

# Natural and Water Resources

## Outstanding Questions for Town Staff:

- How many households, or what percentage of the Town’s population is served by the Freeport Water District and South Freeport Water District?
- Have any Harmful Algal Blooms been reported in Freeport’s freshwater bodies in recent years?
- What sections of the Town are serviced by septic systems?
- Some of the sections in this chapter are repetitive from Marine Resources (e.g., relevant ordinances, general water quality threats). Would you like to see this information duplicated in the chapters or have one refer to the other? If so, which chapter should be the primary location for that information?
- Are there any additional regional planning or conservation efforts for natural and water resources not identified in this draft? Any additional scenic views or areas?

## Highlights

- The Saltmarsh sparrow, a species of Special Concern in Maine, is found in Freeport alongside the Salt-Hay Saltmarsh habitat, an exemplary natural community
- Thirty-seven percent (37%) of Freeport’s 29 miles of coastal bluff shoreline is categorized as unstable or highly unstable, indicating a proclivity to erosion.
- There are 41 culverts in Freeport. Fourteen are listed as a “Barrier” to habitat connectivity and an additional 22 are listed as a “Potential Barrier.” Eighteen of these problematic crossings are Town-owned.
- Freeport is part of the Municipal Separate Stormwater Sewer System (MS4) General Permit program that regulates stormwater discharge.
- The Town of Freeport has several zones and overlays dedicated to the protection of natural and freshwater resources. These include the Shoreland Zoning and the Non-Stormwater Discharge Ordinances.
- Groundwater quality in the Town is generally good, and is sourced primarily from bedrock wells. Two water utilities bring drinking water to the majority of Freeport residents.
- Freeport contains two urban impaired stream watersheds: Frost Gully Brook and Concord Gully. Merrill Brook is also listed as threatened due to potential highway development risk.
- Water quality concerns in Freeport include stormwater runoff, nutrients, and other contaminants such as PFAS due in part to legacy effects from sludge spreading in the 1980s and 90s. Initial sampling at Wolfe’s Neck Farm did not reveal concerning levels of PFAS in their water, soil, or dairy products.

## Introduction

Freeport's coastal location and abundance of surface water resources provide a variety of habitats, wildlife, and recreational opportunities for its residents and visitors to enjoy. Freeport is home to a significant portion of the Maquoit and Middle Bay State Focus Area. This area is recognized for providing critical habitat to rare, threatened, and endangered species, including the Saltmarsh Sparrow which is a State Species of Special Concern. Among many other species, the Saltmarsh Sparrow lives in the Salt-hay Saltmarsh along the Harraseeket River. This focus area, along with two other inland locations, is also designated critical habitat for Inland Waterfowl and Wading Birds. Freeport's eight undeveloped habitat blocks greater than 100 acres in size offer significant habitat refuge for wildlife and are an important characteristic of Freeport's rural regions. 2,211 acres of these undeveloped habitat blocks are currently held in conservation. The leading threat to wildlife using these undeveloped habitat blocks is fragmentation from development. Several invasive species also threaten these ecosystems. Groundwater quality in Freeport is generally good, and sourced primarily from drilled bedrock wells. Typical of built town centers, surface water quality faces threats from sources such as stormwater runoff, excess nutrients, and PFAS contamination. Two watersheds, Frost Gully Brook and Concord Gully, are considered impaired by the Maine Department of Environmental Protection. Remediation efforts are underway as part of the Town's involvement with the regional MS4 permit. The Freeport Conservation Trust (FCT) recently worked on a collaborative project to deconstruct three dams along Frost Gully Brook to provide habitat connectivity for native species.

The following chapter provides a more in-depth assessment of Natural and Water Resources in the Town of Freeport.

## Conditions and Trends

### Topography

At an elevation of 308 feet, Hedgehog Mountain is the highest point in Freeport. The 196-acre property containing the mountain is owned and managed by the Town of Freeport<sup>1</sup>. Other locations of topographic interest as noted by the 1994 and 2011 Comprehensive Plan Committees include High View and Mitchell Ledge<sup>2</sup>.

The topography of the northwestern corner of Freeport, near the Pownal and Durham town boundary, is characterized by rolling hills and steeper slopes, with elevations dropping off towards the coast. The areas around Cousins River and Mill Stream are lower elevations surrounded by higher ground. The Cousins River floodplains are a largely flat, lowland area in the southwestern corner of Freeport on the Yarmouth town boundary. Wolfe's Neck, Flying Point, and Winslow Park peninsulas are the lowest lying areas in the town of Freeport. Freeport has 41.9 miles of shoreline (including the islands), making the coastal topography of the Town an important component of the topographic character. Of these 41.9 miles of shoreline, 29 miles are considered coastal bluff shoreline (Maine Geological Survey, 2022). Coastal bluffs are mapped by the Maine Geological Survey to evaluate their stability. Bluff shorelines are defined as *"a steep shoreline slope formed in sediment (loose material such as clay, sand, and gravel) that has three feet or more of vertical elevation just above the high tide line"* and therefore do not include bedrock slopes, beaches, or dunes. Of the remaining

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<https://static1.squarespace.com/static/628bcb223078e12b645aa87f/t/63b6ea88d0c00133943d7112/1672931981992/2022-12-15+Hedgehog+Mountain+Management+Plan.pdf>

<sup>2</sup> [https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/cp\\_data.facts\\_trends.pdf](https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/cp_data.facts_trends.pdf)

shoreline not categorized as coastal bluff, 8.7 miles is considered non-bluff shoreline, and 4.2 miles was unmapped<sup>3</sup>. An additional 4.5 miles of bluff shoreline and 3.2 miles of non-bluff shoreline were mapped as part of the Yarmouth Quadrangle, though it should be noted that these segments have not been assessed since 2002<sup>4</sup>. Nearly 63% (21.1 miles) of Freeport's bluff shoreline is classified as stable bluff. Stable bluffs are typified by a gentle slope and continuous vegetated cover of grass, shrubs, or trees. To be classified as stable, bluffs need a wide zone of ledge or sediment at their base. In contrast to these, 7.5 miles (22%) were categorized as unstable bluffs and the remaining 4.9 miles (15%) were categorized as highly unstable bluffs. Unstable or highly unstable bluffs are vulnerable based on their slope, vegetation cover, sediment type, and erosion rate. In Freeport, unstable bluffs are concentrated on the eastern and southern sections of the Wolf Neck peninsula, the west and southern portions of the Flying Point Neck peninsula, Little Flying Point, and the majority of bluff shoreline on Freeport's islands (including Bustins, Pettingill, Williams, and Sister Islands). As of 2009, areas of unstable or highly unstable bluffs in Freeport have the required 75' setback taken from top of bank instead of the high water mark<sup>5</sup>.

