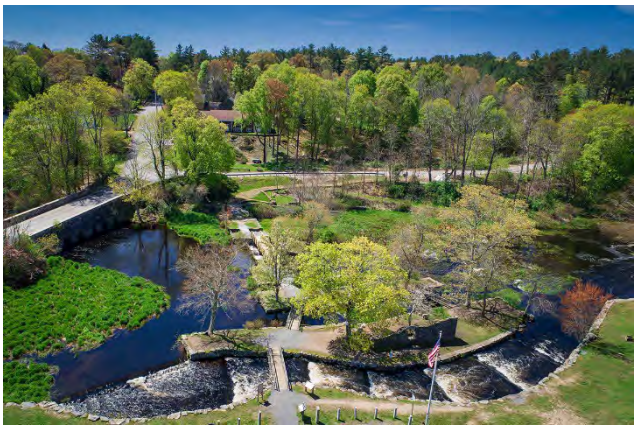
TOWN OF MIDDLEBOROUGH
OPEN SPACE & RECREATION PLAN

2024 - 2034

Photo of:
View at Pierce Playground, Oliver Mill Park, Peter Oliver House, and Staghorn Trail at Pratt Farm.
Middleborough, Massachusetts

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Section 1 - Summary of the Open Space Plan

The Middleborough Open Space and Outdoor Recreation Plan of 2024 - 2034 is a result of six previous Open Space Plans, a Growth Management Policy, an Historic Preservation Plan, a Nemasket River Corridor Plan, the 2002 Master Plan, the 2004 Community Development Plan, the 2003 Field Study Plan as well as past collaborations by the Conservation Commission, Open Space Committee, Park Department, Board of Selectmen, Planning Board and others. Similar to previous plans, the Town of Middleborough faces the urgency to protect its open space and natural resources. On the horizon there are several large development projects proposed, such as the proposed industrial park in South Middleborough, 40B developments and the South Coast Rail, which would connect the Fall River and New Bedford area to Boston. Without planning, communication and public involvement, this presents a real threat to Middleborough's unique and valuable natural resources and rural landscape.

Since the last Open Space and Recreation Plan was submitted; Middleborough has completed most of the recommendations and actions highlighted in this past plan. Continued success will require a deliberate and collaborative effort by the Town of Middleborough and neighboring communities.

Like the 2015 - 2022 Open Space and Recreation Plan, the goals are similar. That is, the preservation and protection of the town's water resources, the rural character of the town, wildlife habitats, corridors and diversity for both plants and animals; historic and archeological sites; preserving and protecting natural vistas, sustaining agricultural land use; and providing accessible and abundant opportunities for residents and visitors to enjoy outdoor recreation in Middleborough. The Action Items reflect the accomplishments of the past, present opportunities, as well as the anticipated needs in the future.

In 2004, 77% of the town land area was undeveloped or used agriculturally. Much of this land area cannot be developed because of environmental constraints or restrictions (i.e. areas Subject to Protection under the Massachusetts Wetlands Protection Act, unsuitable soils, etc.). Through government ownership or conservation restrictions, Middleborough currently has 9,311 acres of protected land (MassGIS Protected and Recreational Open Space, 2022).

Section 2 - Introduction

A. Statement of Purpose

This is the seventh Open Space and Recreation Plan for the community bridging over Forty years of conservation planning. Continuing to update the Open Space and Recreation Plan provides the opportunity to assess where you are, where you would like to go, and how you might get there as well as allowing the town to take the next step with regional open space planning. Having a current Open Space and Recreation Plan that has been approved by the Massachusetts Division of Conservation Services (DCS) also makes Middleborough eligible for funding through the LAND (formerly the Self Help Grant Program) and PARC as well as the Land and Water Conservation Fund Grants available through the DCS, the original Self-Help program was established in 1961 to assist municipal conservation commissions acquiring land for natural resource and passive outdoor recreational purposes. This program will pay for the purchase of property or for a conservation restriction (CR).

Development within Middleborough is anticipated to continue since the population is expected to continue to increase. To support this increase in development the town needs to focus on not only commercial - development in targeted locations but focuses on protecting specific areas, which would be determined through a consensus of the Middleborough residents, planners and officials. This vision depends on land

development that is intelligently planned, of high quality and that contributes to the community as part of a strong economy and tax base. It also depends on active protection and funding for open space and historic preservation. Finally, it depends on the active and coordinated participation of the Town as a whole, through its government and its people. With the completion of the Middleborough Master Plan in 2002 and the Community Development Plan in 2004, Middleborough's leaders and citizens have clearly demonstrated that they are serious about steering the town in a direction to reflect the community's values and vision. The Open Space and Recreation Plan is another important tool that will guide the town government, community leaders and its citizens in their efforts to preserve and fund open space and cultural and historic land. The town is working on a Housing Production Plan and a Hazard Mitigation Plan.

In 2010 the townspeople voted during the mid-term election ballot to institute the Community Preservation Act (M.G.L. Ch. 44B). This has been another tool used in protection of not only open space but also for historic preservation, creation of affordable housing and creation of recreational space. The residents voted to allow a surcharge of 1% and include a $100,000.00 exemption as well as an exemption for those over 65 and those qualifying under low income. The town updated their Community Preservation Plan for fiscal years 2021-2025. In the 2020 Community Preservation Report that came out in April 2021, Middleborough has used $2.4 million in CPA project funding to leverage more than $14.4 million for the town in outside funding. Completed projects include adding trees to Titicut Parish Green, stonework restoration at the Oliver Mill Park, and the purchase of 7.88 acres at Thrush Hollow. Projects considered in Step One include Oliver Mill Restoration Phase III, West Side Park Complex, and Wood Street ball fields.

Middleborough has used past Open Space Plans successfully to compete for land acquisition grants, most notably for the Pratt Farm Property, Soule Farm, the Andreattola property, and in 1998 for the Morgan Property. The community laid out their priorities of protection and recreational potential, and pursued those goals with measurable success. In 2020, with Land & Water Conservation Fund Grant money and partnerships with the Native Land Conservancy and The Archaeological Conservancy the Ja Mar/Nemasket River Village Property was purchased and protected along the Nemasket River.

B. Planning Process and Public Participation

The Middleborough Conservation Commission through the conservation agent initiated and directed the preparation of the 2024 - 2034 Open Space and Recreation Plan update. In the fall of 2021, a Working Group was formed. Several Working Group meetings have been held where the plan has been discussed as well as a public Open Space & Recreation Plan meeting. An opportunity for people to attend the Open Space & Recreation Plan meeting was made by having a virtual Zoom meeting that was recorded and later posted online and broadcasted over the cable access channel. All of these meetings were posted with the Town Clerk and were put on the Town's website as well as announced on the local (MCCAM) cable TV. Working Group participants were emailed agendas. Some of this feedback came from a survey that went out online on the town website, the project website, and on social media, as well as advertised through paper flyers with a survey QR code link that was posted within all government buildings. The ongoing internal Plan updates will significantly reduce efforts to prepare a new plan in 2034 as well as encourage Middleborough to continually implement the proposed Action items.

Patricia Cassady, Conservation Agent for the Conservation Commission has worked with SRPEDD and an Open Space and Recreation Working Group throughout the plan update and map development process. The Open Space and Recreation Working Group included: Peter Gately, Conservation Commission; Laurene Gerrior , Community Preservation Committee; Tom Dexter, Historical Commission; Dave Cavanaugh, Herring Commission; Judy Bigelow-Costa, Park & Recreation Commission; Allin Frawley, Planning Board; Colleen Lieb, Board of Selectmen/Water Commission member; Larissa Hansen-Hallgren, Middleborough Gas & Electric Commission; Connie (Constance) Brown, At Large; Robert Nunes, Town Manager; Leeann Bradley, Town Planner; Fran Cass, Park Superintendent; Christopher Peck, DPW

Superintendent; Mike Bumpus, Water Department; Todd Goldman, Sewer Department; Kayla Davis, Health Agent; Robert Whalen, Building Commissioner/Zoning Officer; and Emily Surette, Assistant to the Town Manager. The final Open Space Inventory Map will ultimately be provided to MassGIS to initiate the updating of their data.

The 2024 - 2034 Final Open Space and Recreation Plan was distributed to the Planning Board, Board of Selectman and SRPEDD for their review and comments. These entities understand going forward that this Plan update will undergo yearly internal updates that include a public involvement component.

C. Enhanced Outreach

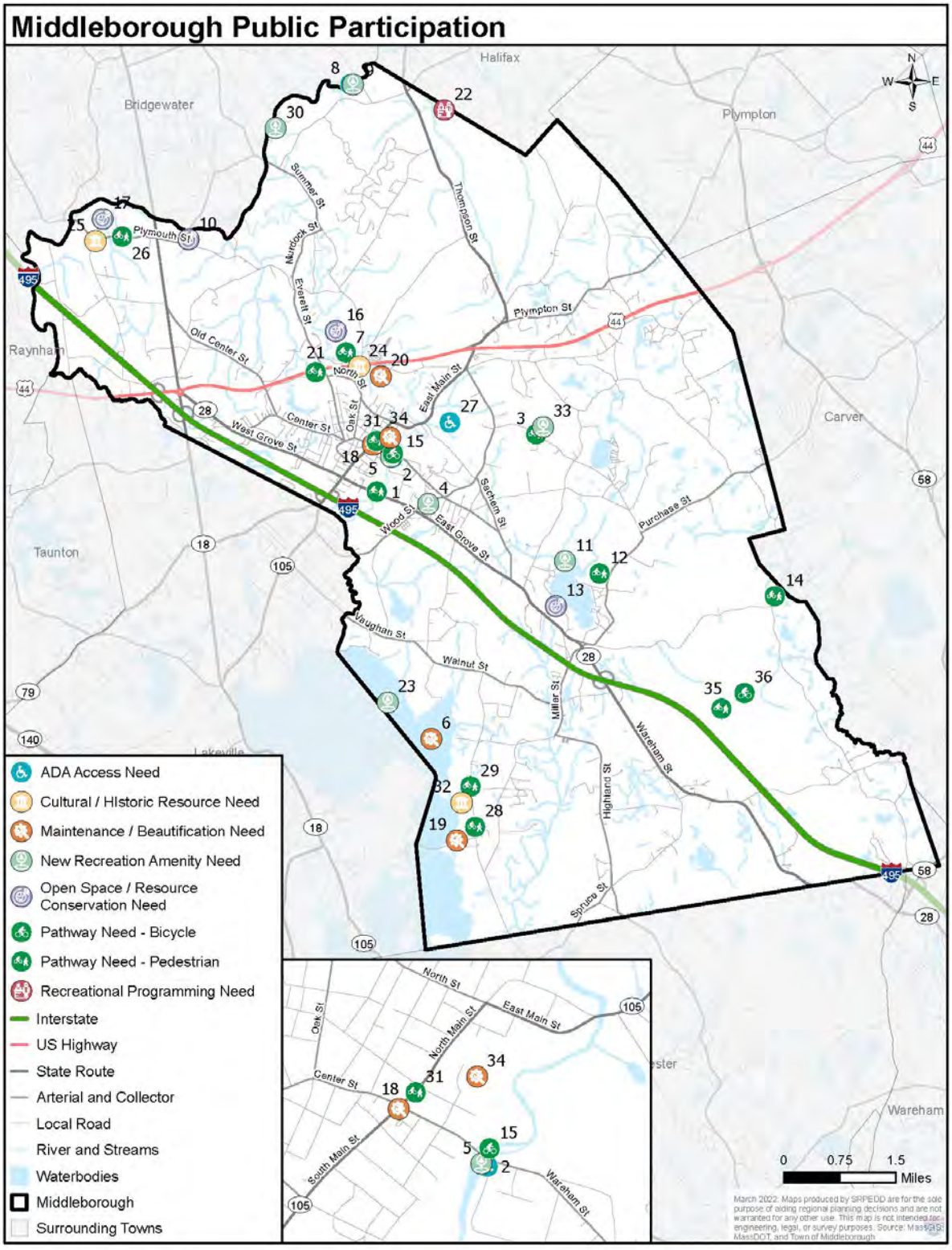
The Open Space Working Group prepared a Conservation, Open Space, and Recreation survey to determine the public's priorities for conservation and recreation needs in the town as well as their satisfaction with existing conditions and facilities. The survey was posted on the Town website, project website, as well as on social media where it could be filled out electronically and made available in paper/hard copy as well.

After much deliberation, the Open Space Working Group determined that the Town Hall & Town Hall Annex and public library would provide the best pick-up and drop-off points for paper/hard copies of the survey. This decision was based on consideration of the needs of the Environmental Justice (EJ), elderly, and ADA populations. The town's EJ population is located just north of the downtown area, in close proximity to the public library and the Town Hall. Both of the hard copy pick-up and drop-off locations also provide public access by sidewalk, and public transportation (including all day fixed route bus and dial-a-ride service) and, all are ADA access compatible. Completed surveys could also be mailed to the Conservation Commission Office at the Town Hall Annex.

Additionally, several activities during the planning process took place within the Middleborough Town Hall, which is within the designated Environmental Justice area for the town. These activities included posted flyers advertising the public workshop and public survey, an interactive map activity where participants could give their feedback on open space and recreation areas throughout town, and the second public workshop was hosted there to gain feedback on the drafted ten-year action plan.

Due to the COVID-19 pandemic, Middleborough's public planning meeting was hosted online via Zoom on January 19, 2022. The meeting was recorded and posted to the project website and later played on the local cable access channel. Before the meeting, it was advertised on local cable, posted at Town hall, posted on the Town Facebook page, posted on SRPEDDs Facebook page, and on the project website. At the public meeting SRPEDD used an interactive online mapping tool for town residents to add points onto a map based on 9 categories: ADA Access Need, Cultural/Historic Resource Need, Maintenance/Beautification Need, New Recreation Need, Open Space/Resource Conservation Need, Pathway Need – Bike, Pathway Need – Pedestrian, Recreational Programming Need, and Other. After the public meeting, the online map link was posted on the Towns Facebook page and available through the project website for a four-week comment period. Two large scale printed versions and their related stickers were placed in the Town Hall and the Public Library for anyone to make their comments in person instead of online.

Figure 1: Public Participation Comments



The information obtained in the survey responses were used as one of the primary means of gauging the public's needs and concerns. In addition to the surveys, all Open Space planning meetings were posted and open to the public. The Open Space and Recreation Working Group also held issue-specific meetings in the fall and winter of 2021 and 2022 for the purpose of formulating the "Goals and Objectives" and "Action Plan" sections of the draft open space plan. The final working group meeting to review the draft plan and prioritize the "Action Plan" was held in June 2022 and was facilitated by SRPEDD.

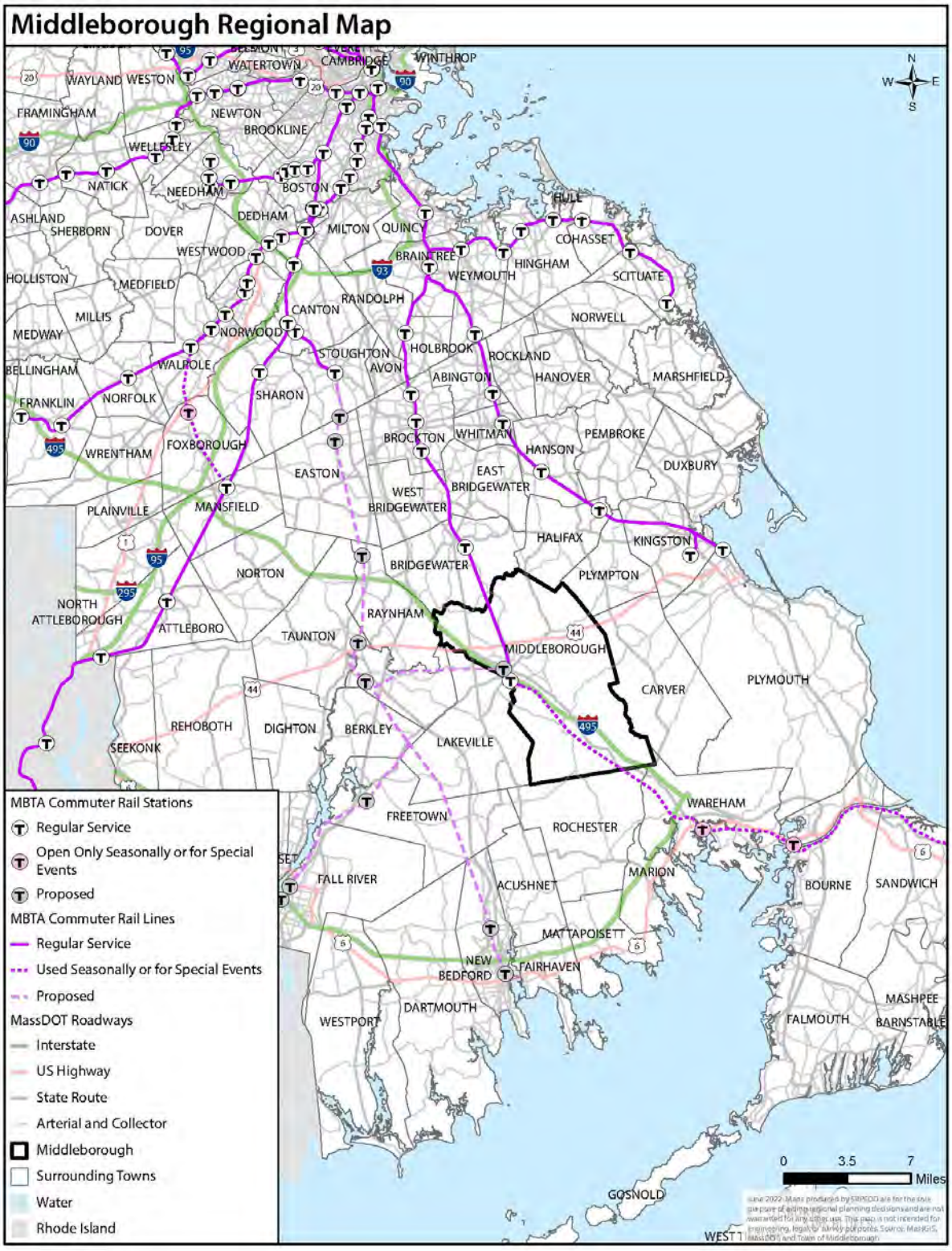
Section 3 - Community Setting

A. Regional Context

Middleborough is the second largest town in Massachusetts with an area of 69.6 square miles of land surface, 72.3 square miles including water bodies. It is located in Plymouth County, in the southeastern portion of the state. Middleborough is located 35 miles south of Boston; 22 miles north of New Bedford; and 30 miles east of Providence, Rhode Island. It is also within the labor market range of New Bedford, Fall River, Taunton and Brockton. It is adjacent to Interstate 495 (with a total of 5 exits), State Routes 28, 18, 79, and 105 as well as U.S. Route 44, which connects Plymouth with Providence. Middleborough's priority development areas are along these corridors. Specifically including Route 28 from Exit 2 to Exit 8 (old Exit 3) off Interstate 495; Middleborough center; Route 28 south of Exit 12 (old Exit 4) off Interstate 495; the land surrounding the rotary at U.S. Route 44, and Routes 18 and 28 near Exit 14 & 15 (old Exit 5 & 6) off Interstate 495; and land north of U.S. Route 44, near Route 105.

The Towns of Plympton, Bridgewater, Halifax, Raynham and Taunton bound the town on the north along the Taunton River. Lakeville bounds it on the west, through the Great Assawompset Pond system, to the south by Rochester and Wareham, and to the east by Carver. Middleborough is located within the jurisdiction of SRPEDD.

Figure 2: Regional Context Map



The community is located on the Middleborough commuter rail line to South Station in Boston, which runs to Lakeville right on the Lakeville/Middleborough border. South Coast Rail Phase 1 is expected to open in late 2023. They are currently building a new commuter rail station in Middleborough. The Bay Colony Railroad and Conrail provide freight rail service and interchange traffic to the Town. Additionally, Middleborough is a member of the Greater Attleboro-Taunton Regional Authority (GATRA), which provides Dial-A-Ride service to the elderly and disabled.

The town in the past completed its *Master Plan: Report on Findings and Alternatives – Revised*, prepared by the Cecil Group in 2002 and its *Community Development Plan*, prepared by Larry Koff & Associates in 2004 in an effort to establish a clear path for public policies and actions and community development over the next 20 years. The Town plans to update its Master Plan in the next year.

Middleborough is a mix of rural agriculture, upcoming industry and serves as a commuter town to other communities and Boston. Largely a middle-income community it contains a small presence (12.4%) of very low-income residents (households that earn less than $25,000 per year) and a small presence (20.8%) of upper-income households (those who earn more than $150,000 annually) according to the 2021 American Community Survey. Middleborough is at a cross roads with respect to being a dominant agricultural community to being more of a residential community.

Regional Green Infrastructure Network

Maintaining a regional perspective while planning for open space, recreation, and conservation can expand the benefits of these community assets. While many land use decisions are made on a local or site-by-site basis, most natural processes, climate conditions, and movements of plants and animals transcend jurisdictions over large areas shaped by topography and geology. Environmental issues such as pollution, changes in groundwater tables, and rising temperatures require a regional - even national and global - response, with every local community acknowledging the role that their lands and policies play in the larger ecological context. Consider a stream corridor, for example. Protecting and restoring forested areas along the stream provides habitat for both fish and wildlife and accommodates their movement through the landscape (ecological resilience), while also reducing flood risks to downstream communities.

In recognition of the inherent interconnected nature of natural landscapes and flows, the concept of "Green Infrastructure" (GI) provides a useful framework for thinking about multi-functional open space networks in the context of open space planning. The Conservation Fund's definition of GI is as follows:

"A strategically planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for America's communities and people."

Improving local open space in concert with adjacent communities and regional networks is one way to promote the well-being of people and ecosystems at all scales. An open space plan that takes a GI approach emphasizes the environmental, economic, and social benefits provided by a town's open space and physical resource network.

The "green infrastructure" approach emphasizes the benefits that a community draws from its natural and semi-natural spaces, and advances actions that protect the ability of natural systems to function. Ecosystem services - the benefits and essential services that natural processes provide to people - is a related concept. Ecosystem services can be divided into four categories:

1. Regulating Services - filtering air and water, sequestering carbon, absorbing floodwaters, moderating micro-climates, aquifer recharge.

2. Provisioning Services - food and fiber production, drinking water.

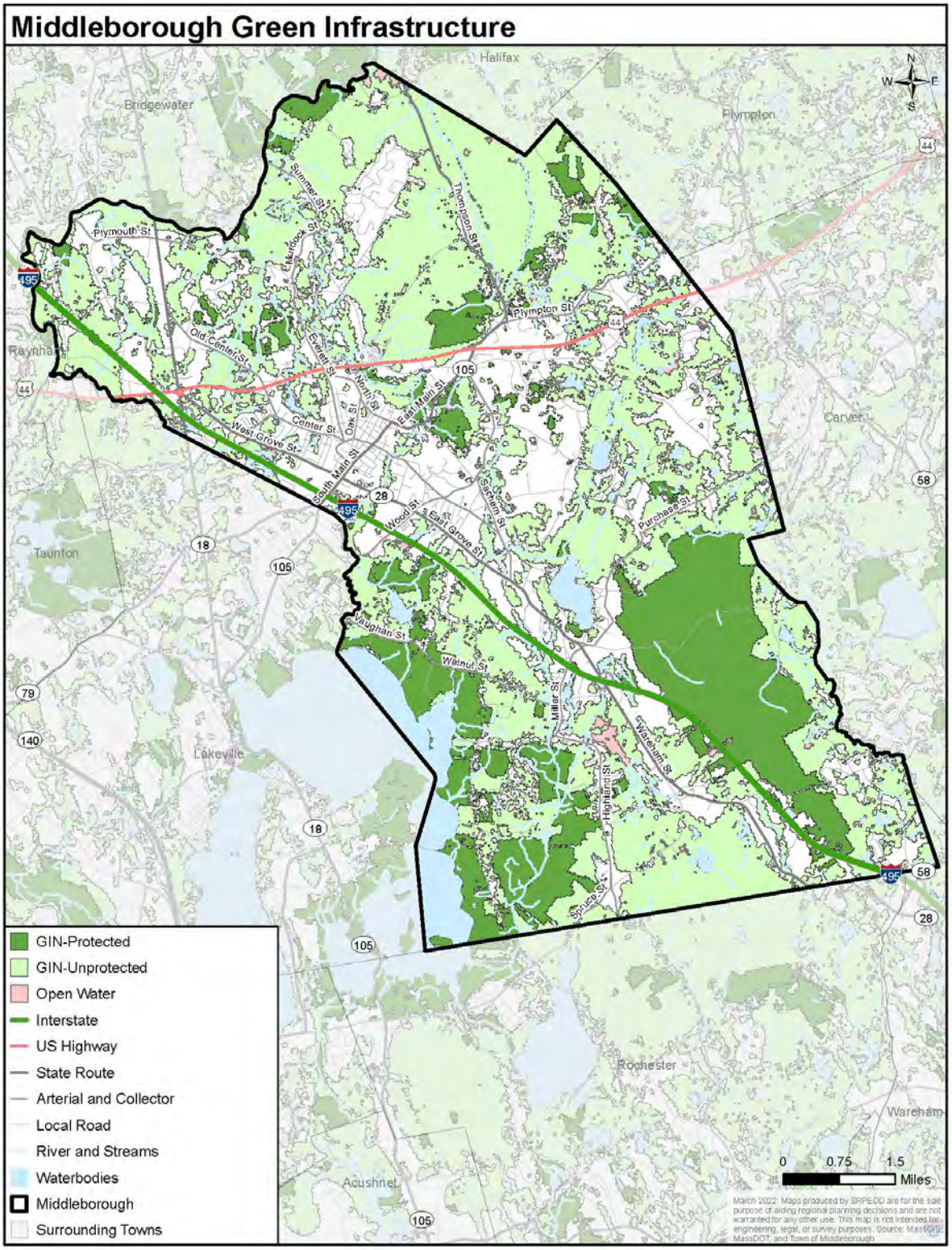
3. Supporting Services - sheltering and allowing for the movement of wildlife, nutrient cycling, crop pollination.

4. Cultural Services - physical activity and recreation, mobility, cultural identity, spiritual inspiration, community cohesion.

The GI approach aims to protect open space areas that preserve the ability of landscapes to perform these essential ecosystems services.

Massachusetts cities and towns are fortunate to have tools that allow planners to easily take a regional approach to GI development. The Manomet and Mass Audubon Green Infrastructure Network (GIN) tool identifies sections of land that exhibit climate change resilience, serve a critical landscape function, are a riparian buffer within 100 feet of a wetland, or are vulnerable to sea level rise. Using this tool, Middleborough planners can quickly identify which significant GI areas are already protected, and which are vulnerable to development, thereby enhancing Middleborough's green assets and establishing its keystone role in protecting the region's ecosystems.

Figure 3: Green Infrastructure Map



Regional Climate Change Impacts and Open Space Planning

In our current moment in earth's history, open space planning can be a powerful tool for mitigating and adapting to climate change. One action that the Middleborough community can take as a means of local response to this global crisis is to preserve open space tracts in particular locations or with specific features that buffer climate change impacts and/or mitigate greenhouse gas emissions.

Climate Change refers to the change in a region's climate conditions – particularly its temperature and precipitation – over a period of time. Climate change shifts have occurred naturally throughout earth's existence due to shifts in the planet's tilt, rotation and shape of its orbit. However, since 1900 there has been a massive increase in the global concentrations of atmospheric carbon dioxide, started by the Industrial Revolution and the burning of fossil fuels such as coal, oil, and gasoline. The global release of CO2 is occurring at rates nearly nine times greater than in the hottest period of the past 800,000 years, and has created an environment that traps thermal energy from sunlight within the earth's atmospheric system.

Key elements of the climate change threat can be communicated by answering three basic questions with the "3S's" of climate change:

Question 1: How do we know climate change is occurring?

Answer: It's simple.

Our human actions are forcing the earth's system to retain more heat. When thermal energy in the form of sunlight reaches earth, two things can happen to it; either it is absorbed into the Earth's atmospheric system or it is reflected and able to emit back into space and dissipate. We can conceive of these phenomena as Earth's "energy budget." If the energy that is emitted back to space equals the energy that is absorbed into the Earth's system, the energy budget is in balance. If more energy is emitted than absorbed, the Earth's system cools. If more energy is absorbed than emitted, the Earth's system warms. Certain gases, known as Greenhouse Gases (Carbon Dioxide/CO2, methane, and others) naturally increase the energy trapping capacity of the atmosphere, causing thermal energy to remain in the system, which causes the world to warm. The changing concentrations of these gases are measurable over time, and climatologists worldwide examining all available data have concluded that the rate of warming we are experiencing today cannot be explained solely by natural causes – it is a human-made phenomenon (4th National Climate Assessment).

Question 2: What harm will climate change cause?

Answer: It's serious.

Since 1895, the global temperature has increased 1.8 degrees Fahrenheit. Due to global differences in topography, wind patterns, and ocean circulation, this temperature increase is not felt evenly; in Massachusetts, the temperature increase has been even greater, rising 2.9 degrees Fahrenheit during the same time period. There is also a large difference between the warming felt on land and in water. In fact, an astounding 90% of the excess thermal energy that has entered the Earth's system has sunk into the deep ocean. While this has kept us cooler on land, it is extremely problematic for the ocean – higher sea surface temperatures, excess carbon dioxide entering the water, and resulting acidification all have implications for animal and plant species.

As temperature and precipitation change in the future, so too will the features of our natural and built environment that rely on them, such as forests and open space, agriculture, and disease/tick seasons, amongst others. In the northeastern United States, the increase in temperature will lead to less distinct seasons, with winter warming three times faster than summer, and earlier spring conditions. This change in

turn will lead to a longer freeze-free period, and earlier leaf-out and bloom. Without a longer frost period to kill them off, more pests will survive season to season, and they will emerge earlier in the season. Changing temperatures can shift the habitable zone for plant, insect, and animal species, prompting their migration. Iconic trees such as Red Maple and Oak have already started to migrate north and west, seeking more suitable climates.

