, with darker colors indicating higher population density. This pattern of housing units illustrates a similar pattern to the previous map showing residential land use. Population density in the northern half of the City reflects the densely developed downtown area of Portsmouth which has been seeing increasing development of multi-family residential buildings (apartments, condominiums, etc.). Higher population density in the southern half of the City are due to “garden apartment” types of residential development. **Note in the map how the primary open space assets (conserved land, parks, cemeteries) are located well away from locations where more people live**, certainly more than a quarter-mile walking distance (see map scale). Exceptions include the Piscataqua River parks, City-owned land north of Sagamore Creek, and the Urban Forestry Center tract south of Sagamore Creek.





## NATURAL RESOURCE CONSIDERATIONS

After gathering and reviewing the natural resources in Portsmouth, augmented by a study of a natural resources inventory made in 2010<sup>1</sup>, a limited suite of natural resource features has been selected for further study as they affect the potential for the Portsmouth open space plan. These include:

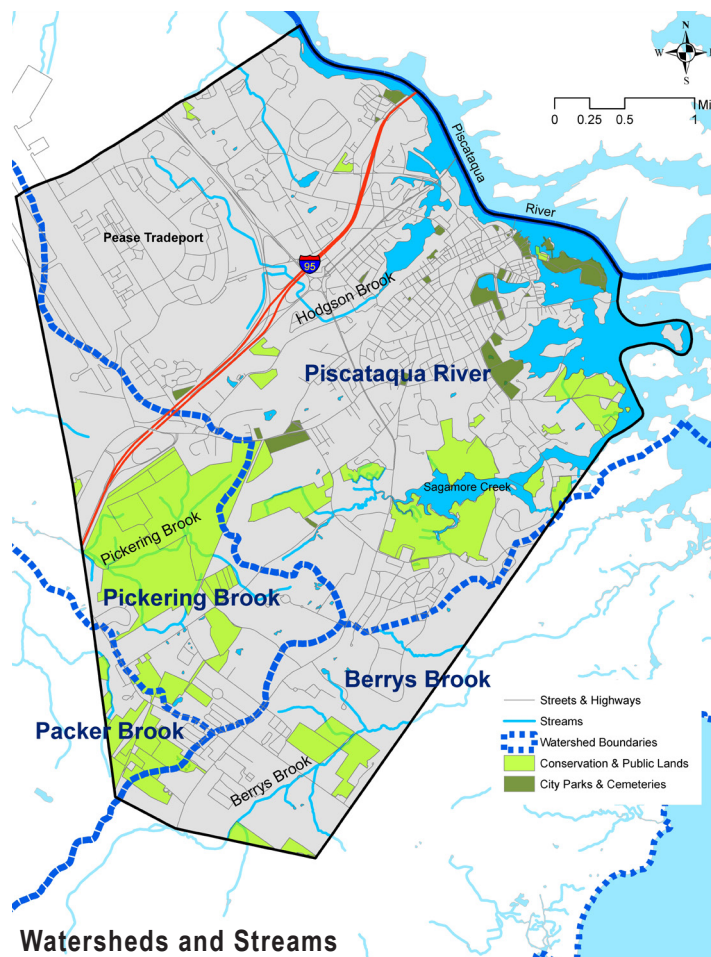
- Watersheds and Stream Corridors
- Wetlands
- Wildlife Habitat & Habitat Type
- Productive Agricultural Soils

Tidal shoreline and marine features are addressed elsewhere in this report under Water Access and Trails.

## WATERSHEDS & STREAM CORRIDORS

There are four major watersheds in Portsmouth, as follows:

- **Drainage to the Piscataqua River** (northern half of the City); this watershed covers more than 70% of the City and involves a mix of manmade stormwater infrastructure and natural overland drainage including Sagamore Creek and Hodgson Brook;
- **Pickering Brook** draining the Great Bog wetlands complex to Great Bay through the town of Greenland (20% of the City);
- **Berrys Brook** draining extensive wetlands eastwards through the town of Rye to the Little Harbor and Ordiorne Point area (14% of the City); and,



<sup>1</sup> Public Undeveloped Land Assessment, Comprehensive Baseline Inventory & Natural Resource Inventory, prepared by West Environmental and Neatline Associates. See report section detailed results of PULA data.

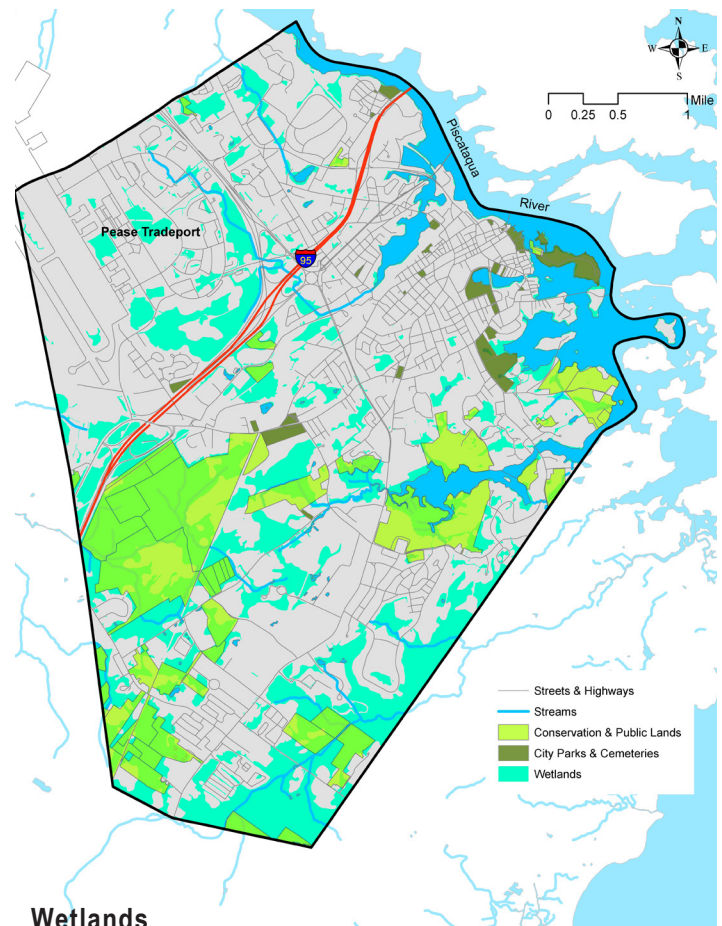
- A small portion of **Packer Brook** in the southern part of the City draining west through Greenland to Great Bay (3% of City land area).

Pickering Brook and Packer Brook, along with the associated wetlands complexes, are very important to maintaining water quality and ecological functions in Great Bay, a little more than one mile to the west of Portsmouth. Berrys Brook has similar importance as it drains to the Seavey Creek estuary in Rye and joins the mouth of the Piscataqua River and the Atlantic Ocean. Sagamore Creek is an ecologically significant estuary adjacent to the more urbanized portion of the City, and while impacted by urban drainage this area is also critical to maintaining water quality and habitat functions in the tidal area leading to the Piscataqua River. All watercourses also function as unique occurrences of wildlife habitat and as corridors facilitating wildlife movement.

## WETLANDS

Detailed mapping of wetlands in Portsmouth<sup>1</sup> shows a total of 3,500 acres, or 33% of the City land area is actually comprised of some wetlands resources. The majority of these wetlands are located in the southern half of the City, but important and unique wetlands also exist in the tidal zones along the Piscataqua River, several islands in the river, and along Sagamore Creek. 45% of these wetlands are forested, 22% are palustrine (marshes), and 22% are marine wetlands (tidal). The remaining wetlands types include small occurrences of scrub/shrub wetlands, bog formations, and ponds embedded within the larger wetlands, as well as a small amount of man-made wetlands in the form of ditches and detention ponds.

Wetlands provide multiple eco-system services, including floodwater storage and natural filtration of sediments and contaminants, and are home to multiple habitat types critical to a range of wildlife species.