Add bluff shoreline map here.

## Soils

There are approximately 37 soil types throughout Freeport. The major types (more than 1% of the Town area) are shown in Table 1. The most common soil types are Lamoine silt loam, which covers more than 3,700 acres (approximately 17%) of the Town, and Suffield silt loam, which covers more than 3,400 acres (approximately 15%). Lamoine series soils are typically found in glacial deposits on coastal lowlands and river valleys<sup>6</sup>. These soils are scattered throughout town, but occur predominantly along the outer edges of Cousins River, Mill Stream, and Little River floodplains and coastal stream and river outlets. Suffield silt loams are typically found on gentle slopes and consist of very deep, well drained soils formed in lacustrine or marine sediments<sup>7</sup>. Suffield soils follow a similar spatial pattern to the Lamoine soils, but generally occur along river and stream banks as well as the coastal shoreline.

Approximately 1,024 acres in Freeport are classified as Prime Farmland soils and 2,880 acres are classified as Farmland of Statewide Importance. These soils are spread throughout the town, particularly along Harvey Brook and around Winter Hill Farm near the Pownal and Durham town boundary. Prime Farmland soils represent soils that have the *"best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops..."* while Farmland Soils of Statewide Importance are determined by the State to be important for high crop yields but do not meet the conditions of Prime soils<sup>8</sup>.

<sup>3</sup> [https://digitalmaine.com/cgi/viewcontent.cgi?article=3130&context=mgs\\_maps](https://digitalmaine.com/cgi/viewcontent.cgi?article=3130&context=mgs_maps)

<sup>4</sup> [https://digitalmaine.com/cgi/viewcontent.cgi?article=1501&context=mgs\\_maps](https://digitalmaine.com/cgi/viewcontent.cgi?article=1501&context=mgs_maps)

<sup>5</sup> [https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/cp\\_data.facts\\_trends.pdf](https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/cp_data.facts_trends.pdf)

<sup>6</sup> [https://soilseries.sc.egov.usda.gov/OSD\\_Docs/L/LAMOINE](https://soilseries.sc.egov.usda.gov/OSD_Docs/L/LAMOINE)

<sup>7</sup> [https://soilseries.sc.egov.usda.gov/OSD\\_Docs/S/SUFFIELD.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/S/SUFFIELD.html)

<sup>8</sup> <https://www.maine.gov/dacf/ard/resources/docs/prime-farmland-determination-guidelines-v6.pdf>

**Table 1.** Freeport major soil types, coverage, and drainage class<sup>9</sup>. \*Indicates farmland of statewide importance.

| Soil Type                         | Total Acres | Percent of Town Area including water | Percent of Town Area excluding water | Drainage Class               |
|-----------------------------------|-------------|--------------------------------------|--------------------------------------|------------------------------|
| Lamoine silt loam*                | 3,770.80    | 12.70%                               | 16.90%                               | Somewhat poorly drained      |
| Suffield silt loam                | 3,426.20    | 11.60%                               | 15.40%                               | Moderately well drained      |
| Scantic silt loam                 | 2,766.40    | 9.30%                                | 12.40%                               | Poorly drained               |
| Lyman-Tunbridge complex*          | 2,501.50    | 8.40%                                | 11.20%                               | Somewhat excessively drained |
| Lyman-Abram complex               | 2,128.80    | 7.20%                                | 9.60%                                | Somewhat excessively drained |
| Nicholville very fine sandy loam* | 1,807.40    | 6.00%                                | 8.10%                                | Moderately well drained      |
| Windsor loamy sand*               | 1,064.00    | 3.60%                                | 4.80%                                | Excessively drained          |
| Buxton silt loam                  | 839         | 2.80%                                | 3.80%                                | Moderately well drained      |
| Hartland very fine sandy loam*    | 571.1       | 1.90%                                | 2.60%                                | Well drained                 |
| Paxton fine sandy loam*           | 581.8       | 1.90%                                | 2.60%                                | Well drained                 |
| Deerfield loamy fine sand         | 544.5       | 1.80%                                | 2.40%                                | Moderately well drained      |
| Hinckley loamy sand*              | 360.3       | 1.20%                                | 1.60%                                | Excessively drained          |
| Woodbridge fine sandy loam*       | 335.7       | 1.20%                                | 1.50%                                | Poorly drained               |

## Scenic Resources

In addition to the coastal scenic vistas described in the Marine Resources Chapter ([see Chapter X](#)), Freeport has a number of important scenic areas with views of its natural and freshwater resources. These include:

1. Hedgehog Mountain – This 196-acre property is owned and managed by the Town of Freeport and contains the Town’s highest point.
2. Florida Lake – This 167-acre property is owned and managed by the Town of Freeport and contains trails through scenic wetlands, woods, and around Florida Lake.

<sup>9</sup> <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

3. Quarry Woods – A 35-acre parcel owned by the Town of Freeport which contains trails through woods and vernal pools.
4. Frost Gully Woods – Owned and managed by the Freeport Conservation Trust, this 13-acre parcel provides trails through woods, wetlands, Frost Gully Brook, and a small pond.
5. Hidden Pond Preserve – This 46-acre parcel is owned by the Town of Freeport with a conservation easement owned by the Freeport Conservation Trust. It provides trails through old pasture lands, wetlands, and the shores of Hidden Pond.

### Rare and Threatened Flora and Fauna

In Freeport, the one species of animal listed as Special Concern under the state Endangered Species Acts is the Saltmarsh Sparrow (*Ammodramus caudacutus*, Table 2).<sup>10</sup> The Saltmarsh Sparrow is found in tidal marshes for the entirety of its life cycle.