Climate change is bringing about an era of extremes. Rain falls more intensely in fewer rain events. Droughts are longer. More extreme precipitation events combined with overall conditions will increase the likelihood and risk of erosive flooding. Extreme precipitation can contribute to soil and riverbank degradation as quick-moving waters strip sediment away, and the loss of topsoil and riverbanks can impact agricultural and riverine uses. Precipitation will also exacerbate pre-existing issues with flooding and contribute to an overall environment where it is dangerous to move around Middleborough during storm conditions. Increased rainfall also intensifies stormwater runoff, which can further contribute to the pollution of important waterbodies.

Question 3: What can we do?

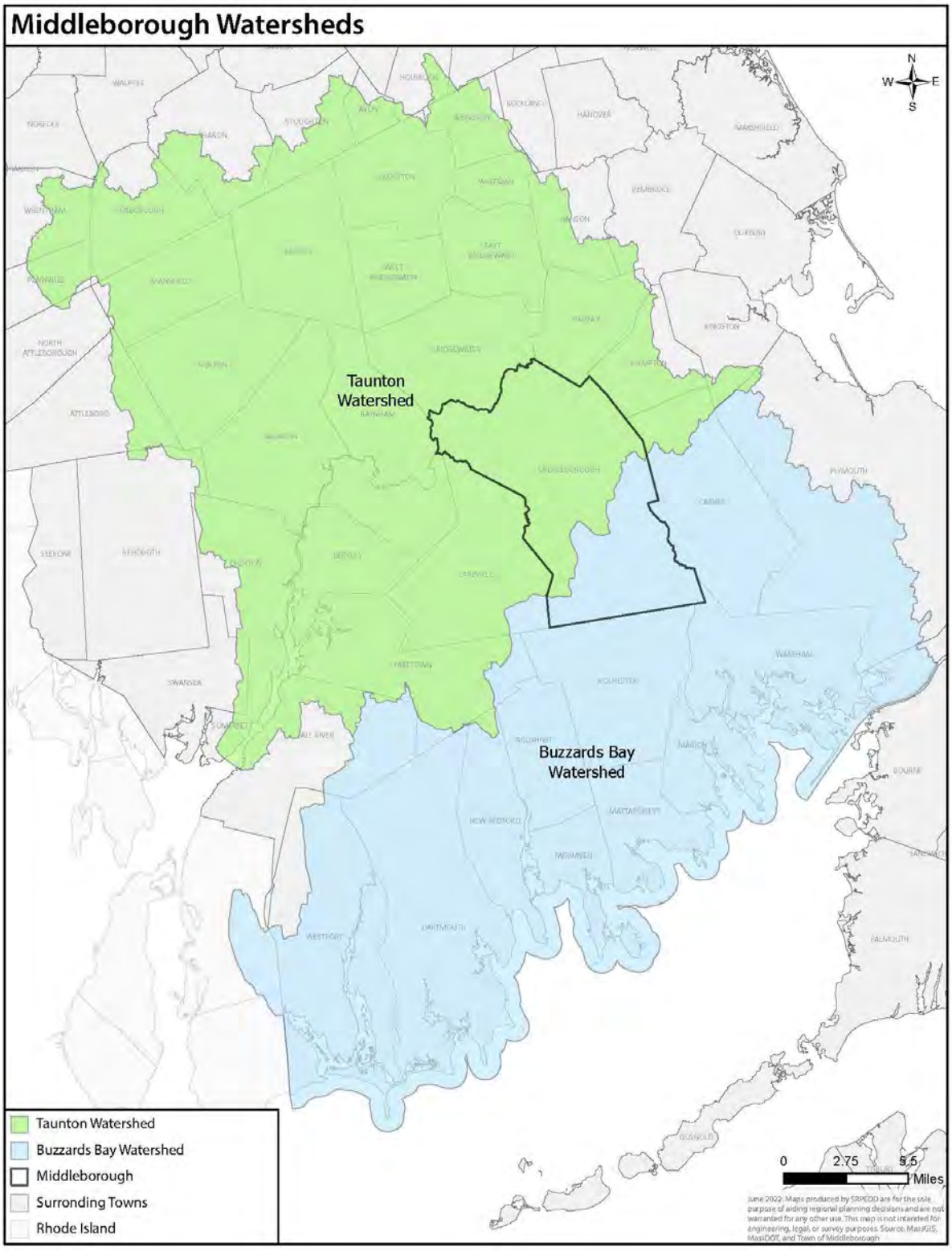
Answer: It's solvable.

Humanity is looking at an extremely different world by the end of this century if our high rate of CO2 emissions continues unabated. However, there is some possibility for humans to change this harsh trajectory. Future emissions upon which various climate change scenarios are based have not yet occurred and are not set in stone. Climate scientists use a range of greenhouse gas emissions scenarios - called Representative Concentration Pathways (or RCP's) - as a basis to predict how temperature and precipitation might change in the future based on different levels of CO2 emissions. Under lower emissions scenarios called RCP 2.6 and RCP 4.5, humans would decrease our overall emissions to limit global temperature increases between 2 – 6 degrees Fahrenheit. This shift to meeting lower emissions scenarios, however, will take material changes to the way that we live, plan our communities, and consume goods and services.

<u>Watershed-Level Climate Change Modeling</u>

Massachusetts climate scientists have projected the impacts of various RCPs at the watershed level (the most localized level of analysis possible under current models). Middleborough is part of two watersheds, Buzzards Bay Watershed and Taunton River Basin Watershed.

Figure 4: Middleborough Watersheds



Buzzards Bay Watershed

In the Buzzards Bay watershed, by 2050, there is expected to be a 3.7-degree Fahrenheit increase in temperatures under a medium CO2 emissions scenario, and a 5.1-degree Fahrenheit increase in temperatures under a high emissions scenario. By 2090, there may be a 4.9- and 8.8-degree Fahrenheit increase in temperature respectively. The implications of a five-degree change are much different than a nine-degree change.

Precipitation patterns in the Buzzards Bay watershed are also expected to change drastically. Under a high CO2 emissions scenario (RCP 8.5), by 2050 the watershed will see an increase of 2.2 inches of annual precipitation, and by 2090, an increase of 3.9 inches of rainfall (Fig 2). This will occur most likely in the form of major precipitation events, as there will be an overall increase in an additional 1.9 days with extreme precipitation events by 2050 under a high emissions scenario. There will also be an increase in the total number of consecutive dry days – by 2050 there will be a 0.7 and 1.5 day increase under a medium and high emissions scenario respectively. By 2090, those dry days are expected to shift to 0.5 and 2.1 days under a respective medium and high emission scenario.

Figure 5: Climate Change Impacts in the Buzzards Bay Watershed (Resilient MA – resilientma.mass.gov)

Changes in Annual Precipitation (inches) – baseline 47.76”		
	2050	2090
Medium Emissions Scenario	+2.7”	+3.2”
High Emissions Scenario	+2.2”	+3.9”
Predicted changes in extreme precipitation events >1” (days) - baseline 8.03 days		
	2050	2090
Medium Emissions Scenario	+1.2 days	+2.0 days
High Emissions Scenario	+1.9 days	+3.0 days
Predicted change in average annual temperature (°F) - baseline 50.67 °F		
	2050	2090
Medium Emissions Scenario	+3.7°*F*	+4.9°*F*
High Emissions Scenario	+5.1°*F*	+8.8 °*F*
Predicted changes in summer days above 90°F (days) - baseline 4.42 days		
	2050	2090
Medium Emissions Scenario	+8.8 days	+12.5 days
High Emissions Scenario	+13.6 days	+37.2 days

Taunton River Basin Watershed

In the Taunton River Basin watershed, by 2050, there is expected to be a 3.8-degree Fahrenheit increase in temperatures under a medium CO2 emissions scenario, and a 5.2-degree Fahrenheit increase in temperatures under a high emissions scenario. By 2090, there may be a 4.9- and 9.0-degree Fahrenheit increase in temperature respectively. The implications of a five-degree change are much different than a nine-degree change.

Precipitation patterns in the Taunton River Basin watershed are also expected to change drastically. Under a high CO2 emissions scenario (RCP 8.5), by 2050 the watershed will see an increase of 2.6 inches of annual precipitation, and by 2090, an increase of 4.2 inches of rainfall (Fig 2). This will occur most likely in the form of major precipitation events, as there will be an overall increase in an additional 2.0 days with

extreme precipitation events by 2050 under a high emissions scenario. There will also be an increase in the total number of consecutive dry days – by 2050 there will be a 0.7 and 1.3 day increase under a medium and high emissions scenario respectively. By 2090, those dry days are expected to shift to 0.5 and 1.8 days under a respective medium and high emission scenario.

Figure 6: Climate Change Impacts in the Taunton River Basin (Resilient MA – resilientma.mass.gov)

Changes in Annual Precipitation (inches) – baseline 47.48"		
	2050	2090
Medium Emissions Scenario	+3.2"	+3.8"
High Emissions Scenario	+2.6"	+4.2"
Predicted changes in extreme precipitation events >1" (days) - baseline 8.23 days		
	2050	2090
Medium Emissions Scenario	+1.5 days	+1.9 days
High Emissions Scenario	+2.0 days	+2.8 days
Predicted change in average annual temperature (°F) - baseline 49.85 °F		
	2050	2090
Medium Emissions Scenario	+3.8°*F*	+4.9°*F*
High Emissions Scenario	+5.2°*F*	+9.0°*F*
Predicted changes in summer days above 90°F (days) - baseline 7.43 days		
	2050	2090
Medium Emissions Scenario	+13.7 days	+18.1 days
High Emissions Scenario	+20.0 days	+43.6 days

In contrast to our likely turbulent climate future, our modern human civilization has developed during a time of relative stability in Earth's geological history. This stability has enabled us to design buildings, communities, infrastructure – all of the cornerstones of modern life – with confidence that in planning these structures, we knew what to expect. The ability to draw on prior conditions to inform our predictions for what we can expect the future to hold is referred to as 'stationarity.' For example, engineers could design a road to withstand a weather event called a "hundred-year storm," which represented the intense weather conditions that would be expected to occur just once in a one-hundred-year period.

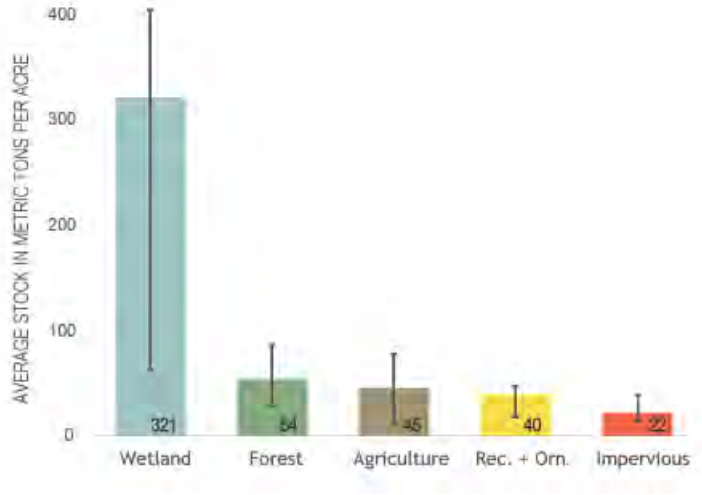
Stationarity allowed us to prepare for the future with the knowledge of prior conditions. However, climate change is shifting what is typical of our region's temperature and precipitation past the boundaries of predictability. The presently occurring climate shifts and anticipated new conditions toward which we are moving with additional GHG emissions will continue to move the needle; they represent a paradigm shift into 'non-stationarity;' a condition in which we can no longer rely on historical records to precisely predict future outcomes, and in which we are planning and shaping our communities within a moving target of what will happen in the future. For example, what previously used to be the 100-year storm event may become a much more likely and frequent occurrence; it may become the twenty- or ten-year storm event. This means that everything from emergency response plans, to siting community facilities, to designing roadways to determining flood insurance rates might continually evolve going forward.

The uncertainty associated with non-stationarity means that communities must take the long view, and build some of this uncertainty into their decision-making with strategies that are flexible and nimble, and that can adapt to and mitigate against the effects of climate change. Mitigation refers to reducing the overall amount of greenhouse gas in the atmosphere by limiting new emissions and/or by drawing gases out of the atmosphere. Adaptation refers to implementing changes in our built or natural environment to reduce our societal and individual vulnerability to the negative impacts of climate change. Adaptation strategies can

cut across all sectors of our life, including our behaviors, building techniques, where we live, and the lands we preserve.

Open space planning can assist with both adaptation and mitigation. Mitigation in an open space planning context can refer to preserving trees and other land covers that absorb carbon dioxide. Wetlands are actually even more productive carbon sinks than forests, as shown in a graphic developed for Massachusetts state-level healthy soils planning.

Figure 7: Massachusetts Soil Organic Carbon Density (excluding carbon in biomass)



Examples of open space planning that furthers adaptation include protecting areas like floodplains and aquifers from development so that they are able to absorb rainfall and storm water runoff, thereby minimizing the impact of extreme storm water events on the built environment. Adaptation could also refer to planting more trees so that they cool down neighborhoods and protect them from rising temperatures. We can expand our traditional definition of open space, to also include smaller but key patches of green space that perform critical functions, such as roadside bioswales that collect stormwater runoff. We can expand recreation offerings to activities that provide educational programming on household resilience, and which connect residents with the landscape to further a community stewardship ethic. Protecting our open space now allows us to hedge against an uncertain future and tap into the multitude of benefits of adaptation and mitigation. The OSRP Action Plan in Section 9 notes any actions proposed in the town's Municipal Vulnerability Plan or Hazard Mitigation Plan that overlap with open space preservation goals. These actions would add to the quality of life and resilience of Middleborough.

B. Regional Resources

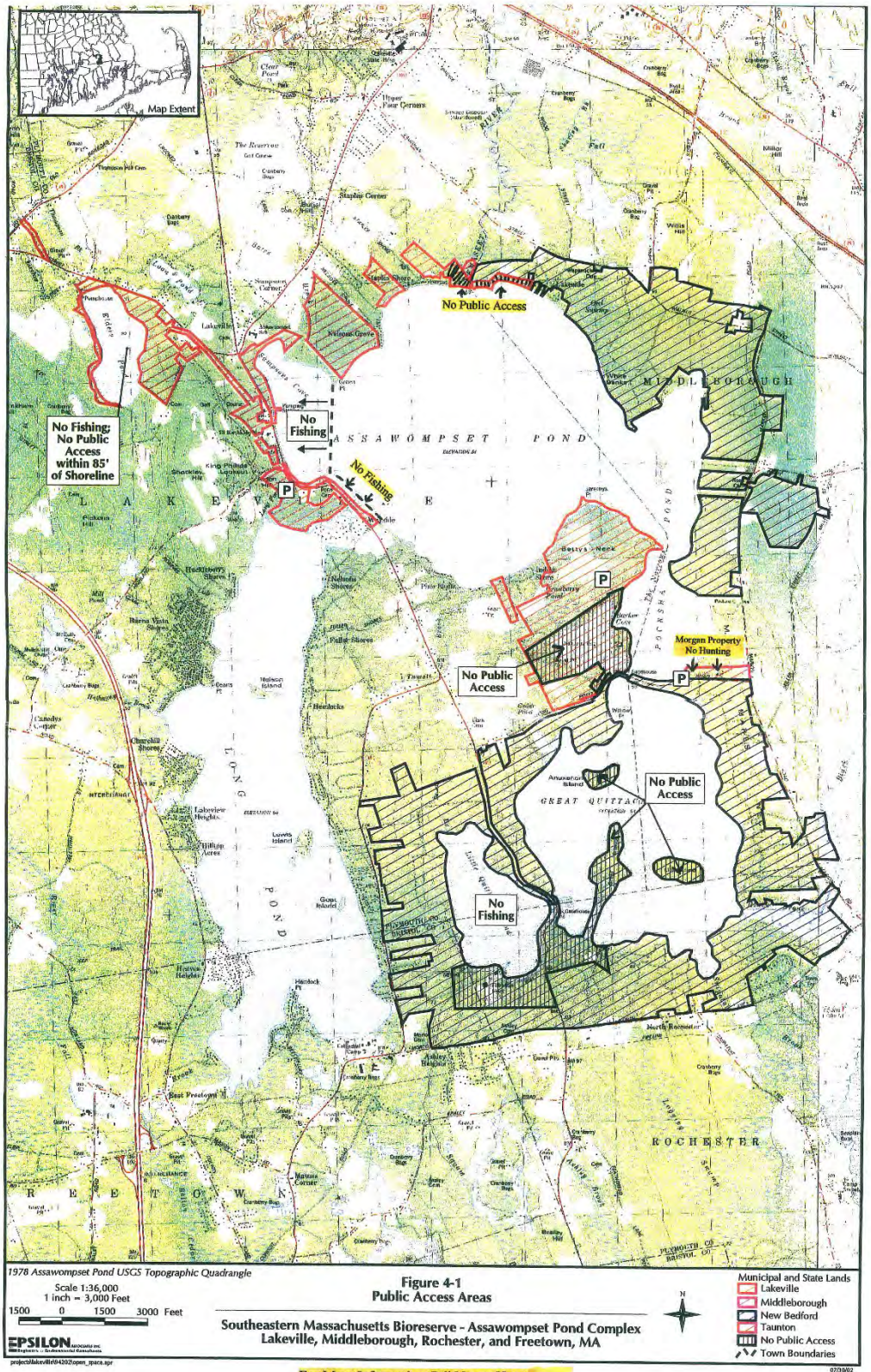
The Assawompset Pond Complex

Sharing stewardship for regionally important natural resources is a challenge to any town in Massachusetts hemmed in by town boundaries, constrained by local budgets and challenged with a variety of diverse, home rule, town governments. Middleborough shares the responsibility of hosting some of the most valuable clean drinking water supplies in southeastern Massachusetts. The Assawompset Pond Complex (APC), which is the public surface water supply to the cities of New Bedford and Taunton, includes Assawompset, Great Quittacas, Little Quittacas, Long and Pocksha Ponds.

Although the ponds are located in Middleborough, Lakeville, Freetown and Rochester, the responsibility of managing this public surface water supply falls legislatively to the cities of New Bedford and Taunton. The City of New Bedford owns most of the land surrounding the pond system (no public access although some passive recreation is allowed). The voters of Middleborough approved the purchase of a Conservation Restriction and Historic Preservation Restriction for the Freitas Property at 87 Vaughan Street during the 2008 May Town Meeting. Several parcels along Black Brook, which is a direct tributary to the APC have been protected under Conservation Restrictions and by the state and non-profits. (A few are the Caparrotta Property, Parks/Cardin Land, Parks Land off Miller Street; MA Department of Fish & Game land off Walnut Street.) However, there are still many unprotected parcels in this area other than the Freitas property and the Morgan property.

The Assawompset Pond Complex is also considered an Important Bird Area through Mass Audubon. This area comprises approximately 10,000 acres, which contains 50% oak-conifer transitional forest, 40% lake/pond, and 5% palustrine wooded swamp.

Figure 8: Assawompset Pond Complex Map



For More Information Call Nancy Yeatts,
APC Environmental Manager at (508)498-4347

The Nemasket River, a Shared Resource

The pond system is not the only shared resource in Middleborough. Flowing northward from Assawompset Pond through Middleborough center to the Taunton River is the Nemasket River, a resource shared with the town of Lakeville as a town bound from the pond, upstream to the rail road tracks. The Nemasket River is part of the Native American canoe passage known as the Wampanoag Canoe Passage, which unites the south shore of Massachusetts Bay to Mount Hope Bay, in Rhode Island. The Nemasket River has long been a Middleborough planning and conservation priority.

Along the Nemasket River there are 327.6 acres of protected land. Most of that land is protected in perpetuity (262.7 acres), parcels such as Oliver Mill Park, Ja-Mar Farm Conservation Area/Nemasket River Village, and Plymouth Street Conservation Area. The remaining 64.8 acres have limited protections and this includes parcels such as Peirce Playground, Middleborough High School, and Henry Burkland School.

Part of the Middleborough APC MVP Planning Process was to remove weed and sediment issues from the Nemasket River. On August 3 and 4 2021, a machine called an Eco Harvester spent two days harvesting aquatic weeds. During that time the Eco Harvester removed 120 cubic yards of invasive plants from the Nemasket River.

The Taunton River, a Regional Resource

The Taunton River is the longest free-flowing coastal river in New England. Its watershed not only includes 43 communities with over 500,000 people, but 31 distinct wildlife habitats and is ranked as globally significant by The Nature Conservancy. For approximately 10 miles, the Taunton River forms the boundary between Middleborough and the neighboring towns of Bridgewater, Halifax and Raynham. The Taunton River and its tributary rivers and streams remain in remarkably wild condition, nurturing 77 species listed as rare in Massachusetts. One of those tributary rivers is the Nemasket River which originates in Middleborough. The watershed includes more unprotected, contiguous natural habitats than any other region in eastern Massachusetts. It has over 93,000 acres of core, sustaining habitat for rare species – about 27% of the watershed's total acreage. Most of the rare habitats are currently unprotected.[1]

The significance of the Taunton River and its 562 square miles of watershed transcend town boundaries. Nine major tributaries make up the Taunton River which contributes the largest amount of freshwater to Narragansett Bay. The main stem of the Taunton River in March 2009 was designated by Congress to be a United States Wild and Scenic River under the National Park Service for its many intact habitats, historic resources and recreation potential. Presently, the upper Taunton River and its tributary rivers and streams are still a remarkable, natural, recreational and cultural resource shared regionally. In Middleborough as well as beyond its borders, there is almost no permanently protected land along the river corridor at present. Efforts to protect the river corridor should be a coordinated effort amongst several Taunton River Watershed municipalities. The Middleborough Planning Department and Conservation Commission participate in the Taunton River Stewardship Program and the Taunton River Watershed Alliance. In addition, The Wildlands Trust of Southeastern Massachusetts and The Nature Conservancy has designated the Taunton River a regional priority area.

The Taunton River's diverse fisheries include the Commonwealth's largest herring run the Nemasket River. This resource however is listed as an "impaired" waterway by the Massachusetts Department of Environmental Protection. Downstream, the Taunton River is shared with the Cities of Taunton and Fall River where it enters Mount Hope Bay.

[1] Taunton River Watershed Alliance: People Working to Save a Great River

Regional Impact of the Transportation Improvements

The most significant regional impact in several decades is the new rail connection between Middleborough and Boston. With the addition of the new Middleborough MBTA Station, it will require the town to zone for 1,400 new housing units and towns surrounding Middleborough are also required to put in units. Recently, the Middleborough rotary had a new design configuration to help with traffic flow. The 1998-2003 Open Space and Recreation Plan anticipated a demand for growth as never seen before and that is still the case with this updated Open Space and Recreation Plan. Relatively low land prices and large tracts of undeveloped land underscore the vulnerability of fragile natural resources. In 2005, the population in Middleborough totaled 21,198. The U.S. Census Bureau determined that the population was 23,116 in 2010 and 24,245 in 2020. In 1999, under the direction of the Executive Office of Environmental Affairs (now the Executive Office of Environmental and Energy Affairs) SRPEDD prepared a build out analysis for Middleborough to provide an estimate of what might result if all of the remaining land in the town were developed under the zoning regulations that existed then. The build out analysis identified the potential for approximately 31.4 million square feet of new commercial and industrial space as well as 10,600 new residences. Based on this analysis, the need for open space and recreation land use preservation and protection is urgent.

C. History of the Community

The Town of Middleborough is a 72.3 square mile historic industrial and agricultural town located on the Nemasket River. Middleborough was originally the Native American village of Nemasket and was a major native settlement area with additional native settlements at Assawompset Pond and at Titicut. These areas were used for seasonal fishing, hunting and berry gathering. The town is one of a handful of Southeastern Massachusetts communities that retained a sizable Native American population throughout the colonial period.

Middleborough was first settled by colonists, from the Plymouth Colony, who, needing more land pushed westward. No authentic date for the first settlement can be established, but it is generally agreed that white settlers first occupied the area in 1654, with one of the first groups being led by Elizabeth Poole. Gradually the settlers purchased large tracts of land from Native Americans. The Plymouth Court approved the prices for properties. The first transaction was known as the "Twenty-six Men's Purchase", March 7, 1661. This purchase included the western portion of the town of Halifax (which separated from the town in 1734). Subsequent purchases added land around Assawompset Pond, Nemasket, Titicut and the whole of Lakeville (which separated in 1853).

By an act of the Colonial Legislature on June 1, 1663, the inhabitants at Nemasket belonged to the town of Plymouth, and continued under that jurisdiction until June 1, 1669, when that portion of Plymouth was incorporated under the name of (Middlebury) Middleberry, which signified that it was the middle borough half way between the Plymouth and Taunton settlements. Middleberry soon became Middleborough. (Historic names have had multiple spellings.)

Although brief, the King Philip's War had a devastating effect on the Native American population in Middleborough, from which they never recovered. This war was a result of a clash of two cultures, Native American and European settlers, competing for the same resources. Following 1675, Native Americans were confined to the Reservation at Titicut and Muttock. Native populations dwindled and reservation lands were sold.

Agriculture (subsistence farming), lumbering and water-powered industries were the main occupations of early Euro-settlers. There was a good deal of bog iron found in Middleborough that stimulated the iron and mill industries in the region. A large self-contained complex, started by local men, was purchased and

developed by Judge Peter Oliver, including a blast furnace, a forge, slitting mill, blacksmith, finishing and hammer shops, grist mill and fuel storage, all of which, along with a country estate, was confiscated by the newly formed State of Massachusetts when Oliver returned to England with other Loyalists at the start of the American Revolution.

Although the iron industry dominated the Federal period, Middleborough also produced many other wares. By 1837 there were two forges, two cotton mills, three shovel makers, an air cupola furnace and factories for the manufacture of nails, shoes, boxes, casks, and straw bonnets. Immigrant populations of Swedes, Italians, Canadians and Armenians followed as industrial jobs became available.

The early 19th century saw the beginning of the development of Four Corners as the main commercial and industrial center of the town. The Peirce Store, built in 1819 on the Main Street, was the first substantial commercial activity in the Town. The beginnings of the fashionable residential area along Main Street also occurred during this time.

The introduction of the railroad in 1846 resulted in a gradual movement of industry westward along Center Street with a second industrial node gradually developing at John Glass Square. The location of textile mills at the Lower and Upper Works in the nineteenth century prevented the decline of the riverfront industrial node and contributed to the commercial development of the downtown area. The New Town Hall was built in the Four Corners area in 1873.

After the Civil War, the town became a rail center, attracting industrial development, lumbering, box mills, straw-hat factories, varnish works, shoe factories, and brickyards. Much later, the well-known Maxim Motor Company, which in 1914 was located on Wareham St., produced fire trucks until 1990.

Through the 1960s Middleborough was a vibrant agricultural/manufacturing center. At one time there were as many as 30 dairies operating in town as well as orchards and vegetable farms. In 1966, Ocean Spray Cranberries Inc. developed a cranberry processing plant in Middleborough. The corporate headquarters for Ocean Spray is located straddling the Middleborough/Lakeville line today.

Several shoe factories, printers, photographic print makers, grain mills and small industries flourished through the 1960's. The domestic shoe industry was lost to overseas labor markets. Today Middleborough is home to emerging high-tech industries in the Development Opportunities District in North Middleborough.

Archeological Resources:

Middleborough's archeological resources are extensive and include some of the most significantly known prehistoric sites in Massachusetts and the northeastern United States.

Archeological investigations by the Massachusetts Archeological Society and others over the past 60 years have discovered and recorded hundreds of sites where Native American artifacts have been found in Middleborough. Three major Native American village sites known as **"**Namasket**"** (Nemasket), **"**Titicut**"** and "Wapanucket**"** have been scientifically identified and recorded.

Wapanucket is located on the north shore of Assawompset Pond and is listed on the National Register of Historic Places. Two very rare Paleo-Indian sites (about 9,000 years old) and an archaic village component including post mold patterns of dwelling houses and ceremonial lodges were found here. Thousands of artifacts were also found; many of which are on display at the Robbins Museum of Archeology on Jackson Street.

Titicut is located on the Taunton River in North Middleborough. It is the largest known Native American settlement in the town, extending three miles on both sides of the Taunton River (Middleborough and Bridgewater). Excavations at Fort Hill uncovered the post molds (circa 1640) of a Native American fort. Many investigations conducted in this area have revealed Native American burial sites. This area was continually occupied by Native Americans and designated as an "Indian Reservation" until about 1750.

Namasket (Nemasket) meaning "Place of Fish" was originally a broader term referring to all of Middleborough and Lakeville. Later the term was narrowed to indicate downtown Middleborough from the Oliver Mill area to Pratt Farm, including the Wading Place and the central Nemasket River Valley. There have been limited archeological investigations in this area. The Thomas S. Peirce Playground is the known location of a 1670 English fortification used by settlers for six weeks during the King Philip's War in 1675. Also, in the Muttock area is a village dating back 8,000 years was discovered through an archaeological investigation.

***Historic Resources*:**

The Middleborough Historic Commission adopted a preservation strategy in 1985 that recommended establishing historic districts at Titicut Green, Eddyville/Waterville, Middleborough Town Center, Rock Village and the Green. The Commission also maintains an extensive inventory of historic sites and buildings. The Massachusetts Archeological Society maintains an inventory of prehistoric sites at the Robbins Museum in Middleborough. Both of those sources can provide detailed descriptions of historical structures and places.

