Section 1: Plan Summary

The Hanover Open Space and Recreation Plan (OSRP) 2017 update is the culmination of almost a year of public input, research, and analysis. The document has been prepared to serve as a planning guide for the various Town staff, committees, boards, commissions, and volunteer groups in Hanover working to support open space and recreation.

Hanover has changed significantly through the years from a rural, bedroom community to a more suburban, developed town, with pockets of its original character spread throughout. Maintaining that historical character and ensuring that open space and recreation assets are preserved is essential to those that live in Hanover as the Town continues to manage its growth.

During this planning process, residents expressed their fondness for sites such as Luddam's Ford Park, B. Everett Hall Field, and the recently constructed Forge Pond Park. An inventory of these areas and others is included in this OSRP as both an educational resource and as a base for the Seven-Year Action Plan, which highlights open space and recreation priorities for the next seven years. The Action Plan provides detailed steps for achieving the plan's goals and objectives, including the relevant parties responsible, timeframe for achieving the action, and potential funding sources. This OSRP also includes an overview of the history of Hanover, its physical development, demographic characteristics, an environmental analysis, and more.

In addition to serving as a roadmap for the town, the final Open Space and Recreation Plan will allow Hanover to apply for specific types of grant funding for projects related to open space and recreation. Once approved by the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), Division of Conservation Services (DCS), Hanover will be eligible for funding opportunities like the Local Acquisitions for Natural Diversity (LAND) and Parkland Acquisitions and Renovations for Communities (PARC) grants, which the Town can use for land acquisition and improvement of parks and other open spaces.

The Town of Hanover hired the Metropolitan Area Planning Council (MAPC) to conduct an update of its 2008 Open Space and Recreation Plan, and this effort was done in conjunction with Hanover300, a master plan for the town. During the course of the OSRP update process, MAPC organized a series of pop-up trail walks, held a public forum, created a survey that was completed by 279 people, and met numerous times with the Town of Hanover's Open Space and Recreation Plan Committee.

Town of Hanover Open Space and Recreation Plan Committee members:

- Mary Dunn, Open Space Committee
- Wally Kemp, Open Space Committee
- Sandra MacFarlane, Assistant Conservation Agent
- April Fore, Parks and Recreation Committee
- Lauren Rodday, Recreation Administrator
- Deb Sullivan, Parks and Recreation Committee
- Amy Walkey, Conservation Agent

Hanover is a charming community that has a deep history and is valued as a wonderful place to live. The overall goal of this planning effort has been to provide another tool for the Town and residents to utilize to help understand the community and how to improve its open space and recreation assets going forward, while also protecting what currently exists.

Section 2: Introduction

Statement of Purpose

The Town of Hanover is a community that resonates with character from its history, open spaces, scenic views, and people who live in the community. As a semi-rural, suburban town only 25 miles from the City of Boston, it is an attractive place to live for many. Since land is a finite resource, competing needs between development and open space preservation exist. Continuing to manage and guide growth, while also protecting natural resources and providing meaningful recreational opportunities, is a challenging but necessary task. This OSRP update serves to provide guidance towards that effort. More specifically, the purpose of this project is to:

- Review and update the 2008 Hanover Open Space and Recreation Plan, specifically in order to identify what has been achieved since the last plan and what tasks remain for meeting the OSRP's goals and objectives.
- Inventory existing open space and recreational resources in Hanover and recommend additional opportunities for acquisition, additional protection, or improvement.
- Inform and educate local residents about their community and existing open space, natural resources, and recreational amenities and why they are important to preserve.
- Obtain and integrate the input of Hanover residents and other local stakeholders in regard to open space and recreation.
- Create the momentum for the implementation of the Seven-Year Action Plan.

Hanover has added a significant amount of both passive and active recreational resources to its arsenal in the years since the 2008 OSRP. The most notable accomplishment is the construction of Forge Pond Park, a 46-acre site that was completed in summer 2014. Financed entirely with $4.3 million in Community Preservation Act (CPA) funds, Forge Pond Park is the largest recreational facility on the South Shore. The park includes a mile-long paved bike path, three baseball fields, three softball fields, three soccer fields, and a pavilion and bathroom building. It was designed to be a destination for tournaments and other high-attendance sports events. The Town of Hanover initially purchased the 75-acre King Street/Cervelli Property, former farmland that Forge Pond Park was constructed on, in 2006 with a $1.4 million CPA bond.