**Table 2.** Rare and threatened animal species found in Freeport

| Species Common Name | Species Scientific Name      | State Status    |
|---------------------|------------------------------|-----------------|
| Saltmarsh Sparrow   | <i>Ammodramus caudacutus</i> | Special Concern |

### Critical Wildlife Habitats and Natural Areas

Critical habitat that supports the Saltmarsh Sparrow is found in the Maquoit and Middle Bay Focus Area along the coast of Freeport (and in the neighboring communities of Yarmouth, Brunswick, and Harpswell). In addition to the coastal resources included in the Marine Resources Chapter (see Chapter X), the Maquoit and Middle Bay Focus Area includes critical habitat for Inland Wading Bird and Waterfowl. Waterfowl includes birds such as ducks, geese, and occasional migrant swans. 18 species breed in Maine every summer and another 20 species spend winter months off the coast. Many waterfowl species nest on the ground next to wetlands, streams, or lakes with some nesting in tree cavities. Wading birds are a diverse group that include herons, egrets, bitterns, coots, moorhens, and rails. Maine Department of Inland Fisheries and Wildlife (DIF&W) has identified significant inland habitats species of waterfowl and wading birds throughout the state, rating them as having high to moderate value.<sup>11</sup>

There are two specific locations within the geographic boundaries of Freeport with Inland Waterfowl and Wading Bird Habitat (IWWH), a Significant Wildlife Habitat defined under Maine's Natural Resources Protection Act (NRPA).<sup>12</sup> The first is centered around Florida Lake and the second is on the Pownal/Freeport Town line and includes a portion of the riparian buffer around a tributary to Chandler Brook.

These birds use these critical areas for breeding, feeding, roosting, loafing and migration areas. Waterfowl depend on wetland habitat for survival. Both the Atlantic Northern Forest Bird Conservation Plan and the North American Waterfowl Management Plan have identified the loss of wetlands from draining, dredging, and filling as the primary threat to water birds in Maine. By protecting the quality of wetlands, nesting success for breeding waterfowl will be greatly improved.

<sup>10</sup> <https://webapps2.cgis-solutions.com/beginningwithhabitat/mapviewer/>

<sup>11</sup> <https://www.maine.gov/ifw/programs-resources/environmental-review/significant.html>

<sup>12</sup> <https://webapps2.cgis-solutions.com/beginningwithhabitat/mapviewer/>

Add habitat map here.

**Table 3.** Exemplary Natural Communities found in Freeport

| Community type                          | State Rarity             | Associated Rare Plants  | Associated Rare Animals  |
|---|--------------------------|---|--|
| Salt-Hay Saltmarsh (Spartina saltmarsh) | S3 – Vulnerable in Maine | <ul style="list-style-type: none"> <li>• Dwarf glasswort</li> <li>• Lilaeopsis</li> <li>• Saltmarsh bulrush</li> <li>• Saltmarsh false-foxglove</li> <li>• Slender blue flag</li> </ul> | <ul style="list-style-type: none"> <li>• Big bluet</li> <li>• Black-crowned night-heron</li> <li>• Laughing gull</li> <li>• Least tern</li> <li>• Saltmarsh sharp-tailed sparrow</li> <li>• Short-eared owl</li> </ul> |

### Undeveloped Habitat Blocks and Habitat Fragmentation

Wildlife abundance and diversity depend highly upon large areas of undeveloped land and habitat corridors that connect these undeveloped blocks. Habitat fragmentation is typically caused by anthropogenic development. The important links between such large habitat blocks, including the riparian areas along streams and associated wetlands have become narrower or interrupted and less able to function effectively as wildlife travel corridors between habitat areas.

There are two undeveloped habitat blocks in Freeport east of I-295 that are greater than 100 acres in size. The first is located along Kelsey Brook and extends into Brunswick to the north. Thirty-five percent (35%) of the Freeport portion of this block is conserved. The second is a 368-acre block in South Freeport. 35% percent of this block is conserved. Freeport also has land within six additional undeveloped blocks west of I-295 that are greater than 100 acres in size. These span both sides of Webster Road, the Hedgehog Mountain Area, the land north and south of Beech Hill Road and a 361 acre block around Collins Brook.

Table 4, below, shows the typical effects of shrinking undeveloped habitat block size on the diversity of wildlife species supported in Maine. While occasional instances of seeing wildlife species on smaller undeveloped habitat blocks do occur, overall, as the density of development moves from Tier 1 (undeveloped) to Tier 5 (1-19 acres of connected habitat) over time, the diversity of species decreases. Freeport’s approach to mapping undeveloped habitat blocks has been modeled after and adapts the data provided by the “Beginning with Habitat” Project, a joint partnership of several state agencies, including the Maine Department of Inland Fisheries and Wildlife, the Maine Natural Areas Program, and the Maine State Planning Office, with the US Fish and Wildlife Service, and the Maine Audubon Society.

**Table 4.** Habitat block size requirements for wildlife in Maine.

| <b>Tier 5</b>     | <b>Tier 4</b>      | <b>Tier 3</b>        | <b>Tier 2</b>         | <b>Tier 1</b>      |
|-------------------|--------------------|----------------------|-----------------------|--------------------|
| <b>1-19 Acres</b> | <b>20-99 Acres</b> | <b>100-499 Acres</b> | <b>500-2500 Acres</b> | <b>Undeveloped</b> |
|                   |                    |                      |                       |                    |
| RACCOON           | RACCOON            | RACCOON              | RACCOON               | RACCOON            |
|                   | HARE               | HARE                 | HARE                  | HARE               |
|                   |                    |                      |                       | COYOTE             |
| SMALL RODENT      | SMALL RODENT       | SMALL RODENT         | SMALL RODENT          | SMALL RODENT       |
|                   | PORCUPINE          | PORCUPINE            | PORCUPINE             | PORCUPINE          |
|                   |                    |                      |                       | BOBCAT             |
| COTTONTAIL        | COTTONTAIL         | COTTONTAIL           | COTTONTAIL            | COTTONTAIL         |
|                   | BEAVER             | BEAVER               | BEAVER                | BEAVER             |
| SQUIRREL          | SQUIRREL           | SQUIRREL             | SQUIRREL              | SQUIRREL           |
|                   | WEASEL             | WEASEL               | WEASEL                | WEASEL             |
|                   |                    | MINK                 | MINK                  | MINK               |
|                   |                    |                      |                       | FISHER             |
|                   | WOODCHUCK          | WOODCHUCK            | WOODCHUCK             | WOODCHUCK          |
|                   |                    | DEER                 | DEER                  | DEER               |
| MUSKRAT           | MUSKRAT            | MUSKRAT              | MUSKRAT               | MUSKRAT            |
|                   |                    |                      | MOOSE                 | MOOSE              |
| RED FOX           | RED FOX            | RED FOX              | RED FOX               | RED FOX            |
| SONGBIRDS         | SONGBIRDS          | SONGBIRDS            | SONGBIRDS             | SONGBIRDS          |
|                   |                    | SHARP-SHINNED HAWK   | SHARP-SHINNED HAWK    | SHARP-SHINNED HAWK |
|                   |                    |                      | BALD EAGLE            | BALD EAGLE         |
| SKUNK             | SKUNK              | SKUNK                | SKUNK                 | SKUNK              |
|                   |                    | COOPER'S HAWK        | COOPER'S HAWK         | COOPER'S HAWK      |
|                   |                    | HARRIER              | HARRIER               | HARRIER            |
|                   |                    | BROAD-WINGED HAWK    | BROAD-WINGED HAWK     | BROAD-WINGED HAWK  |
|                   |                    | KESTREL              | KESTREL               | KESTREL            |
|                   |                    | HORNED OWL           | HORNED OWL            | HORNED OWL         |
|                   |                    | BARRED OWL           | BARRED OWL            | BARRED OWL         |
|                   |                    | OSPREY               | OSPREY                | OSPREY             |
|                   |                    | TURKEY VULTURE       | TURKEY VULTURE        | TURKEY VULTURE     |
|                   |                    | TURKEY               | TURKEY                | TURKEY             |
| MOST REPTILES     | MOST REPTILES      | REPTILES             | REPTILES              | REPTILES           |