Some of the sites that are of significant concern in open space planning include:

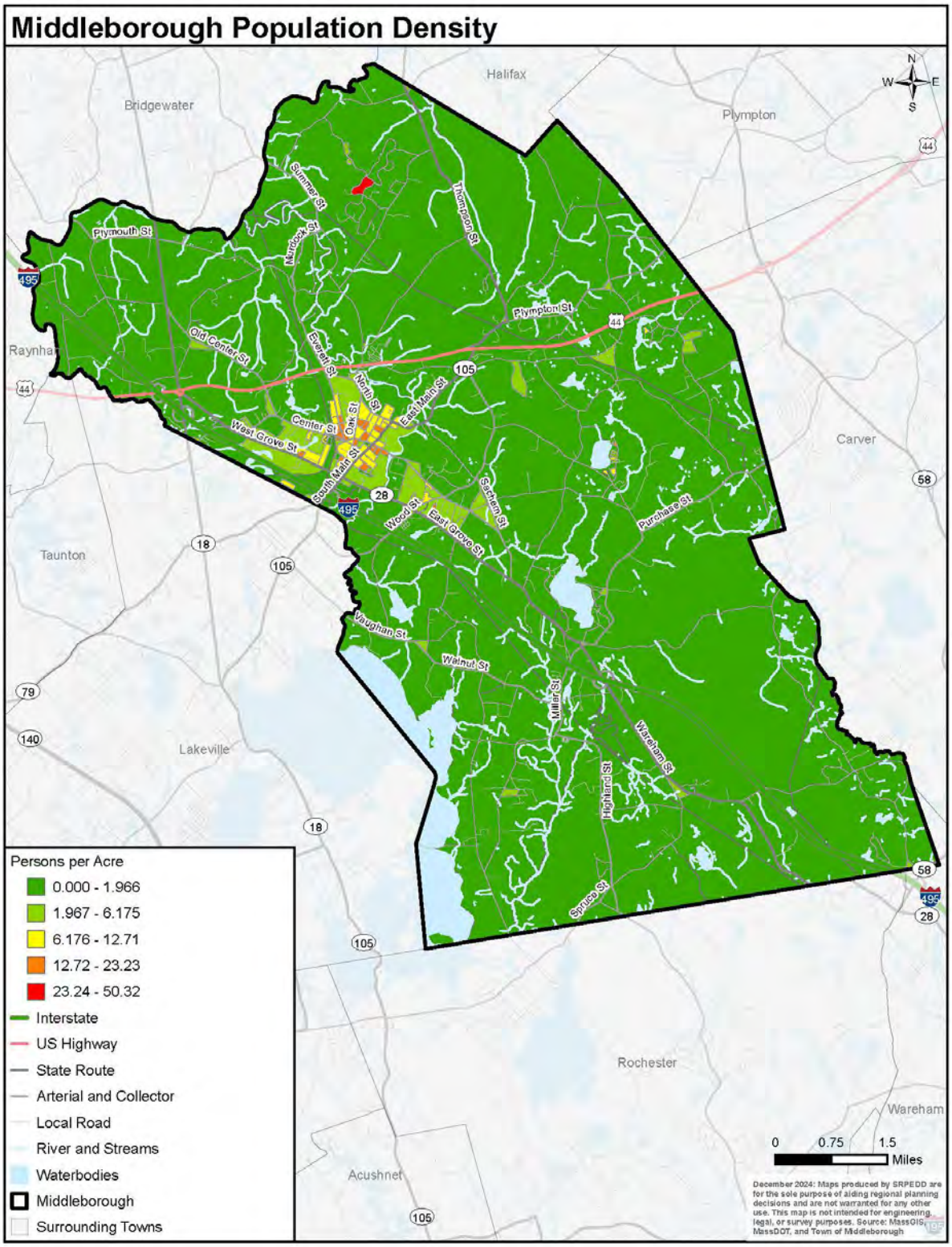
- Fort Hill, Sentinel Rock and Native American fishing weirs.
- Titicut Green including Pratt Free School, Pratt House, Gurney House, Congregational Church, Isaac Backus House.
- Oliver Mill, Peter Oliver House, General Abiel Washburn House.
- Murdock St. Mill foundation in the Nemasket River.
- Eddyville; village in East Middleborough including the Eddy Homestead.
- Smallpox cemeteries.
- Pratt Farm including, Upper and Lower Native American Paths.
- The Wading Place on the Nemasket River.
- "Hand Rock" on Barden Hill.
- Daniel's Island on the northerly shore of Tispaquin Pond.
- Wapanucket Native American settlement (Twelve Mens Purchase).
- Charles Stratton and Lavinia Warren, "Tom Thumb" House.
- Site of colonial fort 1670, (Peirce Playground).
- The Great Rock, off Rock St., legendary Native American ceremonial site.
- The Fall Brook Furnace off East Grove Street
- Ja Mar Turkey Farm/Nemasket River Village Site off Plymouth Street in the Muttock National Historic District

D. Population Characteristics

The population of the Town of Middleborough grew 11% from 1990 to 2000, according to SRPEDD (Southeastern Regional Planning and Economic Development District) and the Town Clerk's figures. Between 2000 and 2010 Middleborough grew by 15.92% the largest increase in population of any other town in Plymouth County. The 2010 Census states the Middleborough's population is now 23,116 people. In 2020, Middleborough's population grew by 4.9% for a total population of 24,245. The majority of

Middleborough's population is located between West Grove St and North St, with a small pocket of higher density within the Oak Point retirement community (see Figure 9. Population Density 2020 in Middleborough)

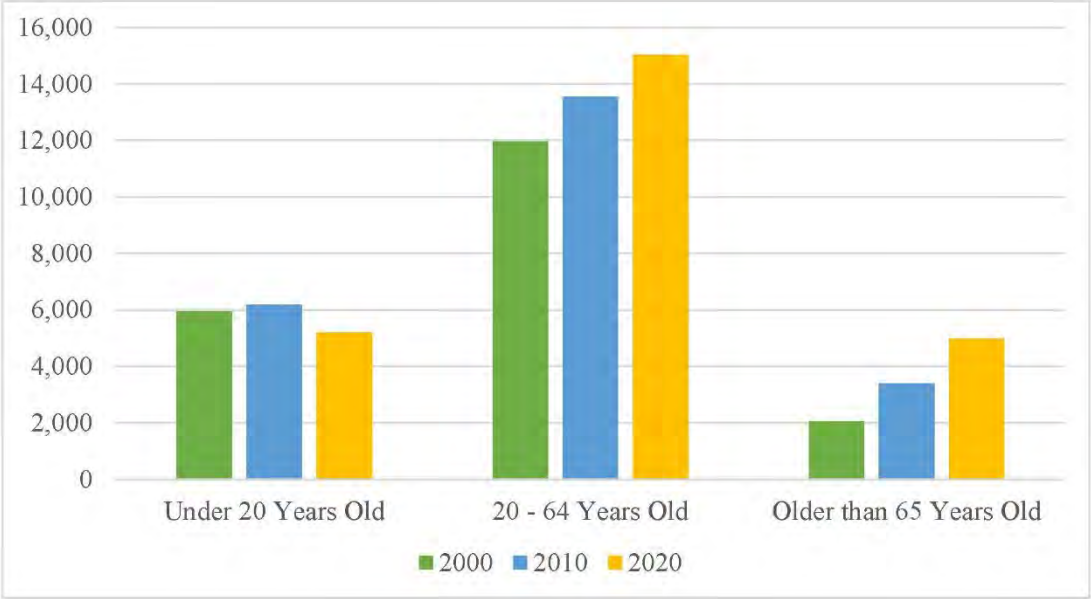
Figure 9. Population Density 2020 in Middleborough



Evaluation of census information and SRPEDD predictions displayed in the figure below reveals the population of Middleborough is aging. The data in the next couple paragraphs comes from the U.S. Census American Community Survey (2016-2020) because the Census 2020 data was unavailable at the time. The percentage of youth, defined as age group 0-19, has decreased over five percent from 1980-2000 and has decreased an additional twelve percent from 2000-2020. In the previous plan, SRPEDD predicted this trend would continue with a decrease of over nine percent by the year 2020. The population aged 55 and over made-up eighteen percent of the population in the year 2000, with eight percent aged 60-75. The population aged 55 and over has doubled to thirty-six percent of the population in the year 2020, with twenty percent aged 60-75. Figure 10 displays the age distribution for 2000, 2010, and ACS 2016-2020.

The median age in the last Open Space and Recreation Plan was 35.6 years, and it has increased to 44.3 years old. The age breakdown was more than sixty five percent of the population in the 20-64 age groups, now the 20-64 age groups make up sixty percent of the population, a five percent decrease. The development of the Oak Point senior mobile home development is substantially changing the demographics of the town, which must be considered when planning for services in the future. This information is most useful when anticipating future housing and outdoor recreational needs.

Figure 10: Age Distribution Chart



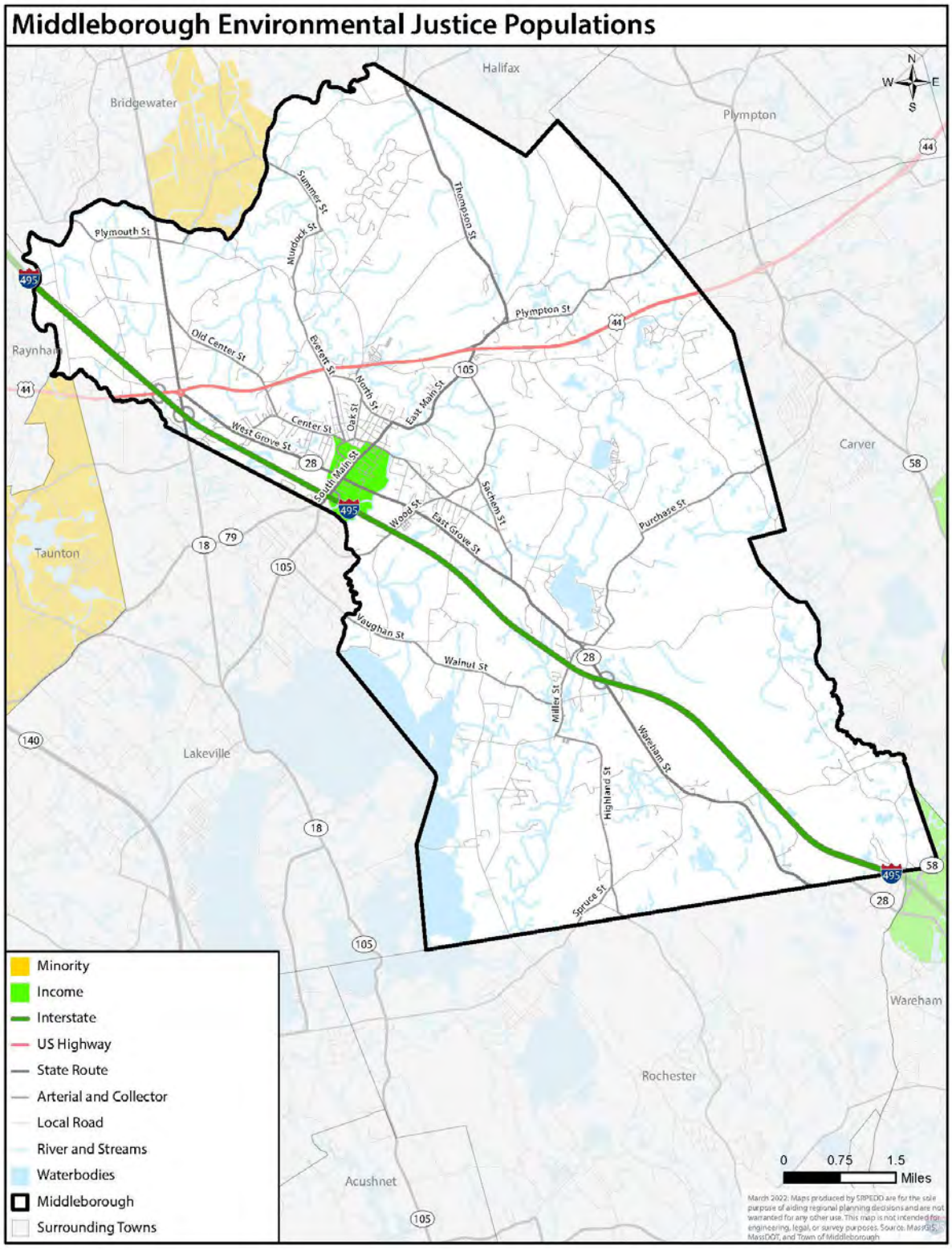
Context and Demographics of Environmental Justice Population(s)

Environmental Justice (EJ) populations are determined by identifying all Census 2020 Block Groups that meet any of the following criteria: Income: 25% or more of the households earn 65% or less than the MA median income; Minority population: 25% or more of residents identify as a race other than white, and; English speaking isolation:25% of the households have no one over the age of 14 who speaks English only or very well.

The combined 2020 data for Middleborough revealed the same EJ population cluster in town as the previous 2010 data showed. This area shows an income level based EJ population north of the downtown in the John Glass Square neighborhood. The area is bordered to the north by Route 44, running east and west and is bordered on the west by Route 18, running north and south. The population in this area is of mixed age.

Because the EJ area is located in or immediately adjacent to the downtown on major transportation routes, the affected populations are in very close proximity to major cultural, recreational, and social facilities. The downtown area is also served by public transportation, the Greater Attleboro-Taunton Regional Authority (GATRA), with fixed route service to outlying areas, including shopping centers and commercial and service areas. GATRA also provides Dial-a-Ride, curb to curb service for senior citizens and transportation for individuals with disabilities.

Figure 11: 2020 Environmental Justice Population in Middleborough



Population Growth Predictions

The population in Middleborough has steadily increased over the past thirty years, with a total increase of 47% between 1970 and 2000. This District predicted a population of 22,395 by the year 2010 (23,116 2010 actual population), 24,856 by the year 2020 (24,245 actual 2020 population), and 27,314 by the year 2030 (a 21% increase), over twenty years.[2]

According to a build-out study conducted in 1999 by the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) and described briefly in the next section of this plan, if all the remaining land in town was developed under existing zoning regulations, the population of Middleborough could reach 50,220 persons at build-out.

Economic Characteristics

According to the SRPEDD Quickstats and the U.S. Census Bureau, the median family income as of the ACS 2016-2020 is $91,378 up from $87,455 recorded in September 2016. This compares with $106,526 median family income for the Commonwealth of Massachusetts during the same time period.

The percent of the population living below the poverty level in 2020 was 8.5, just lower than the state average of 9.8. According to the Massachusetts Executive Office of Labor and Workforce Development the labor force in Middleborough as of March 2022 was 13,179 with a 4.6% unemployment rate. Before the COVID-19 pandemic in 2020, Middleborough had an average yearly unemployment rate of 3.1% (2019). During 2020, Middleborough's unemployment rate went up to 10.4% and in 2021 the unemployment rate dropped almost half to 5.9%. Middleborough is aiming towards bringing more industry to the town to create more middle-income jobs even in the current economic downturn that exists in the State and Country right now.

The industry and business in the town includes four private commercial parks, which are the following: Middleborough Park @ 495, Campanelli Business Park, Abbey Lane off of Route 28, and Cowan Drive South Middleborough Business Park. The Town is also home to the headquarters for Ocean Spray Cranberry, the Christmas Tree Shops, AMTEK Brookfield and many more. Middleborough has recently created a business guide titled We Mean Business.

Middleborough has seen economic growth over the past few years. Marijuana cultivation and distribution has been growing in the Commonwealth and in Middleborough. Middleborough has licensed five facilities in the town. An Amazon Distribution center was also opened in 2020. There are more warehouse facilities and contractor bay buildings being proposed for the town.

Race and Ethnicity

According to the 2020 census, Whites made up over 89.1% of the population; there were 1,110 people identifying as two or more races; 597 people identifying as Hispanic or Latino race and 220 identifying as other races. Ancestry was reported to be predominantly Irish, English and Italian.

Special Populations

According to the 2002 Middleborough Master Plan, within the working age population (age 16-64) 309 persons identified themselves as mobility limited. 1,088 persons had some work disability and 436 were prevented from working because of a disability. Amongst persons over 65 years, 231 identified themselves

[2] U.S. Census Information.

as having a self-care disability. These are all non-institutionalized persons with disabilities.[3] According to the 2016-2020 United States Census American Community Survey within the working age population (age 18-64[4]) 661 persons identified themselves as having an ambulatory disability. 331 of these people do not work. Amongst persons over 65 years, 165 identified themselves as having a self-care disability.

Working in collaboration with the Greater Attleboro Transit Regional Authority (GATRA), the Middleborough Council on Aging provides transportation services for elderly and handicapped residents. The Council also provides a wide range of recreational activities and education programs for special populations. The Leonard E. Simmons Center, off Plymouth Street, serves as a multi-service center for the elderly with beautiful grounds, outdoor walkways, sitting areas and gardens. Dancing, painting and ceramics classes are also offered.

E. Growth and Development Patterns

Middleborough is the second largest town in Massachusetts by area; however as mentioned earlier it remains one of the least densely populated in southeastern portion of the state. In the local region, i.e. the towns surrounding of Bridgewater, Carver, Halifax, Lakeville, Plympton, Raynham, Rochester, Taunton, and Wareham, including Middleborough, the population grew from slightly more than 149,253 residents in 1990 to more than 190,295 residents in 2020, an increase of 41,042 or an annual change of 3% per year. Middleborough is an agricultural, residential and industrial community settled in five distinct village areas separated by wetlands and rivers. About a third of the area is made up of wetland or surface water.

North Middleborough

The community of North Middleborough is located north of Route 44 and west of the Nemasket River. Within this area are the wetlands of Purchade, Poquoy and Puddingshear Brooks as well as the bordering wetlands of the Taunton and Nemasket Rivers. The North Middleborough Green, known as the Titicut Parish Green is surrounded by important historic houses, schools, a church and historic cemetery. Large areas of undeveloped backland as well as miles of Taunton River frontage rank it as Middleborough's most picturesque area. This region of town is also the location of three comprehensively planned business/industrial parks within Town's Development Opportunities Overlay District (See zoning.) are strategically placed so as to leave historic areas unaffected.

Warrentown – Eddyville – White Oak Island Area

This area is north of Route 44 and east of the Nemasket River. Great Cedar, Little Cedar, Beaverdam and Meetinghouse swamps are all located within this region. Several dairy farms dominated the land use in this area, however, only one remains active today. There are still large open tracts of farmland and relic farm fields as well as vegetable and hay producing farms. The historic Soule Farm was purchased by the town and is operated as an education/farm center. Three other historic sites in this area are the Eddy Homestead in Eddyville, Tom Thumb's Homestead in Warrentown, and the old small pox cemetery at the corner of Soule and Brook Streets. Oak Point, a 55 and over community is also established in the area.

Middleborough Center, historically known as Four Corners

Significantly the Four Corners still maintains the majority of its historic commercial and housing stock. Where losses have occurred, replacement buildings have maintained the traditional look of a typical New England town. Central are the Town's well-maintained church and it's recently restored Town Hall. The Nemasket River flows through this section of town that also includes the Thomas S. Peirce Playground and recreational complex, the High School, the Early Childhood Center formerly the Memorial Junior High

[3] Middleborough Master Plan: Report on Findings and Alternatives (2002)
[4] Note the age change in working age population.

School, Mary K. Goode School Formerly Mayflower and Henry B. Burkland School, the Pratt Farm Conservation Area, Oliver Mill Park, Thomas Memorial Park and many historic sites.

Waterville - Thomastown - Weweantic Area
Along the mid-east border, east of Tispaquin and Short Streets, is the center of the cranberry industry in Middleborough. It also contains Woods Pond, Tispaquin Pond, and the wetlands bordering the Weweantic River. Extensive and well-maintained areas of cranberry bogs, many in the same families for generations maintain this timeless part of Middleborough's past.

Rock Village - South Middleborough - Wapanucket Area
South of Route 495 are the villages of Rock Village and South Middleborough, each with their own distinct historic centers and identity. West of Rock Village is the area known as Wapanucket featuring the expansive Assawompset Pond complex, with its acres of protected woods surrounding these huge ponds. Today this City of New Bedford Water Department property, along with miles of country roads containing small farms, new residential neighborhoods and large tracts of open land, dominate the area. The acquisition and protection of a large portion of the Black Brook took place between 2005 and 2007. More recently, land off Spruce Street has been protected under the Massachusetts Department of Fish & Game.

Infrastructure/Transportation Systems - The transportation network linking Middleborough to Boston, Providence and Cape Cod is extensive, modern and convenient. Interstate 495, also known as the (Boston-Worcester) metropolitan outer loop, runs the length of Middleborough, northwest to southeast, with Middleborough enjoying four interchanges within its boundaries. It is a principal route to routes 24 and the Southeast Expressway, and to the Massachusetts Turnpike, major state arteries. Route 44 running east west through the north of Middleborough connects Route 3 in Plymouth and Route 495 in Middleborough.

Non-vehicular transportation is currently being addressed in Middleborough with the completion of a Complete Streets Policy and Prioritization Plan. In March 2021, the town was awarded just under $230,000 from the MassDOT Shared Winter Streets and Spaces Program to construct a new concrete sidewalk with granite curbing on the south side of the roadway of East Main Street to extend the sidewalk to Pratt Farm. In January 2022, Middleborough was awarded $400,000 from the MassDOT Complete Streets Program to improve safety and access on North Main Street from Reland Street to North Street. This will provide a sidewalk on the south side of the road as well as adding new curb ramps, high visibility crosswalks, a Rectangular Rapid Flashing Beacon (RRFB), and installing bicycle lanes on the roadway. This project should be completed by the end of 2023. Our urban downtown is very walkable to many. There is even a sidewalk that connects the MBTA Train Station in neighboring Lakeville to Middleborough's downtown. The new Middleborough MBTA Station will be completed in 2023.

Middleborough operates its own municipal gas and electric department providing electricity and gas to residents at rates well below the commercial utility rates in the region.

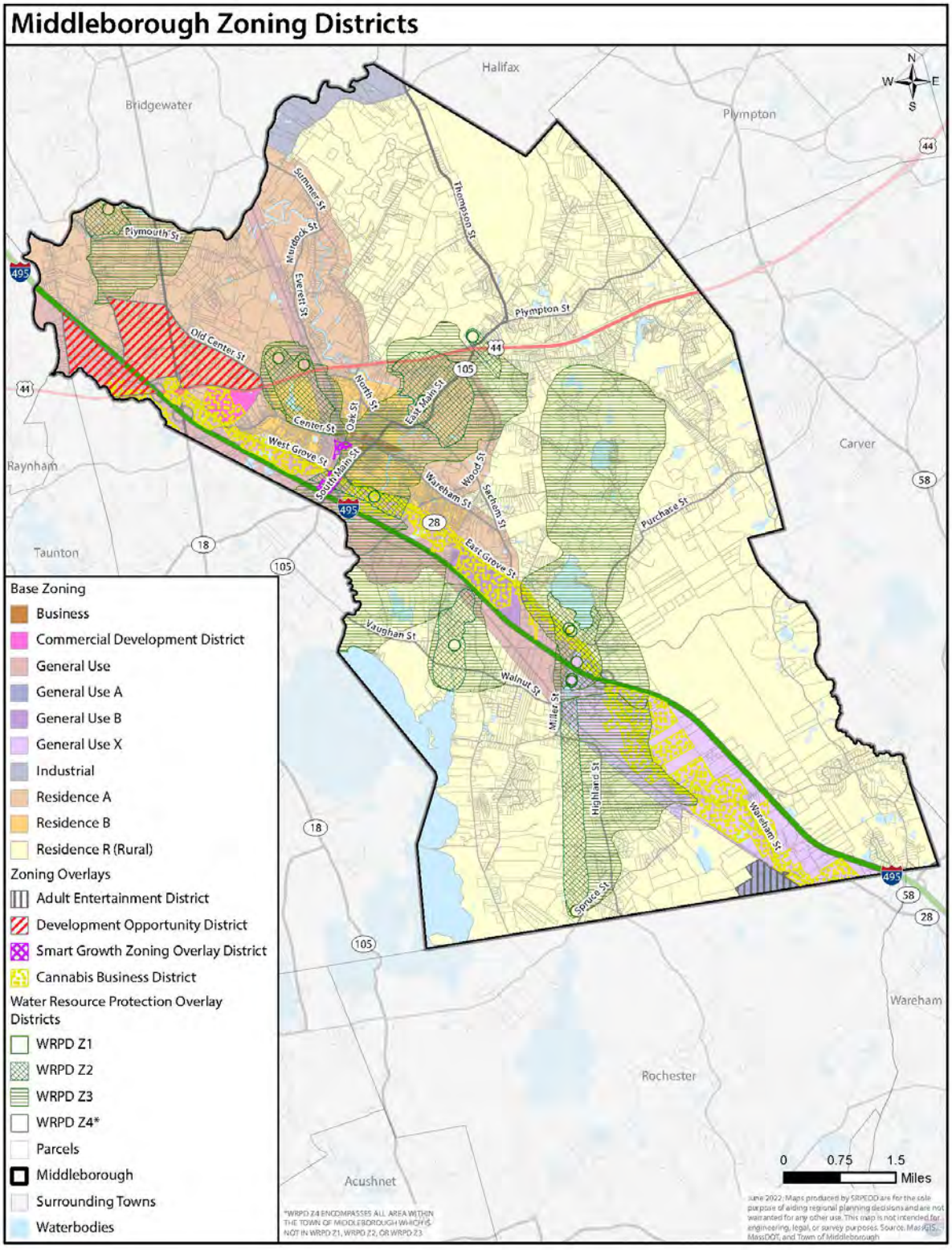
Middleborough's water system is 130 miles of water main, 2 water storage tanks, and 13 ground water sources. These groundwater sources produce an average of 1.68 million gallons per day. Most of the town is on private on-site septic systems and wells, however, the center of town and some spurs off the center enjoying the convenience of town water and sewer.

Long-term development patterns – zoning

Middleborough has eight distinctive zoning district designations: Residence A (RA), Residence B (RB), Residence Rural (RR), Business (B), Industrial (I), General Use (GU), General Use B (GUB), General Use A (GUA) and General Use (GU-X). In addition, it also has five overlay district designations, superimposed over the zoning districts. Those overlay districts are Development Opportunities District, Open Space and

Resource Preservation Development District, Flood Plain District, Water Resources Protection District, Cannabis and Adult Entertainment District. The purpose of this multi-layered zoning system is to protect valuable fragile natural resources while encouraging economic growth and development in appropriate places. In 1996, Middleborough amended its Zoning By-laws to include The Open Space and Resource Preservation Development District which allows for an alternative to conventional subdivision within RA, RR, GU and GX Districts and the Development Opportunities District which covers portions of the RA and GU districts and provides for larger scale commercial and industrial development opportunities. In Fall 2021, the Town of Middleborough passed a zoning amendment for a Smart Growth Zoning Overlay District. The use regulations are detailed in the Zoning By-laws, available at the Town Hall.

Figure 12: Zoning Map



Existing Land Use

The Town of Middleborough has a total area of approximately 46,205 acres. The land use map on the next page shows the land use by parcel for the FY22. A table below shows the breakdown of each land use category based on their type. Residences less than or equal to three units make up the highest land area in town with vacant land and institutional land closely following.

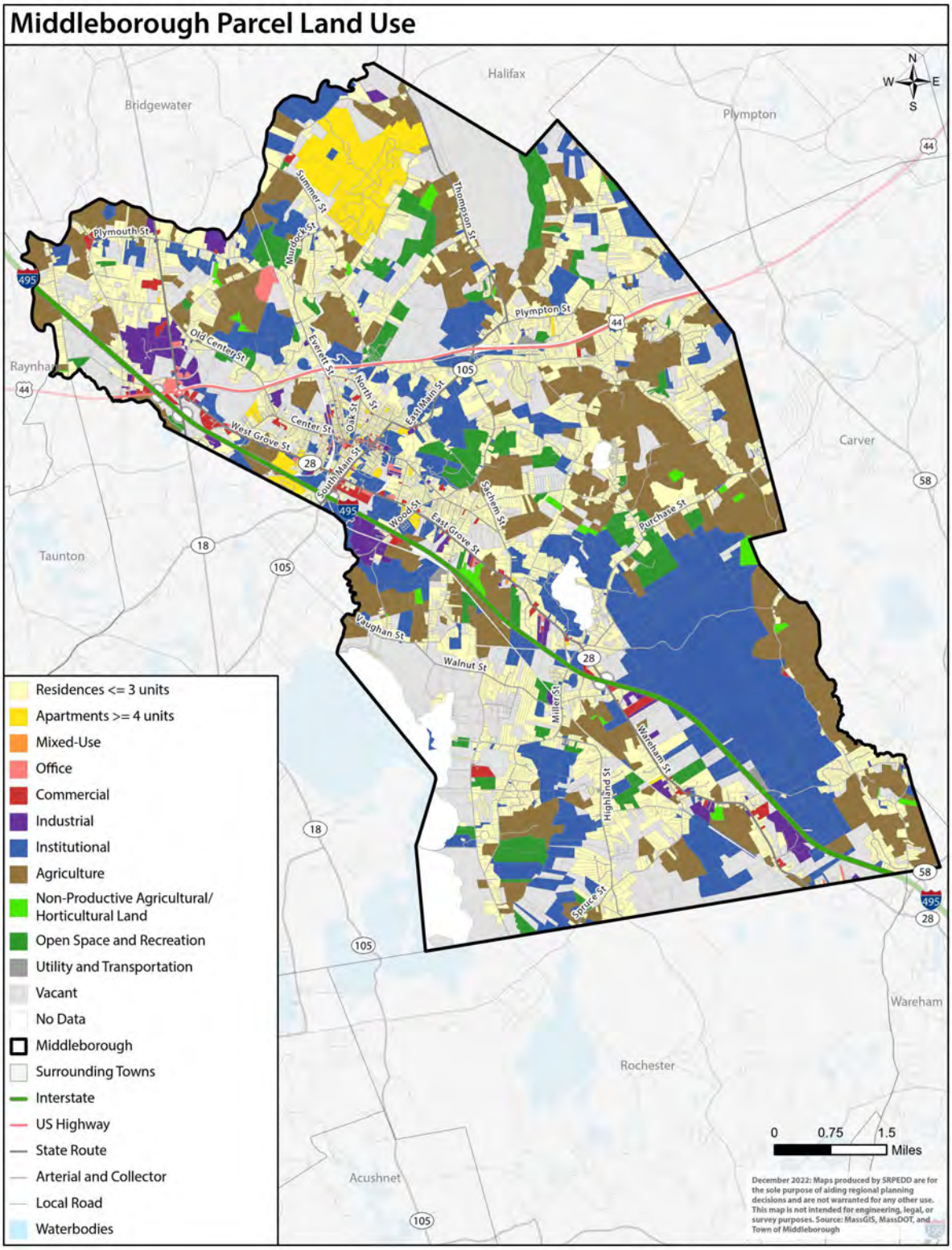
Institutional lands are categorized as all land totally exempt from paying taxes. Types of property include land owned by the Commonwealth, the town, educational, charitable, religious groups, and authorities. Middleborough has about 19.2% of its land categorized as institutional. The majority of the land falls within the Rocky Gutter Wildlife Management Area, under the state Division of Fisheries & Wildlife and Department of Fish & Game (depicted by the big blue area in the southwest on the map on the next page).