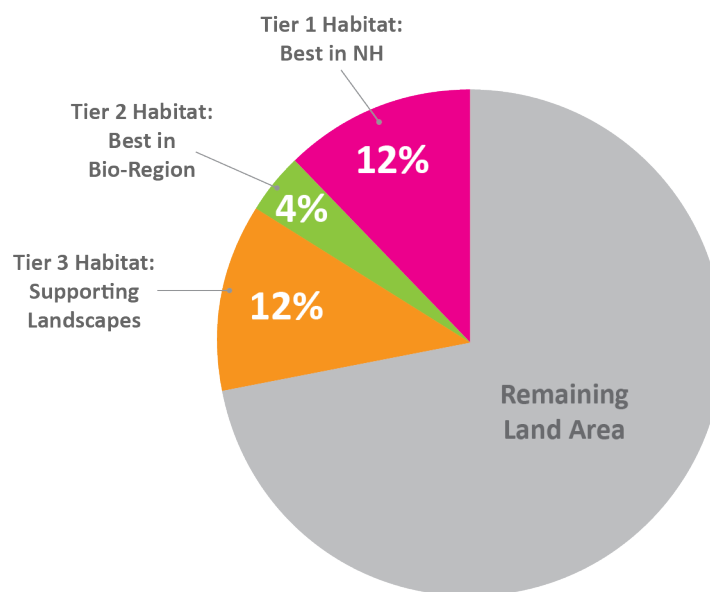
As indicated above, wetlands in Portsmouth are critical to water quality in streams, the Great Bay, and the Piscataqua River. The suite of marine wetlands found in Portsmouth are rare in New Hampshire, with only 17 miles of saltwater shoreline. These include salt marsh habitats, mud flats, eel grass flats, and other habitats with linkages to brackish and saltwater ecologies. With nearly half of the City's wetlands being forested, these areas also provide eco-system benefits such as oxygen production, cleaning of polluted air, and urban heat sinks and temperature regulators for the community. The Wetlands map shows the extent and distribution of wetlands of all types in Portsmouth.

**Note how the wetlands complexes are closely associated with the streams discussed above.** Development in the southern half of the City has followed the high ground along Route 1, but has crowded the wetlands margins in many locations. Note also the wetlands associated with the Pease Tradeport in the northwestern part of the City; this area is almost totally built-up with little remaining natural land cover except for the remaining wetlands.

In terms of recreational open space uses, wetlands offer limited potential due to constant or periodic standing water. They are most appropriate for passive recreational uses such as bird-watching, nature enjoyment, and solitude. Trails are difficult to construct and maintain, except as costly boardwalks, and many wildlife biologists argue against trails in some areas due to habitat disturbance issues and potential wildlife species poaching (turtles). Therefore, despite Portsmouth having abundant wetlands of various types, the possibilities for open space development are likely quite limited in the future. However, as noted above there are a range of benefits provided by wetland systems and they contribute greatly to the City's resilience as a coastal community.

## WILDLIFE HABITAT

As urbanized and densely populated as Portsmouth is today, there remain areas of important wildlife habitat. There are two perspectives to consider: **habitat condition** and **habitat types**, some of which are unique and rare.



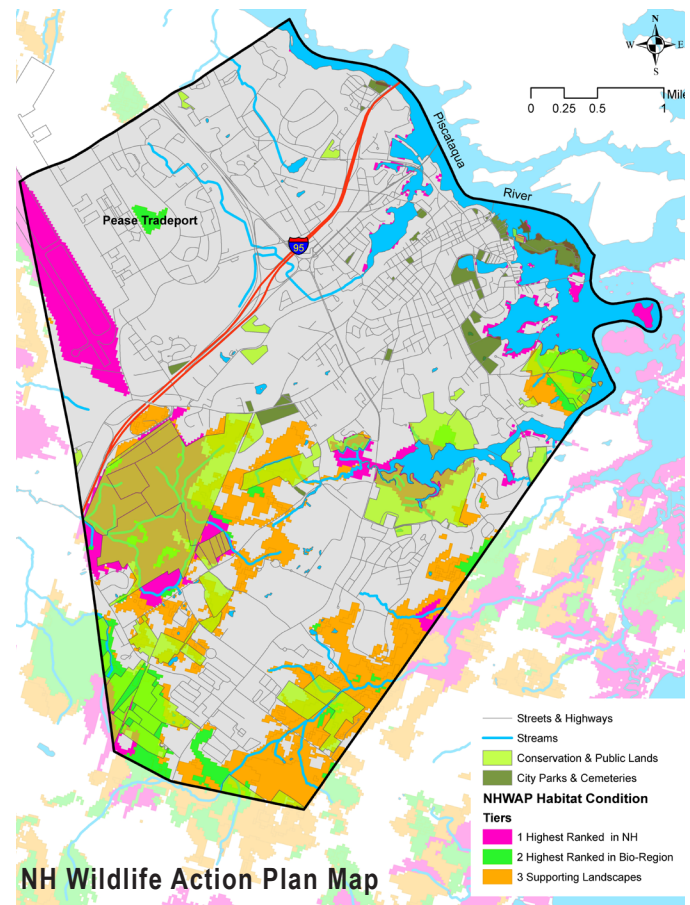
Both are addressed in the NH Wildlife Action Plan (NHWAP), last revised in 2015<sup>1</sup>. The map on the following page displays data from the NHWAP habitat condition analysis. The pink color indicates Tier 1 habitat that is "best in NH" for its type; the bright green color Tier 2 is "best in bio-region"<sup>2</sup>.

1 Based on analysis and modeling conducted by the NH Fish & Game Department; 2015.

2 Gulf of Maine Coastal Plain Lowland ecological sub-section; TNC



The orange color represents Tier 3 supporting landscapes intended as a buffer to protect the integrity of Tiers 1 and 2, but also important wildlife habitat. While much of Portsmouth is not rated for high quality habitat, several areas do stand out. **The Tier 1 area adjacent to the Pease Tradeport is important bird nesting habitat.** The Tier 1 lands associated with the wetlands complex in the west-central part of Portsmouth reflects the quality of these extensive forested wetlands. **Similarly, the Tier 2 classification in the southwest corner of the City (Packer Brook/Packer Bog) is also high-quality habitat.** Note also the large Tier 3 supporting landscape in the southeastern portion of the City which represents the Berrys Brook wetlands discussed above.



Small but important occurrences of Tiers 1 and 2 are also found along Sagamore Creek, the offshore islands within Portsmouth's jurisdiction, and along the Piscataqua River shoreline. See detail in Habitat Types below.

## HABITAT TYPES

Nine distinct habitat types are mapped in the NHWAP within Portsmouth. Forested habitats (Appalachian Oak Pine and Hemlock-Hardwood-Pine) total a little more than 1,300 acres, and tend to be found across the central part of the City, not including urban tree cover such as street trees and park plantings. Freshwater wetland habitats total about 2,640 acres, or 27% of City land area; marine habitats (coastal islands, dunes, salt marsh) add another 252 acres<sup>1</sup>. Each NHWAP habitat type has its own plant and animal community expressions.

Again, note in the map on the following page displays that the freshwater wetlands habitats are grouped in the southern half of the City, especially in the Great Bog area and the Berrys Brook drainage. The marine habitats are typically small occurrences located along Sagamore Creek and the Little Harbor area. These habitat types are uncommon in NH, and unique to the Seacoast Region.