| Tier 5          | Tier 4            | Tier 3            | Tier 2            | Tier 1            |
|-----------------|-------------------|-------------------|-------------------|-------------------|
|                 | GARTER SNAKE      | GARTER SNAKE      | GARTER SNAKE      | GARTER SNAKE      |
|                 | RING-NECKED SNAKE | RING-NECKED SNAKE | RING-NECKED SNAKE | RING-NECKED SNAKE |
| MOST AMPHIBIANS | MOST AMPHIBIANS   | MOST AMPHIBIANS   | AMPHIBIANS        | AMPHIBIANS        |
|                 |                   | WOOD FROG         | WOOD FROG         | WOOD FROG         |

Source: A Response to Sprawl: Designing Communities to Protect Wildlife Habitat and Accommodate Development, Maine Environmental Priorities Project, July 1997.

Aquatic system connectivity is heavily dependent on minimizing fish passage barriers such as dams or undersized culverts. Efforts are underway throughout Maine to improve road-stream crossings and connectivity for wildlife. Well-designed road-stream crossings simulate the upstream and downstream characteristics of the natural stream channel, use natural substrate within the crossing, match the natural water depths and velocities, and are wide and high relative to their length.

The Maine Stream Habitat Viewer, developed by the Maine Stream Connectivity Work Group and convened by the Maine Coastal Program, lists 41 culverts, under “Crossing Type” in Freeport. Of these 41 crossings, 14 are listed as a “Barrier” to habitat connectivity and an additional 22 are listed as a “Potential Barrier.” 18 of these problematic crossings are Town-owned. There are 10 dams, another crossing type, in Freeport. All 10 dams are listed as a “Barrier” to habitat connectivity.

In 2023, FCT worked with Merrymeeting Bay Chapter of Trout Unlimited, Maine Water Company, US Fish and Wildlife Service Gulf of Maine Coastal Program, Casco Bay Estuary Partnership, and stream restoration specialist Alex Abbott to deconstruct three dams impeding Frost Gully Brook, a small tributary in the Frost Gully brook watershed of the Harraseeket River and Casco Bay.<sup>13</sup> With the removal of the dams, there miles of additionally connected habitat for native species was created.

## Invasive Species

Invasive species pose the second greatest threat to national biodiversity after habitat loss (The National Wildlife Federation, 2023). Out of their native range, these species thrive due to a lack of natural predators and differences in growth cycles that often allow them to begin growing earlier in the spring and later in the fall than our native species. These species also often have other adaptations that allow them to spread quickly or inhibit other species growth by changing soil chemistry.

Unmapped but common invasive species in Maine which likely occur in Freeport include asiatic bittersweet (*Celastrus orbiculatus*), Japanese knotweed (*Reynoutria japonica*), multiflora rose (*rosa multiflora*), rugosa rose (*Rosa rugosa*), Norway maple (*Acer platanoides*), honeysuckle shrub (*Lonicera spp*), buckthorn (*Rhamnus cathartica*), glossy false buckthorn (*Frangula alnus*), and green crab (*Carcinus maenas*).<sup>14</sup>

Freeport has also had persistent issues with browntail moth (*Euproctis chrysorrhoea*), an invasive species. As of 2023, the Maine Forest Survey identified Freeport as a community with significant browntail moth populations. This designation makes the Town eligible for Browntail

<sup>13</sup> <https://freeportconservationtrust.org/frost-gully-dam-removal>

<sup>14</sup> [iMap Invasives](#)



Moth Mitigation Funds.<sup>15</sup> Flying Point, Wolfe’s Neck, South Freeport, and the area west of Staples Cove are the hotspots for browntail in Freeport.

While the Town can work to manage invasive species on municipal properties, property owners can also manage invasive species. The Maine Invasive Species Network at the University of Maine and the Invasive Plant Management Program with the Maine Forest Service can support homeowners with the best methods for invasive plant control and eradication on their properties.

## Groundwater

20 public drinking water sources are recorded in Freeport by the Maine Drinking Water Program. These include the South Freeport Water District and the Freeport Water District (owned by the Maine Water Company), which are the two primary drinking water suppliers. The Freeport Water District service area comprises Freeport’s downtown, the southern stretch of the I-295 and Route 1 corridor, and extends up Desert Road and down South Street. The South Freeport Water District Service area comprises the South Freeport neighborhood and extends along the north and south ends of South Freeport Road. The Freeport Water District sources water from two wells in a sand and gravel aquifer while the South Freeport Water District sources from one gravel well off of Pine Street. No violations in water quality were reported in their most recent annual report from 2022<sup>16</sup>. In total, five sand and gravel aquifers are mapped within Freeport, the largest of which continues into Pownal.