On the map, Open Space and Recreation lands are classified as nature study areas. Open Space areas that are owned by institutional owners show up in blue. This is why in the table that Open Space and Recreation only makes up 4.4% of the town. Detailed breakdown on the Open Space and Recreation land are in Section 5 of this report.

Figure 13: Middleborough Land Use Breakdown

Land Use Type	Area (Acres)	Percent
Residences <= 3 units	10,932.4	23.7%
Apartments >= 4 units	1,253.4	2.7%
Mixed-Use	1.6	0.0%
Office	142.6	0.3%
Commercial	387.1	0.8%
Industrial	838.5	1.8%
Institutional	8,849.4	19.2%
Agriculture	8,493.8	18.4%
Non-Productive Agricultural/Horticultural Land	280.6	0.6%
Open Space and Recreation	2,027.0	4.4%
Utility and Transportation	63.3	0.1%
Vacant	9,245.7	20.0%
No Data	3,689.2	8.0%
Total	**46,204.8**	

Figure 14: Middleborough FY22 Parcel Land Use



Build-Out Potential

In 1999, SRPEDD, under the direction of the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), conducted a build out analysis for the Town in order to estimate the possible results if all the remaining land in town was developed under existing zoning regulations. The build out analysis identifies the potential for approximately 31.4 million square feet of new commercial and industrial space providing approximately 72,042 new jobs. An estimated total of 10,588 dwelling units could be created, 95% of which would be single family. Given the average household size of 2.86, the population could grow by an additional 30,280 residents or a total of 30,280 residents resulting in a total population of 50,220 persons at build-out.

This analysis does not give any indication of the rate of development or the time frame for reaching full build-out. However, it is likely that residential zoning districts will reach build-out sooner than commercial and industrial districts.

Due to the complexity of Middleborough's zoning, build-out analysis was based upon a close approximation of the underlying zoning districts and the Development Overlay District (DOD). Although major environmental constrains (i.e. wetlands, flood zones and endangered species) were accounted for, infrastructure limitations which may impact the potential for commercial and residential development in some areas of town were largely overlooked.

An alternative build-out scenario was considered by the town, taking into account the potential for development beyond current zoning regulations. The resulting build-out analysis estimated if 25% of all new development follows recent development trends and is done under Chapter 40B and each project provides 25% affordable units with a density bonus of 400%, then the total dwelling units could reach 25,000 with a population of 72,900 at build-out.

Developable Residential Lots as of 1998

potential subdividable land (14,182 acres)	7,466 new units
existing subdivided lots	911 vacant lots
potential "new" dwelling units	8,377 potential new units

General Use District Developable Lots

potential subdividable land (1,788 acres)
1,076 single family units or (2,116 multi-family units)

Lots from Land designated "Undevelopable"
(Provided with infrastructure, i.e. roads)

potential subdividable land (3,403 acres)	1,904 potential new units
existing subdivided lots	331 vacant lots
potential new dwelling units	2,235 potential new units

This build-out report identified several areas in town with high potential for new development. They include: Route 44 and Route 18 Rotary; Route 44 – Everett Street to Plymouth Street; Route 44 – Everett Street intersection; Rock Village; Wareham Street; South Middleboro; DOD South and Oak Point Village. The potentially high growth areas were predicted to be the extreme northern section of town, the extreme eastern section (despite wetlands), Rock Village and just outside of the downtown area.

Section 4 - Environmental Inventory and Analysis

A. Geology, Soils and Topography

Middleborough is located within the Seaboard Lowlands, characterized by generally low relief, no more than 100-foot changes in elevation throughout the town. Barden Hill, at 191 feet above sea level, is the highest feature in town. The landscape is entirely the result of glacial deposition. This is expressed in a combination of flat outwash plains, poorly drained wetlands, and hummocky kettle and knob terrain with pond features.

New England was shaped about fourteen thousand years ago, with the final advance and melt-back of the Wisconsin glaciers at the end of the glacial period. Locally, it was the Buzzards Bay Lobe that formed most topographical features of southeastern Massachusetts. Middleborough is located entirely within this region.

Rock, dirt and debris were picked up and carried within the advancing ice and then deposited as the great ice masses melted. This deposition is called glacial drift and covers the bedrock with mineral material, from particles as small as silt and clay, to particles as large as huge boulders. The terminus of the glacial lobe was just southeast of Middleborough. Large deposits of unconsolidated rock and soil were plowed forward at the tip of the lobe and left behind in this region. These deposits, known as glacial till, contain an unsorted mix of boulders of all sizes and various origins. The topographic feature of these deposits is called ground moraine. Ground moraine follows the contour of the underlying bedrock and occurs in Middleborough in sharply delineated upland areas, above low land areas of sorted, layered drift.
Soil and rock materials carried in melt water, or suspended in water within huge melt-water puddles, were deposited in layers. Heavier materials dropped from suspension first and the lightest materials, last. These deposits are generally sorted and stratified, or “sifted”. When mineral materials are deposited by standing water over a long period of time, the results are thick layers of fine sands and clays near the surface known as lacustrine deposits. They are impervious and hold water at the surface.

Following the end of the ice period, a glacial lake nearly two miles wide existed in northwest Middleborough into Bridgewater. What is now the Taunton River eventually draining that lake and, what was left behind were vast, flat, clay deposits. These deposits were utilized in modern times by the clay-brick industry.

Not all of the melt water puddled. Run-off water carried and deposited materials, which are called glacio-fluvial deposits. They are also generally stratified and take the shape of the outwash plains and stream channels, known as eskers. Eskers are represented on the land as stratified ridges and there are several in Middleborough. Ice blocks carried in moving water were also deposited on the landscape creating unique landforms within the landforms. Surrounded by till deposits, they became the pock marked features known as kettle-hole ponds. Woods Pond and Tispaquin Pond are both small kettle-hole ponds. The wide distribution of kettle and knob landforms indicates that much of Middleborough’s landscape is a result of local ice blocks that broke away from the terminus of the glacial lobe.

The great ponds which border Middleborough and Lakeville - Assawompset, Pocksha, Great Quittacas, Little Quittacas and Long Pond are believed to be remnants of melted ice blocks whose drainage was blocked by the terminal moraine of the glacier. These ponds are drained northward toward the low-lying Taunton River Basin via the Nemasket River. Sorted sands and gravels deposited in piles and shaped by moving ice and water into conical hills is called a kame. Barden Hill is an example of a kame.

Understanding the morphology of the local geology is important in an Open Space and Recreation Plan because the type and distribution of glacial deposits directly relates to the availability of ground water and

the protective measures required. Outwash areas of sand and gravel are excellent recharge and ground water retention areas. Ninety-five percent of Middleborough's ground water is found in these deposits. They are also highly permeable which makes ground water within these soils susceptible to pollution. On the other hand, lacustrine deposits of fine silts and clays have many limitations for development because they drain so poorly. Glacial till, expressed in stony soils and hard pan, is also a poor candidate for ground water accessibility and presents building limitations.

Soils

The soils of an area depend on the (1) parent rock, (2) topographic relief, (3) climate, (4) living organisms, (5) the activity of man and (6) time. In Middleborough the parent rock material derives from glacial drift, bedrock particles carried in glacial ice from the north. The type of vegetation, habitat and other biota are determined by the associated, underlying soils. The soils above that layer provide for good vegetative growth, and associated availability of water can support some of the best habitat. Silty, till, muck and peat soils are found throughout the Town and can support wetland habitats which are the rarest of valuable habitats.

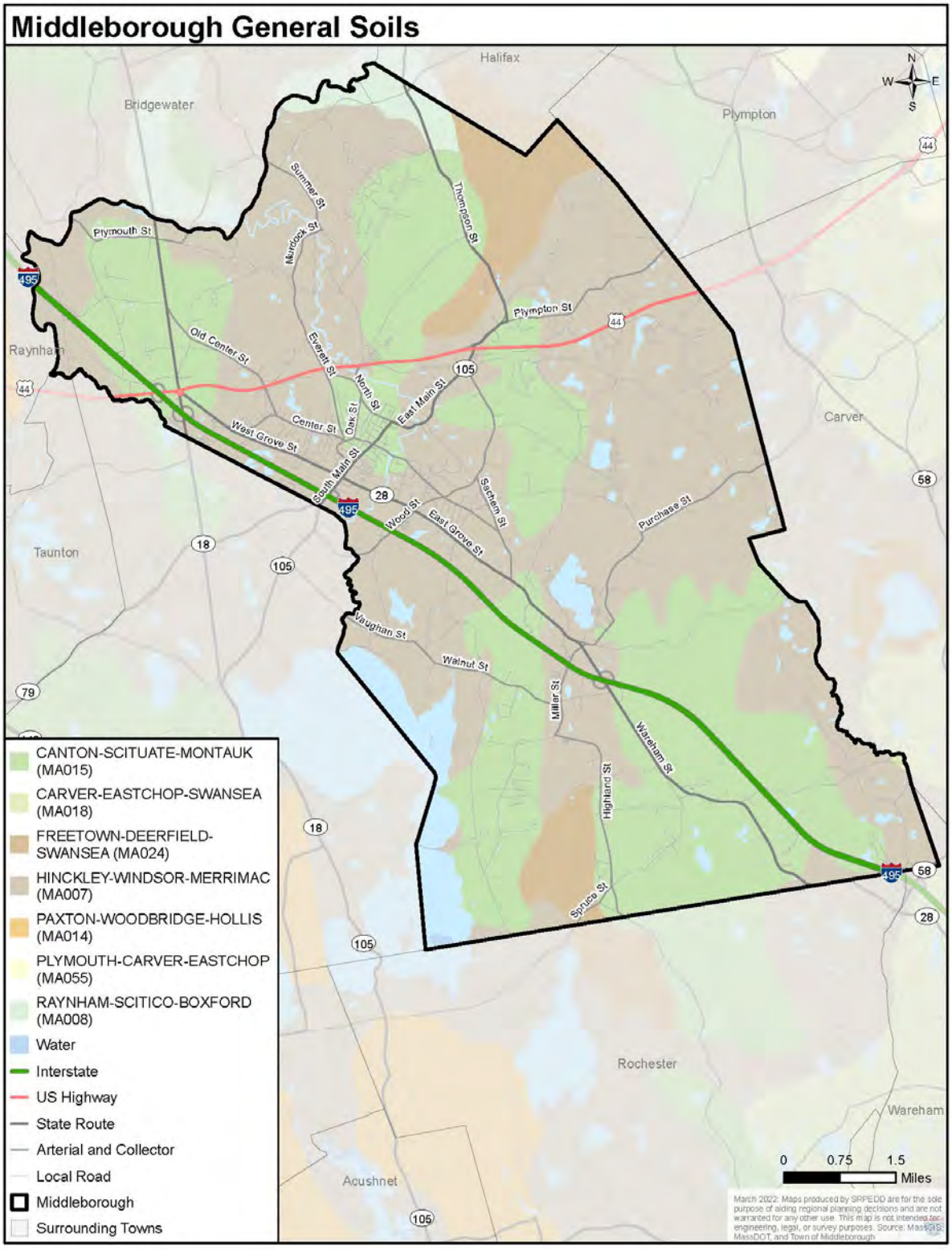
The natural soil conditions define the potential for everything from biodiversity to human construction. The Natural Resources Conservation Services (NRCS; U. S. Department of Agriculture) identify soil types and categorize them according to their qualities. The principal soil types of concern within Middleborough are related to its agriculture, its wetlands, and water supplies for the Town and the region.
'Prime farmland' soils as identified by the NRCS, exist in key locations in the Town and to attest to its tradition of agriculture. In Middleborough, the most prevalent prime farmland soils are called Merrimac soils. These soils can be found through the northern two-thirds of the town, but are concentrated within the center of Middleborough. The Merrimac-Raynham-Saco association consists of broad, flat, low, wet areas interspersed with moderately sloping, well-drained areas.[5]

As noted in the most recent Town Open Space and Recreation Plan (2015) the type and distribution of glacial deposits relates to the availability of ground water. In addition, if the deposited soils above the water protect it from surface impacts, this determines the groundwater's sensitivity to pollution. The Hinckley soils are the principal soils of concern, composed of deep sand and gravel deposits. The majority of the Town's public water supply wells are found in these soil types, which lie within the central portion of the community. The Hinckley-Merrimac-Muck Association consists of broad, low ridges; nearly level plains and terraces; and knobby, irregular ridges. Intermingled with these are extensive low, flat wet areas.[6]

The Carver – Peat Association soils are found predominantly in the southeastern side of Middleborough. This association consists of a large, nearly level, sandy outwash plain that is pitted with kettle holes and is dissected by southward flowing streams. Carver soils are considered poor for agriculture but support mostly wooded areas that provide valued upland habitat. The Gloucester-Windsor-Brockton Association, found along the southern fourth of Middleborough consists of rolling hills interspersed with plains and low wet areas. Most of the acreage is wooded.

[5] U.S.D.A Soil Conservation Service Soil Survey for Plymouth County, 1969
[6] U.S.D.A Soil Conservation Service Soil Survey for Plymouth County, 1969

Figure 15: Middleborough General Soils Map



B. Landscape Character

Middleborough's visual character, one of its most endearing features, is a result of historic land uses. It has a compact central business district that is entered through a shaded Main Street lined with historic homes, the Middleborough Green, Town Hall and large white church, typical of small New England towns. The town includes vistas and landscape areas that provide a unique and pleasant experience for the public.

Middleborough evolved as numerous small clusters of "villages" or hamlets at the crossroads of a webbed network of roads. Some of these villages were substantial and became concentrations for a mixture of commercial, residential and rural uses. Others were merely a convenient concentration of farms and associated residences. Each had its own name, and its history can be traced through old maps, tax rolls, and school districts. The remnants of this scattered pattern of clustered settlements are visible in many locations today, although their identity has often become obscured by time and the imposition of subsequent development.

There are several distinct village areas including Titicut Green (also called North Middleborough Green) centered upon the intersection of Pleasant and Plymouth Streets; Eddyville centered upon the intersections of Plympton, Cedar, and Carmel Streets; Waterville located along Plymouth Street between Carmel and Wall Street's south of U.S. Route 44; Middleborough Center; Rock Village located along Miller and Smith Streets in South Middleborough; and the Green located at the intersection of East Main and Plymouth Streets. Each village area contains historic buildings such as churches and schools, old cemeteries and farmhouses. Stonewalls and orchards, once common throughout New England still dot the landscape in Middleborough. The town is rich in other historic and prehistoric sites including Native American villages and encampments as well as colonial mill sites. The outlying areas include "newer" residential neighborhoods, interspersed with the villages, farms, cranberry bogs, woodlands and water resources.

The great swamps, ponds and streams run all through the town providing abundant wildlife habitat and the opportunity to observe nature. There are several fish runs associated with the Nemasket River including fish ladders at the Assawompset Dam, Thomas Memorial Park, and Oliver Mill Park. Hunting and fishing are common passive recreational activities.

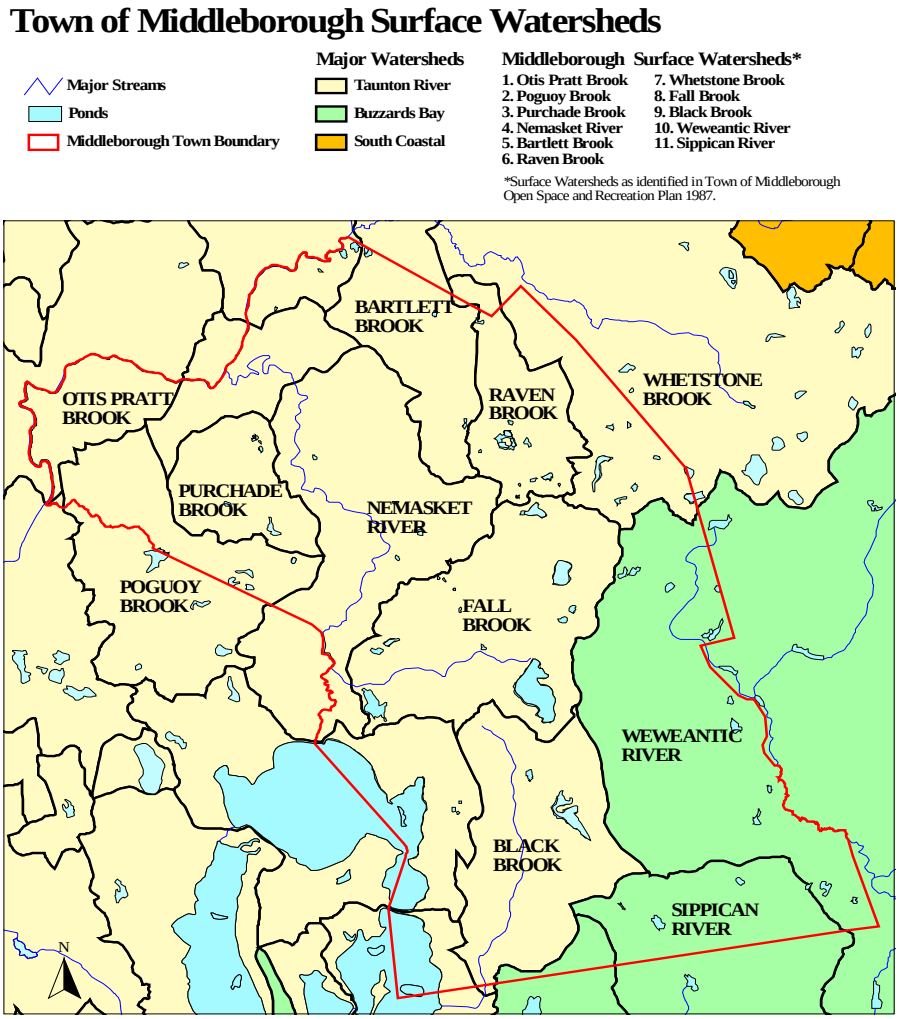
It is this very character, *expressed on the landscape*: small town, rural, historic, village-like, agricultural, with ample privately-owned open space, which Middleborough residents have identified as the most important value to be preserved into the future.

C. Water Resources

The three existing surface watersheds define the flow of surface waters and groundwater flow through the town. The vast majority of the surface area of Middleborough lies within the Taunton River drainage basin which is the most significant watershed in Middleborough. Tributary streams include Black Brook, Fall Brook, Whetstone and Raven Brook, Bartlett Brook, Purchade Brook, Otis Pratt and Poquoy Brook, and the important Nemasket River. The Nemasket River, a tributary of the 44-mile-long Taunton River, flows northward from its source at the Assawompset Pond complex, through the center and north of town. The Nemasket River has been the focus of previous Open Space and Recreation Plans and conservation efforts because it is rich in archeological sites, historic sites, scenic vistas, wildlife habitat and recreational opportunity. It is being viewed in the larger context of the Taunton River Watershed, with regional interest and efforts along that corridor. The Taunton River forms the boundary between Bridgewater and Middleborough and Raynham and Middleborough. Regionally, Taunton River basin covers 562 square miles and is surprisingly undeveloped. Yet there is very little permanently protected land within the corridor. This watershed is one of the most important from the standpoint of regional ecological and cultural values.

The remaining two watersheds within Middleborough's corporate limits are the Weweantic River watershed which covers a significant portion of the Rocky Gutter State lands and includes a majority of the town's cranberry bogs and the Sippican River watershed which collects runoff from the southernmost portions of the town. Both are part of the Buzzards Bay Drainage Basin.

Figure 16: Town of Middleborough Surface Watersheds



Source: Massachusetts Executive Office of Environmental Affairs, MassGIS: subbasins (watersheds), major steams, hydrology.
Town of Middleborough Open Space and Recreation Plan 1987, Figure 4 Surface Watersheds.

Middleborough includes 2.7 square miles of surface water bodies. After adding wetland and bog areas, between 30 to 40 percent of Middleborough's surface, about 25 square miles, is covered by water resources. Below are summary descriptions of the inter-related and major water systems. The descriptions have been taken from the Middleborough Master Plan: Report on Findings and Alternatives dated March 23, 2001 and revised February 11, 2002.

Running eventually to the Taunton River, the Assawompset Great Pond system is one of the most important regional water resource areas in the State. Great Quittacus, Little Quittacus, Assawompset, Pocksha and Long Ponds are all part of the Assawompset Great Pond complex. This is the largest natural inland body of water in the state. The ponds are part of an interconnected system of resources in the Taunton River Watershed connected to the Taunton River by the Nemasket River. It lies within Middleborough, Lakeville, Freetown and Rochester, but is actually part of a regional surface drinking water supply for the municipalities of New Bedford, Taunton, Acushnet, Fairhaven, and the City of Fall River (secondary source). It does not provide any water service to Middleborough. The ‘’safe yield" of the ponds for drinking water supplies is 27.5 million gallons per day. The region is hoping for a new "safe yield" study in the near future to reassess the entire watershed influencing the Pond Complex.

The City of New Bedford actually owns most of the watershed lands adjacent to the ponds. The City of New Bedford owns about 1,470 acres of land in Middleborough, out of a total of about 8,000 acres around Assawompset and Pocksha ponds. Taunton owns about 11 acres in Middleborough off Lakeside Road for water supply protection. However, while Assawompset has approximately two-thirds of its shoreline protected, Pocksha Pond has only about one-third of its shoreline preserved from development. The land and water resources here deserve protection and management for several reasons: water supply, natural resources, cultural resources, and passive recreation. Consequently, the management of this system requires a comprehensive plan. A summary of the access and resource issues is as follows:

Access - Under a memorandum of understanding, Rochester has access on the city watershed lands to the ponds for passive recreation. However, Middleborough residents **do not** have access on the city lands. There is physical access to the ponds through the municipal right-of-way, Long Point Road (town scenic roads) at Pocksha Pond, and across the Morgan property on Pocksha Pond.

Natural resources - The connection between this system and the other water resources within the Taunton River watershed are very important, not only to water supply, but also to natural resource management. Although the immediate watershed of the pond complex is fairly small within Middleborough, further east, the Black Brook provides additional watershed areas that flow into the pond system. An unusual nature of the pond system is that the southern end, Great Quitticus Pond, can also flow to the Snipatuit and discharge to the Buzzards Bay watershed. In addition, fish populations use the river system for migration and spawning. The system is reportedly the most prolific herring run in the state. However, it can be affected by the flows from the pond complex as it is controlled for water supplies. Property around Pocksha Pond are bald eagle nesting areas and the lands around the pond complex have other large bird nesting species such as the Red-Shouldered Hawk, Broad-Winged Hawk, Osprey, and Barred Owl. The State Division of Fisheries and Wildlife releases rehabilitated bald eagles at the Pocksha Pond causeway. This suggests this area is important breeding and feeding habitat for these species. However, these species require large undisturbed areas for their habitat and could be impacted by water supply projects. Loons have also been recently introduced.

The cities of New Bedford and Taunton have a legal requirement to establish a management plan for the pond complex that takes into account the natural resource and water supply issues. However, formulation of a proper management plan will require the input of the host communities as well as the regional conservation and planning efforts that have been ongoing. Intergovernmental efforts have included informal discussions between the cities managing the water supply and the local communities. More active management for natural resources and water systems have come under the umbrella of the Taunton River Stewardship Program, which includes participation from Middleborough, Raynham, Bridgewater, Halifax, West Bridgewater, SRPEDD, the State Division of Fisheries and Wildlife, the National Parks Service, The Wildlands Trust of Southeastern Massachusetts, Massachusetts Audubon Society, and the Taunton River Watershed Alliance. The Assawompsett Ponds Complex and the Upper Nemasket Group have been

meeting over the last couple of years to create a variety of plans and projects. They have been working on the APC & Nemasket Watershed Management and Climate Action Plan, Upper Nemasket River Enhancement Plan and a Hydrological and Hydraulic Study. This Action Plan was completed in 2022 thanks to a grant from the Municipal Vulnerability Preparedness Program.

Tispaquin Pond

Lying almost within the geographic center of Middleborough, Tispaquin Pond offers a variety of natural resource conditions and recreational amenities. The pond is part of the Fall Brook watershed eventually draining to the Nemasket River. The multi-use nature of the surrounding lands is as follows (acreages as listed in the 1998 Open Space Plan):

- There are two camps around the shoreline: Camp Avoda with about 49 acres, Camp Yomechas with about 32 acres, and YMCA camps.
- Surrounding the pond on the eastern side is the Frederick C. Weston Memorial Park totaling about 311 acres. Although identified as a park, the land is actually managed by the Frederick C. Weston Memorial Park Committee and the Board of Selectmen.
- The Town has a well site property off Wareham Street of about 22 acres.
- About one third of the shoreline, outside of the above, is held in private hands.
- There is a state boat ramp off Eldon Way that can be used by the public.

In addition to the above information, the privately held open space connects Tispaquin Pond to the Rocky Gutter Wildlife Refuge. Consequently, this great pond presents the Town with a multi-purpose management need.

Nemasket River

Flowing from Assawompset Pond, the Nemasket defines Middleborough's municipal boundary with Lakeville up to the former Ocean Spray Cranberry processing plant where the river turns in and flows through the center of Middleborough. Passing just south of the Downtown (Four Corners) area, the river has a related, but not closely tied, connection to the downtown social and business activities. The Gas and Electric building and the former Department of Public Works (DPW) building are sited on either side of the river just south of the Downtown district. The Nemasket could become more of an integrated part of the downtown activities by having either of the public facilities replaced with a formal public park and an access point to help create a connection to the downtown area. There is also a feasibility study being conducted have a river walk along the river through the center of town. At Oliver Mill Park the bridges and stonework are actively being restored through grants and Community Preservation Act funding. The former DPW site is being looked at for a park and the Gas & Electric site will be rebuilt. The dam at Wareham Street in this same area is also being looked at for potential removal.

Taunton River

The Taunton River flows generally west along the boundary between Middleborough and Bridgewater, Halifax and Raynham before flowing south through Taunton and Fall River eventually into Mount Hope Bay. Its watershed is 562 square miles and the river corridor is 44 miles long. There are four public properties on its banks in Middleborough. These include:

- the Division of Fish and Wildlife, (DFW) a 72-acre Wildlife Management Area off River Street;
- the Bradshaw property of 57 acres owned by DFW;
- the Bally property of 13 acres owned by DFW;
- The Department of Conservation & Recreation 13-acre Slein property near Vernon Street. Adjacent to that is the 27-acre Connors property.
- Approximately 3-acres off Auburn Street managed by the Middleborough Conservation Commission
- Town Water Department has 19-acres also known as the Mizaras well site.

However, this is very limited for permanently protected land along the river corridor. The Wildlands Trust of Southeastern Massachusetts (September 1998) believes this stems in a large part from the lack of recreational access and use of the river. However, by increasing public access the river system's carrying capacity (ability to accept impacts and still retain its condition and number of resources) is then impacted. The Taunton River Stewardship Council (TRSC) and the Taunton River Watershed Alliance & Campaign are groups with the established purpose of protecting the resource for its natural, cultural and recreational values. The Taunton River Watershed Alliance has also stated its concern that the Taunton River watershed is the most unprotected ecosystem in Massachusetts. The TRSC has noted the following:

- The river is of statewide importance to conservation goals because of its relatively undisturbed nature and its resources. However, full protection would be a highly ambitious effort.
- The Taunton River Greenway was listed among the top three priorities as part of the State Department of Environmental Management's (now the Department of Conservation & Recreation) Greenways and Trails workshop.

  The river is one of the longest free-flowing rivers, without dams or impoundments.

A 1997 natural resource inventory identified over 114 breeding birds including 12 rare species, 28 herptiles including 6 rare species, 51 vernal pools, 29 fish species, 360 plant species including 5 rare species and 3 globally rare species and 7 species of fresh water mussels. The last being the reason the river is one of the most diverse reaches in the state.

- Most of the river is still pristine in the nature of development along its banks.
- Invasive species have been unable to take hold in the river.
- Overall, because of these conditions, the state has an opportunity to take a proactive stance in watershed protection, thereby reducing if not eliminating the costs of restoration, which would result if the river were to be degraded.

A potential partnership of state and federal agencies, with local input, for acquisition and management of lands along the Taunton River have generated recent activity centered on land acquisition. The realization of a river access of Auburn Street via a completed design and the acquisition of the Cumberland Farm property would create significant assets for Middleborough.

In 2009 the river was designated as a Wild & Scenic River through the National Parks Service. There is now regular federal funding by which the Taunton River Stewardship Council awards grants to Taunton Watershed Communities.

Great Cedar and Little Cedar Swamps

Located in the northeastern corner and draining into the Bartlett, Whetstone and Raven brooks, this wetland resource area is within more than 2,000 acres of land and includes remnants of Atlantic White Cedar and White Pine forests. These are one of the rarer wetland types composed of boggy, acidic soils. The actual swamps have been reduced to the Hockomock and Acushnet cedar swamps. The land drains into the Winnetuxet River before eventually flowing into the Taunton River. Little Cedar Swamp was separated from Great Cedar Swamp by the construction of Fuller Street.

Lying within the lands previously used by the Cumberland Farms dairy operation, these resource areas are connected to the Striar property owned by the Wildlands Trust of Southeastern Massachusetts and Town of Halifax land, as well as the former K&F Brickyard in Middleborough. The original swamp was reduced by agricultural operations, but has in turn provided a unique grasslands habitat area of about 900 acres that supports a wide variety of birds as reported in 1996 (Kathleen Anderson in the Bird Observer, vol. 24, no. 1).

Other Major Wetlands

Wetlands have long been recognized for their multiple values as natural habitats and support to maintaining water quality. A significant amount of inland wetland resource areas, protected by the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131 Section 40 (the Act) and its Wetland Regulations (310 CMR 10.00 *et seq*.). The Middleborough Conservation Commission has the responsibility of administering the Act and the provisions of its implementing regulations. Since regulations for implementation of the Act were first issued in 1974, the Department of Environmental Protection has promulgated several revisions, including extensive changes in 1983. Additional regulations protecting wildlife habitat went into effect November 1, 1987, and the Rivers Protection Act (amendments) was passed in 1996 that created a new 200-foot Riverfront area subject to Protection under the Act. This amendment is especially significant to Middleborough, with its extensive river and perennial stream systems. The latest revisions to the Regulations in 2008 have incorporated Stormwater Management Performance Standards as regulations that provide further protection of the wetlands and waterways in Middleborough and throughout the State of Massachusetts.