The Curtis School, a former elementary school on the site of Amos Gallant Field, was torn down in September 2012. The 2.74-acre site currently has one Little League and its potential for additional recreational facilities is being assessed.

Forge Pond Park[1]

In July 2010, the Board of Selectmen turned over the Hanover former Council on Aging building to the Parks and Recreation Department. Town Meeting voted to sell the property in May 2016 and it sold in late 2016.

The Town of Hanover has also acquired additional conservation land since completion of the 2008 OSRP. One such site is the Denham Property, a 24-acre site off Circuit Street with walking trails. Another site is the Shinglemill Brook North Parcel, which is 29 acres and located in North Hanover.

In 2014, the Hanover Historical Society created a comprehensive trail map of Hanover with historical buildings and landmarks, open space, and scenic roads. This effort was funded through the Community Preservation Act and was done in consultation with Town boards and committees, particularly the Open Space Committee. The detailed map has been widely distributed throughout town and is an excellent resource for those with limited or significant knowledge of Hanover's open space assets.

[1] Photo source: www.hanoverparkandrec.com/forge-pond-park.php

Planning Process and Public Participation

The Hanover Open Space and Recreation Plan kicked off its most recent update kicked off on August 9, 2016 with meeting of the Open Space and Recreation Plan Committee. At this meeting, Metropolitan Area Planning Council staff, Hanover's Town Planner, and the OSRP Committee discussed past plans, the timeline of the OSRP update process, and the project's scope of work.

MAPC released an Open Space and Recreation Plan survey on August 22, and 279 residents responded to the survey before it closed on October 12. The survey was designed to better understand resident demand and awareness of Hanover's open space and recreational facilities. This provided the most significant source of resident input to help the Town identify opportunities for significant, long-term preservation and improvements that provide the greatest benefit to Hanoverians.

On September 24, MAPC organized a series of "pop-up" trail walks to promote awareness and appreciation of Hanover's walking trails. The walks were organized to coincide with the Touch-A-Truck event, a day when most Hanoverians are already out and about.

MAPC staff and the OSRP Committee met again on November 11 to discuss the results of the survey, research and mapping completed to date, and the inventory of open space and recreation assets.

Flash Trail Walks Flyer

During the next meeting on December 13, MAPC staff and the OSRP Committee reviewed the Analysis of Needs section from the 2008 OSRP, discussed what needs are still relevant for Hanover today, and added new needs that have emerged since the last plan. The group also reviewed and updated the Goals and Objectives section from the 2008 OSRP through a similar exercise. In addition, the group discussed the plan for the February Community Assets Forum and devised an outreach strategy.

MAPC held a Community Assets Forum on February 15, 2017 at the John Curtis Free Library. This open house-style forum for Hanover300, included a station for the Open Space and Recreation Plan, as well as for two other elements of the master plan: Public Services & Facilities and Historical & Cultural Resources.

At the OSRP station, attendees were given the ability to prioritize and comment on the plan's goals and objectives. The station also included a breakdown of implementation section of the plan, including definitions and examples for goals, objectives, and actions. Attendees could then suggest action steps that would help the Town achieve its goals and objectives. MAPC also created a large map that attendees could stick dots and post-its on to indicate the scenic resources and unique environments in Hanover that make it a special place to live and visit.

The final OSRP Committee meeting was held on May 22, 2017. At this meeting, the Committee reviewed MAPC's draft of the plan and provided input on the Seven-Year Action Plan.

Community Assets Forum

Section 3: Community Setting

Regional Context

The Town of Hanover, Massachusetts is a primarily residential community located about 25 miles southwest of Boston within Plymouth County. It is bordered by the Town of Norwell to the northeast, Hanson and Pembroke to the south, and Rockland to the west (see Figure 1). Compared to other communities in Plymouth County, Hanover is one of the smaller towns with a total area of 15.7 square miles (the largest is Plymouth with 134 square miles).