In addition to these shared water sources, there are 1,377 wells listed in Maine’s Water Well Database in Freeport (including Bustins Island)<sup>17</sup>. These wells range in depth from approximately 12 feet to 1,120 feet, and in yield from 0.1 gallons per minute (gpm) to 800 gpm. Freeport wells are primarily located in bedrock (approximately 98%) and for domestic use (97%) (Tables 5 and 6).

In 2019, the State of Maine passed Maine Public Law 2019 Ch. 158 (An Act to Strengthen Testing for Lead in School Drinking Water) mandating all K-12 schools to test for the presence of lead. Results for local school lead testing programs are presented in parts per billion (ppb) in Table 7 below. Although no level of lead is deemed safe, schools are recommended to stop using any fixtures with lead concentrations of 4 ppb or higher. All Freeport schools except the Freeport High School and the Maine Coast Waldorf School returned detections of lead but most were below the guidance of 4 ppb<sup>18</sup>. The Freeport Middle School had one detection of 11 ppb at one of 11 samples. The Morse Street School returned three detections out of nine samples, two of which were above the recommended level of 4 ppb. The Mast Landing School detected lead in 10 of 23 samples, with only one above 4 ppb. L’Ecole Francaise du Maine detected lead in one sample of three, but this sample was below the state guideline of 4 ppb.

**Table 5.** Number of wells by well type.

| Well Type       | Bedrock | Gravel | Gravel Packed | Other | Unknown |
|-----------------|---------|--------|---------------|-------|---------|
| Number of Wells | 1,346   | 13     | 2             | 4     | 12      |

<sup>15</sup> <https://www.freeportmaine.com/home/pages/browntail-moth-survey>

<sup>16</sup> <https://www.mainewater.com/media/msrfakja/frptme0090580.pdf>

<sup>17</sup> <https://www.maine.gov/dacf/mgs/pubs/digital/well.htm#tblsearch>

<sup>18</sup> <https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/testingLeadSchoolWater.shtml>

**Table 6.** Number of wells by well use.

| Well Use        | Domestic | Municipal | Commercial | Geothermal | Industrial | Institutional | Other | Unknown |
|-----------------|----------|-----------|------------|------------|------------|---------------|-------|---------|
| Number of Wells | 1,333    | 4         | 13         | 6          | 1          | 2             | 11    | 7       |

**Table 7.** Freeport school lead level testing results.

| School Name                | # of samples | # of lead detections | Average lead level (ppb) | Max lead value (ppb) |
|----------------------------|--------------|----------------------|--------------------------|----------------------|
| Freeport High School       | 13           | 0                    | 0                        | 0                    |
| Maine Coast Waldorf School | 31           | 0                    | 0                        | 0                    |
| Morse Street School        | 9            | 3                    | 3.5                      | 21.2                 |
| Freeport Middle School     | 11           | 1                    | 1                        | 11                   |
| Mast Landing School        | 23           | 10                   | 0.8                      | 6.5                  |
| L'Ecole Francaise du Maine | 3            | 1                    | 1.3                      | 3.8                  |

## Surface Water

The primary watersheds in Freeport are the Harraseeket River watershed and the Cousins River watershed. These are further divided into smaller watersheds such as the Frost Gully Brook watershed and the Concord Gully watershed.

[Add water resources map here.](#)

## Rivers and Streams

All rivers and streams in Freeport are classified by the Maine Department of Environmental Protection (Maine DEP) based on designated uses and water quality goals. Fresh surface waters are classified as AA, A, B, and C in order of decreasing water quality and protection (See Title 38 M.R.S.A. Article 4A for more information). All surface waters in Freeport are Class B, with the exception of Frost Gully Brook which is Class A. Class B waters should be suitable for drinking water following treatment, recreation in and on the water, fishing, industrial process, cooling water supply, hydroelectric power generation, navigation, and suitable habitat for aquatic life. Class A waters must meet the same uses, along with natural habitat requirements and additional discharge restrictions. Surface waters are also classified according to Section 303(d) of the Clean Water Act by levels of impairment by one or more pollutants. Categories include:

- Category 1 – Meets water quality standards.
- Category 2 – Rivers and streams that meet some designated uses, insufficient data for others.
- Category 3 – Insufficient data.
- Category 4A – Impaired water for uses other than mercury, Total Maximum Daily Load (TMDL) completed.

- Category 4B - Impaired rivers and streams, pollution control requirements expected to result in attainment.
- Category 5 – Impaired water requiring a TMDL or other water quality improvement project. Subcategories are specific to impaired pollutant type.

Frost Gully Brook was listed as Category 4A in the 2022 Maine DEP Integrated Water Quality Monitoring and Assessment Report<sup>19</sup> due to impairments with macroinvertebrate assessments, habitat, and *Escherichia coli* (*E. coli*). Concord Gully was likewise listed as Category 4A with impairments for macroinvertebrates, dissolved oxygen, habitat, and other bioassessments. Concord Gully is also listed at Category 5A due to an *E.coli* impairment, meaning a TMDL is not yet complete.

Concord Gully and Frost Gully Brook are also listed as impaired on the latest Nonpoint Source Impaired River and Streams Priority List by the Maine DEP. This priority list is intended to highlight waterbodies that are the most vulnerable to nonpoint source pollution and to encourage restoration projects<sup>20</sup>. Concord Gully, an MS4 priority water, is on the priority list because it is threatened from highway access-related development. Merrill Brook is also listed as a threatened stream, due to highway access-related development threats.

The Maine DEP monitors water quality through its Biological Monitoring Program. Through this program, the Maine DEP counts the population and species of algae and benthic macroinvertebrates (aquatic animals without backbones) living in a stream. Certain invertebrate species are uniquely sensitive to pollution in the water, and therefore, their absence can serve as a key indicator of degrading water quality. Maine DEP has two established macroinvertebrate sites on Frost Gully Brook, three on Concord Gully, and one on Merrill Brook<sup>21</sup>. Frost Gully Brook was last sampled in 2010 and Concord Gully in 2019. Merrill Brook has only been sampled once in 1998. Additionally, Frost Gully Brook and Concord Gully each have one algae monitoring station which were last sampled in 2015 and 2012 respectively.