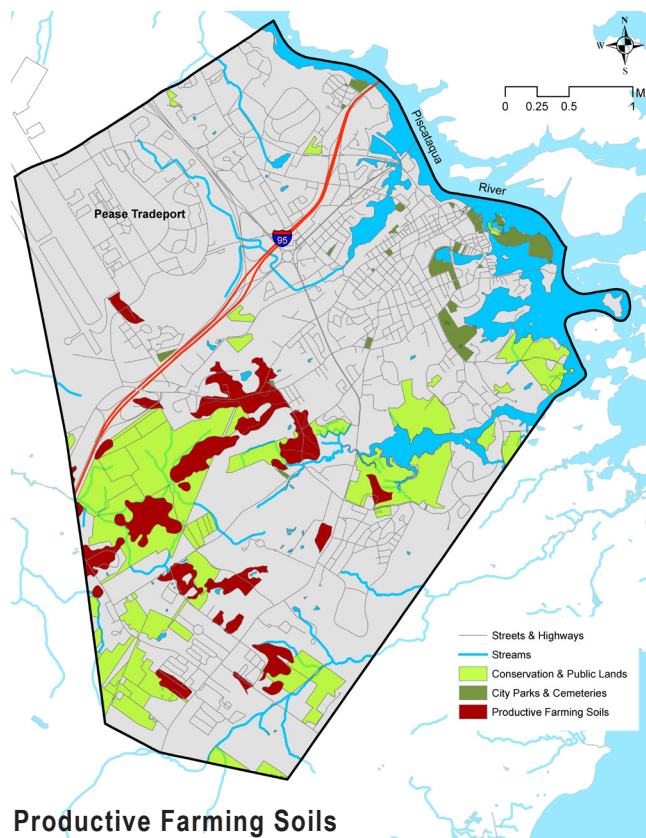
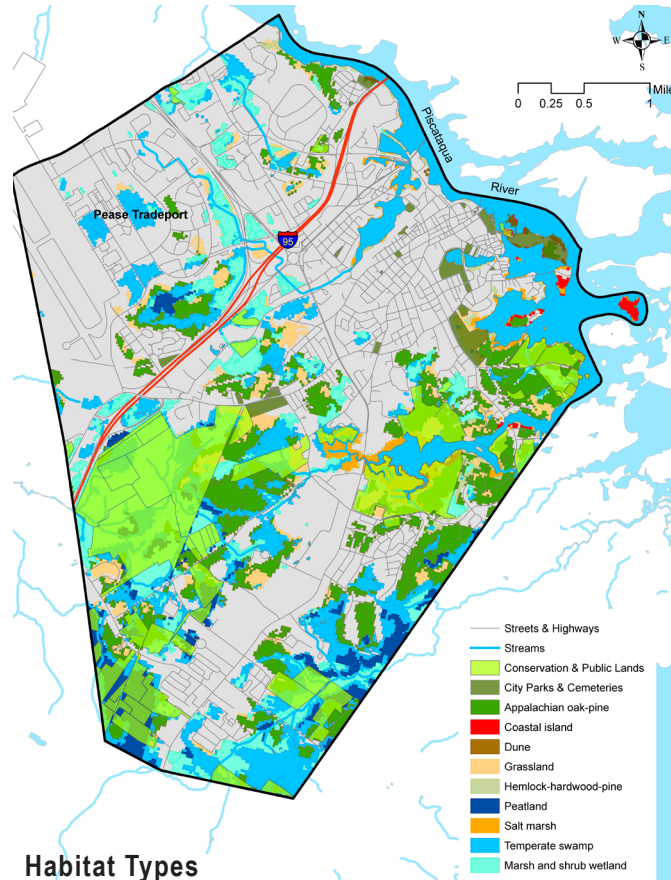
<sup>1</sup> Note that wetlands habitat acreages do not match the mapped wetlands in Portsmouth. The NHWAP data is based on habitat types while the City data on wetlands maps all occurrences of wetlands regardless of type or habitat function.



## PRODUCTIVE FARMING SOILS

While active agriculture has nearly disappeared from existence in Portsmouth with continuing development over the past few decades, growing interest in community gardens and local food production from “niche farming” of vegetables and fruits points to reserving the best agricultural soils for the future. Agricultural soils<sup>1</sup> are rare and scattered in NH, accounting for only 6.5% of the state’s land base. Approximately 25% of the most productive farming soils in NH are found in Strafford and Rockingham counties, close to the Seacoast. **Portsmouth has about 520 acres of these soils, or 5% of the City land area.** Currently, 192 acres (37%) of these soils are forested, and another 194 acres (37%) are already developed for urban land uses and transportation. Only 4% of Portsmouth’s farming soils are in any sort of agricultural use, primarily for hay crops.

The majority of the undeveloped soils are located along Peverly Hill Road and to the south on forested “islands” in the vicinity of Great Bog. Small occurrences are also found at the Urban Forestry Center and adjacent the Panaway development near the Pease Tradeport.



## OPEN SPACE RESOURCES

Portsmouth's existing recreational open space resources include several types of assets:

- **Parks** which are maintained in a more or less urban condition
- **Cemeteries** in a range of sizes that provide open space amenity values to local residents
- **School properties** with amenities ranging from active recreation open space to natural areas with little or no development
- **Tidal shorelines** and **water access points** for various types of boating, fishing, and other uses
- **Municipally-owned, undeveloped properties**, and
- **Conservation land** that is open to public access
- **Trail systems**, some maintained and others informal.

The first four open space elements above will be addressed in this section. The municipal and conserved lands involve much more detailed analysis, and are addressed in the next section. Trails data is presented in a third section.

There are 12 tracts of land in Portsmouth devoted to cemeteries, totaling about 58 acres. These tracts range in size from .5 acre to 34 acres (Harmony Grove/Cotton Cemetery/Sagamore Cemetery). Some of the cemeteries are very old, dating into the 1600's, and important historic features in the downtown area. The Harmony Grove/Cotton/Sagamore cemetery complex involves extensive green space and plantings, providing a pleasant location for walking or other passive recreation; this cemetery also provides some tidal shorefront views and exposure to the water. Other cemeteries such as the Calvary Cemetery on Middle Road are less attractive, but do provide some open space amenity and passive recreation opportunity. The Temple Israel cemetery on Banfield Road is gated and access is restricted.

Especially in the downtown area of Portsmouth, these cemeteries provide an important adjunct open space in concert with the park system. See section on Trails which discusses level of use observed using Strava data.

## PARKS

There are 28 tracts of land in the City devoted to public parks, playgrounds, and recreation fields, totaling about **90 acres**. These parks range in size from about a tenth of an acre (pocket parks, small memorial green spaces) to 35 acres in the case of Pierce Island Park. The average park size is **3.5 acres**.

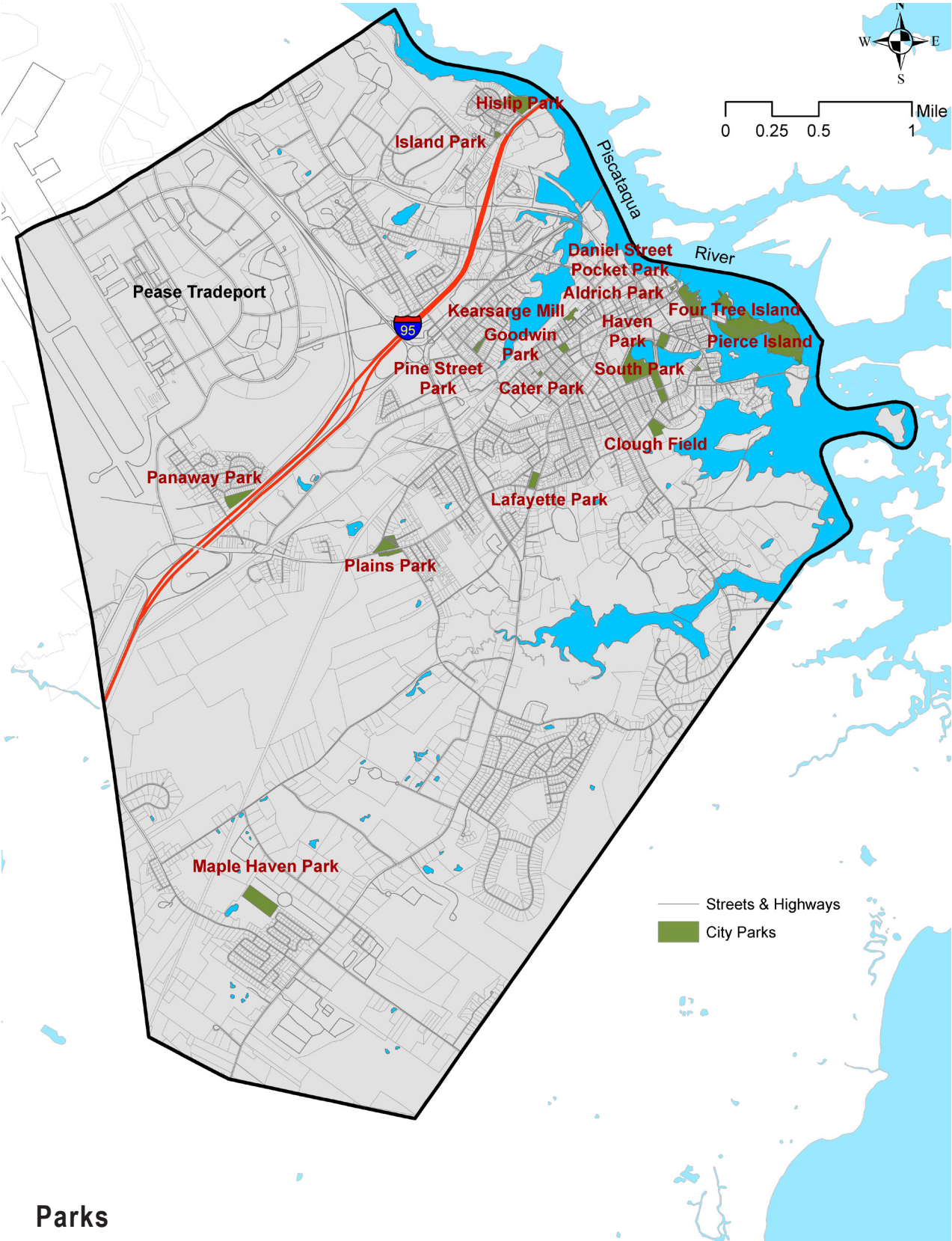
Parks are generally distributed across the northern half of the City. These parks are typically located in the urban downtown area and along the Piscataqua River shorefront. Some parks are older and semi-formal in character (Goodwin Park, Aldrich Park). Others provide venues for recreational field activities (Alumni Field, Leary Field, Clough Field, Hislop Field, Plains Field). There are at least nine parks with a playground focus, some updated more recently. None of these parks provide much in the way of natural amenities.