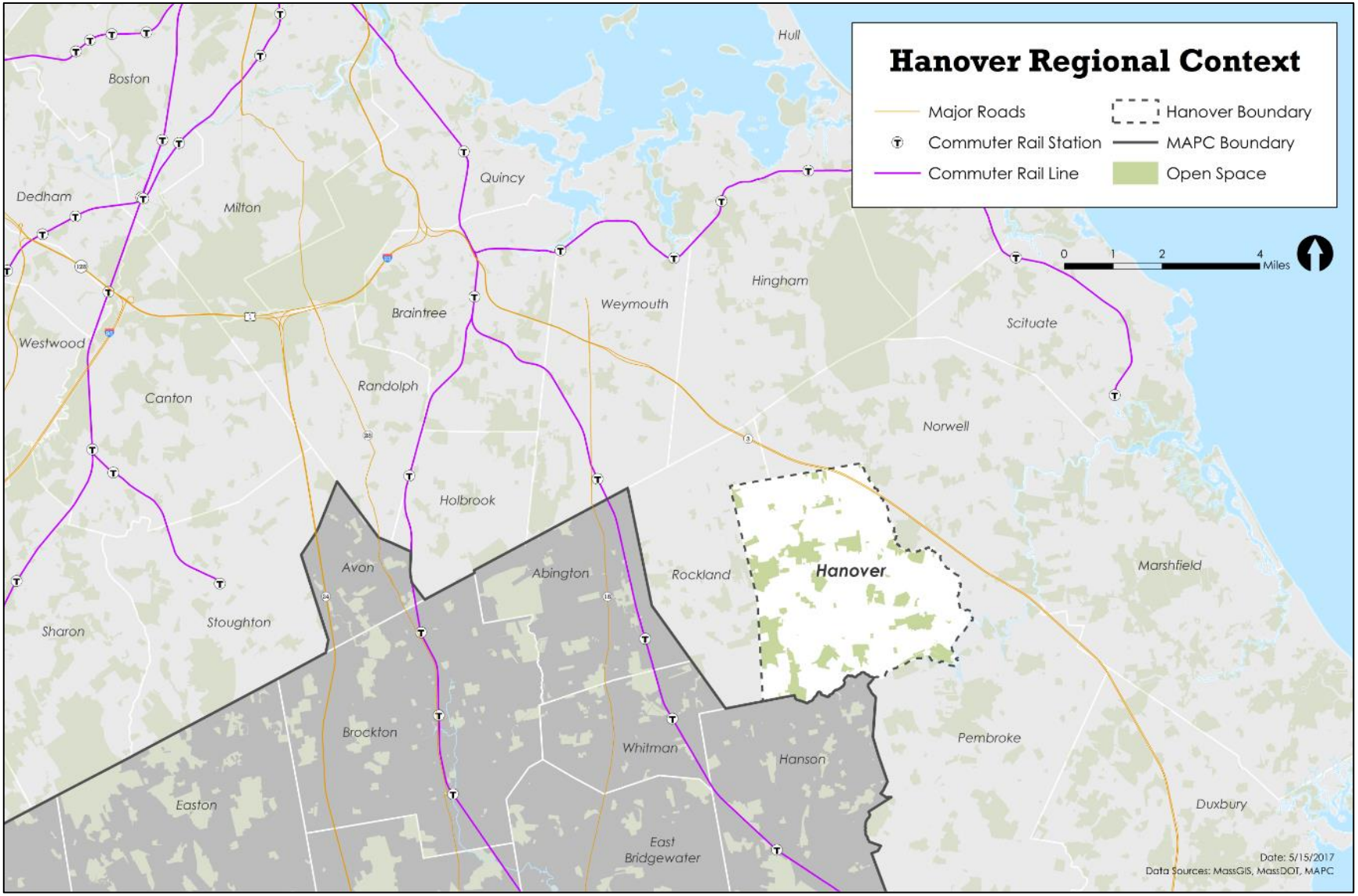
The Town of Hanover is located in the coastal region of southeastern Massachusetts within the North River watershed. The Indian Head and North Rivers form the southern town line with the Towns of Hanson and Pembroke, while the Third Herring Brook serves as the eastern boundary between Hanover and Norwell.

Hanover is regionally accessible via State highway routes 53, 123, and 139, all of which transect the town. Route 3, a limited-access highway, provides convenient access to both the Boston metropolitan area and Cape Cod. Running four miles north and south between Norwell and Pembroke, Route 53 was once the major route to Cape Cod and today continues to be the main commercial thoroughfare for the town. Routes 123 and 139 both traverse Hanover in an east-west direction and also provide an assortment of business and professional establishments.