## Lakes

Freeport has three lakes or ponds that are considered Great Ponds (Class GPA, greater than 10 acres) by the Maine DEP: Florida Lake, Pratts Pond, and an unnamed pond along Merrill Brook. According to 38 M.R.S § 465-A(1)(A): Class GPA waters must be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, agriculture, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other aquatic life<sup>22</sup>. The habitat must be characterized as natural.

## Wetlands

Wetlands, which include swamps, marshes, bogs, and fens, provide a number of vital ecosystem services including flood buffering, pollutant filtration, habitat and food sources for a

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<sup>19</sup> [https://www.maine.gov/dep/water/monitoring/305b/2022/25-May-2022\\_2018-22\\_ME\\_IntegratedRpt-REPORT%20\(002\).pdf](https://www.maine.gov/dep/water/monitoring/305b/2022/25-May-2022_2018-22_ME_IntegratedRpt-REPORT%20(002).pdf)

<sup>20</sup>

[https://www.maine.gov/dep/land/watershed/nps\\_priority\\_list/Stream%20NPS%20Priority%20Watersheds%20List%202022.pdf](https://www.maine.gov/dep/land/watershed/nps_priority_list/Stream%20NPS%20Priority%20Watersheds%20List%202022.pdf)

<sup>21</sup>

<https://maine.maps.arcgis.com/apps/webappviewer/index.html?id=8752837d17a64017a84769539ef810a6>

<sup>22</sup>

<https://www.mainelegislature.org/legis/statutes/38/title38sec465.html>

number of waterfowl, fish, insects, reptiles, amphibians, and mammals. Approximately 1,298 acres of freshwater wetlands are mapped within Freeport, which includes a mix of forested, shrub, and emergent systems.

Because wetlands are ecologically important in all the ways described above, and because they are vulnerable to filling, dredging, draining or other alterations in order to make them suitable for or supportive of development, these activities are regulated at federal, state, and local levels of government. The Army Corps of Engineers and the Maine DEP regulate activities in wetlands of all sizes.

Under State and federal wetland regulations, sometimes a developer is allowed to fill, drain, or otherwise alter a wetland, provided that the same developer compensates for this activity by restoring, creating, enhancing, or preserving wetland(s) on the same site or elsewhere on another property. This is accomplished by participation in Maine's In Lieu Fee Compensation Program. Fees are allocated for use in wetland restoration projects via the Maine Natural Resource Conservation Program (MNRCP). Funds will be allocated to the biophysical region in which they were collected but are not required to be used within the same watershed. This provides a balance to Maine's overall ecosystems but may result in a loss or degradation of Freeport's wetlands and can lead to fragmentation of critical habitat for reptile and amphibian species. To date, one MNRCP project has been awarded in Freeport to the Brunswick Topsham Land Trust for the acquisition of a conservation easement located on the border of Freeport and Brunswick in 2010.

### **Vernal Pools**

Vernal pools are small wetlands formed by natural depressions in the forest floor. They are inherently temporary, lasting for only a few weeks each year in the spring and fall. These pools are fed by melting snow or rain at the times of year when the water table is generally at its highest. They play critical roles in the life cycles of many species including the wood frog, the spotted salamander, the blue-toed salamander, and the spotted turtle. A significant vernal pool is determined by the number and type of breeding amphibian egg masses, the presence of fairy shrimp, or its use by endangered or threatened species.

In 2006, legislation was passed in Maine to regulate significant vernal pools as Significant Wildlife Habitat under the state's Natural Resources Protection Act. In 2007, Maine passed legislation regulating development activities within 250 feet of significant vernal pools.

To date, 15 vernal pools have been mapped within Freeport of which all are considered significant by the Maine DEP.<sup>23</sup> All of these vernal pools are located on the mainland, with one vernal pool split between Freeport and Brunswick.

## **Threats to Water Quality**

The Town's water quality depends in part on the quality of stormwater runoff, the effectiveness of septic systems, and historic uses of the land. Water quality concerns in Freeport stem primarily from nonpoint sources. The Freeport Sewer District discharges directly into the estuarine portion of the Harraseeket River, which is discussed further in the Marine Resources Chapter (see Chapter X).

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<sup>23</sup> <https://webapps2.cgis-solutions.com/beginningwithhabitat/mapviewer/>

## Stormwater Runoff

Stormwater runoff is caused by the runoff of rainwater and snowmelt along impervious surfaces, such as roads, driveways, and rooftops. This runoff carries sediment, bacteria, nutrients, fertilizers, pesticides, herbicides, oil, grease, and other pollutants into surface waters. As Maine continues to see an increase in rainfall intensity due to climate change, the threats of stormwater runoff to surface waters will be an increasing concern. Intense precipitation in a short period of time cannot infiltrate into the ground and thus causes more surface erosion and may carry additional pollutants into nearby waterbodies.

## Septic Systems

Septic systems can pose a serious threat to water resources. Systems located directly adjacent to bodies of water will inevitably have the greatest impact on water quality. Septic system malfunctions can cause leaks that expose local water resources to elevated levels of nutrients and bacteria, impacting their health and recreational value. These malfunctions can easily go unnoticed, with leaks occurring underground and traveling to waters via groundwater. The travel time and filtration of bacteria and nutrients is highly dependent on the underlying soil type, with shallow to bedrock soils providing minimal filtration.

Sewer infrastructure in Freeport is limited to the downtown, the southern stretch of the I-295 and Route 1 corridor, and portions of Desert Road and South Freeport. The areas west of I-295, north of downtown, Wolfe's Neck, and Flying Point are not served by public sewer and rely on private wastewater disposal systems, most likely septic systems.

## Nutrients and Dissolved Oxygen

The most common limiting nutrient in freshwater is phosphorus; this means that the addition of phosphorus is the most significant limiting factor for expanded growth of many plant and algae species. As the algae dies off and decomposes, excessive microbial activity consumes dissolved oxygen and can result in low oxygen conditions throughout the ecosystem. Algae blooms can also be caused or exacerbated by warm water temperatures. These blooms may become more frequent in the future as climate change brings stronger storms (and therefore increased stormwater runoff) and rising air and sea temperatures to Freeport. In addition to the environmental impacts of algal blooms, some species produce toxins which can be harmful to human health. In freshwater, these are known as Harmful Algal Blooms (HABs). HABs are typically caused by cyanobacteria, a bacteria that releases toxins that can cause rashes, nausea, diarrhea, and in severe cases death<sup>24</sup>.