The Prescott Park complex and the Pierce Island Park/Four Tree Island tracts are key park open spaces located in the downtown area along the Piscataqua River. Together with the park land in the Atlantic Heights neighborhood in the northwestern quarter of the City, these parks provide more than two miles of direct access to the river and tidal shorefront.

All park tracts are constrained in terms of future expansion, and in some cases redevelopment, due to being embedded in the most densely built-up area of Portsmouth. The potential for new urban parks is also limited due to a lack of available under-utilized open space which could be acquired by the City. However, options do exist as in the case of the Mill Pond lineal park currently being planned and implemented.







Parks

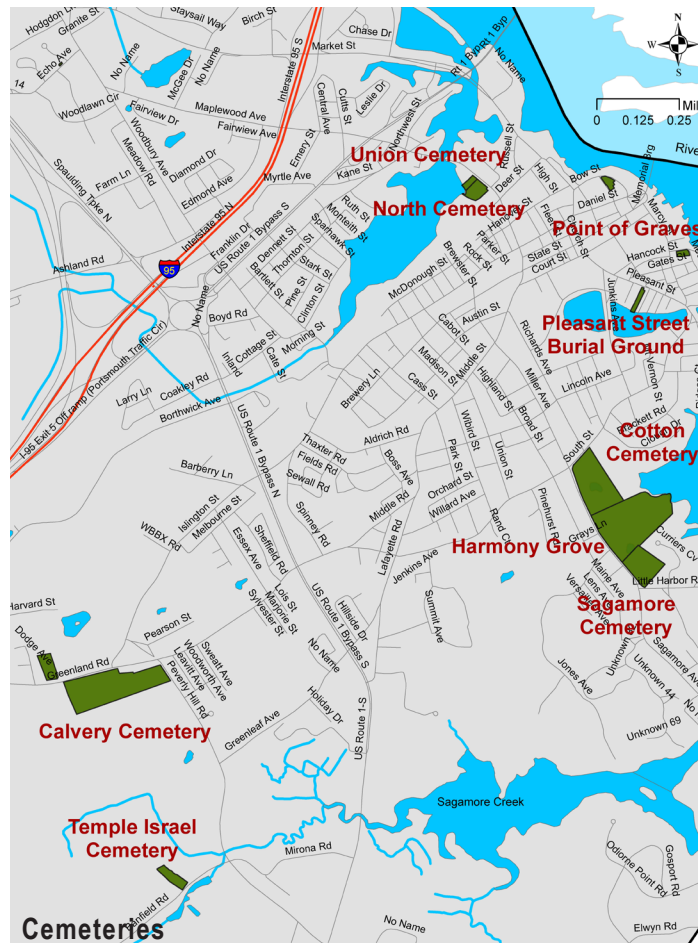


## CEMETERIES

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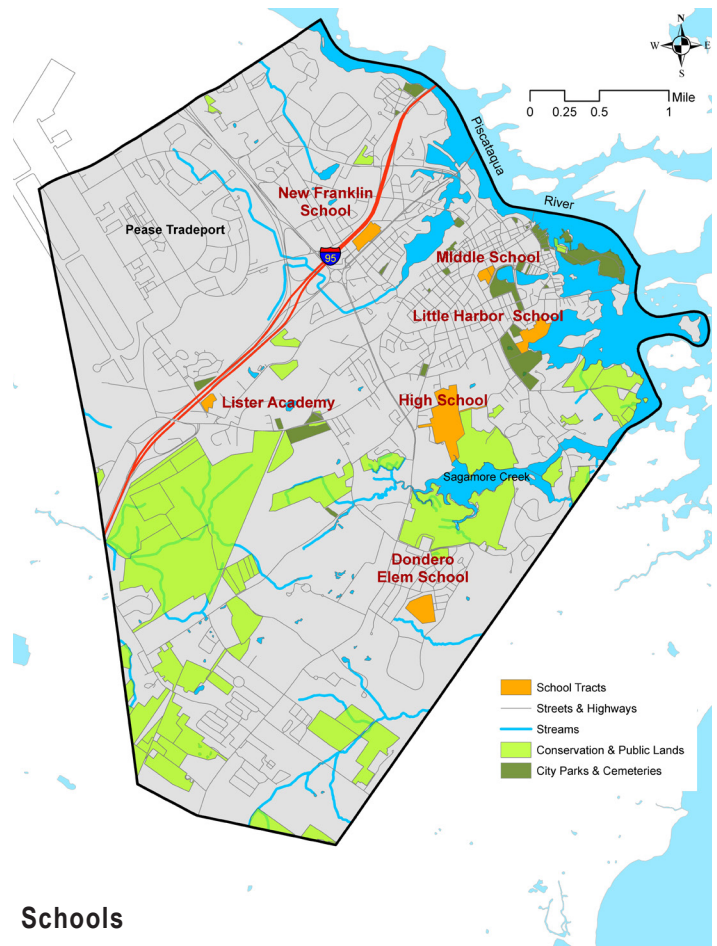


## SCHOOLS

Portsmouth has **six schools**, five of which are located in the northern half of the City and east of the I-95 corridor. The sixth school – Dondero Elementary is located in the middle of an extensive residential neighborhood south of the Urban Forestry Center and Sagamore Creek.

Site-specific information for each school is as follows:

- **Portsmouth High School** occupies a 55-acre tract and is immediately adjacent to the City's Sagamore Creek lands and other City-owned parcels.
- **Dondero Elementary School** is located on a 19-acre tract which includes outdoor educational and creative play facilities on the half of the tract that is not developed
- **Little Harbor School** is located on 18 acres on a tidal shoreline (~1,500 feet) and adjacent to a small wetland.
- **Portsmouth Middle School** is located on a 6-acre tract in the downtown area but adjacent to South Park and tidal wetlands.
- **New Franklin School** is on a 12-acre tract adjacent to I-95 and in a mixed urban context. Only marginal outdoor/natural space exists.
- **Lister Academy** is on a 5-acre tract, adjacent to I-95, and has very little natural outdoor space.