The nearest access to the Massachusetts Bay Transit Authority (MBTA) Commuter Rail is the Abington station, approximately 10 minutes by car from Hanover. The Plymouth & Brockton Street Railway (known locally as the P & B Bus) provides weekday service from Marshfield to the Braintree MBTA Station, with a park-and-ride stop in Rockland. The Greater Attleboro Taunton Regional Transit Authority (GATRA) also offers some regional transportation services.

In regard to its socioeconomic context, Hanover is an upper income Boston suburb where residents value living both close to a major city and in a community that maintains a small-town feel. While appreciation of and desire for open space and recreational facilities is a key element of Hanover's rural atmosphere, it has also attributed to development pressure in the town because of its many amenities. Further, the majority of Hanover's homes are single-family houses on large lots which are a particularly land-intensive.

Figure 1: Regional Context Map



Hanover is one of 101 cities and towns represented by the Metropolitan Area Planning Council (MAPC), the regional planning agency for the Greater Boston region. Hanover is within the South Shore Coalition, one of eight MAPC subregions. In 2008, MAPC adopted a comprehensive plan for the region with goals through 2030 entitled MetroFuture. MetroFuture guides the work of MAPC agency-wide and every project MAPC undertakes works towards reaching these goals. Many MetroFuture goals are applicable to the Hanover Open Space and Recreation Plan, including:

- Goal 3: Brownfields and other polluted sites will be cleaned up and re-used for parks or development.
- Goal 8: Historic resources will be preserved and enhanced.
- Goal 9: The region's landscape will retain its distinctive green spaces and working farms.
- Goal 11: The region will be prepared for and resilient to natural disasters and climate change.
- Goal 23: All neighborhoods will have access to safe and well-maintained parks, community gardens, and appropriate play spaces for children and youth.
- Goal 25: Most residents will build regular physical activity into their daily lives.
- Goal 62: The region's rivers, streams, lakes, and ponds will have sufficient clean water to support healthy populations of native fish and other species, as well as recreational uses.
- Goal 65: A robust network of protected open spaces, farms, parks, and greenways will provide wildlife habitat, ecological benefits, recreational opportunities, and scenic beauty.

History of the Community

Early Settlement

The land area which comprises the present Town of Hanover is bounded by the North River, extending to the Indian Head and Drinkwater Rivers on the south, and the Third Herring Brook which forms the natural border to the east. Numerous small brooks feed these streams. These natural water ways are among the town's greatest natural resources. Prior to 1649, the area served as hunting and fishing grounds for the local Native Americans whose permanent villages were located around the ponds in Hanson and Halifax.

In the early 1600s, woodlands made up 90% of Hanover's land area. Oak, upland and swamp cedar, elm, hornbeam, hickory, birch, sassafras, maple, poplar, beech, hemlock, spruce, and pine were commonly found in the woodlands. Wildlife such as deer, wildcats, bears, and wolves, as well as smaller woodland animals and birds, were abundant during Hanover's early settlement. Deer were protected by law in Hanover as early as 1739. A sizable portion of the area's natural acreage consisted of swampland and salt marshes. A granite boulder in North Hanover, known as Absolum's Rock, is said to be the largest free-standing boulder in Plymouth County.