## PFAS

Per- and polyfluoroalkyl substances (also known as PFAS or forever chemicals) are widely used and potentially harmful chemicals that do not break down in the environment. The effects and impacts of these chemicals are still not fully understood, but studies have shown that exposure can lead to harmful health effects such as increased risk of cancer, hormone disruptions, and developmental delays in children. PFAS can be found in several household products, firefighting foams, cleaning products, and more. Another potential source of PFAS is sludge and septage spread as fertilizers. The State of Maine issued a number of permits for these spreads, primarily in the 1980s and 90s. Twenty-six (26) sludge spread sites are located in Freeport<sup>25</sup>. All but five of these licenses were issued to the Freeport Sewer District to spread lime stabilized sludge

<sup>24</sup> <https://www.maine.gov/dep/water/lakes/algalbloom.html>

<sup>25</sup> [https://www.google.com/maps/d/viewer?mid=12VGRs04Oc-7Kpp2G4e9\\_uV4\\_abUaR3dK&ll=43.859264392692104%2C-70.06181867930252&z=13](https://www.google.com/maps/d/viewer?mid=12VGRs04Oc-7Kpp2G4e9_uV4_abUaR3dK&ll=43.859264392692104%2C-70.06181867930252&z=13)

from the treatment plant. These sites are especially concentrated on the Wolfe Neck peninsula. The remaining five licenses were issued to S.D Warren for the spread of ash, pulp, and papermill sludge on private properties.

Following a 2019 Executive Order by Governor Mills establishing a Task Force to study the effects of PFAS prevalence in Maine, the Wolfe's Neck Center staff collaborated with state staff to test soil, water, and milk on site. Results indicated that PFAS levels were not a concern<sup>26</sup>.

## Existing Measures to Protect Surface and Ground Water Quality

### Stormwater Management

Freeport is part of the Municipal Separate Stormwater Sewer System (MS4) General Permit program that regulates stormwater discharge for communities of a certain density. Freeport belongs to the group of Greater Portland communities that have formed the Interlocal Stormwater Working Group (ISWG) to implement this program. Under the MS4 regulations, a municipality must implement the following six Minimum Control Measures:<sup>27</sup>

- (1) Public education and outreach
- (2) Public participation
- (3) Illicit discharge detection and elimination
- (4) Construction site stormwater runoff control
- (5) Post-construction stormwater management
- (6) Pollution prevention and good housekeeping for municipal operations.

One requirement of the MS4 General Permit is to develop a Stormwater Management Plan. The Plan defines the appropriate Best Management Practices (BMP's) for each of the six Minimum Control Measures listed above. The Plan also includes the following information: (1) the measurable goals for each BMP; (2) the person(s) or position(s) responsible for implementing each BMP; and (3) the schedule for implementing each BMP. The Town also needs to document the implementation of the Plan, and provide annual reports to the Maine DEP.<sup>28</sup>

Freeport developed a Stormwater Management Plan for 2022-2027 that will be updated over the course of the five year permit period. Freeport also recently completed two stormwater and stream protection projects through grant funding provided by the U.S. EPA.

Freeport also has a Post-Construction Stormwater Management Ordinance, amended in 2023, that complies with minimum control measures requirements of the federal Clean Water Act, of federal regulations, and of Maine's General Permit for Small Municipal Separate Storm Sewer Systems.<sup>29</sup> The Freeport Public Works Department also uses best management practices in their regular operations, such as seasonal street sweeping twice a month, which help to protect water quality.

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<sup>26</sup> <https://www.wolfesneck.org/pfas/>

<sup>27</sup> <https://www.freeportmaine.com/public-works/pages/storm-water-management-information>

<sup>28</sup> <https://www.freeportmaine.com/public-works/pages/storm-water-management-information>

<sup>29</sup> [https://www.freeportmaine.com/sites/g/files/vyhlf4436/f/uploads/chap53\\_final\\_20231003.pdf](https://www.freeportmaine.com/sites/g/files/vyhlf4436/f/uploads/chap53_final_20231003.pdf)

# Management and Protection

## Zoning

The Town of Freeport has several zones and overlays dedicated to the protection of natural and freshwater resources. These include the Shoreland Zoning, the Non-Stormwater Discharge Ordinances, and the Incidental Processing of On-Site Earth Material Ordinance. Additionally, the Town's Zoning Ordinance requires that new commercial development projects must follow the requirements of the State's Chapter 500 Stormwater Management regulations, even on projects smaller than the minimum one acre of impervious area used in State regulations. Freeport's Shoreland Zoning Ordinance has been consistent with state standards since its 2009 update, and it was most recently updated in 2022.

### The Shoreland Zoning Ordinance

1. The area shown on the official Town of Freeport Zoning Map which includes the land area located within two hundred and fifty (250) feet, horizontal distance, of the normal highwater line of any river; within two hundred and fifty (250) feet, horizontal distance, of the upland edge of a coastal wetland, including all areas affected by tidal action; within two hundred and fifty (250) feet of the upland edge of a freshwater wetland; or within seventy-five (75) feet, horizontal distance, of the normal high-water line of a stream.
2. Includes four Zoning Districts:
  - a. Resource Protection 1
    - i. Prohibits residential and commercial development and limits use to low-impact development such as low-impact recreational uses, wildlife management practices, and other similar uses.
  - b. Shoreland Area
    - i. Requires a 75' building setback from the high-water mark or the top of the bank, with no other restrictions.
  - c. Stream Protection
    - i. Includes all land areas within 75 feet of the normal high water line of a stream except for those areas within 250 feet of the upland edge of a freshwater or coastal wetland.
  - d. Marine Waterfront
    - i. Protects water-dependent, commercial marine operations from being forced out by non-water-dependent land uses.
    - ii. Has no minimum lot size and allows the following as permitted uses requiring site plan approval: boat yards, marinas, ship chandleries, commercial fishing activities, and municipal wharves.
3. Section 306 requires a buffer of native vegetation sufficient to infiltrate stormwater and mitigate erosion within 25 feet of the normal high-water line of a waterbody or upland edge of a wetland. Stormwater management is required for other types of development in these zones, such as parking lots, and an erosion and sedimentation control plan is required when earthmoving activities are conducted which require a permit. All activities are prohibited from impaired water quality classifications and designated uses.