The major wetland systems other than the Great and Little Cedar Swamps within Middleborough include the following:

Rocky Gutter and Forbes Swamp both occupy land in the south and southeast of Town and drain, for the most part into Buzzards Bay through the Weweantic River and the Sippican River. Principle brooks include East Rocky Gutter Brook, West Rocky Gutter Brook and Double Brook.

- Meeting House Swamp, a large wetland on the north side of Route 44.
- Beaver Dam Swamp, along Beaver Dam Brook in the northeast quarter.
- Along the Taunton River, Puddingshear Brook, Poquoy and Pratt Brook drain wetlands from the north and the Joses Meadow Brook and Purchade Brook system drain large wetlands.
- White Oak Island.

- Rocky Gutter and Forbes Swamp, mostly located within the Rocky Gutter Wildlife Refuge and draining to the Weweantic and Sippican watersheds and eventually to Buzzard's Bay.

- Devil's Kitchen found within the Black Brook watershed flows south in Middleborough.

- Extensive wetlands along Fall Brook, tributary to Nemasket and Taunton Rivers and between Woods Pond and Tispaquin Pond, two brooks, Woods Brook and Shorts Brook share wetlands between them, which feed into Fall Brook.

- The Weweantic River watershed is an area, which holds a majority of the cranberry bogs within Middleborough. The location of the cranberry bogs places an additional management burden when supporting water quality and public access initiatives.

There is an ongoing need for management and protection of inland wetlands in Middleborough. The wetlands provide a unique and important habitat area and provide recreational opportunities such as hunting, fishing, wildlife-viewing and other passive recreational pursuits.

Groundwater Resources

Middleborough has a large supply of surface and ground water resources that satisfy current local demands. However, growth in the region and surrounding cities will most likely have consequences to Middleborough's balance of water resources.

The outwash areas, where glaciers melted and spread sand and gravel are known as good-to-excellent recharge and ground water retention areas depending on the depth of the sand and gravel deposits. Almost all of Middleborough's ground water is found in these types of soil deposits. These soils are also highly permeable, which makes ground water within these soils easy to extract but potentially susceptible to pollution depending on the soils covering the surface. Lacustrine deposits where fine silts and clays have settled have many limitations for development because they are poorly drained. Glacial till, which is stony soil and hardpan, creates limitations on everything from building to gardening. However, both of these latter soil types make excellent protective cover over the permeable aquifers.

These aquifer recharge areas are found in several places throughout Middleborough. There are 5 major areas where the aquifers are high yielding such as the following: 1) Where the northern boundary west of where the Nemasket and Taunton Rivers converge. 2) South of the Middleborough Rotary and Route 44 toward the Town of Lakeville. 3) From the Assawompset Pond north to Route 44. 4) North of Tispaquin Pond and 5) Where the boundary of the Town of Plympton to the East at Route 44.

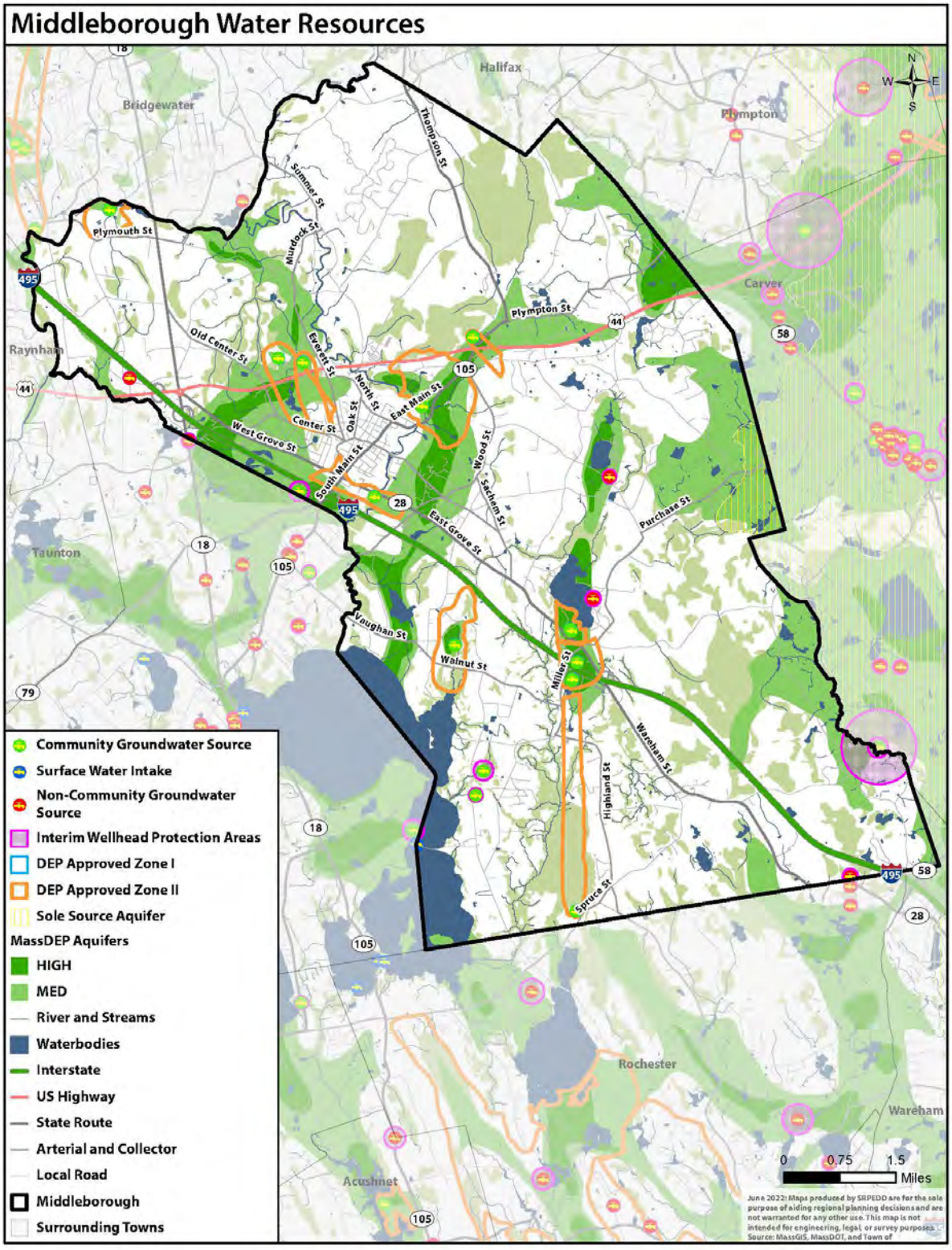
Although each water supply site and its development are unique to the conditions found there, general information on the groundwater development within Middleborough, where 10 out of 11 wells are within the western-central portion of town, indicate this is a critical area for the Town water supply. Generally, the deep aquifers that provide the water supplies were created with, and so follow, the related river watersheds. A small portion of the town to the east near the Town of Carver is also within the Plymouth-Carver Aquifer, which is considered a sole source aquifer.

This becomes important to managing the water resource balance within each watershed as well. As water withdrawals from the ground increase, this in turn can deplete the water reserves for surface water resources. This is especially important for water resources within the Nemasket River, Fall Brook and Black Brook watersheds where clusters of Town wells are located. The recent water supply development close to Assawompset Pond falls within a separate, but related watershed area.

Watershed protections for approved water supply wells are created in the local regulations as the Water Resource Protection Districts. These regulations are mandated by the State law and are reviewed by the Department of Environmental Protection.

Ten of the eleven town wells in Middleborough's water system are located within the Taunton River Basin. One well is located in the Buzzards Bay Basin. They are protected by the Massachusetts Well Head Protection Law. Activities at the well head, state approved Zone I and Zone II's are restricted by state regulations. Zones of secondary contribution or Zone IIIs are additionally protected by Middleborough zoning regulations and the Water Resource Protection District Bylaw under the Select Board as the Water Commission as well.

Figure 17: Water Resources



In addition, there are two kettle-hole ponds in Middleborough within the Taunton River Basin. They are Tispaquin Pond and Woods Pond connected by Woods Brook and Shorts Brook. Woods Pond is surrounded by development and is not well suited for recreational development because it is shallow. Tispaquin is also shallow, however it has recreational potential. The Frederick C. Weston Conservation land borders the pond on the north. It has wetlands and access is a problem. Efforts could be made to acquire dry land for a town beach, to meet future needs. There is also a state boat ramp off Eldon Way for Tispaquin Pond. At the end of Gibbs Road there is town land with access to Tispaquin Pond but the roadway is private and there is not much upland area for a parking lot.

The southeast section of the town drains into the Buzzards Bay through the Weweantic River and the Sippican River. This is an area of low relief wetlands with small intermittent streams. There are a lot of cranberry bogs in this region that are dependent on a fragile perched water table for agricultural water supplies. The Town of Rochester has located an industrial park on the town line in the Buzzards Bay Watershed. The principal occupant of the park is SEMASS, a waste to energy electrical power plant. The increasing water demands of steam turbine power generation evidenced by frequent increased withdrawal permits are having a significant impact on local agricultural resources.

Middleborough enjoys an abundance of surface and groundwater supplies to satisfy current municipal needs, however growth in the region beyond the control of the municipality, could outstrip surface and ground water supplies. Increasing demands made by water hungry cities, and in particular the new demand by Brockton and its surrounding communities, are a growing concern throughout the region. The Massachusetts Department of Environmental Protection through the Division of Water Supply provides a mechanism of monitoring and permitting with regards to additional withdrawals beyond 100,000 gallons per day in any given watershed.

The Middleborough Select Board acting as the Water Commission is the special permitting authority for the Water Resources Protection District By-law. The two principal areas of protection are recharge areas to town wells and all surface water bodies including brooks, streams, rivers, ponds and wetlands.

Wetlands

Wetlands are generally recognized as lands that have water near or at the surface much of the year. They are identified by the presence and duration of water, soil types and vegetation cover. Between 30% and 40% of Middleborough's surface is covered by either surface water or wetlands, including farmed cranberry bog wetlands. Wetlands have long been recognized for their value as wildlife habitats and for flood control, but more recently they are valued for the protection they give to ground and surface water by sedimentation control and the purification of the surface infiltration.

The absorbing qualities of peat and heavy grasses retard heavy storm runoff and the resulting erosion. An acre of marsh has the capacity to hold 3,000,000 gallons of water. Furthermore, water moves slowly through marshes and swamps through a maze of tiny irregular streams. This acts as a filtering basin, intercepting sediments and pollutants from upland runoff. The vegetative material of a wetland absorbs and removes toxic chemicals through this very slow percolation process as well as through biological processes.[7]

Cranberry Bogs

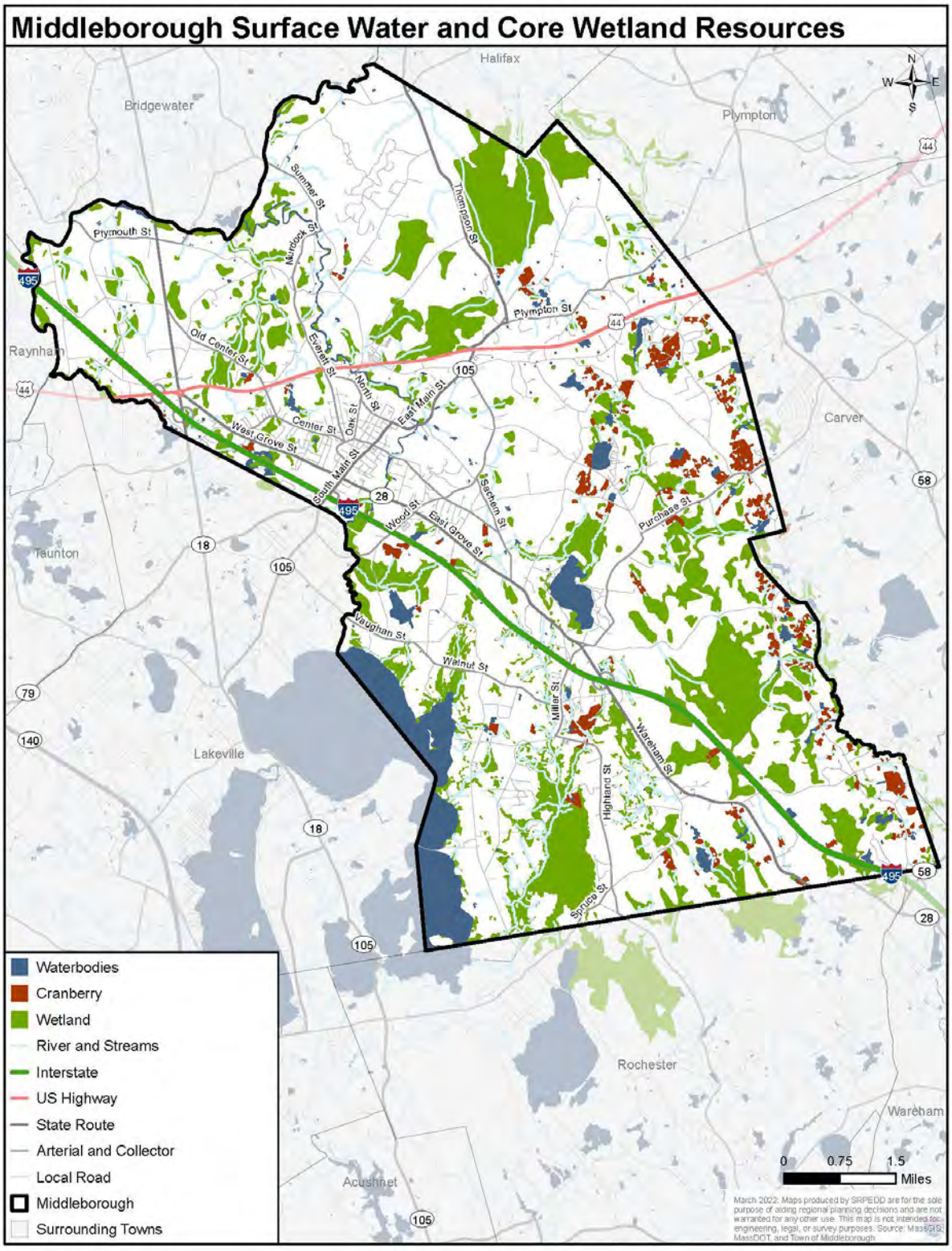
Cranberry bog wetland systems are unique to only a few small areas in North America. They are wetland farms, maintained at their level of wetland succession by the activity of farming cranberries. Sometimes they are prior converted wetlands; select natural bogs and more recently, entirely man made. The cranberry

[7] Middleborough Master Plan: Report on Findings and Alternatives (2002)

bog system includes a water supply and conveyance system, bog beds, and an upland workspace. The bog beds are routinely flooded and de-watered as normal agricultural practice. Cranberry bog systems have almost all of the wetland functions of a natural wetland; however, they are managed for a monoculture, and may not provide all of the habitat functions of natural wetlands.

Cranberries have been cultivated in Middleborough for at least 100 years in natural bogs and swamps converted to cropland. They have become part of cranberry wetland ecosystems, unique to southeastern Massachusetts. Middleborough is the second largest cranberry growing town in Massachusetts with just under 1,700 acres in cranberry production. Per the Cape Cod Cranberry Growers Association there are 1,630 acres of cranberry bogs in cultivation in Middleborough. Other than cranberries, and to a lesser extent, vegetables, hay, flowers and small fruits make up the balance of crops farmed in Middleborough today.

Figure 18: Middleborough Surface Water and Core Wetland Resources Map



Vernal Pools Habitat in Middleborough

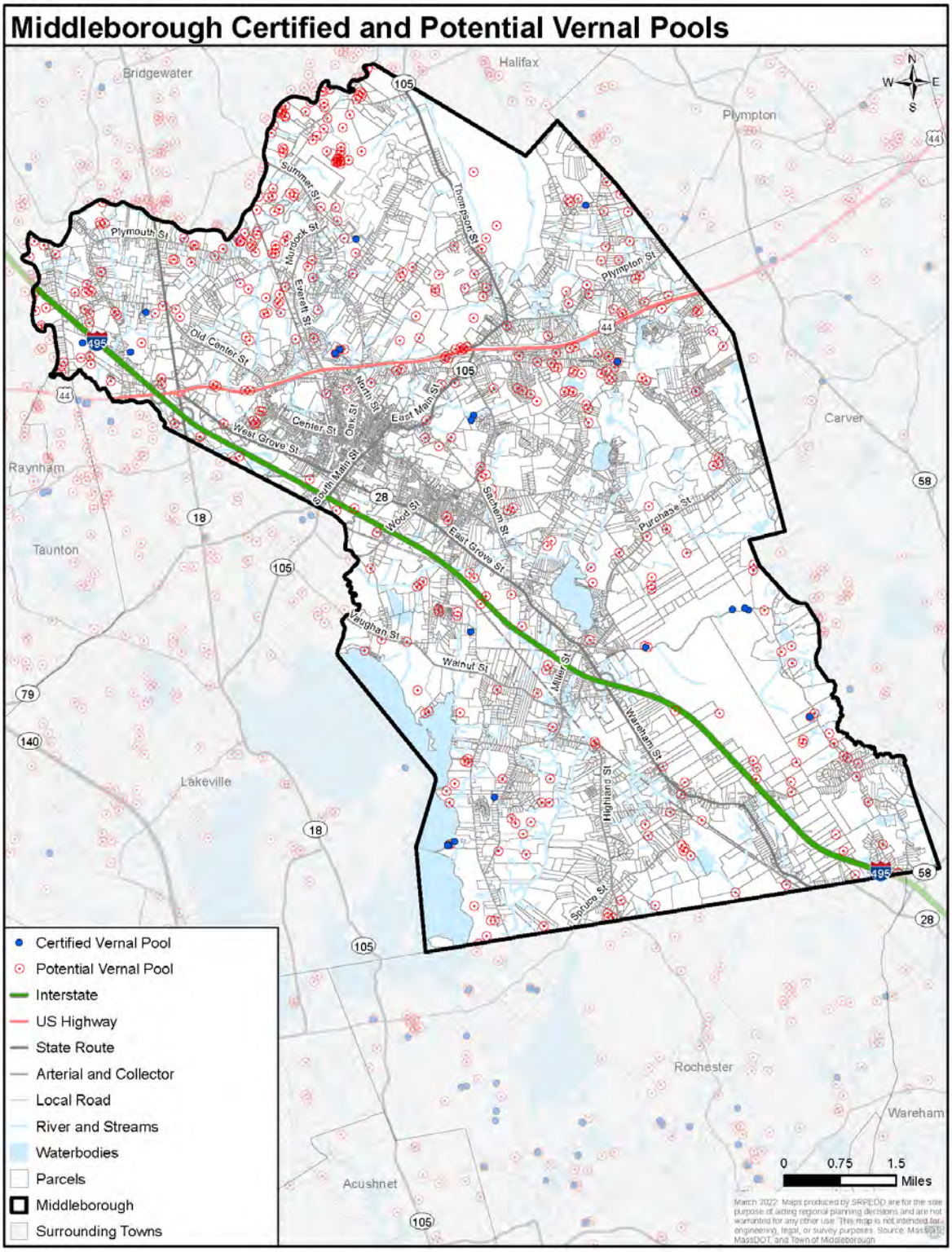
Vernal pools are critical habitats that support unique and valuable plant and wildlife communities. They are ephemeral wetlands which fill annually from precipitation, snowmelt, runoff, and rising groundwater. During most years they become completely dry, losing water through evaporation and transpiration. The wet-dry cycle prevents fish from becoming established, yet presents a rich, albeit temporary, habitat for many species.

A vernal pool is a productive hatchery for terrestrial amphibians. Its short period of intensive growth cycles the nutrients and energy of fallen leaves on the pool bottom into the frogs and salamanders of the adjacent woodlands. Also, for a vernal pool to be certified it cannot have the presence of fish.

In Massachusetts, vernal pool habitat (the pool and 100 feet beyond) within a wetland resource area are afforded some protection through existing regulations, mainly the Wetlands Protection Act Regulations and local bylaws. Other regulations that protect vernal pools include the Surface Water Quality Standards, Title V of the Massachusetts Environmental Code (septic system regulations), and the Forest Cutting Practices Act Regulations. Many, but not all, of these regulations require that the pool be "certified" by the NHESP.[8]

[8] NHESP: A Field Guide to the Animals of Vernal Pools (May 2001)

Figure 19: Certified and Potential Vernal Pools in Middleborough



Floodplain and Flood Hazard Areas

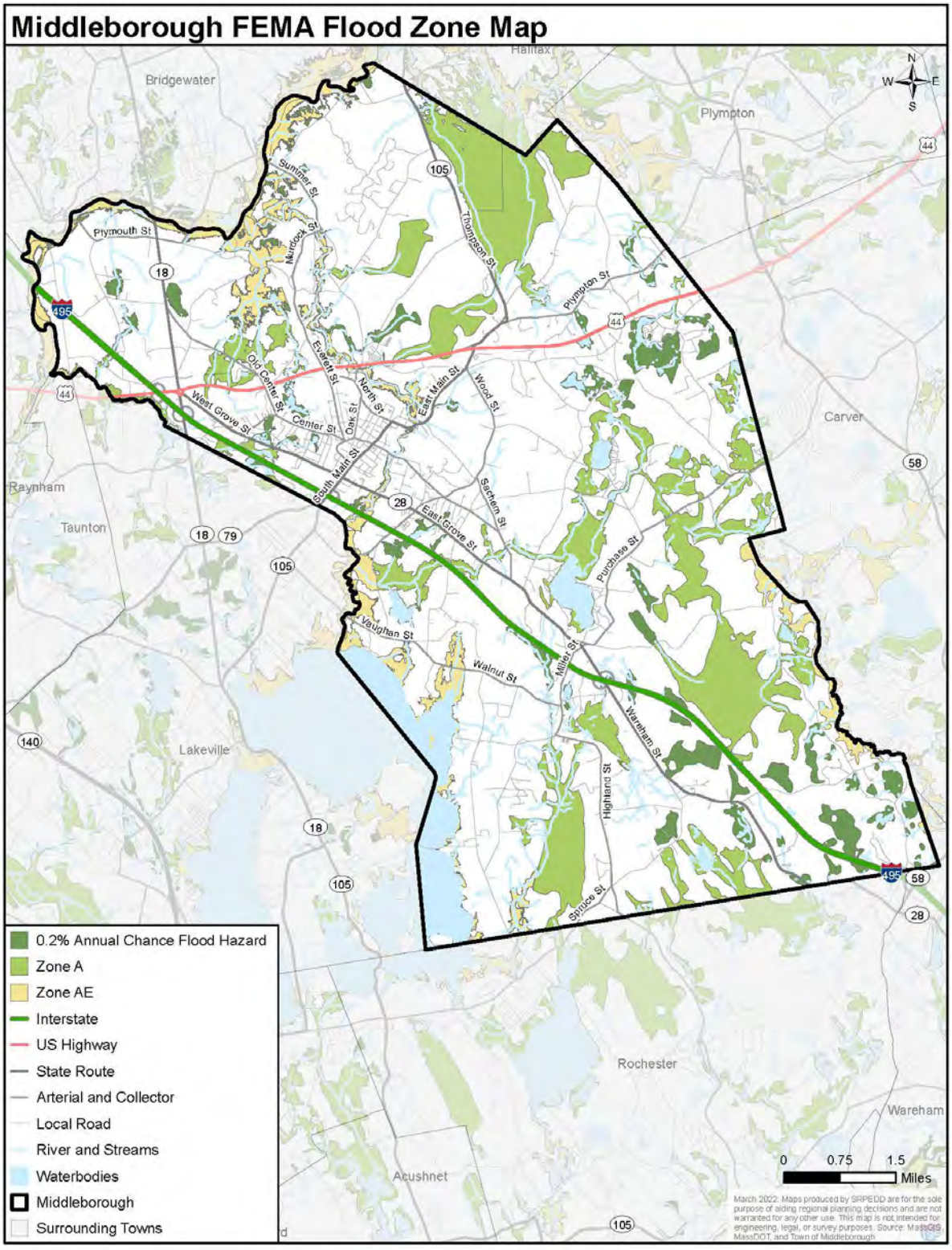
Most of the flood hazard areas in town according to the Federal Emergency Management Agency Flood Insurance Rate Maps are around cranberry bogs and their connecting wetlands and unnamed streams, ponds, and named streams, brooks and rivers. The major Flood zone areas are the Zone A, which denote the 100-year flood events. Flood zone B denotes the 500-year flood events.

In 2011 the Planning Department drafted a Hazard Mitigation Plan (HMP) discusses the flood prone areas in more detail and identifies all of the known dams in town. Flood Plain Maps have been updated by FEMA and the U.S. Geological Survey in 2015 and 2017 respectfully. A new HMP will be updated in the coming year.

The following streams, brooks and rivers have flood zone A bordering them: Rocky Meadow Creek, Shorts Brook, Woods Brook, Double Brook, Rocky Gutter Brook, Black Brook, Taunton River, Poquoy Brook, Bartlett Brook, Fall Brook, Whetstone Brook, Nemasket River, Beaverdam Brook, Purchade Brook, Raven Brook and parts of Otis Pratt Brook, Puddingshear Brook, and most of Shaving Brook.

The following ponds have a small flood zone A bordering them: Tispaquin Pond, Woods Pond, Great Quittacas Pond, Pocksha Pond and Assawompset Pond.

Figure 20: FEMA Flood Zone Map



D. Vegetation

Public Shade Trees

The Town of Middleborough promotes the use of public shade trees through the Department of Public Works (DPW) and the Planning Board. The DPW Director is the Tree Warden. The Conservation Commission suggests additional trees and other vegetation be planted from time to time under wetland permitting. The DPW currently follows the state law regarding public shade trees under Chapter 87 and the Planning Board in their Subdivision Rules & Regulations has a section on Planted Trees. They also have a policy called "Middleborough Planning Department Street Tree Planting Guidelines". The tree policy was recently revised. There is also a provision in the Zoning Bylaws under Section 5.4.8: Shade Trees – In addition to trees required within landscaped islands and landscaped medians, shade trees shall also be provided every forty (40') feet along the perimeter of all parking areas and driveways for the purpose of providing shade.

Wetland Vegetation

Wetlands are usually classified by the plant communities that grow in them. Most of the wetlands in Middleborough are a combination of communities, representing various stages of succession, from very wet to seasonally wet and occasionally draughty. The marsh community occupies the wettest sites characterized by shallow standing water and floating or emergent vegetation such as reeds, arrow head, duck weed and cattails. A wet meadow community is made up of chiefly grasses working toward a drier community where trees and woody shrubs can survive. Swamps are initially populated by shrubs, hence, shrub swamps, gradually changing to a drier wooded swamp community including stands of red maple, black ash, pin oak and sweet gum, for example. Some shrub swamp plant varieties include pepper bush, button bush, alders and willows. Along the flood plains of rivers and streams, intermittent flooding creates a plant community different from marshes, meadows and swamps. Plants in these areas tolerate both immersion and dryness and include: pin oak, swamp white oak, cotton wood, river birch and box elder.

The stream bank community includes an abundance and variety of flowering herbaceous plants. Where streams are fed from wetland areas, as in much of Middleborough, acid loving plants colonize the banks like ferns, cardinal flower, marsh marigold and Indian poke. In shaded areas, ferns may dominate.

An unusual wetland community is the natural bog community characterized by evergreen shrubs, sedges and sphagnum moss. These areas are created when small, deep kettle hole ponds are covered with a floating mat of vegetation. The anaerobic decomposition that occurs beneath the mat keeps the growing medium acidic, and will support only a select, acid tolerant plant community including: cranberries, bog laurel, red and white cedars, as well as some unusual plants like sun dews, bog orchids and pitcher plants.

Forested Land

According to the 1980 University of Massachusetts Vegetation Survey, forest types in Middleborough can be categorized into four groups closely related to soil characteristics. White Pine (*Pinus strobus)* forests and white pine and oak mixes [White Oak (*Quercus alba*) and Red Oak (*Q. rubra*)] are abundant in the north and western part of town. They are located on well-drained soils. Oak forests typically exist on dry sandy soils and, on excessively dry soils; the scrub oak is frequently mixed with Pitch Pine (*P. rigida*). This is found on the course soils in the southeastern portion of town. Pine and Red Maple (*Acer rubrum*) forests, and Atlantic White Cedar (*Chamaecyparis thyoides*) and red maple swamps make up two distinct forest types within the wetland soil associations.

There is unique vegetation communities located in patchy stands throughout town. Atlantic White Cedar is found in both Great Cedar Swamp and Little Cedar Swamp and the Weston Forest. Southern New England is considered to be the northern limit of pure stands of Atlantic White Cedar, which under suitable conditions, are reputed to be the densest of any North American trees. Several small American Holly (*Ilex opaca)* stands are located throughout south and east Middleborough as well as Eastern Hemlock (*Tsuga anadensis)* on the north shore of Tispaquin Pond and in south Middleborough. Black Walnut (*Juglans nigra),* American Beech (*Fagus grandifolia*), Shagbark Hickory (*Carya ovata*) and Ironwood (*Ostrya Virginiana*) trees can be found along the Taunton River.