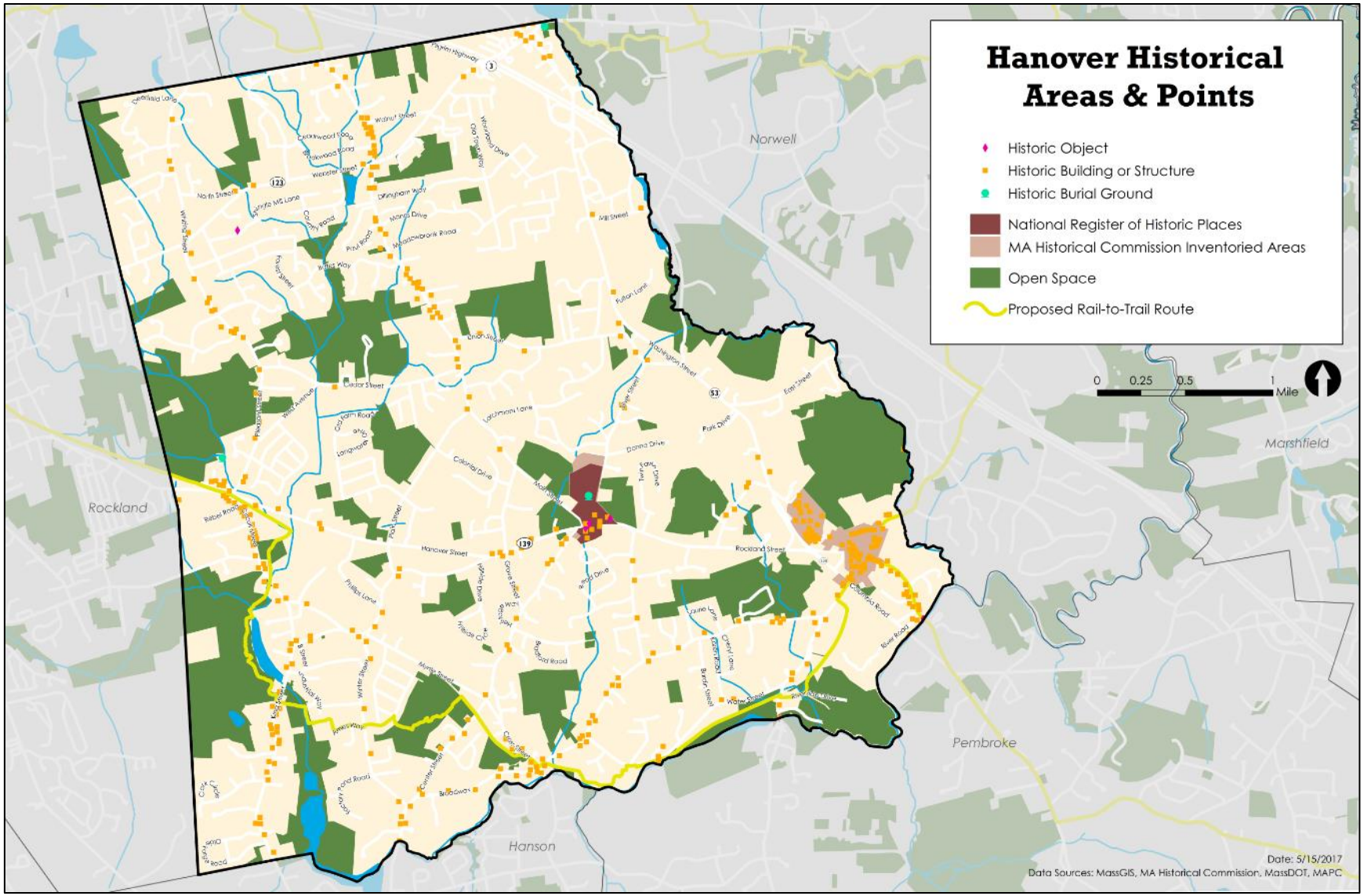
Hanover's abundance of large oak trees and its proximity to the North River made the town desirable to the shipbuilding industry. In 1649, William Barstow, the first settler, came to Hanover to build his house in the area now known as "Four Corners." He was a carpenter or shipwright by trade, and began a shipyard on the banks of the North River. He later constructed the first bridge across the river and laid out the way from the river to Hugh's Cross and beyond, "towards the bay so as to avoid a certain Rocky Hill and Swamp."[2] Later, he operated a tavern where refreshments were sold to travelers.

Other settlers soon followed Mr. Barstow. They cleared the woodlands for their farms and pastures, and built sturdy structures to house their families. Approximately one hundred of these 18th century houses still exist today. These settlers continued the trade of shipbuilding, while others constructed small mills on the streams for grinding corn, sawing wood, and smelting iron nuggets from the town's various bogs.

According to a town historian, Hanover had a population of approximately 300 people at the time of its incorporation in June 1727. However, about 50 of these people lived in a part later annexed to Pembroke. The town continued to grow slowly from a population of 958 in 1800 to 1,303 in 1830. Most citizens built homes and operated small farms to accommodate the needs of their families. Tracts of swamp cedar provided wood for post rails and tubs.