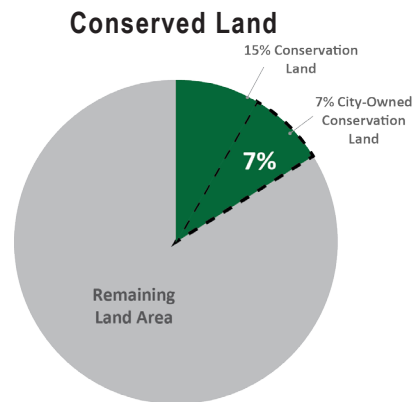
Schools

Access to natural open space near schools provides a valuable opportunity for outdoor environmental education. Lister Academy and the New Franklin School are land-locked in a mixed urban context, with no significant natural open space within a quarter mile walk from the schools. However, the new rail/trail will be less than a mile away from Lister Academy on Middle Road, providing access to extensive City-owned and conservation lands to the south. The Middle School is similarly constrained onsite, and must rely on more remote outdoor education venues, mainly City parks and shoreline.

Little Harbor School has a unique location on an estuary, with a small wetland onsite. The High School is home to extensive recreational and sports field facilities which dominate the site, but the school is also immediately adjacent to the City's 78-acre wooded Sagamore Creek land. At this time, it is not known if Little Harbor School and the High School have structured educational activities onsite or involving nearby natural lands. Dondero Elementary School is the only school open space that currently has intentional and structured educational and creative play activities onsite. See report link.

## CONSERVED LAND

Conserved land is protected permanently from future development by legal means, including conservation easements (CE) or deed restrictions (DR). Some conserved land is held in fee-ownership (FO) by agencies and organizations whose mission is to preserve land in its natural state, or for specific purposes such as agriculture. Generally, but not always, this protected land is accessible to the public; restrictions on existing conserved land in Portsmouth has been researched, and is discussed at the end of this section.



There is a total of 1,469 acres of conserved land in the City in 59 distinct tracts; this amounts to about 15% of the total land area of Portsmouth. 679 acres of that total (46% of all conserved land) are City-owned.

The NH Department of Resources Economic Development (DRED) owns three tracts in the City, including the Urban Forestry Center (165 acres) on the south side of Sagamore Creek, the Wentworth Coolidge Historic Site (26 acres) on Little Harbor, and the Portsmouth Fishing Pier (3 acres) on the Piscataqua River and adjacent to the City's Four Tree Island/Pierce Island parks. The NH Fish and Game Department owns the 263 acre Great Bog Wildlife Management Area in the southern part of the City, comprising about 20% of all conserved land.

Private land trusts own another 20% of the conserved land, including:

- Southeast Land Trust: Great Bog CE on 193 acres adjoining the NHFG Great Bog WMA (the Forest Society holds a secondary executive interest on this property); a CE on the City's Maxam tract near the southern City boundary; and a 16 acre FO on the southern boundary line;
- Society for the Protection of NH Forests: Creek Farm tracts totaling a little more than 35 acres at the mouth of Sagamore Creek estuary into Little Harbor;
- The Nature Conservancy: one 26-acre tract of the Packer Bog complex of conserved lands in Greenland and Rye is located near the southern boundary of the City.

In the course of data gathering for City-owned land and/or tracts that are conserved but not yet incorporated into the GRANIT database, four additional City CE's were discovered that have been added to the conserved lands data layer used in the mapping for the open space plan.

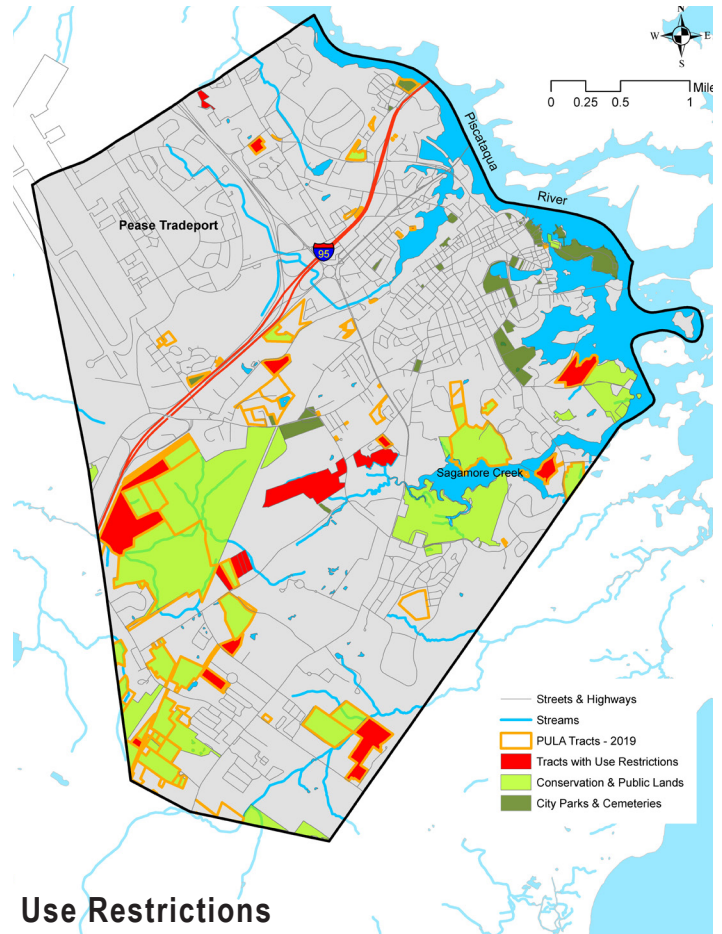


## USE RESTRICTIONS

All relevant documentation related to conserved land use restrictions (deed restrictions, conservation easement agreements, personal communication with agents) has been conducted with the assistance of City staff. Two observations may be drawn from that analysis:

- The majority of conserved lands have little in the way of specific restriction of public use; and,
- The older the date of transaction providing the legal protection to the property, the more general the description of use intent and/or restriction. For example, many properties are conveyed “for good conservation practices” or “for conservation purposes” with detailed guidance on how the land is to be managed.

There are a few exceptions to these observations that are noted below. The property names and identifier codes used in the table below are drawn from the GRANIT Conservation and Public Lands database (NH’s official geographic database of conserved lands statewide). These properties are also cross-walked and indexed with identifier codes taken from the City’s Public Undeveloped Lands Assessment (PULA) which is discussed in more detail in the next section. This table is subject to revisions.



It should be noted that due to the general nature of most of the use-related language in the conserved land documentation, questions of interpretation remain. For example, the wording “no buildings”; does this mean no constructed amenities such as boardwalks, entry kiosks, bridges, etc. are allowed, or is the intent to limit construction of enclosed facilities such as shelters, educational buildings, and so forth? These vagaries will need to be taken up on a case-by-case basis if and when a specific property is being actively considered for improvements as part of the open space plan.



## MUNICIPAL LAND AND PULA

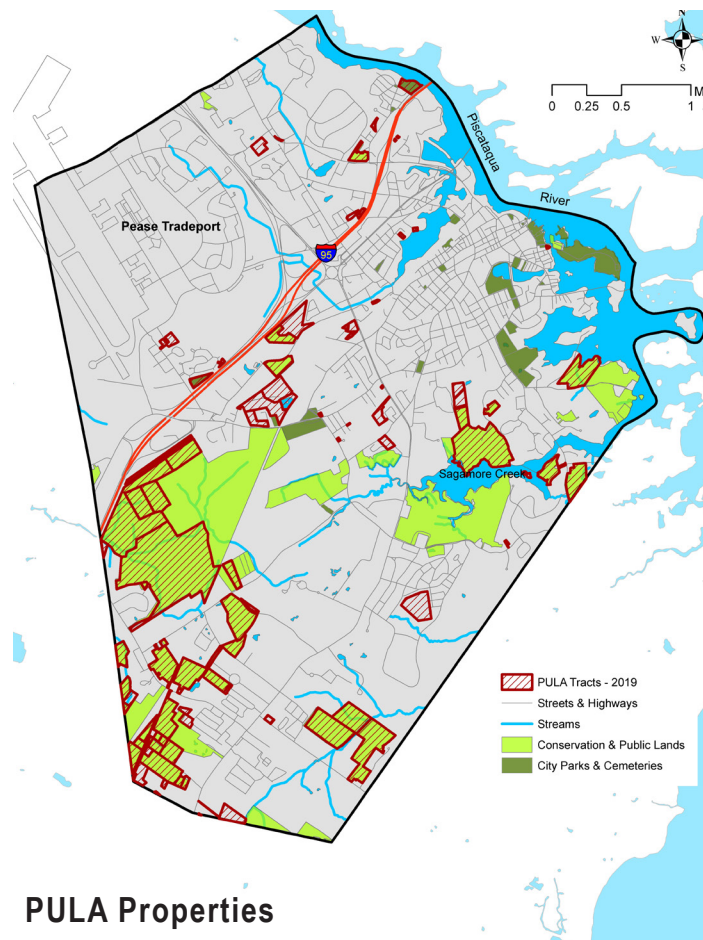
Portsmouth owns and therefore controls 1,226 acres of land on 193 tracts of land, with the majority of the larger tracts grouped in the southern half of the City; this amounts to about 12% of the City's land area.