### Non-Storm Water Discharge Ordinance<sup>30</sup>

Section 27-105 prohibits non-stormwater related discharges to the Storm Drainage System.

### The Incidental Processing of On-Site Earth Material Ordinance

As defined in Section 2 purpose of the ordinance, "the Ordinance is to establish standards and limitations applicable to the temporary and/or incidental on-site processing of modest amounts

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<sup>30</sup> [https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/chap27\\_final\\_20231003.pdf](https://www.freeportmaine.com/sites/g/files/vyhliif4436/f/uploads/chap27_final_20231003.pdf)

of earth material excavated from any single parcel of land, when such processing is a temporary activity incidental to construction, alteration, development or other improvement of the parcel or portion thereof for uses other than excavation operations, and where no earth materials are brought onto the parcel from off-site for processing”. The intent of the ordinance is to minimize adverse impacts on adjacent and nearby properties, including adverse impacts from groundwater contamination and other land disturbances.

## **Local and Regional Planning Efforts**

### **Freeport Climate Action Plan (Ongoing)**

The Town is currently working with the Greater Portland Council of Governments (GPCOG) to write a Climate Action Plan. The purpose of this Plan will be to assess the threat of climate change on the Town of Freeports built infrastructure and natural communities. The Plan will also include a greenhouse gas emissions inventory and a vulnerability assessment.

### **Freeport Downtown Vision Plan (2022)**

Freeport’s Downtown Vision Plan, finalized in July of 2022, includes strategies to encourage best practices for stormwater management, “...focusing on reducing runoff, improving water quality, and minimizing impervious surfaces with sensitivity to the urban impaired streams in the downtown area.”<sup>31</sup> The Vision Plan also includes many action items that indirectly support natural resource management related to sustainability, reduced parking/impervious surfaces, support of electric vehicles, and access to the outdoors for the community.

### **Hedgehog Mountain Management Plan (2022)**

The Town of Freeport owns Hedgehog Mountain, a 100-acre property located off of Pownal Road and neighboring the Freeport Recycling Center. As part of this purchase, the Conservation Commission is responsible for reviewing (and updating if necessary) the Hedgehog Mountain Plan every five years. Included in the Plan is a summary of natural resources on the property and management recommendations. Primary threats to the natural resources of this property listed in the Plan include invasive species, climate change, and erosion from recreational use.

### **Freeport, Maine Active Living Plan (2014)**

Freeports Active Living Plan (May 2014) was stewarded by the Active Living Task Force to improve the quality of life for Freeport’s residents by building physical activity into their daily routines. This Plan includes a priority matrix with 26 projects identified to improve active living in Freeport. Many of these projects indirectly improve natural and water resources in the community, through open space and trail improvement projects and exposure of the community to natural spaces.

## **Land Conservation**

There are 3,385 acres of conserved land in Freeport representing 14% of the Town’s landmass. Fee owned parcels account for 60% of all conserved land by acreage, and the remaining 40%

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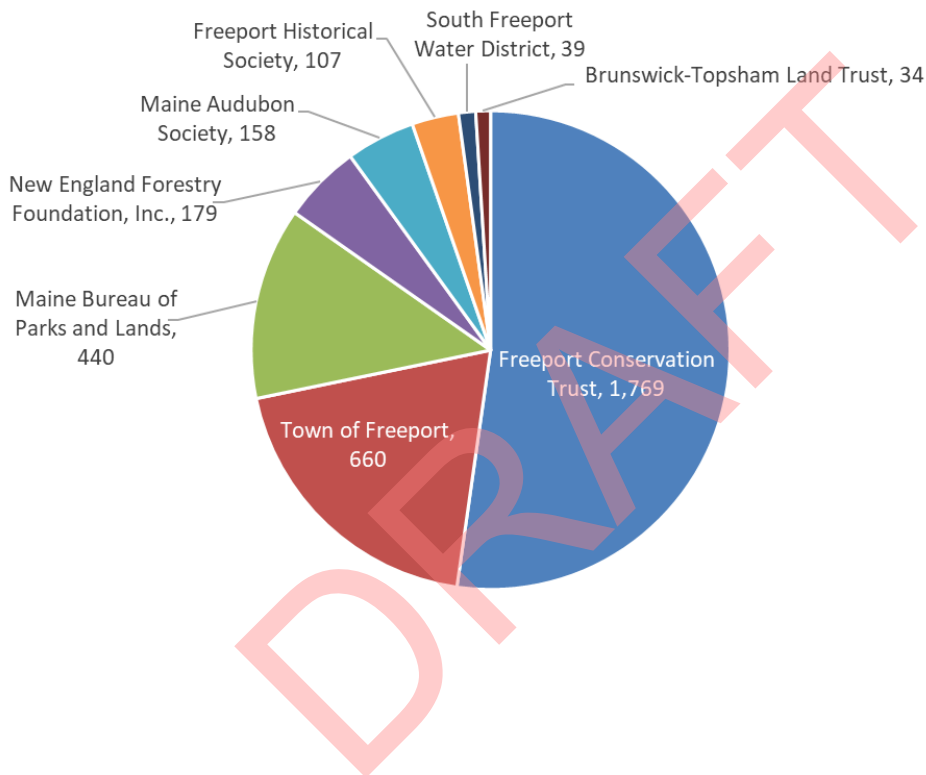
<https://www.dropbox.com/s/vjc8q6ru1kxzg7a/Freeport%20Downtown%20Vision%20Plan%20Draft%20Final%20Plan%2020220714.pdf?e=1&dl=0>



are in easements. The local land trust for Freeport is the Freeport Conservation Trust (FCT).<sup>32</sup> FCT is the largest holder of conserved land in Freeport and protects 1,769 acres in and around Freeport, 615 acres of which are in fee and 1,154 acres in easements (Figure 1). Some properties, on which FCT holds conservation easements, are not accessible to the public. The Town of Freeport is the second largest holder of conserved land, protecting 660 acres total including Hedgehog Mountain which is Freeport’s highest point. Other significant conserved areas include Winslow Memorial Park, Wolfe’s Neck Woods State Park, Pettengill Farm, and the Mast Landing Sanctuary.

Add conserved lands map here.

**Figure 1.** Distribution of conserved lands in Freeport by parcel holder, and each holder’s total acreage.



<sup>32</sup> <https://freeportconservationtrust.org/>