[2] Jedediah Dwelley and John Franklin Simmons (1910), History of the Town of Hanover, Massachusetts with Family Genealogies, Town of Hanover

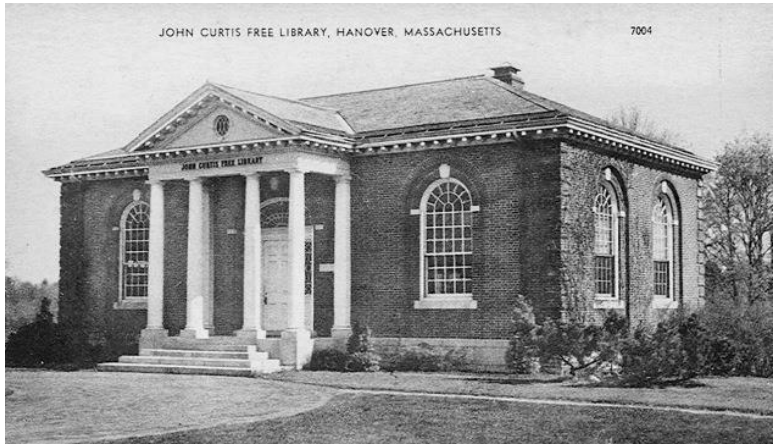
Figure 2: Historical Areas & Points Map



Several hundred cords of pine were carted annually to Hingham to be made by coopers into the, now famous, Hingham buckets. Later, pine was used to manufacture boxes in town while both cedar and pine shingles were sawed at the Shingle Mill in North Hanover. By 1850 the population had increased to 1,592 and much of the land was cleared and the large timber gone.

From 1896 to 1904, the Town was served by fire wardens. In the event of a fire, the wardens would ring church bells to alert volunteers, who would then line up in bucket brigades. Hanover's first Fire Department was established in 1904. The Town's library was built in 1906 with $15,000 donated by John Curtis.

John Curtis Free Library[3]



[3] Photo source: johnson-roberts.com/postcard-library/clients.html

Industry and Transportation

An early industry in Hanover was iron works. One forge was located by the Luddam's Ford Site and another on the former National Fireworks Site, areas that are now conservation land. Anchors, oven doors, cannon, cannon balls, bells, and machinery were cast in Hanover's forges, including the original anchor to the U.S.S. Constitution. The manufacturing of nails and tacks also flourished.

Many people in North Hanover were engaged in the cottage industry of shoe manufacturing. Typically, families operated small shops on their property where shoes in various stages were passed to other neighborhood families for completion. Later, larger factories were established. In 1860, Studley's on Main Street and Blanchard's at Assinippi were the Town's largest manufacturers of shoes and boots. From 1860 to 1880, the shoe business thrived; there were approximately ten shoe factories located in Hanover. In 1875, the value of the products manufactured within Hanover was approximately $200,000, millions of dollars today when adjusted for inflation.

The Clapp Rubber Mill, located near the Luddam's Ford site, began its business of grinding and cleaning ground rubber in 1875. While such an industry provided employment for many in Hanover, it likely contributed towards the pollution of the North River. Other industries in town included E. Phillips & Sons, the Waterman Tack Factories, the Goodrich Shoe Factory, and Clark's National Fireworks Factory.

By 1900, the population of Hanover was 2,152 and most households still consisted of small subsistence farmers. Most homes were heated with wood cut from their property or purchased locally, though coal was also being used.

From 1864 to 1938, the Hanover Branch Railroad, which followed the river bank, provided convenient transportation from the Four Corners area, thorough South Hanover, to West Hanover, and on to Rockland, Abington, and Boston. Freight service went to West Hanover until the late 1970s or early1980s. Some of the land previously used by freight trains is used now as walking trails.

Between 1893 and 1921, a trolley ran through North Hanover with a spur to Assinippi. The trolley provided transportation for many workers, as well as for vacationers heading to Nantasket in the summer. The first paved road in Hanover went from the North River to the end of Rockland Street. The construction of Route 53 began in 1930.