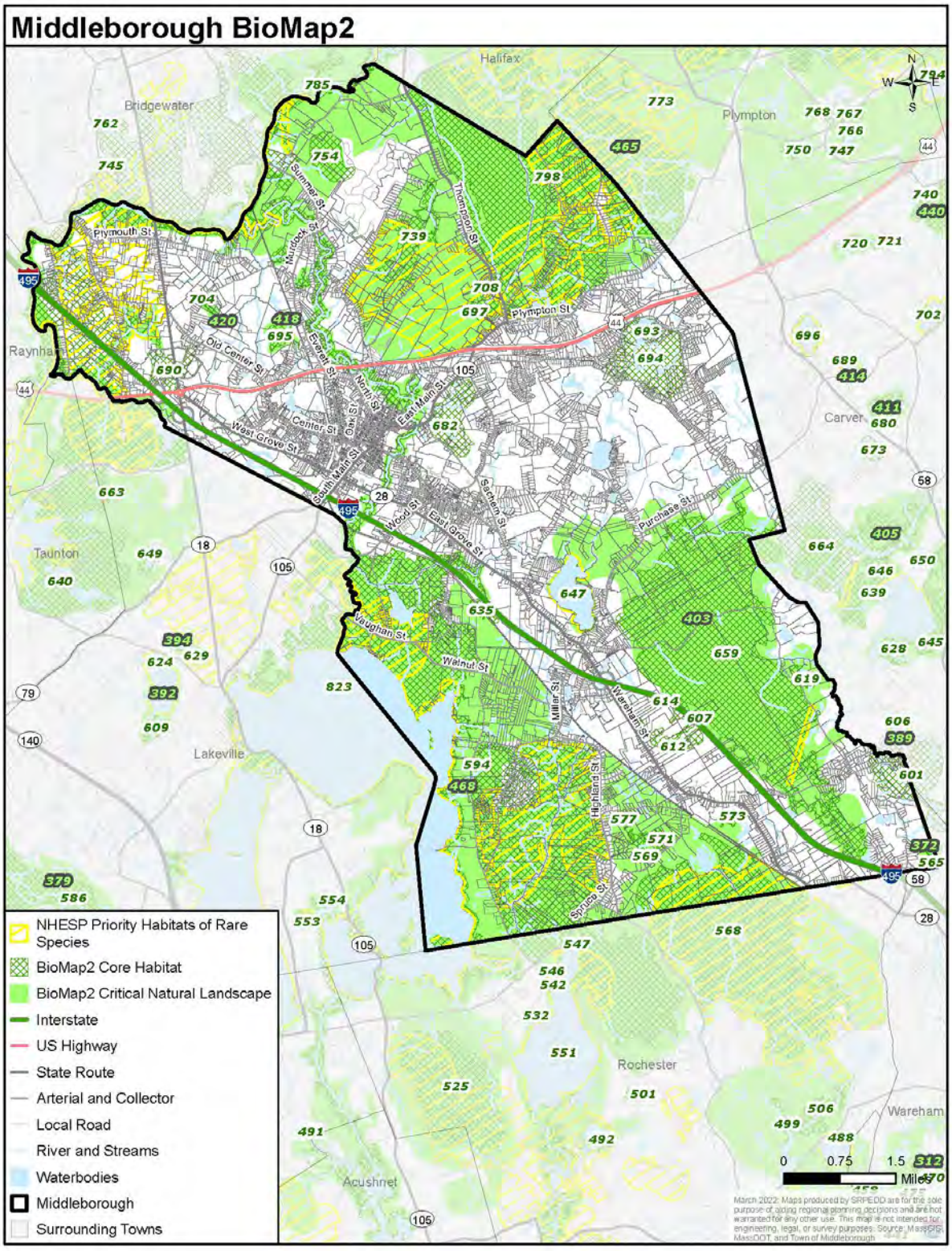
Core Habitats

According to the NHESP BioMap and Living Waters: Guiding Land Conservation for Biodiversity in Massachusetts produced in 2004, there are five Core Habitats in Middleborough. Core Habitats have been identified as the most critical sites for biodiversity conservation across the state. Core habitats represent habitat for the state's most viable rare plant and animal populations and include exemplary natural communities and aquatic habitats. Core Habitats represents a wide diversity of rare species and natural communities and these areas are also thought to contain virtually all of the other described species in Massachusetts.

Middleborough has five Imperiled Natural Communities. Imperiled communities typically have 6-20 site or few remaining acres in the state. These Imperiled communities include: Alluvial Atlantic White Cedar Swamp, Coastal Plain Pond shore, Pitch Pine – Scrub Oak Community, Coastal Atlantic White Cedar Swamp, and Kettle hole Level Bog.

In 2010 *BioMap 2* was published as an update to the 2001 *BioMap* and 2003 *Living Waters*. The BioMap 2 report for Middleborough was produced in 2012. Within this updated report it states that "Middleborough lies on the border of the Bristol Lowland/Narragansett Lowland and the Cape Cod and Islands Ecoregions. The Bristol Lowland/Narragansett Lowland Ecoregion is an area of flat, gently rolling plains. Forests are mostly central hardwoods and some elm-ash-red maple and red and white pine. There are numerous wetlands, some cropland/pasture, and many cranberry bogs. Many rivers drain this area. The Cape Cod and Islands Ecoregion was formed by three advances and retreats of the Wisconsin Ice Sheet. The resulting terminal moraines, outwash plains, and coastal deposits characterize the area with their sandy beaches, grassy dunes, bays, marshes, and scrubby oak-pine forests. There are numerous kettle hole ponds, swamps, and bogs. Much of the surface water is highly acidic."

Figure 21: BioMap2 Areas in Middleborough



Alluvial Atlantic White Cedar Swamp

Alluvial Atlantic White Cedar swamps differ from other Atlantic White Cedar wetlands in that they occur within the floodplain of rivers and streams or at the fringes of open marshy areas along ponds. They receive annual or semi-annual overbank flooding making them more mineral-rich than other Atlantic White Cedar wetlands. Water saturated peat, generally 1 meter thick in alluvial examples, overlies the mineral sediments, and standing water generally occurs for half of the growing season or longer. Atlantic white cedar (*Chamaecyparis thyoides*) and red maple (*Acer rubrum*) dominate the tree layer, and highbush blueberry (*Vaccinium corymbosum*) and sweet pepperbush (*Clethra alnifolia*) occur in the shrub layer along with silky dogwood (*Cornus amomum*). The herb layer is comprised of species common to very wet, open or enriched sites. Alluvial Atlantic white cedar swamps can function as vernal pool habitat if water remains standing for 2-3 months and they lack fish; these areas provide important amphibian breeding habitat.

There are two distinctive threats to this community. They are land clearing for agriculture, commercial and residential development, and interference of normal hydrological functioning as a result of development. Selective cutting is detrimental to the persistence of cedar swamps because hardwoods, such as red maple, out-compete and replace the cedar. It is recommended that no clearing or filling of these wetlands be allowed.

Coastal Plain Pond shore

Coastal Plain Pond shore communities of various sizes and quality are scattered throughout the Core Habitat. This habitat is found along shallow, highly acidic groundwater ponds in glacial outwash, usually with no inlet or outlet. Water rises and falls with changes in the water table, typically leaving an exposed shoreline in late summer. In wet years, the pond shore may remain inundated. Vegetation along the pond shore is correlated with flooding regime – from dry to waterline and not every pond shore has every zone. Coastal plain pond shores have an abundance of state-protected and globally restricted rare plants. It provides habitat for at least 43 rare animal and plant species.

There are multiple threats to this community, the greatest of which is from over-development of coastal Massachusetts which impacts pond shores directly through housing and recreation and indirectly through water withdrawal.

Pitch Pine – Scrub Oak Community

Pitch Pine – Scrub Oak communities are globally rare, fire dependent, shrub-dominated communities with scattered dense trees. They develop on droughty, low nutrient soils – usually deep, coarse, well-drained sands derived from glacial outwash. Pitch pines form an open canopy above a shrub layer dominated by shrub oaks, scrub oak (*Quercus ilicifolia*) and sometimes dwarf chinquapin oak (*Q. prinoides*). Scattered openings of variable size support patches of heathland or grassland vegetation – more or less sparse lowbush blueberry (*Vaccinium angustifolium*), bearberry (*Arctostaphylos uva-ursi*), lichen patches and various ground cover species. They provide habitat for many rare plant and animal species.

Threats to this community include development, fragmentation, and erosion from heavy trail use. Fire suppression and severe wildfires are also a threat.

Coastal Atlantic White Cedar Swamp

Coastal Atlantic White Cedar Swamps typically occur at low elevations, less than 40 ft. above sea level, in basins of overlaying sand and gravel deposits or glacial lake bottom sediments. Atlantic white cedar (*Chamaecyparis thyoides*) is the dominant tree mixed with red maple (*Acer rubrum*). Young thickets

provide excellent cover for deer, rabbits, and birds. The rare plant Heartleaf twayblade (*Listera cordata*) has been associated with this habitat. Rare animals associated with coastal Atlantic white cedar swamps include; blue-spotted salamander (*Ambystoma laterale*), mystic valley amphipod (*Crangonyx aberrans*), four-toed salamander (*Hemidactylium scutatum*), pale green pinion moth (*Lithophane viridipallens*), hessel's hairstreak (*Mitoura hesseli*) and Northern Parula (*Parula Americana*).

There are two distinctive threats to this community are land clearing for agriculture, commercial and residential development, and interference of normal hydrological functioning as a result of development. Selective cutting is detrimental to the persistence of cedar swamps because hardwoods, such as red maple, out-compete and replace the cedar. It is recommended that no clearing or filling of these wetlands be allowed.

Kettle hole Level Bog

Kettle hole level bogs are a subset of level bogs that occur in ice block depressions in sandy glacial outwash. They are typically small, round, and they lack inlets or outlets. Kettle hole level bogs have similar vegetation to level bogs (mixture of tall and short shrubs that are predominantly members of the Heath family – Leatherleaf (*Chamaedaphne calyculata*) is dominant) except that the vegetation is typically in a ringed zonation pattern. Often the outer wet moat is dominated by a mixture of highbush blueberry (*Vaccinium corymbosum*) and swamp azalea (*Rhododendron viscosum*) bordering to the interior by a ring of rhodora (*Rhododendron canadense*). The mat has a mixture of tall and short shrubs that are predominantly members of the Heath family (i.e. *ericaceous*) – Leatherleaf is dominant. Scattered, stunted coniferous trees occur throughout. Moats surrounding kettle hole level bogs can function as vernal pool habitat if water remains standing for 2-3 months and they lack fish.

Hydrologic alteration and nutrient enrichment from road and lawn runoff and trampling from humans affect peat mat integrity are its biggest threats (aside from complete destruction if not subject to regulatory protection).

Supporting Natural Landscape

Supporting Natural Landscape provide buffers around Core Habitats, connectivity between Core Habitats, sufficient space for ecosystems to function, and contiguous undeveloped habitat for common species. Supporting Natural Landscape represents potential land protection priorities once Core Habitat protection has been addressed.

Endangered, Threatened and Species of Special Concern – Plants

The State Natural Heritage and Endangered Species Program has prepared general mapping to indicate areas critical to state-listed (rare) species. These areas are shown generally to protect the species from disturbance. The majority of the critical habitats are within the northern portions of Middleborough along the Taunton River, and around the Assawompset Pond Complex. As mentioned earlier, there may be thousands of vernal pools within Middleborough that are not certified by NHESP and therefore may be unprotected or could be afforded additional protection through existing state and federal regulations as they would be classified as Outstanding Resource Waters.

The following table lists the vascular plants documented in Middleborough that are either Endangered, Threatened or of Special Concern. **Endangered (E)** species are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts. **Threatened (T)** species are likely to become endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range. **Special Concern (SC)** species have suffered a decline that could threaten

the species if allowed to continue unchecked or occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened in Massachusetts.

Table 4.3 Rare and Endangered Plant Species in Middleborough

Common Name	Scientific Name	MESA Status	Last Observed
Dwarf Bulrush	*Lipocarpha micrantha*	T	2013
Foxtail Clubmoss	*Lycopodiella alopecuroides*	E	2017
Lion's Foot	*Nabalus serpentarius*	E	1900
Long-leaved Panic Grass	*Panicum rigidulum ssp. pubescens*	T	2019
One-flowered Pyrola	*Moneses uniflora*	SC	1980
Pale Green Orchis	*Platanthera flava var. herbiola*	T	1997
Philadephia Panic Grass	*Panicum philadephicum ssp. philadephicum*	SC	2000
Plymouth Gentain	*Sabatia kennedyana*	SC	2010
Pondshore Knotweed	*Persicaria puritanorum*	SC	1990
Round-fruited Seedbox	*Ludwigia sphaerocarpa*	E	2017
Stiff Yellow Flax	*Linum medium var. texanum*	T	2021
Taperleaf Water-horehound	*Lycopus rubellus*	E	2000
Three-angled Spike-sedge	*Eleocharis tricostata*	E	2018

E. Fisheries and Wildlife

Middleborough's diverse geography provides habitat for a wide variety of species, from upland forest species to open field and wetland inhabitants, as well as pond and riparian species. Some wildlife species use different habitat areas for nesting and breeding, feeding and watering, or transitory stopovers. An important example of this is the annual herring run up the Nemasket River which is one of the most productive warm water fisheries in southeastern Massachusetts and part of what fisheries experts consider the region's most significant alewife run.[9] Today, the spring spawning run of alewife and blueback herring up the Nemasket River into the Assawompset Ponds averages between 500,000 to 800,000 consistently. In 2002, it was estimated that one million herring came up the Nemasket River into the Assawompset ponds. There is concern over the population numbers since in the last 6 years there have been 3 droughts.

Mammal species in Middleborough are typical woodland and wetland varieties. While black cats (fishers) and otter may have been common at one time, species adaptive to suburban land uses prevail today. See the list below. Suburban development has disrupted a natural balance causing deer populations to soar, unabated by *natural* predators and more recently, a growing population of the very adaptive coyote.

Some of the common mammals include:

Chipmunk	gray squirrel	muskrat	vole
Coyote	red squirrel	opossum	weasel
Deer	Mink	rabbit	woodchuck
Fox	Mice	raccoon	skunk
Otter			

Common birds:

[9] Taunton River Stewardship Plan (July 2005)

Crows	Pheasant	geese	quail
Ducks	Heron	woodcock	blue jays
Hawks	meadow lark	turkeys (re-introduced)	owls
song birds	Doves	ruffed grouse	sea gulls

Common reptiles and amphibians:

Salamanders	Toads	green frog	ribbon snake
Bull frog	tree frog	painted turtle	green snake
spring peeper	snapping turtle	garter snake	black snake

Native fisheries:

brook trout	largemouth bass	small mouth bass	bluegill sunfish
pumpkin seed sunfish	eastern chain pickerel	brown bullhead catfish	Alewife & Blueback herring
yellow perch	black crappie	golden shiner	carp

The Taunton River watershed supports 29 native fish. There are several fish ladders in Middleborough, associated with the Nemasket River, including structures at the Assawompset Dam, Thomas Memorial Park and Oliver Mill Park. These fish ways are overseen by the Middleborough-Lakeville Herring Fishery Commission and also the MA Division of Marine Fisheries. These fish ladders must be kept in working order. Obstruction to herring migration and otherwise harassing anadromous fish is against the law and punishable with fines. In order to protect the population only native indigenous people can harvest the herring currently.

Fish that could be introduced include: Tiger Musky and Northern Pike in warm water streams, and Brown Trout, Rainbow Trout and Brook Trout in cold water streams.

Endangered, Threatened and Species of Special Concern – Other

According to the Natural Heritage & Endangered Species Program there are a total of twenty protected species residing in Middleborough. Estimated habitats protected by law are depicted on the National Heritage and Endangered Species Program (NHESP) Priority and Estimated Habitats Map.

According to The Massachusetts Audubon Society there are three Important Bird Areas in Middleborough. The first area mentioned earlier in the plan is the Assawompset Ponds Complex, the second area is the Rocky Gutter Wildlife Management Area, and the third is the Cumberland Farms property within Middleborough and Halifax.

Birds:

Common Name	Species Name	Status	Last Observed
American Bittern	*Botaurus lentiginosus*	Endangered	1992
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	2019
Barn Owl	*Tyto alba*	Special Concern	1985
Common Gallinule	*Gallinula galeata*	Special Concern	1992
Common Loon	*Gavia immer*	Special Concern	2016
King Rail	*Rallus elegans*	Threatened	1995
Long-eared Owl	*Asio otus*	Special Concern	1974

Northern Parula	*Parula americana*	Threatened	1995
Pied-billed Grebe	*Podilymbus podiceps*	Endangered	1984
Upland Sandpiper	*Bartramia longicauda*	Endangered	1994
Vesper Sparrow	*Pooecetes* gramineus	Threatened	2009

Reptiles:

Common Name	Species Name	Status	Last Observed
Blanding's Turtle	*Emydoidea blandingii*	Threatened	1994
Eastern Box Turtle	*Terrapene Carolina*	Special Concern	2020
Eastern Hog-nosed Snake	*Heterodon platirhinos*	Special Concern	1991
Northern Red-bellied Cooter	*Pseudemys rubriventris*	Endangered	2019
Wood Turtle	*Glyptemys insculpta*	Special Concern	1993

Others:

Animal	Common Name	Species Name	Status	Last Observed
Amphibian	Blue-spotted Salamander	*Ambystoma laterale pop. 2*	Threatened	2017
Amphibian	Eastern Spadefoot	*Scaphiopus holbrookii*	Threatened	1931
Butterfly/Moth	Water-willow Stern Borer	*Papaipema sulphurate*	Threatened	2015
Dragonfly/Damselfly	Ringed Boghaunter	*Williamsonia lintneri*	Threatened	2022
Fish	Bridle Shiner	*Notropis bifrenatus*	Special Concern	2003
Moth	Water-willow Stem Borer	*Papaipema sulphurata*	Threatened	2015
Mussel	Creeper	*Strophitus undulatus*	Special Concern	1947
Mussel	Eastern Pondmussel	*Ligumia nasuta*	Special Concern	2014
Mussel	Tidewater Mucket	*Leptodea ochracea*	Special Concern	2010

Wildlife Corridors

Wildlife Corridors are defined as narrow strips of land that differs, usually in terms of dominant vegetation, from the surrounding area. They serve as traveling avenues for wildlife species between two similar yet fragmented habitat areas, and provide important sources of food and cover for many species. (Indiana Division of Fish & Wildlife: Wildlife Corridors: Habitat Management Fact Sheet, December 2004). According to Pat Swain from the Massachusetts Division of Fisheries and Wildlife does not have an official definition for wildlife corridor.

Some obvious corridors in Middleborough are the large swamp areas such as the Great Cedar Swamp, Meetinghouse Swamp, Beaverdam Swamp and the large swamp area within the Rocky Gutter Wildlife Management Area. The most notable riparian corridors in town are the Taunton River and the Nemasket River but other riparian corridors include the following: Fall Brook, Purchade Brook, Black Brook, Beaverdam Brook, Whetstone Brook, Rocky Gutter Brook, Rocky Meadow Creek, Shorts Brook, Woods Brook, Double Brook and the two main Brooks that flow through the Great Cedar swamp which are Raven Brook and Bartlett Brook. Some of these riparian corridors may be barriers to certain terrestrial animals.

The Assawompset Pond Complex is another important wildlife corridor as there have been Bald Eagles seen nesting here and of course the Alewife and Blue-black Herring utilize the pond complex after their long journey up the Nemasket for spawning. Loons have also been introduced recently.

Some of the major barriers to terrestrial wildlife in Middleborough include Route 495 because it fragments much of South Middleborough from the rest of Middleborough and Route 44, which fragments Northern Middleborough from the rest of town. Other notable barriers are where Fuller Street in the eastern portion of town fragments the Great Cedar Swamp from the Little Cedar Swamp of which used to be one continuous swamp. The Meetinghouse Swamp and the upland that would connect it to the Beaverdam Swamp are bisected by Precinct Street.

Coldwater Fisheries

In October of 2014, the Massachusetts Division of Fisheries and Wildlife (DFW) provided communities with another important conservation planning tool, an online map of Coldwater Fisheries Resources (CFR). Coldwater streams are state classified as Critical Areas, and they are certified by DEP under its "Outstanding Resource Water" Programs. These streams provide important habitat for a number of species, including trout. Trout are a very important indicator species in gauging the health of a coldwater stream as they are typically more sensitive to changes in temperature, water quality, and stream flow within their resident streams. The CFR database is derived from fish samples collected annually by DFW staff biologists and technicians. The hope is to update the database as new streams are sampled annually by staff.

The current CFR database shows four certified coldwater fisheries in Middleborough: Fords Brook, Fall Brook, Poquoy Brook and; an unnamed tributary (UNT) to the Fuller Street Bog Reservoir. While Puddingshear Brook is a certified coldwater fishery, it is only the Lakeville portion that carries this certification. Many of the coldwater streams in the area occur as very narrow brooks, creeks, or spring fed waterways that emerge from and flow through heavily vegetated areas, are unnamed, and in some cases, don't appear on maps.

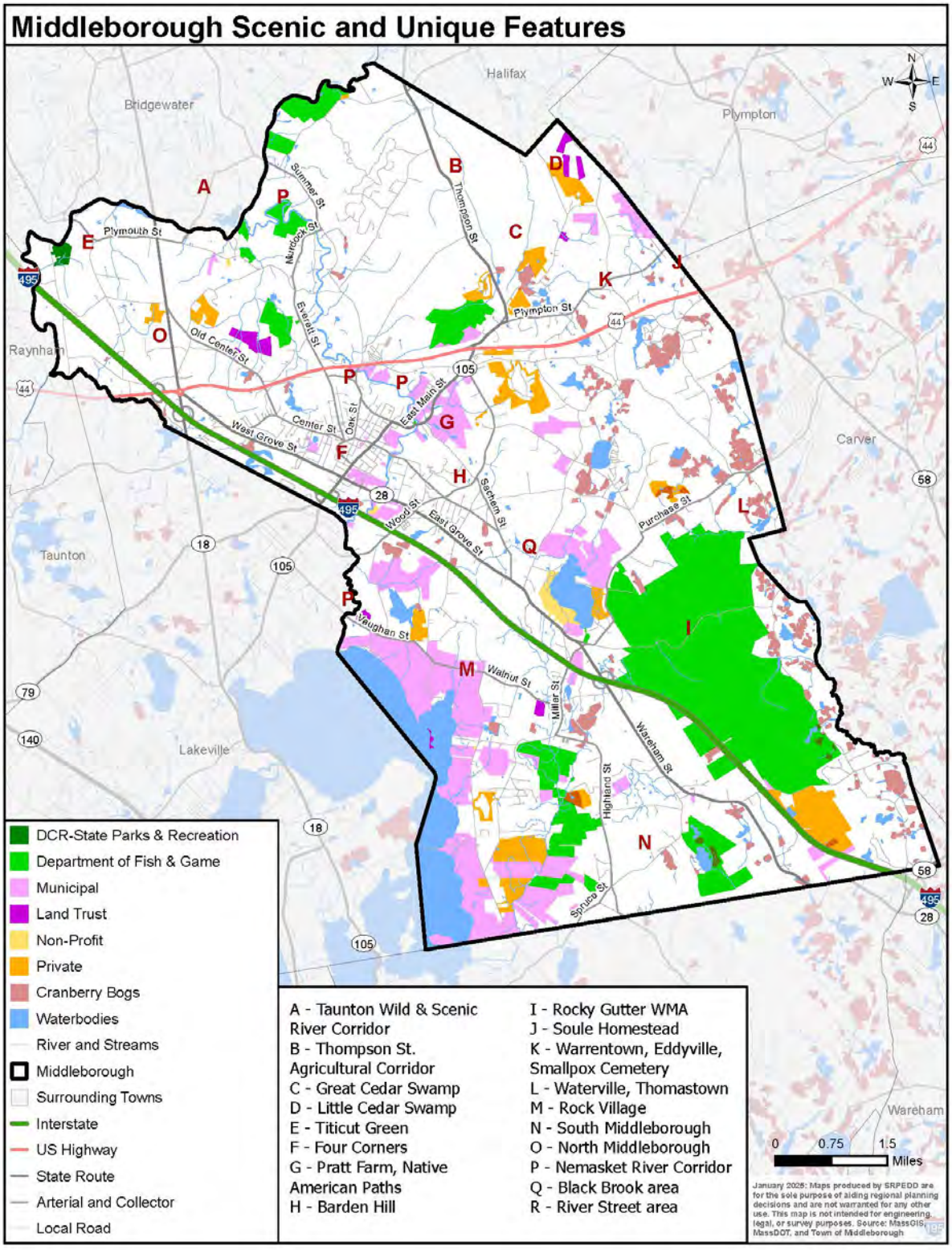
Threats to CFRs include roadway runoff, cutting of streamside vegetation, and other activities that can reduce the amount of shading and increase the stream's temperature. Small breaks in streamside vegetation can affect the entire reach of a coldwater stream. An even greater threat to CFRs may be the general lack of awareness of where these critical resources are located within the Middleborough area.

F. Scenic Resources and Unique Environments

The unique visual features of the landscape are a combination of natural and man-made elements. This includes Historic homes, churches and farms throughout town and within the historic villages. There are several notable Scenic Resources and Unique Environments that can be found within the town. For starters, Barden Hill for one is the highest point in town, there are glacial erratics within the Black Brook area in south Middleborough, and there are clay deposits within the River Street area which was historically used as a brick factory. Additionally, Middleborough has lots of wetland soils and cranberry bogs. More information on the various scenic trails, historic structures, historic places, and scenic roads can be found

below. A wonderful resource on historical features is a blog site on the internet by Michael Maddigan who is also currently on the Historical Commission. The blog is called *Recollecting Nemasket* and is found at http://nemasket.blogspot.com/

Figure 22: Scenic and Unique Features Map



Trails:

Indian Trail along the Nemasket River
This is one of seven defined paths running through town. This path ran from the wading place a little below the Star Mills off East Main Street to Plymouth. There was an upper path and a lower path. These were all part of the Native American and early Colonists route from Plymouth to the Taunton River and Narragansett Bay.

Oliver's Walk
This is in the Muttock section of town. While this path was largely destroyed by the installation of a sewer line from downtown to the sewage treatment plant, it was originally part of Peter Oliver's Oliver Hall, located just above the walk on a bluff overlooking the river.

Nemasket Cemetery Footbridge
There was a walking bridge over the Nemasket River at the end of a path from North Street. The pilings are all that remain along with stone steps that go up the hill to the cemetery.

Abandoned Stage Coach Route in South Middleborough
This trail goes from Rocky Gutter Street south to the Town line.

Historic Structures

Eddy Houses
There are a few Eddy houses. One is the Zachariah Eddy House located at the Eddy Homestead at the Eddyville Green, the Joshua Nathaniel Eddy Houses that face one another across Plympton Street and the William S. Eddy House which is on Plymouth Street opposite Savery's Pond at Waterville.

Small Pox Cemetery and Hospital
This is located at the corner of Brook and Soule Streets near the Plympton line.

Tom Thumb House
This is on Plymouth Street and is where Charles Stratton and Lavinia Warren lived. Lavinia's birthplace was across the street.

Shovel works building walls at Oliver Mill Park
These buildings once produced shovels at the site occupied by Judge Oliver's Ironworks in the Muttock section of town.

Oliver House and Estate
Judge Oliver built this house for his son Dr. Peter Oliver in 1769. This house is located off of Plymouth Street near Route 44. It is the only surviving house in the town at which all of the major figures in colonial Massachusetts were visitors. The town now owns this property.

Oliver Mill Park
This is located off Nemasket and Spring Streets and can be seen from Route 44. This area is maintained by the Park Department and the Lion's Club. There is a shoreline, picnic tables and foot bridges to use. This is part of the Nemasket River and has one of the town's fish ladders for the migrating herring to use each spring.

Oliver Hall
This house was burned by local inhabitants in 1778, during the toughest winter of the American Revolution. It is likely that the foundation of the Hall remains beneath the present field.

Colonial Fort
This fortification was built at the rear of the Park Department playing fields and behind the former Junior High School (now the Early Childhood Center) is. In this fort the local inhabitants took shelter during the early part of King Phillip's War in 1675.

Reed Cemetery
This is on Marion Road.

Ernest Pratt Ice House
Located off East Main Street this Ice house supplied ice to the town up until the 1930's.

Isaac Backus House
Reverend Isaac Backus Built this house, located on Plymouth Street just before the Titicut Green. A Baptist minister he lectured widely advocating the separation of church and state. Although a controversial figure, he corresponded with James Madison and helped influence the formulation of the First Amendment to the U.S. Constitution.

Gurney House
Now the Parsonage for the North Congregational Church at the Titicut Green. Reverend David Gurney lived here as an early minister of the North Congregational Church.

Pratt Free School
Known as Titicut Academy, this school funded by the Pratt Family of North Middleborough was incorporated in 1856 and provided free education to the children of local residents.

North Congregational Church
This church was established in 1744. The current structure was erected in 1893 after the existing structure was struck by lightning.

Historic Places

Fort Hill
This site is near the Taunton River was occupied by Native Americans from about 8600 BCE. A fort was built for protection from neighboring tribes at some point in the 17th Century. Isaac Winslow and Stephen Hopkins spent the night here on their first visit to Massasoit in 1621. Protected under the Massachusetts Department of Conservation & Recreation.

Thompson Street agricultural land
This area starts at Plympton Street and goes into Halifax and is also known as part of Route 105. For a time, there was a neighborhood group that looked into preserving the agricultural integrity of this area. This Street has the last Dairy Farm in Middleborough called Lolans Farm that is run by Sam & Susan Shields as well as sweeping views to the Great Cedar Swamp. The street is being reviewed by the Massachusetts Historical Commission as a National Historic Register Area. This area is also part of the 26-man purchase.

Hand Rock (Barden Hill)

Hand Rock commemorates the site from which Isaac Howland shot an Indian at the beginning of the King Philips War in 1675. The local settlers were at the time huddled in the colonial fort behind the Early Education Center. The story is told that an Indian was shouting insulting comments to the settlers and that Howland, aiming along flintlock was able to shoot the Indian from a distance of about 300 yards.

Daniel's Island
Daniel Island is located near the northerly shore of Tispaquin Pond, close to the Frederick Weston Forest.

The Great Rock
This site is located behind Rock Street and is a Native American ceremonial site.

The Danson Stone
A colonial artifact, five foot in diameter and is an unfinished millstone, partially cut from a granite ledge in the eastern part of town.

Wampanucket Native American Settlement
Known as the 12 men's purchase. This land extends from Assawompset Pond to Fall Brook and then to Tispaquin Pond close to Black Brook. Purchased from the Native Americans, the deed was recorded June30, 1672.

The Wading Place
Location along the Nemasket River at East Main Street marked the intersection of several of the Indian trails from Plymouth.

Nemasket Hill Cemetery, overlooking Nemasket River
Overlooking the Nemasket River, this is one of the town's earliest cemeteries. There are decedents of the Mayflower buried here as well.

South Main Street to Nickerson Ave., historic homes on tree lined street.
A principal avenue into the center of town this street is lined with architecturally important turn of the century Colonial, Greek Revival and Victorian homes.

Soule Homestead
A town owned, preserved 18th Century farm, the Soule Homestead is leased to a local group that promotes environmental and agricultural education. Highlights include a sheep shearing and a Folk Festival.