Many of the tracts are quite small; 77 parcels are less than one-half acre in size and are typically sites for pump stations, small parking lots, and other urban land uses. However, some of the tracts are significant in size, with 27 tracts greater than 10 acres and ranging up to 193 acres on the Great Bog tract (SELT conservation easement mentioned above).

### PULA DATA

In 2010, Portsmouth engaged an environmental consultant to conduct baseline natural resource inventories<sup>1</sup> on 91 of the municipally owned tracts, based on a selection by the Portsmouth conservation commission and planning board of the municipal parcels, with the purpose of providing the information necessary for long-term land management decisions. In 2017, three additional City-owned parcels were similarly evaluated, bringing the total to 94 tracts, and 928 acres of land (one new tract is currently under dispute and is not considered in this study). This information has been compiled into an extensive reference dataset commonly known as PULA (Public Undeveloped Lands Assessment).

All of these properties are undeveloped at present, but some are likely prospects for careful development as future open space assets in the City (see more detail below). The map above shows the location of the PULA properties. Note the clustering in the southern half of the City.

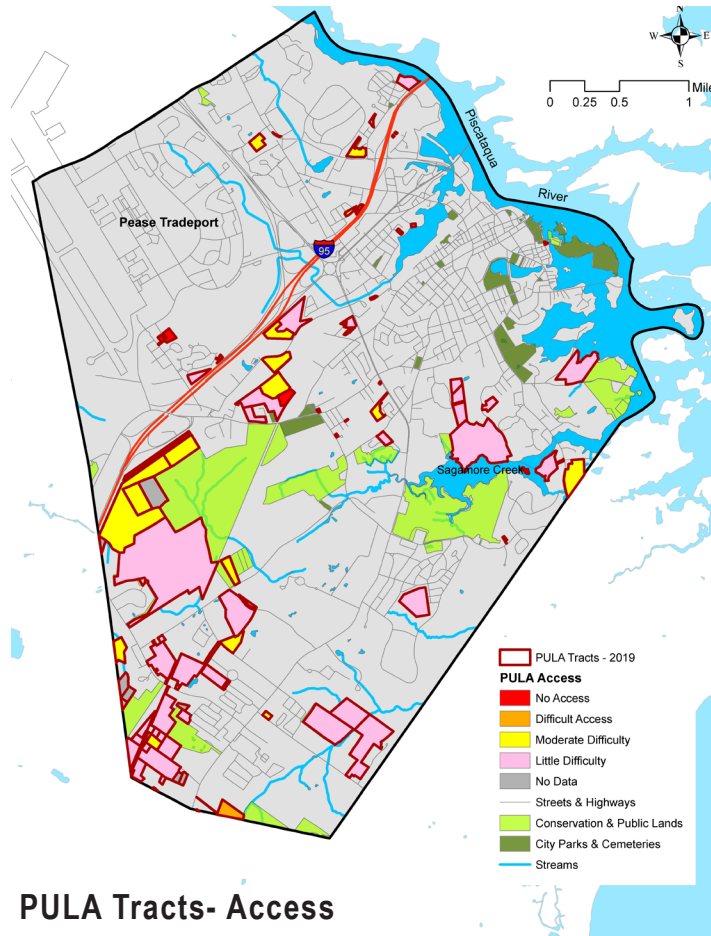


<sup>1</sup> Public Undeveloped Land Assessment, Comprehensive Baseline Inventory & Natural Resource Inventory; West Environmental & Neatline Associates; November, 2010

The PULA baseline inventory assessed a range of factors, including presence of wildlife corridors, invasive species, access (parking and foot), presence of historical features, rare plants and animals, dumping issues, water craft access, non-point source discharge site (storm drainage), and potential for wetlands restoration. Most of these aspects of the PULA properties pertain more to management plans, but access opportunities or issues flagged in the field work are helpful in identifying potential for recreational activities.

Accessibility to PULA tracts has been summarized as follows, working from the range of comments in the field notes (preliminary and subject to field inspection):

- 7 tracts have *no access*; they are fenced or impossible to access directly
- 11 tracts have *difficult access*; they are mostly wetland or adjacent to busy highways with no parking potential
- 23 tracts have *moderate access*; the majority of the property is wetland, no trails present
- 40 tracts have *no access issues*; they are located near or adjacent to a street, parking may exist or may need to be developed off-street; trails may be present on the tracts
- 9 tracts are *not yet evaluated*



The map to the right shows the current evaluation of tract access. It should be noted that the completion of the Hampton Branch of the new rail trail system will provide upgraded access to some significant PULA parcels in the southern part of the City.

Additional notes in the field data provide a sense of how wetlands dominate most of the PULA properties.

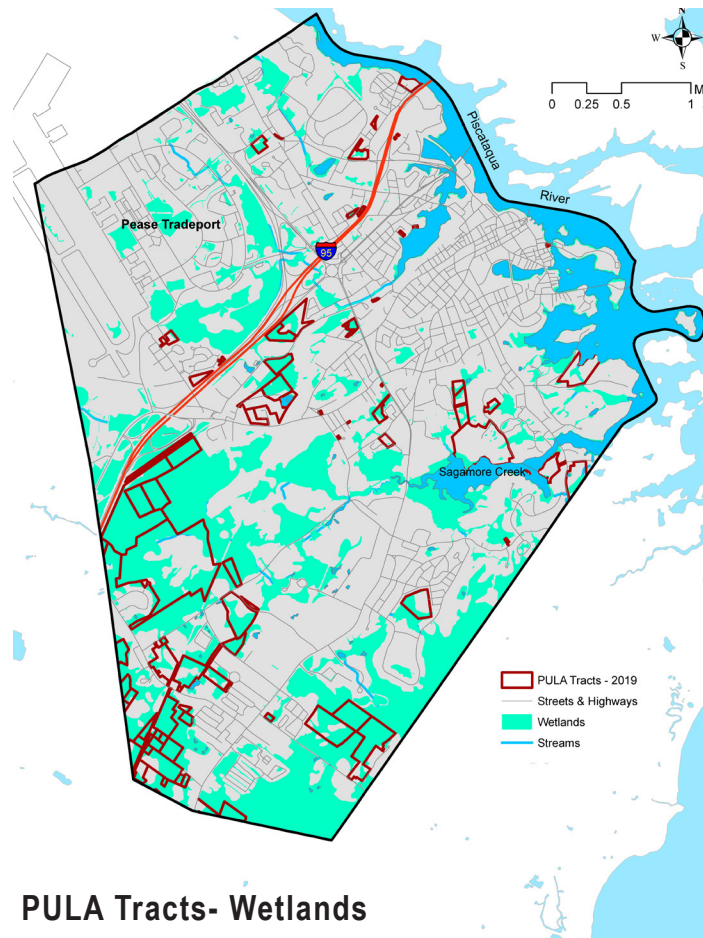
64% of the total PULA land area is wetlands, mostly forested wetlands, but the PULA field notes tend to indicate access and use issues in those areas. Some PULA tracts are almost entirely wetland. However, wetlands mapping in Portsmouth reveals upland forested "islands" within the larger wetland complexes; the field notes mention these areas as well.