Hanover was once home to a small municipal airport. Started by William Melvin Clark, Clark Airport was used frequently by the late 1930s. It was closed during World War II when George J.J. Clark, William Melvin Clark's father and owner of the National Fireworks Company, bought the land from his son in order to store supplies for making munitions. The airport returned to use after the war when George J.J. Clark sold the land back to his son. The Indian Head Land Trust bought the land from William Melvin Clark in 1958 and it was developed into a residential area.

Clark Airport[4]

Historical Sites

In 1995, the Massachusetts Historical Commission voted to nominate Hanover Center to the National Register of Historic Places (NRHP). On May 9, 1996, the district was approved by the NRHP and became a National Register District. The district is comprised of twenty properties in Hanover's Town Center. The district contains a well preserved grouping of buildings and sites, reflecting the historical and

[4] Photo source: www.wickedlocal.com/x402528082/Hanover-resident-will-give-lecture-on-towns-former-airport

developmental core of the community. These buildings range in date from the Stetson House, circa 1696, to the Sylvester School, circa 1927.

Samuel "Drummer" Stetson built the Stetson House, near Hanover Town Hall, about a decade before the Town's incorporation. Town Meetings and religious services were held in the house during its early years, and the house has been listed on the National Register of Historic Places since 1979. The Town now owns the house and it is open for public tours and research. The Hanover Historical Society aids in the preservation and upkeep of the property.

Town Hall, also within Hanover Center, was designed by architect Luther Briggs III in 1863. It was expanded in 1893 by well-known local architect, J. Williams Beal. The John Curtis Library designed by another Hanover architect, Edmund Q. Sylvester.

Also in this district are the First Congregational Church and the parsonage of the church. This church was Hanover's first. Though the First Congregational Church's current building is the fourth on the site, its location has remained.

The Civil War Monument, a granite obelisk designed by J. Williams Beal in 1878 at the age of 23, is also located in the Hanover Center Historic District. The Hanover Cemetery, with its earliest burials from 1727, contains a large number of early slate markers concentrated behind the First Congregational Church and provides a back drop to the town's historic center.

Stetson House[5]

The "Line House," in the Assinippi section of town, straddles the Hanover and Norwell town line. The house originally served as the Post Office and Selectmen's Office for Hanover. Those offices were in the Norwell section of the building until it was deemed illegal to conduct Hanover Town business in another town. Renaming the area where the house was located as "neutral territory" with the name

[5] Photo source: brss.org/tag/historic/

Assinippi solved the dilemma. Assinippi, a Native American name translated to "rushing clear water" or "rocks over water," commemorates a nearby Native American meeting ground on Third Herring Brook. This same area was also the crossroads of two Native American trails: Plymouth Path and Bay Path.

Population and Housing Characteristics

Population Trends

Hanover's population as of the 2010 Census was 13,879, a population density of 900 people per square mile (see Figure 3). According to ACS 2014 5-Year Estimates, the population has continued to grow to 14,360. In comparison to nearby communities, Hanover's population is larger than Norwell's and smaller than Hingham's. Overall, the town's population has grown steadily over the past few decades, but the pace is slowing. Between 2000 and 2010, Hanover's population rose by 5%.

Due to Hanover's desirable location on the South Shore and its proximity to Boston, many people who work in Boston or along the Route 128 corridor have moved to Hanover. Historically, a majority of Hanover's growth actually occurred between 1950 and 1970, when Hanover's population increased almost 200%. This dramatic increase was due in part to the expansion of Route 3 in during this time, which resulted in convenient vehicular access to Boston, Cape Cod, and other popular destinations. Another factor was the trend towards suburbanization. Although the pace of development has slowed since the 1970s, new construction continues to result in the loss of valuable open space.

Figure 3: 1970 to 2010 Population (U.S. Census)