Pratt Farm including Upper and Lower Native American Paths
A town owned property that was once the site of a local farm; it is now under the management of the Conservation Commission and provides trails & open space for local residents.

Stone Bridge at Nemasket and Spring Streets on the Nemasket River
The bridge was built in 1819 at Oliver Mill Park.

Rocky Gutter Street forested wildlife habitat
This is extensive wildlife habitat owned and managed by the State. It is over 3,000 acres.

Cranberry bogs, throughout town
Cranberry Bogs compose a significant geographic and visual feature of the country landscape. Many are more than 100 years old and signify the importance of the cranberry harvest to the local economy.

Assawompset, Pocksha, Long Great Quittacas Pond

This pond complex comprises the largest single geographic feature of the Middleborough and Lakeville area. Shared by both communities, they are important for their history as well as their value as water resource. Provides water supply to cities of New Bedford & Taunton as well as a back-up supply for Fall River.

Scenic Roads

There are several road sections that have been designated as "scenic roads" through Town Meeting vote. Scenic Roads are mentioned under M.G.L. Chapter 40, Section 15C. The 1998 Open Space Plan identifies seven streets as Scenic Roads, some of which are on connecting routes:

- Marion Road from Cherry Street to the Rochester town line
  (Approved at the June 8th, 1992 Town Meeting)
- Purchase Street from Faye Avenue to Chestnut Street
  (Approved at the June 8th, 1992 Town Meeting)
- Chestnut Street from Faye Avenue to Tispaquin Street
  (Approved at the June 8th, 1992 Town Meeting)
- South on Tispaquin Street to Wareham Street
  (Approved at the April 29th, 1987 Town Meeting)
- Summer street from Route 44 to Murdock Street
  (Approved at the October 15th, 1979 Town Meeting)
- Plymouth Street from Summer Street to the Bridgewater town line
  (Approved at the May 21st, 1990 Town Meeting)
- Pleasant Street from Route 44 to Plymouth Street
  (Approved at the January 7th, 1985 Town Meeting)

G. Environmental Challenges

The environmental challenges that Middleborough has faced and currently face does influence the planning efforts for future open space and recreation considerations. We want to make sure that those who enjoy these areas are safe to enjoy them and that any of our open space and recreational planning does not contradict with our goals and potential future acquisitions. As stated earlier a new Hazard Mitigation Plan is being completed by the Planning Department.

Hazardous waste and brownfield sites:

There are a number of sites in Middleborough from its industrial past and present that have been investigated through the Massachusetts Department of Environmental Protection Reportable Release program. In total Middleborough has a list of 201 sites that have been assigned a Release Tracking Number (RTN). There are two sites that have qualified at one time or another as superfund sites, which are the Rockland Industries site on Plymouth Street and J & G Auto Salvage on Plain Street. Middleboro Plating on Cambridge Street is a site which has been targeted for a brownfield assessment.

The Rockland Industries site is a Tier 1 site under the Massachusetts Contingency Plan (MCP) and has been under scrutiny for the last 50 plus years to get cleaned up. The state DEP now has jurisdiction over the clean-up and citizens in town have formed a committee through town meeting in the fall of 2007 called Citizens Environmental Health Impact Committee to look over the clean-up of this site as well as the clean-up of other sites of concern in town. The Rockland Industries site is still a work in progress with the hope that someday soon the remediation will be completed. In December 2011 the DEP removed a contaminated area known as the NAPL (Non-Aqueous Phase Liquid) area near the old foundations of former buildings on site. New testing wells will be installed near this area to see if the removal was successful.

Landfills:

There is one landfill in Middleborough that is located at Brook and Plympton Streets. In a letter dated May 27, 2010 the Department of Environmental Protection issued a final approval on an application for BWPSW11 Major Modification of a landfill – Landfill Gas Extraction and Control System Stage II Permanent Gas Flare & Extraction Wells.

Erosion:
Erosion and sedimentation are right now our greatest source of stream flow degradation. There is especially concern with the flow of the Nemasket River since the floods of 2010 and continued weather extremes between droughts and wetter periods. Erosion prevention during earth removal projects and other construction projects is closely monitored by the Conservation, Planning and Public Works Departments to hopefully prevent any sedimentation into wetland resource areas from these activities.

Chronic Flooding:
Besides the areas of obvious flooding near those perennial streams, creeks, and rivers that are mentioned in section 4-part C (water resources) of this plan there are a few other areas that are worth noting for their chronic flooding. The Woloski Park neighborhood off of Plymouth Street is known for its seasonal flooding year after year and on Vernon Street near the Poquoy Brook. In March of 1968 there was a three-day period of rain totaling 5.35 inches that impacted several areas in town. As reported in the Brockton Enterprise newspaper more than 100 homes had their basements pumped out. At the Nemasket River on Wareham Street the automatic flood gate opened, a brook washed out some of Precinct Street, there was flooding at the Taunton River at the Bridgewater town line on Summer Street, Houses on slabs on Everett Street flooded and the Winnetucksett Stream flooded out the area near the Halifax town line. Other areas impacted during this storm event were France Street, Cross Street, River Street east of Thompson Street and Susan Lane. Vernon Street at the Middleborough/Taunton town line at the Poquoy Brook was flooded, the Purchade Brook flooded out part of Plymouth Street near Middleboro Chemical (also known as Rockland Industries a Tier 1 site under DEP's Massachusetts Contingency Plan.) In the spring of 2010, there were three flood events in the month of March that rivaled or surpassed the 1968 floods.

Sedimentation and Ground and surface water pollution:
Non-point source pollution from storm water run-off is one of the most threatening environmental problems affecting Middleborough today. Run-off from roads carries sediments, oils, heavy metals and salts to rivers, streams, wetlands and ground water supplies. Shallow, private water supply wells on small lots with close proximity to road fronts are particularly vulnerable. Storm water running over disturbed ground erodes loose soil particles and deposits sediments in streams and wetlands. While clean soil hardly seems like a pollutant, the results of sedimentation are sand choked streams and filled wetlands. Nationwide, erosion and sedimentation (of even clean soil particles) are the greatest source of stream flow degradation.

Storm water runoff from agricultural-use land can carry chemicals and nutrients to receiving water bodies. Nutrient loading associated with animal waste from feed lots and manure storage has been a problem in the past, particularly in the Taunton River Watershed. The Town implemented an approved Stormwater Bylaw & Regulations in 2019 & 2020.

Failing septic systems and older on-site waste disposal systems that are under-designed for modern use and standards. Practices that were not thought to be of concern in the past have been identified as environmental concerns of the present and future. Deteriorating underground fuel storage tanks, for example, and hazardous waste sites from earlier industries are problems today. Highway construction with the avoidable and unavoidable degradation that accompanies road work is another concern that visits Middleborough today and into the future. A problem of growing concern is pollution from road salts. Soluble materials applied to the extensive highway system in Middleborough during snow and ice conditions can find their way into public water supplies, private wells, surface water bodies, and wetlands.

New Development:
As with the rest of Southeastern Massachusetts, Middleborough has experienced an increase in residential development. Since 2015 the town has had 8 subdivisions approved resulting in 82 lots and 10,639 linear feet of roadway.

Impaired water bodies:
Under the Federal Environmental Protection Agency (EPA) TMDL for Category 3 waters Assawompset Pond, Pocksha Pond, Great Quittacas Pond has not been assessed as of yet. There are points along the Taunton River that have been impacted in the past through livestock using the river and creating sedimentation impairing the flow of water downstream. The Purchade Brook has been potentially impacted by a nearby contaminated site and has been devoid of wildlife for years. The flow of the Nemasket River has been impacted by sediment and invasive plant species taking hold along its banks and within the channel.

Environmental Equity:
Although the Town has decent access to open spaces from the urban downtown since the downtown is a close distance to the heavily used Pratt Farm and to several ball fields, town pool, etc.…there are areas in town that could have more open spaces and parks for the residents to enjoy. These areas in town that could use more open space are the following: North Middleborough, Along the Taunton & Nemasket Rivers, part of East Middleborough to South Middleborough in the Rocky Meadow Street, Wall Street and Chestnut Street areas, and in the Thompson Street agricultural area toward Halifax.

Other concerns:
Another issue of importance to the wetland resources in Middleborough is the invasion of non-native species which is a problem in many parts of the region. Many non-native species exist within the area and are not considered pests. However, plants such as these can over run an area and are not easily controlled, mainly because the most destructive mitigation measures such as herbicides also impact the desired native species. The pristine nature of the Taunton River has kept it relatively free of invasive species.

Over the last ten years the defoliation of the deciduous trees in the area both in Middleborough and regionally has been devastating. The defoliation has been caused by a number of pests such as the Gypsy Moth Caterpillar, the Tent Caterpillar, and the Winter Moth Caterpillar. More recently hundreds and possibly thousands of oak trees have been impacted by Sudden Oak Death resulting from a fungus-like pathogen called *Phytophthora ramorum*. Emerald Ash Borer is devastating all the ash tree species and the Beech Scale has caused some of the very old beech trees along South Main Street to be taken down.

Site preparations for anticipated growth, solid waste disposal, air pollution and noise pollution are chronic concerns. Identification of environmental problems that affect the natural community and public recreational opportunities should be identified in a more specific, targeted approach over the next five years, with Actions proposed in the internal yearly Open Space and Recreational Plan Updates.

Section 5 - Inventory of Lands of Conservation and Recreation Interest

The protection of open space is important to Middleborough so that the residents and others can enjoy the preservation of natural spaces, which create habitat for wildlife, protect water supplies, and other sensitive areas that are unique to the area. By “protection” we mean that the land is to be preserved for only specific uses such as passive recreation or active recreation, archeological and habitat preservation or as stated earlier for water supply protection. The inventory of open space in Middleborough includes private and public land that is customarily used for conservation, public water supply protection, recreation, agriculture

and forestry. All of these lands may enjoy various levels of protection. Included in these protected are three (3) Agricultural Preservation Restriction (APR) properties; 295 Cherry St (Fallbrook Farm), 46 Soule St (Soule Homestead), and 415 Plymouth St (Picone Farm). All town-owned recreation land, conservation land, water supply protection land, and town forest in sensitive resource areas are assumed to be protected by the town as open space. By protecting open space, we create climate resiliency and carbon sequestration.

Figure 23: Middleborough Open Space and Recreation Land by Level of Protection

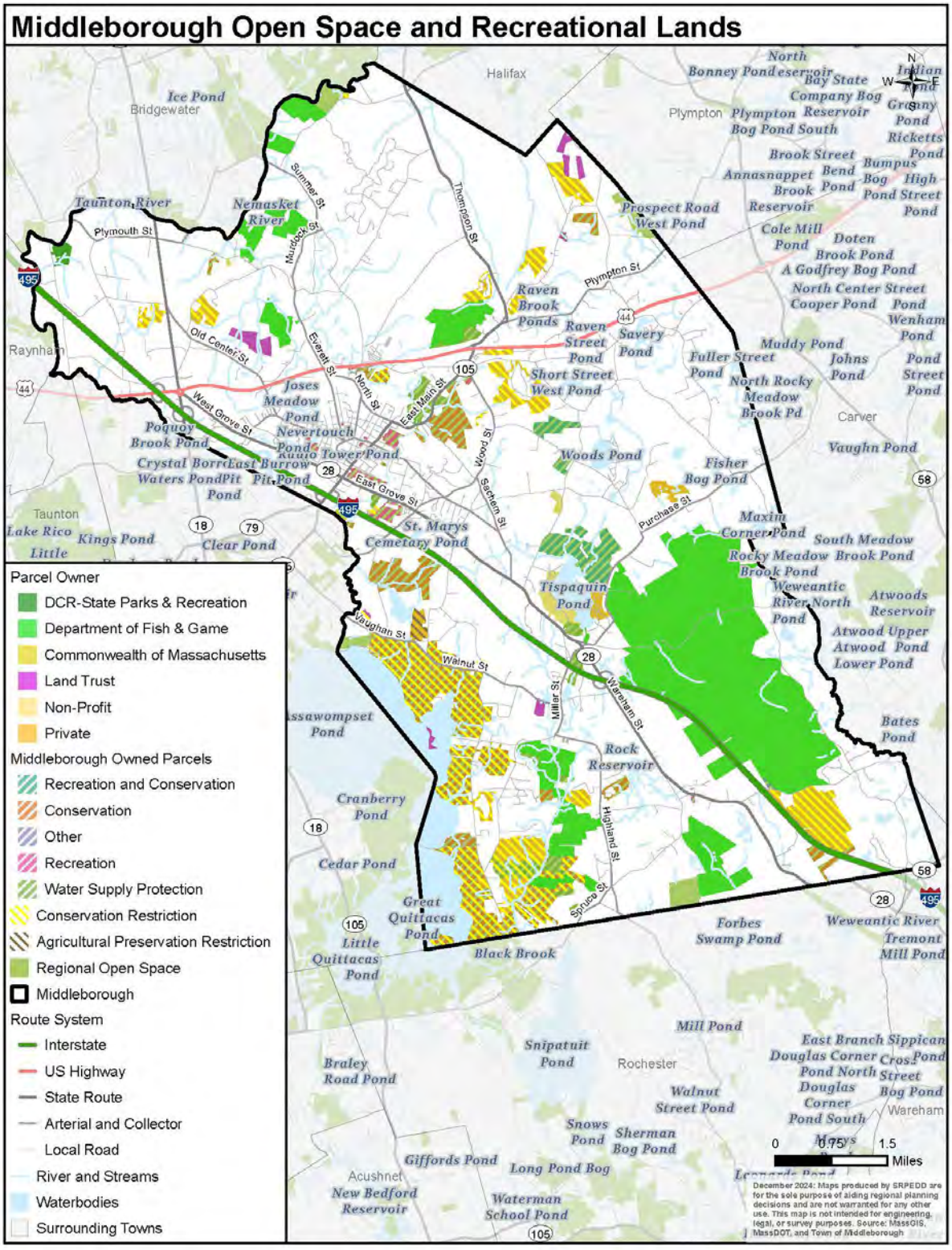
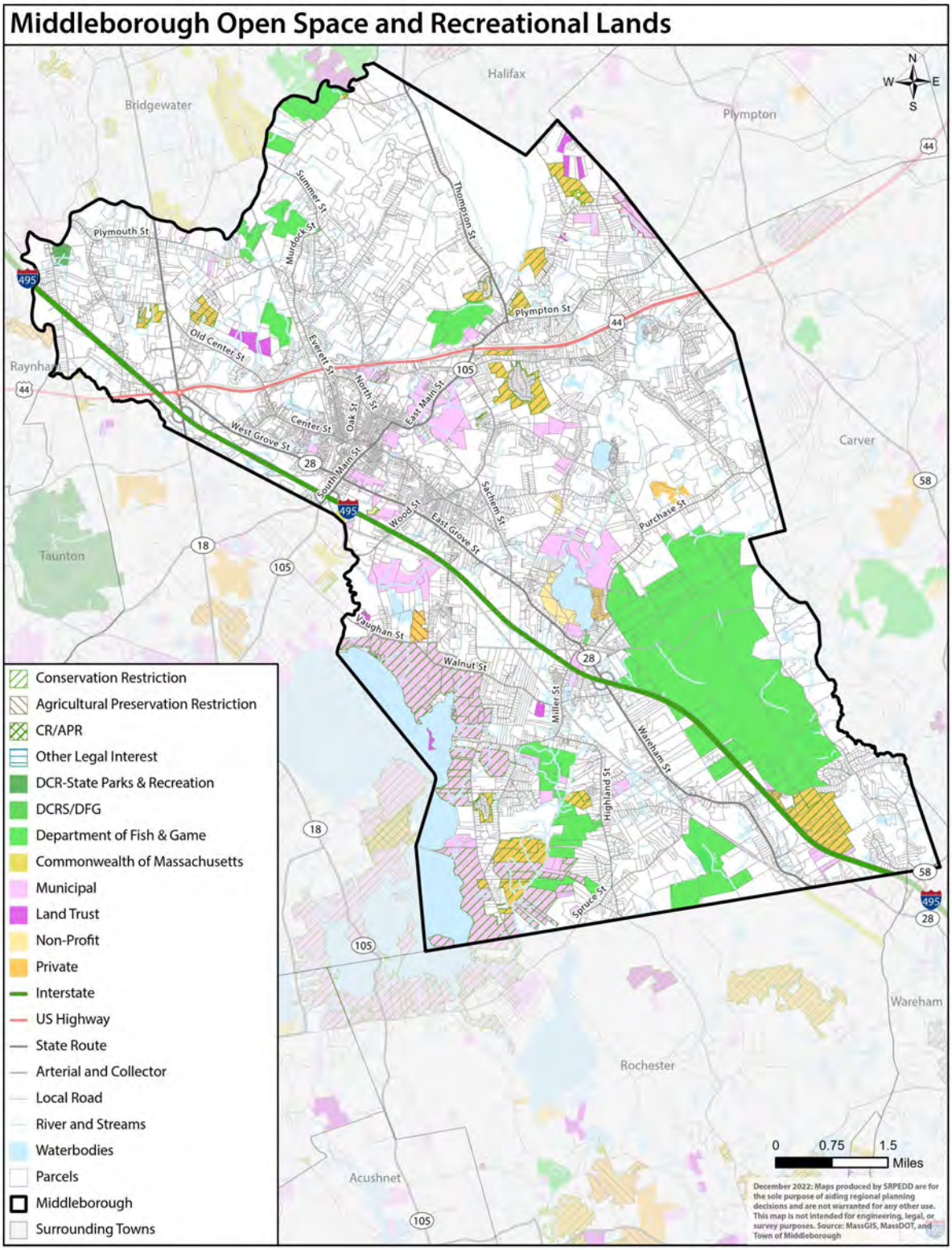
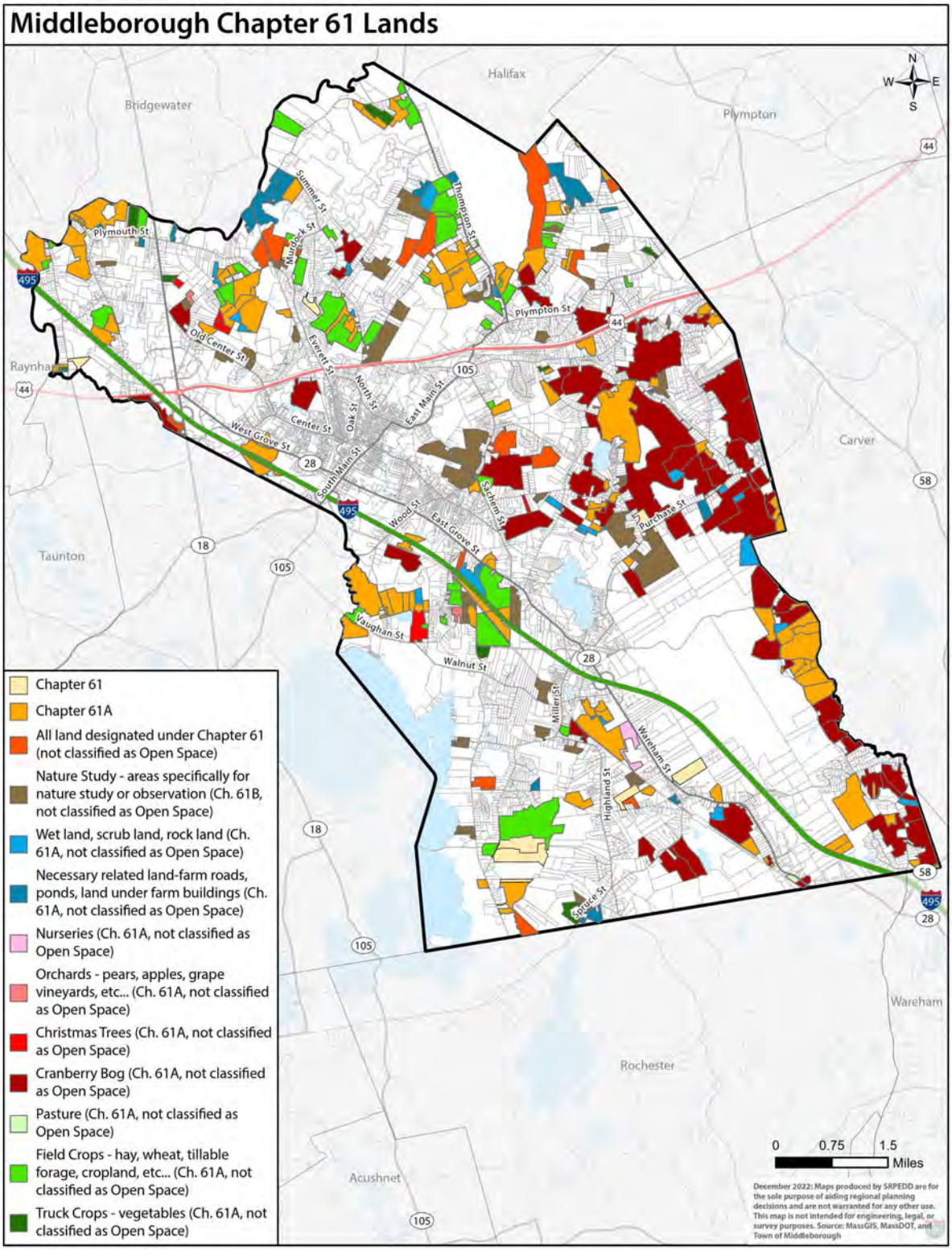


Figure 24: Open Space and Recreation Lands by Owners



Farmland enrolled in the Massachusetts Farmland Assessment Act, Chapter 61A, forestland enrolled in the Chapter 61 Forest Assessment Program, and recreation land enrolled in the Chapter 61B Recreational Land Program are included in the open space inventory because they are temporarily secured with conservation easements. Chapter 61 lands are depicted on the *Chapter 61 Lands* map found on the next page. However, these types of conservation easements provide temporary protection, and while they afford the town the option to purchase, without the financial ability to exercise that option at will, this land is vulnerable to development. Therefore, they are inventoried as unprotected parcels. A list of Middleborough Open Space Land Inventory can be found in **Appendix A**. Action Items that propose cataloging these priority preservation parcels and others are described in Section 9 of this Plan.

Figure 25: Middleborough FY2022 parcels showing Chapter 61 lands



Section 6 - Community Vision

A. Description of the Process

The Middleborough Conservation Commission through the Conservation Agent initiated and directed the preparation of the 2024 – 2034 Open Space and Recreation Plan update in 2021 and 2022, working with SRPEDD and an Open Space and Recreation Plan Working Group. Public surveys went online via the project website and on the Towns Facebook page. Surveys were available in paper form upon request. The Open Space and Recreation Working Group received surveys with some interesting results. There were also several Open Space & Recreation Working Group meetings held and open to the public.

The Open Space and Recreation Survey results and comments are attached as **Appendix D**.

The final 2024 – 2034 Open Space and Recreation Plan was distributed to the Conservation Commission, Planning Board, and Select Board for their review and comments attached as **Appendix G**. They understand that this Plan Update will undergo yearly internal updates going forward.

The Community Goals and Action Items were identified and developed during the Plan update development process. They are presented in a broad fashion for subsequent tailoring and implementation by the Open Space Plan Committee or equivalent over the next ten years and for each internal yearly Plan update.

B. Statement of Open Space and Recreation Goals

Consistent with past surveys the surveys conducted in 2021-2022 show that the residents of Middleborough have overwhelmingly indicated that protecting the intrinsic quality of life, defined as a traditional rural small town to be the highest priority. Instilled with a strong sense of community, residents identify with their landscape, farm and forestland, cranberry bogs, abundant and diverse wildlife, villages and historic past.

From some of the comments received through the surveys it is clear that the residents of Middleborough would like to see more recreational opportunities such as a public beach, ATV trails, better river access, picnic areas, child and family neighborhood play areas, dog parks, additional ball fields, museums, recreation center building, bike paths, and horse trails just to name a few.

These goals could be achieved by protecting available land now and in the future and redeveloping unused or abandoned sites for recreation use. This seems more attainable with the Community Preservation Act in place. By working with the different recreation groups in town such as the Park Department, horse groups, youth sports groups etc.…this vision can be realized.

Section 7 - Analysis of Needs

Relative to the overall goal for the town as stated above, resource protection needs to derive from an inventory and evaluation of natural resources as identified by a compendium of sources including soils maps, estimated habitat maps, water supply maps, wetland maps, historic and archeological maps, detailed conservation plans, open space maps, farm, forest and recreation maps, river way plans and parcel maps, zoning maps, park plans and other sources. Community needs were identified through the survey that was conducted in the fall 2021 and winter 2022.

A. Summary of Resource Protection Needs

In order to preserve the quality of life in Middleborough it is essential to tend to the following resource protection needs. This is consistent with the community needs, which are fundamentally inter-dependent.

- Protection of current and future drinking water supplies.
- Preservation and protection of wildlife habitat.
- Protection of buffers adjacent to surface water bodies.
- Protection of river and stream corridors.
- Maintaining buffers of undeveloped land.
- Agricultural sustainability.
- Continued Timber Stand Improvements through forestry management.
- Preservation of scenic vistas.
- Preservation of the town's unique cultural history.

Middleborough is a large town by area that includes land bordering a major drinking water supply in southeastern Massachusetts - Assawompset Pond, Pocksha Pond and Great Quittacas Pond all interconnected and known as the Assawompset Pond complex. This is also a potential future water supply for Middleborough. Assawompset and Pocksha Ponds form the headwaters of the Nemasket River that runs north through the center of town. Management of the dam on Assawompset Pond to the Nemasket River most directly effects the welfare of the entire river corridor and the diverse habitat that it supports, including the range of the American Bald Eagle, Loons and the most significant anadromous fish run in Massachusetts (Massachusetts Division of Fisheries and Wildlife). River flow also directly impacts historic Oliver Mill Park on the Nemasket River. Fall Brook and associated wetlands contribute flow to the Nemasket River from Tispaquin & Woods Ponds.

The Nemasket River joins the Taunton River in an area of archeological significance, and together, becomes part of the Wampanoag Canoe Passage connecting Cape Cod Bay in the north to Narragansett Bay in the south. These river corridors contain a wealth of historic and archeological sites, diverse natural habitats, aesthetically beautiful natural areas, and farm and forestland. The Taunton River is the second largest watershed in southeastern Massachusetts, and in addition to the resident wildlife, is also a migratory stop along a north to south flyway.

Middleborough Public Water Supply wells are located south of Tispaquin Pond, and along the Nemasket River Valley, within the Taunton River watershed. This riparian beltway, including Assawompset, Pocksha and Great Quittacas Ponds, Tispaquin Pond, Woods Pond, Fall Brook, Black Brook and Purchade Brook(s), along with the Taunton River and the Nemasket River, requires careful consideration and protection.

In the southeastern part of the town, the Weweantic River and contributing streams and brooks, including Crane Brook and Double Brook, also provide a diverse wildlife habitat and support the reservoirs of the local cranberry wetland agriculture. The Weweantic River is within the drainage basin of Buzzards Bay, and is entirely recharged through ground water. In order to continue viable cranberry agriculture in Middleborough (known as the cranberry capitol of the world), it will be essential to protect the Weweantic River from over development and loss of recharge potential.

The ranking of resource protection needs, according to the 2022 Open Space Survey was: 78% of the respondents thought it was very important to preserve open spaces to protect water supplies, 76% to preserve wildlife habitats, 73% to preserve land along rivers, 72% to preserve forest land, 64% to preserve open spaces that meet recreational needs (horse trails and walking trails), 63% to preserve agricultural land, 62% to preserve remaining open spaces in developed areas, 55% to protect park land, 52% to preserve

places of historical value, 51% to protect scenic vistas, and 48% to preserve archeological sites. Another question asked was which approaches do you support to protect natural areas and/or acquire recreational land (yes percentages): 90% encourage programs of land giving, 90% protect land through zoning, 89% encourage private nonprofit and public partnerships, 88% purchase land with partial state reimbursement, 88% tax incentive for private conservation, 81% conserves sensitive tax titled land (land taken for taxes), 78% purchase development rights or conservation easements, 77% encourage private sector recreational investment, and 75% to purchase land with town funds.

B. Parks & Recreation and Community Needs

The Statewide Comprehensive Outdoor Recreation Plan (SCORP), Massachusetts Outdoor 2017, is a five-year plan developed by the Commonwealth's Executive Office of Energy and Environmental Affairs. The plan is required for state participation in the federal Land and Water Conservation Fund (LWCF) grants programs. The SCORP also provides an overview of the recreational preferences of the citizens of each geographic region of the Commonwealth as determined through a public participation and outreach process. The profile of recreational use afforded by the SCORP also provides municipalities with a planning tool for addressing the future needs and uses of our outdoor recreational resources.

The SCORP summary of the Commonwealth's most popular recreational activities indicates that water-based activities and playgrounds provide the most popular facilities for adults and seniors are hiking and walking trails; adolescents find athletic fields and skate parks most popular; for children, playgrounds and athletic fields, and; for preschoolers are playgrounds and water facilities. The SCORP also indicated that trails are the type of facility that has increased the most in popularity over the past five years, as well as the activity that people believe will increase the most in popularity over the next five years.

Special User Group Needs:

Seniors

Middleborough's senior population participates in a number and variety of special programs and provides a great deal of volunteer time to local causes and committees. Middleborough is similar to state and national trends in that its population is aging and remaining more active than in years past. Data supplied by SRPEDD (based on 1990 and 2010 U.S. Census figures) indicates that the percentage of Middleborough's population aged 45-65 has increased by 196% since 1990, and the population aged 75 and over has increased by 140% since 1990. Furthermore, Middleborough's Median Age increased by almost (10) years during this same period (from 31.8 years in 1990 to 41.2 years in 2010), and passed the state Median Age figure for the first time. By 2010, 52% of the population of Middleborough was aged 45+. According to the most recent ACS (2016-2020), Middleborough's population keeps aging. The current median age is 44.3 years old (3.1 years older than 10 years ago).

Much of the statistical aging of the population is attributable to the Oak Point 55+ housing development in north Middleborough. This facility has continued to grow since 1990 and could potentially expand in the future. While Oak Point does provide numerous onsite amenities for residents, many people in this age group, both in survey responses and in community meetings, were looking for the Town to provide increased outdoor activities for seniors (walking, hiking, etc.). This is an issue that the Town will have to deal with in looking at a comprehensive open space and recreation strategy that includes life-long opportunities for citizens of all ages and abilities.