These islands may offer unique recreational opportunities for trails and nature experience, if access across wetland areas can be provided. These islands are also mentioned in the PULA field data as having forest management potential for their ecological and/or timber value.

The map below shows the City wetlands mapping in relation to the PULA tracts. Note the extensive wetlands in the southwest and southeast quarters of the City, and the forested island in the Great Bog tract.

Several PULA tracts have been selected for further study and field inspection to evaluate the degree of limitation presented by the wetlands. These are located in the southern third of the City (see red circles), close to existing residential developments.

85% of PULA land is currently conserved by fee ownership or conservation easement. The PULA report also mentions several tracts of land that are not currently protected from development, but are recommended for conservation. These will be considered as the role of the PULA tracts becomes clearer in upcoming analysis.



**PULA Tracts- Wetlands**

## TRAILS

Data from the GRANIT database and/or City databases represents the core information on existing trails. Most of these are maintained and are intensively used.

The current trails data is as follows:

- 7.3 miles of dedicated trails total:
  - 2.3 miles of complex, inter-looping trails in the Sagamore Creek Land managed by the City
  - 3.5 miles of trail loops at the Urban Forestry Center maintained by NH DRED
  - 1.5 miles of trail known at the Little Harbor Loop Trail, managed by DRED and the Forest Society



The new Mill Pond Trail will provide another 1.2 miles of trail along the tidal shorefront. The PULA baseline inventory recorded several informally used trails on various parcels in the southern part of the City. Most are simply trail segments found while doing transects, but some indicate more complex trails systems, as in the City's Great Bog tract; more trails probably exist and are not mapped yet.

Including portions of the future Hampton Branch rail trail, this adds another 11.1 miles of trail to the total network City-wide.

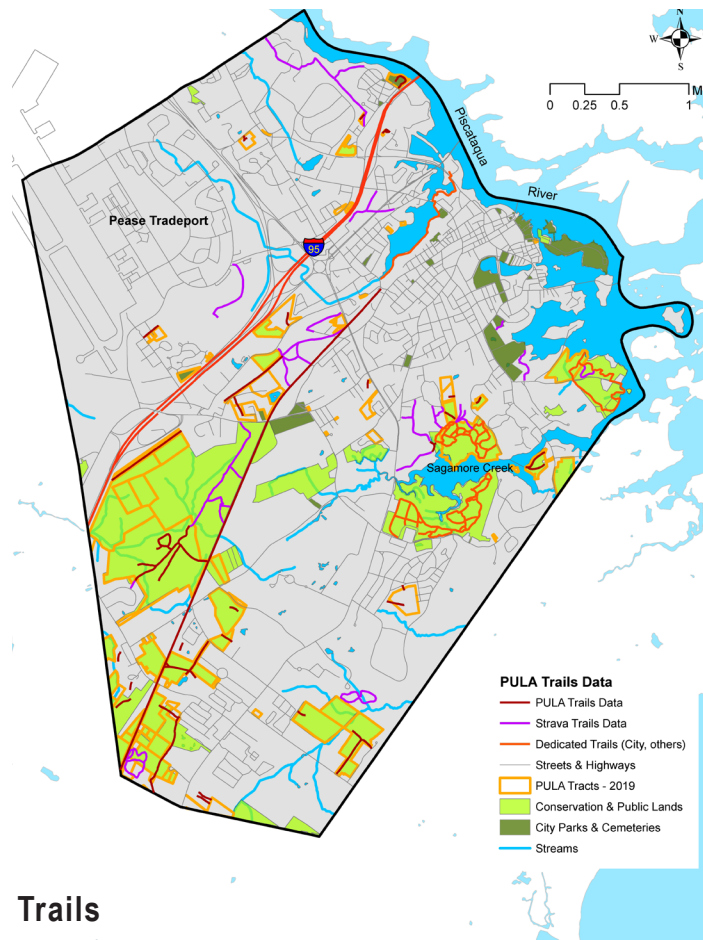
Strava is a software and world-wide database business that focuses on providing spatial information to athletes to aid in personal training and performance enhancement. Data is typically gathered from personal GPS-related hardware carried by an athlete, but aggregated data is pooled in an application known as the Strava Global Heat Map which shows all uploaded athlete data, typically for a year's duration. This data can be segregated into bicycle routes, pedestrian/runner routes, water routes (primarily rowing or kayak use) and winter activities such as XC skiing or snowshoeing. The "heat" concept appears in the mapping as increased intensity of color over the same routes; this can mean many individual athletes submitting data, or a few athletes with multiple uploads of their training routes.

The value of this data to the Portsmouth open space plan is that it reveals travel pathways not apparent in other data, e.g., City or State trails databases. As is often the case, the Strava data shows "bootleg" trails and unofficial pathways that have been discovered by athletes and incorporated into their training regimes as they explore Portsmouth's open spaces. As such, Strava provides an important adjunct database for discovering opportunities to expand existing trails systems. It should be noted that not all submissions to Strava flow from performance-seeking athletes; some pathways simply reflect the activities of regular exercise walkers enthused about the power of Strava.



A review of the Strava Heat Map data for Portsmouth shows several levels of pathways used by athletes. By far, the largest concentration of pathways in the heat map are found on City walkways along streets, with streets themselves, mostly in the low-density residential developments in the southern part of the City, coming in a close second. It also shows intensive use of the Little Harbor Loop trail, trails on the Sagamore Creek land, and at the Urban Forestry Center.

Biking routes appear to outclass walking/running routes by a large margin as well, as shown in the following two screenshots taken from the Strava heat map. The color gradient from red to orange to yellow to white indicates the relative numbers of pathways recorded. Note how the Hampton Branch rail trail is used by both bicyclists and walker/hikers. Also note how both types of pathways rank as more intensive surrounding the Sagamore Creek estuary (City's Sagamore Creek Land to the north and the Urban Forestry Center to the south). Finally, note the intensive use of land in Rye and Portsmouth by off-road bicyclists in the lower left corner of the biker map. This was also documented in the PULA baseline inventory in 2010.



## Trails

The Strava data adds about 9 miles of trails to the City database beyond the dedicated trails noted earlier in this section, and somewhat duplicative of trails mapped in the PULA project.

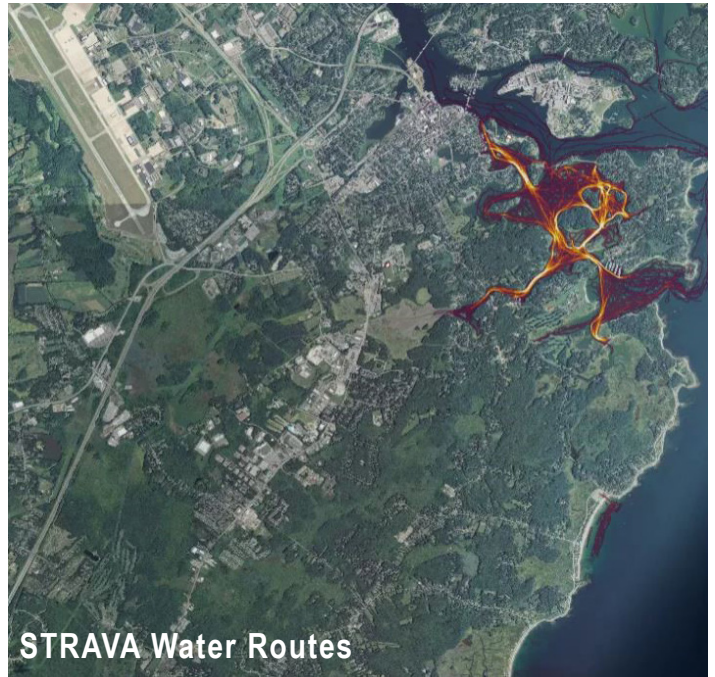
The map above documents all known trails and pathways in Portsmouth. Note the use of the transmission line right-of-way, the rail trail, and trails complex on the City's Great Bog tract in the southern part of the City. Also note the "bootleg" trails west of the Sagamore Creek Land which are due in part to the high school being located immediately to the west. These trails and the areas they serve will be detailed further in subsequent open space planning and analysis.