Teens

While the under 20 demographics in Middleborough is the smallest subset of residents, access to age-appropriate amenities for teens are still valuable to the community as a whole. Many of the current amenities for this age group come from opportunities within the school department or with private organizations that rent the town's fields. Some of these offerings include Softball during the spring and Fall through the Middleborough Youth Softball, Madness Softball, and East Coast Pitching/Lady Sting Softball teams, Football during the summer and fall through the Mitchell Memorial Club (MMC), and the Football & Cobras teams, Flag Football during the summer and fall through MMC, Cheerleading in the summer and fall through MMC, Baseball in the spring through the Middleborough Little League, Aces Baseball, and Gateway Baseball teams, Soccer in the spring and fall through the International Soccer and Middleborough Youth Soccer teams, as well as Lacrosse during the spring and fall through the Aces Lacrosse and Riverhawks Lacrosse teams.

Citizens with Disabilities

The Town has prepared a self-evaluation and transition plan for its recreational facilities as required under the Americans with Disabilities Act (ADA). These plans are carried out through a municipally appointed ADA Coordinator. The coordinator is responsible for working to bring all municipal services, infrastructure, and buildings into compliance with the Act. The ADA Coordinator is not responsible for privately owned facilities.

The ADA Transition Plan, located in **Appendix F** of this document, contains an inventory of the public recreation facilities of the Town of Middleborough (exclusive of the School Department facilities; the School Department must conduct their own assessment and prepare a Transition Plan for their facilities). The Transition Plan takes inventory of the improvements needed to bring a facility into ADA compliance. The Town has been attempting to address these needs as funding allows and has accomplished some of the necessary tasks.

All future recreation facilities should be designed with the needs of citizens with disabilities in mind, in terms of site access, physical use, and ability to view events and cultural/scenic landscapes.

Previously, the Conservation Commission along with the Commission of Disabilities were awarded a grant from the Department of Conservation & Recreation in the amount of $32,704.89 to create an accessible trail at the Pratt Farm Conservation Land.

Other Needs:

- Preservation of rural qualities.
- Preserve agricultural land use.
- Protection of historic sites.
- Protection of scenic roads.
- Protection of archeological sites (Native American significance).
- Preservation of air, water and sound quality.
- Improve handicapped access in all recreation areas.
- Provide wholesome recreational activities for Middleborough youth.
- Improve and maintain recreational properties.
- Provide ample access to water resources for recreation.
- Develop multi-use trails for horse riding, hiking, cross-country skiing and snowmobiling.
- Maintain access to forestland for fishing and hunting.
- Provide access to Assawompset, Pocksha and Great Quittacas Ponds for limited recreation and wildlife appreciation.

- Develop bike paths as an alternate mode of transportation and recreation.
- Develop picnic areas particularly near a swimming beach.

According to the 2021 Open Space Survey, 65% of respondents identified Middleborough as a rural community as opposed to 68% thinking that way in 2013. Asked what they liked best about living in the town, most identified aspects of small-town living including, open space, farming, low crime rates, quietness, clean air and water, forestland and friendliness. Consistent with every survey conducted throughout the last 15 years, the residents of Middleborough have overwhelmingly indicated that protecting the rural, small-town quality of life is the highest priority.

Middleborough adopted open space zoning as a method of protecting rural characteristics while allowing for new development. It was anticipated that this by-law would encourage creative landscape designs within subdivision plans that would be less land consumptive and environmentally and aesthetically pleasing. This provision has been underused in part because local land developers lack experience with this type of land use design.

Historic and archeological sites have always been most important to Middleborough residents. Not surprisingly, these sites happen to be located in the most sensitive natural resource areas, principally along the rivers and streams (throughout history used for water, fishing, hunting and transportation). Some areas are protected while others are particularly vulnerable.

Oliver Mill Park, on the Nemasket River is an historic, recreational site that is also significant to the herring running up the Nemasket. The potential development of the land off Precinct Street that was formerly for the proposed casino and Route 44 and improvements to Route 44, abutting the park could significantly impact the condition and uses of the facility.

With 31 miles of river flowing through the town, there is very little publicly owned access, or protected habitat and open space. Aside from acquiring land along waterways, access can be provided by developing launch areas and parking places along public rights of way, against bridge abutments and in sub-division plans as they are approved. Residents clearly need public access to enjoy the traditional Wampanoag Canoe Passage, which encompasses 76 miles of paddling between Battleship Cove in Fall River and Cape Cod Bay. The Town is actively working on preservation of 190 +/- acres known as Picone/Sunnyside Farm off Plymouth Street along the Nemasket River.

Multi-use trails are needed to access public open space and woodland currently available in town. Over 64% of the respondents indicated with high importance to protect open spaces to meet recreation needs such as walking trails and horse trails and 69% indicated that Middleborough needs more walking or biking trails. 45% of respondents felt that we needed more conservation areas. Horse trails have also been requested by an interested group of residents. This is also consistent with past plans and surveys. Moreover, trails would enable greater access for a variety of uses to all public open space. In addition, there is a group in town interested in pursuing bicycle paths. Private property rights should be respected and trail easements should be legally obtained in cooperation with property owners. SRPEDD is assisting the Town to map all trails. Also, during the COVID-19 pandemic there has been increased use of open space and trails.

One of the most pristine natural places in Middleborough is currently off limits to even the most casual and passive appreciation: Assawompset Pond, Pocksha Pond and Great Quittacas Pond, part of the Assawompset Pond system known as the New Bedford Water Works. Historically, Native Americans in several successions settled the area. Later, the ponds were popularly enjoyed for recreation and at one point included a popular riverboat from Assawompset Pond up the Nemasket River. Today, the City of New Bedford owns most of the surrounding land that is not private, and currently prohibits access to Middleborough residents. Lack of any public access and hence appreciation is a long-standing problem. In

1998 the Morgan property was acquired through self-help funds and now provides limited access to view Pocksha Pond although boating and swimming is still off limits there.

There is no public swimming area on any of the ponds in Middleborough. 25% of the respondents stated that they would like to have a beach area. One area of town that this could be possible is the Tispaquin Pond area, which has high build-out anticipation but would be desirable. There are also town wells on Tispaquin Pond, which is also within the Nemasket River Corridor, a desirable natural resource zone.

The surveys included many comments on maintenance and improvement of town owned recreational land. Suggestions include developing a map of existing facilities, trail development, better communication, and a system of volunteer stewardship. See **Appendix D** for more on the survey.

C. Management Needs, Potential Change of Use

There is a need for consistent management of town owned parcels. The Conservation Commission would like to establish a volunteer stewardship program where people could help be the watch dogs and help maintain the Conservation land in their own neighborhoods. There have been recent issues with enforcing the rules of some of the Conservation properties. There has been an increase use of All Terrain Vehicles (ATV's), which has prevented some from enjoying the peacefulness of the properties. The ATVs are also an issue because they disturb habitat, create erosion and create trails where there should not be trails. Time to organize such a program has been limited due to priorities under the Wetlands Protection Act and other obligations of the Conservation Department.

There is a need for more recreation facilities such as baseball, softball and soccer fields. The hope is that with the Community Preservation Act that land the town either already owns or could potentially own could be improved upon using this funding source to create new recreation areas. Many people surveyed also suggested the town create more neighborhood parks. Since the town is so large neighborhood parks would be ideal especially in the more rural areas. However, we would need to make sure the Park & Recreation Department was properly funded so these parks could be maintained. The Park Department is working on a new park on Wood Street near Route 28.

It would also be wonderful if the schools and the town could join forces more often to establish an environmental education program using some of the existing Conservation property such as Pratt Farm.

The Conservation Commission currently has a Land Steward Position in their FY2024 Budget to be voted on at the April 24, 2023 Annual Town Meeting.

D. Sport Field Needs for Middleborough Youth Organizations

It is estimated that well over a thousand boys and girls participate in league baseball, football and soccer in Middleborough. Although these organizations are private non-profit, they are available to all children in Middleborough and provide a wholesome outdoor recreational activity for student athletes and their families. Promoting organized activities for Middleborough's youth is a community goal.

The Peirce Playground Complex

The Peirce Playground Complex has two lower baseball fields and a basketball court, and a small playground area, used primarily by younger children, as well as Battis Field which is used for a variety of public, private and school events. Battis Field is used by the Middleboro Cobras as their home field for the football season, as well as the home field of the Mitchell Club Youth Football Program. Some of the special events held at Battis Field include an annual summer Blues Festival, Police Department Fundraising events

and numerous other changing venues. Each event generates hundreds of participants and/or spectators. Also the Hillside on the lower level is used for a variety of events and shows throughout the spring, summer and fall. From early spring until late October fields are used to capacity with hundreds of participants weekly and additional hundreds of spectators. These facilities are used to capacity for 6-7 weeks as part of the Park Department's summer recreation program and heavily used by other groups in spring, fall and winter. This past winter's heavy snow season brought hundreds to the park afternoon, evenings and weekends to use the hill for sledding. More parking is needed here. Park Department has a 501c3 non-profit to be able to apply for certain grants and other funding. There is a new Basketball court on the lower field, one pickleball court and can be used for basketball too. On one of the old tennis courts a skate park was built. That skate park is scheduled to be rebuilt with a large upgrade.

The Town Swimming Pool is the cornerstone of the Park Department's summer programs and is used for swimming lessons, recreational swim, swim teams, water aerobics, private functions and special programs. Pool usage is estimated at 800 children and parents per season for lessons, another 1600 per season, including weekends, for free swim. Usage is defined as the total number of swimmers and parents in the pool over the collective period.

The upper level consists of 3 baseball fields (with several sets of bleachers for spectators) 4 tennis courts, and a gated playground with swings, slides, jungle gyms, etc.

These fields are used by the Mitchell Memorial Club for their youth football teams and cheerleaders, adult church league softball, Babe Ruth League baseball, Legion Baseball, Cranberry League Baseball, and Girls Softball League. Organized usage exceeds 2,000 participants and is generally in full use 6 to 7 days per week. Other parts of the fields and grounds are used by the Middleborough Public Library for special Story Hours (about 30 children plus parents x 8 weeks for an estimated 250 users). The Reads Academy brings students for 6 months per year, estimated usage 3,500. Also, several local Day Care providers bring groups to the parks and playground on a regular basis.

The Oliver Mill Complex at the Nemasket River

Oliver Mill is under the oversight if the Middleborough Park Department. It is primarily a passive recreation area, used extensively by the general public for picnicking, canoeing, and watching the herring run in the spring. Surprisingly it is a very popular spot even in the winter for local workers to stop by and enjoy the natural setting while eating their lunch. It is not monitored for numbers so any estimate is simply a guess. Most any time you will find between 6 and 10 cars there and in the warmer weather often much higher. Oliver Mill Park also attracts visitors from the KOA campground across the street for day use. Each May, the Park department holds an annual Canoe Race which brings about 50 –100 people to Oliver Mill. The complex has had many upgrades through the Community Preservation Committee and the towns' people. Bridges were fixed or newly built, rock formations were secured, maintenance for the Herring Run Festivals of the past, and granite posts were placed around the park.

The West Side Playground

West Side playground is a smaller playground, but well used. Upgrades to the West Side Playground will include a healing garden, picnic area, and soccer fields. Once again numbers are difficult to define, as there is no organized oversight of the attendance.

Field of Dreams

This is the home of Middleboro's Little League Baseball and is under the oversight of the Middleborough Park Department, but by agreement with Middleboro Little League is maintained and managed by the Little League organization at their own expense. It also provides field for Middleboro Youth Soccer. Numbers of participants are well into the hundreds.

Wood Street

Wood Street will have a track and 2 baseball fields. There has not been any significant change in the status or number of the town's fields since last reported in 2015. More fields are needed. Those we have are used to full capacity, and even overflow. The actual numbers and usage is very difficult to provide, but is significantly in the thousands on all fields. The Park Department recognizes that, at this time, the need is beyond our ability to provide and has agreed to help with maintenance on fields at both the Nichols School and Middleborough High School in order to provide more field availability for youth activities. A large majority of the residents of Middleborough enjoy an active, healthy, outdoor lifestyle which should be recognized and encouraged as valuable to us individually and as a community. The acquisition and development of additional fields and parks would add significantly to healthy opportunities for our youth and the betterment of the community.

Under the 2017 SCORP, there were main themes that came out through the public participation process. From the surveys there were goals and objectives created to address over the next five years. The list of goals and objectives are below:

1. Access for Underserved Populations
    a. Support the acquisition of land and development of new open spaces in areas that lack existing or useable open spaces, such as Environmental Justice neighborhoods
    b. Develop parks and open spaces that offer amenities that go above and beyond ADA requirements for people with disabilities
    c. Consider the needs of underserved demographic groups — senior citizens and teenagers — in park and open space designs
    d. Encourage establishment of programming endowments
2. Support the Statewide Trails Initiative
    a. Support the acquisition of land and development of new open spaces that can provide a trail network
    b. Fill in the gaps of existing trail networks
    c. Ensure that any existing or new trails are fully accessible to people with disabilities
3. Increase the Availability of Water-based Recreation
    a. Support the acquisition of land that will provide for water-based recreation
    b. Support the acquisition of land that will increase drinking water supply protection
    c. Develop water-based recreational facilities, including swimming areas, spray parks, boating facilities, fishing areas, etc.
4. Support the Creation and Renovation of Neighborhood Parks
    a. Promote the acquisition and development of neighborhood parks where none currently exist
    b. Develop amenities supported by neighborhood parks, such as playgrounds, off leash dog parks, and community gardens
    c. Work with community development organizations to improve walking access to local parks

A similar trend was seen in Middleborough, with the public survey reflecting a desire for increased amenities for those often-underserved demographic groups such as senior citizens and teenagers, support for expanded trail systems within the town, a want for water-based recreation through public beaches or better river access, and an expansion / improvement of picnic areas, child friendly parks, dog parks, and ball fields.

Section 8 - Goals and Objectives

The following list provides concrete objectives to meet the general goals identified in Section 6 of this Plan.

Goal 1: Protect the intrinsic quality of life, defined as a traditional rural small town. (Building on the resident's identification with the landscape, farm and forestland, cranberry bogs, abundant and diverse wildlife, villages and historic past)

1. Protect ground water resources including Public Water Supply Well Sites and Zone I, II, and III areas.
2. Evaluate, prioritize and preserve or protect parcels necessary for protection of existing Public Water Supply Wells and their Zone of Contribution (I, II and III).
3. Work with the Water Department and Board of Selectmen Water Commissioners to enforce the Water Resource Protection District Bylaw (W.R.P.D.).
4. Identify and prioritize parcels critical to the protection of Middleborough's and the region's water resource, and pursue protection / acquisition of those parcels including in riparian zones and adjacent watersheds.
5. Re-establish the Land Use Committee and have them work closely with the Conservation Commission, the Open Space and Recreation Working Group, and Stewardship Committee.
6. Acquire and protect agricultural land, open space, scenic roads and vistas, and local villages through the use of Community Preservation Act funds.
7. Preserve and promote historic villages throughout town via the adoption of local Historic District designations.
8. Promote land uses within village areas that complement the village center.
9. Protect the historic stone structures and geological formations in town from vegetative growth with routine maintenance.
10. Update and Maintain Historic Oliver Mill Park by making the bridges ADA compliant
11. Promote diversity of natural and rare habitats in Middleborough through community education (social media posts, school programs, and events) and departmental review of projects within the Natural Heritage and Endangered species areas.
12. Educate the community by creating educational materials on the values of open space protection including the advantages of conservation easements and restrictions.
13. Work with land trust to see that preservation goals are met and educate landowners regarding tax incentive options such as Chapter Lands and Tax Credits for donated land opportunities.
14. Work with the Agricultural Commission to support continued viability of agriculture and forest land management through education, best management promotion and incentives, zoning, and promoting 'buy local produce'
15. Work with the Agricultural and Tourism Commissions to create a brochure for the Chamber of Commerce and Town to have available to tell people where to find local produce as part of a 'farm trail'.
16. Continue the program for vernal pool certification on town-owned land and encourage private land owners to participate in the program.

Goal Two*:* Expand recreational opportunities (public beach, ATV trails, better river access, picnic areas, child and family neighborhood play areas, outdoor amphitheater, ice skating rink, dog parks, additional ball fields, museums, recreation center building, bike paths, and horse trails)

1. Continue to update to-scale site maps for each town-owned open space parcel when new information becomes available.
2. Develop Geographic Information Systems (GIS) data on the above points and make this information accessible online.
3. Initiate Critical Land protection for recreational opportunities and other resources.
    a. Pursue this with the City of New Bedford, City of Taunton, adjoining towns, state government, and non-profit organizations such as the Taunton River Watershed Alliance,

the Nature Conservancy, the Parks Department, and the Department of Conservation and Recreation.

4. Manage and improve the Nemasket River Ecosystem, providing benefits for both recreational use off and on the river, while supporting the anadromous fish run.
5. Create a stewardship program with volunteers to monitor and care for each of the open space parcels for all town lands and parks. Improve all existing town-owned open space parcels. Implement trail improvements, public awareness enhancements, public facility improvements, handicapped access improvements, Timber Stand Improvements, invasive species controls, etc.
6. Reorganize an annual stream survey and / or stream clean up.
7. Explore the possibilities of creating a Nemasket/Taunton River Corridor Designation.
8. Implement Open Space and Recreation Planning on a more regional basis.
9. Discover and preserve /acquire historic and archeological sites with the Mass Historic Commission and the Community Preservation Committee.
10. Promote the use of non-motorized modes of transportation throughout Middleborough by implementing trail improvements on town owned parcels to include accessible trails, walking trails, bike trails, and horse trails.
11. Provide and promote wholesome organized recreational activities for Middleborough Youth. (Acquire and improve additional open space for athletic fields and parks).
12. Connect schools to natural areas by either creating new trails (Riverwalk) or marking existing trails for outdoor education programs. (Middle School to Pratt Farm)
13. Encourage exploration by promoting private recreational businesses that conserve open space values and protect wildlife habitats.
14. Develop Forest Management Plans and research the implementation of Timber Stand Improvements (TSI) on town owned forested lands.

Section 9 - Ten Year Action Plan

Successful attainment of the goals and objectives listed in Section 8 will require constant, deliberate collaborative effort by the Town of Middleborough. Beyond the submission and approval of this 2024 - 2034 Open Space & Recreation Plan update, a team of individuals will need to formerly implement actions identified in this Plan to continue the success story that took place at the October 2021 Special Town Meeting to allocate Community Preservation Funding and at the April 2022 Annual Town Meeting to apply for Municipal Vulnerability Preparedness Grant toward the protection of the Picone/Sunnyside Farm off Plymouth Street. To meet the objectives listed in Section 8 – Goals and Objects, the following Action Items:

Goal 1: Protect the intrinsic quality of life, defined as a traditional rural small town. (Building on the resident's identification with the landscape, farm and forestland, cranberry bogs, abundant and diverse wildlife, villages and historic past)					
Goal #	**Priority**	**Year(s)**	**Description**	**Responsible Agencies**	**Funding Source**
1.1	High	On-going	Protect ground water resources including Public Water Supply Well Sites and Zone I, II, and III.	Select Board, Water Dept.	Drinking Water Supply Protection Grant Program, SNEP Watershed Implementation Grant (SWIG), Municipal Funds
1.2	High	On-going	Evaluate, prioritize and preserve or protect parcels necessary for protection of existing Public Water Supply Wells and their Zone of Contribution (I, II and III).	Select Board, Water Dept.	Drinking Water Supply Protection Grant Program, Municipal Funds
1.3	Low	On-going	Work with the Water Department and Board of Selectmen Water Commissioners to enforce the Water Resource Protection District Bylaw (W.R.P.D.).	Select Board, Water Dept.	Municipal Funds
1.4	High	On-going	Identify and prioritize parcels critical to the protection of Middleborough's and the region's water resource, and pursue protection / acquisition of those parcels including in riparian zones and adjacent watersheds.	State, Fed, Non-profit	Drinking Water Supply Protection Grant Program, Municipal Funds
1.5	High	On-going	Re-establish the Land Use Committee and have them work closely with the Conservation Committee, the Open Space and Recreation Working Group, and Stewardship Committee.	Town Staff / Volunteers	Municipal Funds
1.6	High	On-going	Acquire and protect agricultural land, open space, scenic roads and vistas, and local villages through the use of Community Preservation Act funds.	On-going – CPA, Con Com & other grants	Community Preservation Grants
1.7	Low	On-going	Preserve and promote historic villages throughout town via the adoption of local Historic District designations.	Historical Comm., Downtown Committee, Robbins Museum, Tourism, CPA	Municipal Funds

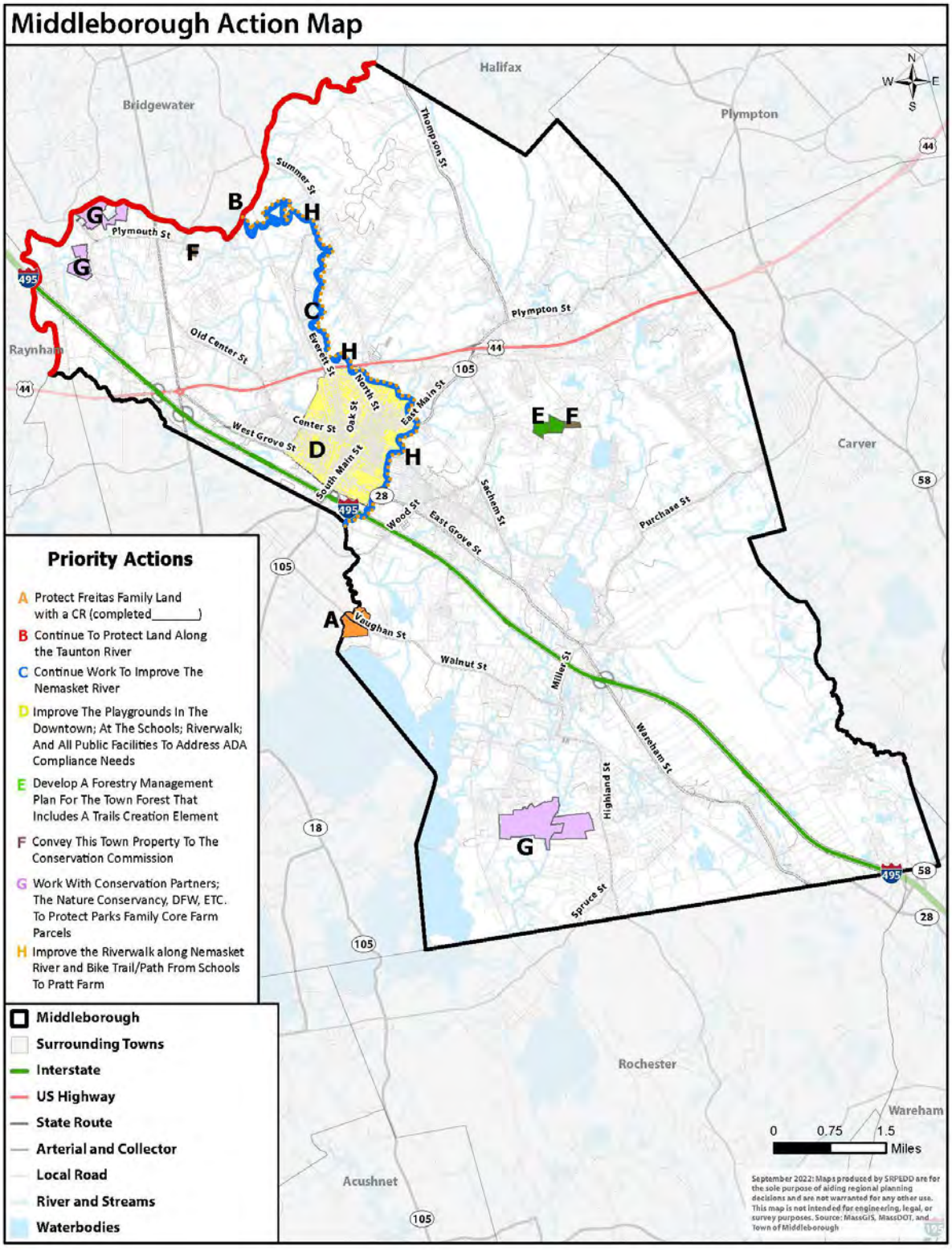
1.8	Low	On-going	Promote land uses within village areas that complement the village center.	Planning	Municipal Funds
1.9	Low	On-going	Protect the historic stone structures and geological formations in town from vegetative growth with routine maintenance.	Historical Comm., Con Com and Robbins Museum	Municipal Funds
1.10	Low	1-2 years	Update and Maintain Historic Oliver Mill Park by making the bridges ADA compliant.	CPA, Park Dept, Comm. On Disability	Parkland Acquisitions and Renovations for Communities (PARC) Grant, Municipal Americans with Disabilities Act (ADA) Improvement Grant, Municipal Funds
1.11	Medium	On-going	Promote diversity of natural and rare habitats in Middleborough through community education (social media posts, school programs, and events) and departmental review of projects within the Natural Heritage and Endangered species areas.	Con Com, Regional Scientists & experts	Municipal Funds
1.12	Medium	On-going	Educate the community by creating educational materials on the values of open space protection including the advantages of conservation easements and restrictions.	Con Com, Non-Profits	Municipal Funds
1.13	High	On-going	Work with land trust to see that preservation goals are met and educate landowners regarding tax incentive options such as Chapter Lands and Tax Credits for donated land opportunities.	Con Com & Non-Profits	Municipal Funds
1.14	Low	On-going	Work with the Agricultural Commission to support continued viability of agriculture and forest land management through education, best management promotion and incentives, zoning, and promoting ‘buy local produce’	Ag. Comm., 4H Clubs, SEMAP, Soule Homestead, Bristol Aggie HS, Land For Good	Municipal Funds

1.15	High	On-going	Work with the Agricultural and Tourism Commissions to create a brochure for the Chamber of Commerce and Town to have available to tell people where to find local produce as part of a 'farm trail'.	On-going – SEMAP, OECD, Ag. Comm.	Municipal Funds
1.16	Low	On-going	Continue the program for vernal pool certification on town-owned land and encourage private land owners to participate in the program.	Con. Com. Non-Profit, Natural Heritage	Municipal Funds
Goal 2: Expand recreational opportunities (public beach, ATV trails, better river access, picnic areas, child and family neighborhood play areas, outdoor amphitheater, ice skating rink, dog parks, additional ball fields, museums, recreation center building, bike paths, and horse trails).					
2.1	Medium	On-going	Continue to update to-scale site maps for each town-owned open space parcel when new information becomes available.	Con Com, SRPEDD, Interns	Municipal Funds
2.2	Low	On-going	Develop Geographic Information Systems (GIS) data on the above points and make this information accessible online.	Con Com, SRPEDD, Interns	Municipal Funds
2.3	Medium	On-going	Initiate Critical Land protection for recreational opportunities and other resources.	Pursue this with the City of New Bedford, City of Taunton, adjoining towns, state government, and non-profit organizations such as the Taunton River Watershed Alliance, the Nature Conservancy, the Parks Department,	Landscape Partnership Grant, Local Acquisitions for Natural Diversity (LAND) Grant, Parkland Acquisitions and Renovations for Communities (PARC) Grant, Municipal Funds

				and the Department of Conservation and Recreation.	
2.4	High	On-going	Manage and improve the Nemasket River Ecosystem, providing benefits for both recreational use off and on the river, while supporting the anadromous fish run.	DMF, Herring Comm, Park Dept.	MassWildlife Habitat Management Grant Program, Municipal Funds
2.5	Medium	On-going	Create a stewardship program with volunteers to monitor and care for each of the open space parcels for all town lands and parks. Improve all existing town-owned open space parcels. Implement trail improvements, public awareness enhancements, public facility improvements, handicapped access improvements, Timber Stand Improvements, invasive species controls, etc.	Con Com, Park Dept., Tourism, Fledglings Clean-up crew, Scouts, MHS	Parkland Acquisitions and Renovations for Communities (PARC) Grant, MassTrails Grant, Municipal Americans with Disabilities Act (ADA) Improvement Grant, Municipal Budget
2.6	Medium	1-2 years	Reorganize an annual stream survey and / or stream clean up.	Volunteer groups	Municipal Funds
2.7	Medium	1-3 years	Explore the possibilities of creating a Nemasket/Taunton River Corridor Designation.	Con Com	Municipal Funds
2.8	Low	On-going	Implement Open Space and Recreation Planning on a more regional basis.	Surrounding Towns, politicians	Municipal Funds
2.9	Medium	On-going	Discover and preserve /acquire historic and archeological sites with the Mass Historic Commission and the Community Preservation Committee.	Historical Comm., Mass Historic Comm., Community Preservation Comm.	Municipal Funds

2.10	Medium	On-going	Promote the use of non-motorized modes of transportation throughout Middleborough by implementing trail improvements on town owned parcels to include accessible trails, walking trails, bike trails, and horse trails.	SRPEDD, other towns	MassTrails Grant, Parkland Acquisitions and Renovations for Communities (PARC) Grant, Municipal Americans with Disabilities Act (ADA) Improvement Grant, Municipal Budget
2.11	High	On-going	Provide and promote wholesome organized recreational activities for Middleborough Youth. (Acquire and improve additional open space for athletic fields and parks).	Park Dept., Comm. On Disability, Select Board, CPA, Schools	Local Acquisitions for Natural Diversity (LAND) Grant, Parkland Acquisitions and Renovations for Communities (PARC) Grant, Land & Water Conservation Fund Grant, Municipal Budget
2.12	High		Connect schools to natural areas by either creating new trails (Riverwalk) or marking existing trails for outdoor education programs. (Middle School to Pratt Farm)	Park Dept., Schools	MassTrails Grant, Municipal Funds
2.13	Low	On-going	Encourage exploration by promoting private recreational businesses that conserve open space values and protect wildlife habitats.	Con Com, OECD, Natural Heritage	Municipal Funds
2.14	Low	On-going	Develop Forest Management Plans and research the implementation of Timber Stand Improvements (TSI) on town owned forested lands.	State Certified Forester, Con Com., DCR	Municipal Funds

Figure 26: Middleborough 2024-2034 OSRP Action Map



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