## WATER ACCESS AND “TRAILS”:

No large freshwater lakes or ponds exist in Portsmouth, but the City does enjoy more than 22 miles of tidal shoreline, including the Piscataqua River shore, the various tidal basins and inlets such as Sagamore Creek, and the offshore islands. Much of the river frontage is developed and public access is limited to occasional use in non-restricted areas.

However, there are 8 public access points <sup>1</sup> where boaters can launch into the river or estuaries, and the Four Tree Island and Pierce Island Park complex provides about two miles of tidal shoreline. The Prescott Park complex has about a half mile of shoreline frontage, and the Atlantic Heights Park in the northern part of the City has about 850' of shoreline on the river. Other shoreline access is provided by the Wentworth Coolidge historic site (1,520') and the Forest Society's Creek Farm with nearly a half mile of shoreline, including tiny Goose Island.



Often overlooked as part of the City of Portsmouth are its offshore islands: Four Tree Island, Pierce Island, Belle or Lady Isle, Pest Island and the Frame Point island chain leading to Newcastle. Four Tree and Pierce Islands are City-owned and function as multi-use public parks. The other islands are privately owned with several residences, except for Pest Island which is undeveloped and in current use assessment. While landing on these islands is not welcomed by the owners, they do offer unique and varied tidal shoreline features that can be appreciated from on the water.

Strava data includes a water-related component that is comprised primarily of athlete-rated routes used by kayakers, rowers, paddle board enthusiasts, and other visitors to the water. The Strava data shows rather intensive use of the Little Harbor area of Portsmouth, with looping routes around the islands, and penetrations into the estuaries to the limit of high tides.

The screenshot above shows the complexity of water pathways in the Strava data in the vicinity of Little Harbor which is shared by Portsmouth, Newcastle and Rye. Again, the darker red color indicates lighter or less frequent use while the lighter colors show the heavier use areas.

<sup>1</sup> GRANIT Access Sites to Public Waters database - 2012



Note the pathway penetration to the western mud flat limits of the Sagamore Creek estuary, and the route west of Pierce Island. It is clear, too, that recreational use of the tidal waters is concentrated in the more sheltered bays, inlets and passages. Far less use is made of the Piscataqua River, probably due to the stronger river and tidal currents.

## RELATIONSHIP TO REGIONAL CONSERVATION PLANS

Several regional conservation plans exist that provide guidance to the Portsmouth open space plan. These are mainly concerned with maintaining natural land cover and wildlife habitats in key locations specifically by means of permanent protection of land from future development. While recreation improvements to City-owned lands will typically be of low-intensity and designed more for passive recreation uses, there are certain locations where any development in the form of trails and supporting facilities (parking, informational kiosks, etc) will be inappropriate due to sensitive habitat, unique plant communities, and other natural features. In particular, off-road bicycle use presents a land management challenge as trails are discovered and used intensively by recreational users. Off-road motorized vehicular uses (ATV, motorcycles, etc.) should be discouraged and/or controlled in most of the open space assets in the City.

## GREAT BAY RESOURCE PROTECTION PARTNERSHIP

The Great Bay Resource Protection Partnership is a collaboration of nine conservation organizations in the coastal region that promotes landscape-scale land conservation and stewardship. Since 1994, the Partnership has operated as a collaborative to promote shared conservation goals and implement conservation programs. The Partnership's primary role is as a convener of organizations to support the permanent protection and ongoing stewardship of the region's significant habitat areas and conservation lands, with a special focus on the estuarine resources surrounding Great Bay, just to the west of Portsmouth.

The Partnership's comprehensive approach to conservation is guided by landscape scale conservation planning. This collaborative, science-based process furthers the understanding of ecosystem and water quality health, and informs the Partnership's land protection, management and stewardship activities.

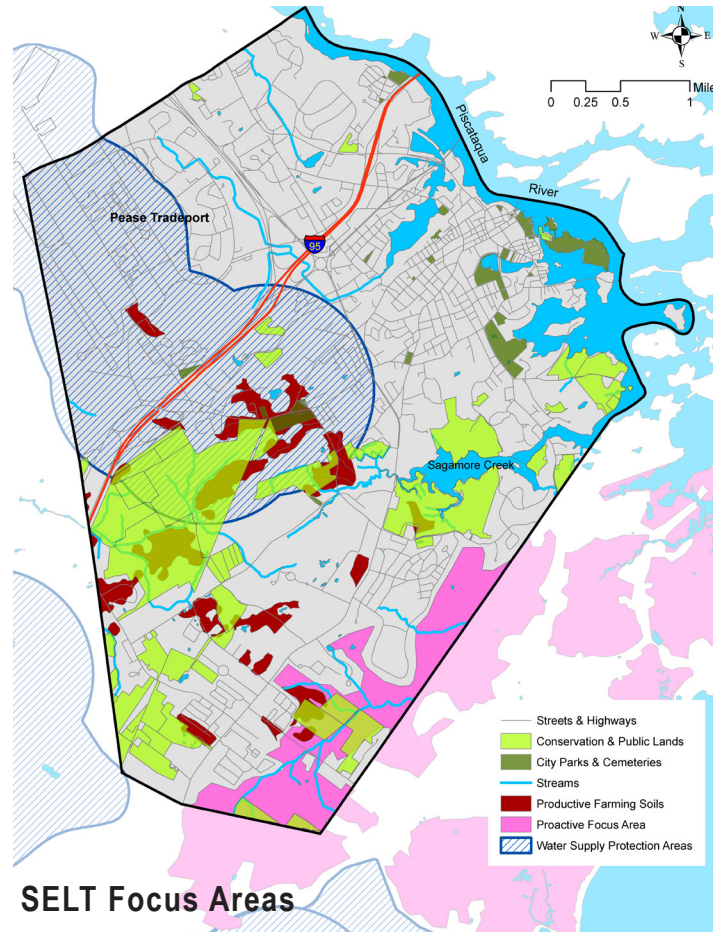
Portsmouth's Great Bog wetlands complex and the Pickering Brook watershed with its headwaters in Portsmouth has been a principle focus of the GBRPP land protection efforts. As noted in earlier sections of this report, water quality in Great Bay via Pickering Brook is of concern.

## SOUTHEAST LAND TRUST FOCUS AREAS

The Southeast Land Trust (SELT) is a private, regional land conservation organization with a multi-track focus on protecting strategic lands as follows:

- Living Landscapes (large blocks of undeveloped land essential for ecological functioning, wildlife habitat, and remote recreation)
- Farmland for the Future (conserving working farms and productive farmland)
- Clean Drinking Water (protecting current and future municipal water supplies)

To these ends, SELT has delineated specific focus areas aimed at these themes in the Seacoast Region, as shown on the map on the next page. The pink areas labelled proactive focus areas correspond to the large blocks of undeveloped lands targeted in the living landscapes category above. These areas are derived from core focus areas found in the 2006 coastal plan for NH prepared by TNC. Prime agricultural soils in this map are a proxy for farmland for the future since no working farms exist at present in the City. The clean drinking water aspect of the SELT strategic plan is represented by NH DES drinking water protection areas shown in blue.



## CONNECT THE COAST

Recently, the NH chapter of The Nature Conservancy (TNC) has engaged in a study of coastal NH which adds an important connectivity aspect to the 2006 coast conservation plan. It also modifies the 2006 core conservation focus areas somewhat. The technical report and outreach documentation on the Connect the Coast (CTC) study will not be released until May or June 2019, but the GIS data is now available for planning purposes.

The map on the next page shows the core focus areas and critical connectivity corridors that link upland habitats to the coastal and estuarine resources mainly via undeveloped land along streams. Much of the core focus area within the City limits is already conserved, but large areas along Banfield Road and Peverly Hill Road are not protected. Most of the core focus area along the boundary with Rye and centering on Berrys Brook involves extensive unprotected wetlands. The connectivity corridors (purple) are the most critical natural resource features in the CTC plan. Note the corridor following the Sagamore Creek drainage and largely undeveloped land north to Middle Road, as well as three smaller corridors highlighted with red circles. These smaller corridors are highly constricted by developed land, but small undeveloped parcels remain along Berrys Brook and in the connection between Packer Bog in Greenland and Great Bog in the City.