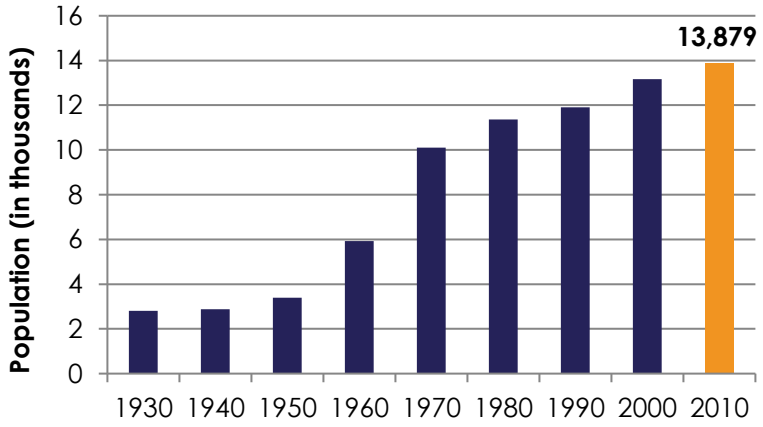
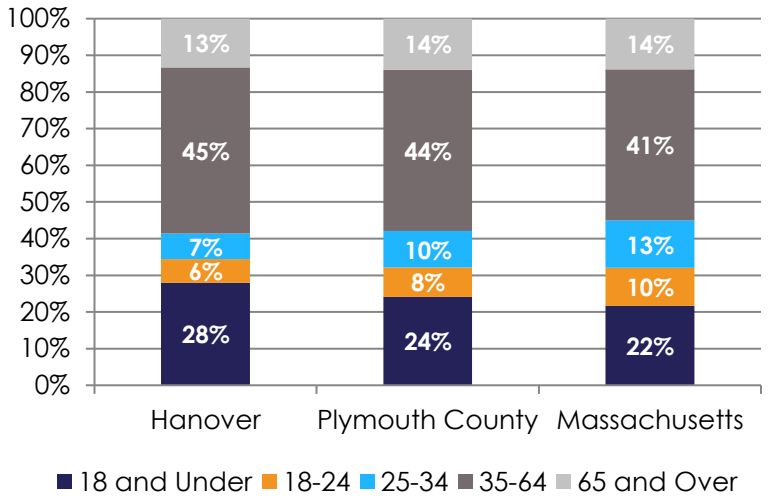


Figure 4: Population by Age (U.S. Census)



Compared to the rest of Plymouth County and Massachusetts, Hanover's population is relatively younger. According to Figure 4, the largest age cohort in Hanover is between 35 and 64 years old, making up 45% of the population. The next largest cohort is residents 18 and under who make up 28% of the population, followed by those 65 and older (13.3%), 25 to 34 (7%), and 18 to 24 (6.5%).

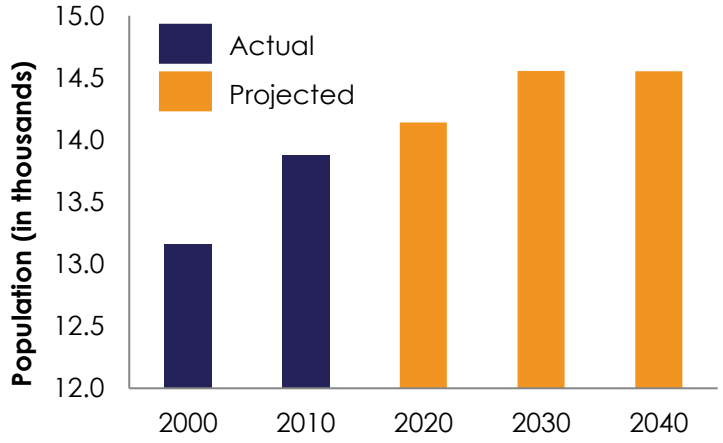
While Hanover's population may be slightly younger compared to other communities, it is still an aging community. Due to the aging Baby Boomers, Hanover, like other cities and towns in the Boston region, is getting older overall. At the time of the 2000 Census, Hanover's median age was 37.5 years old. By 2010, it had increased to 41.8 years old

For the purposes of this Open Space and Recreation Plan, it is important to understand Hanover's population via the needs of different age groups. This is because the open space and recreational needs of children and young adults are not the same as those of teenagers, adults, or the elderly. While open space and recreational facilities should be available to residents of all ages, this plan will identify enhanced opportunities, for both passive and active recreational facilities, for specific age groups. For example, it may be relevant to suggest building a pocket park or improving a park in a neighborhood where there is known to be a number of younger children.

The Metropolitan Area Planning Council (MAPC) has prepared population projections through 2030 for the Metro Boston region. These projections are based on two scenarios: Status Quo (SQ), based on the continuation of existing rates of births, deaths, migration, and housing occupancy; and a Stronger Region (SR) that assumes higher population growth, greater housing demand, and a larger workforce.

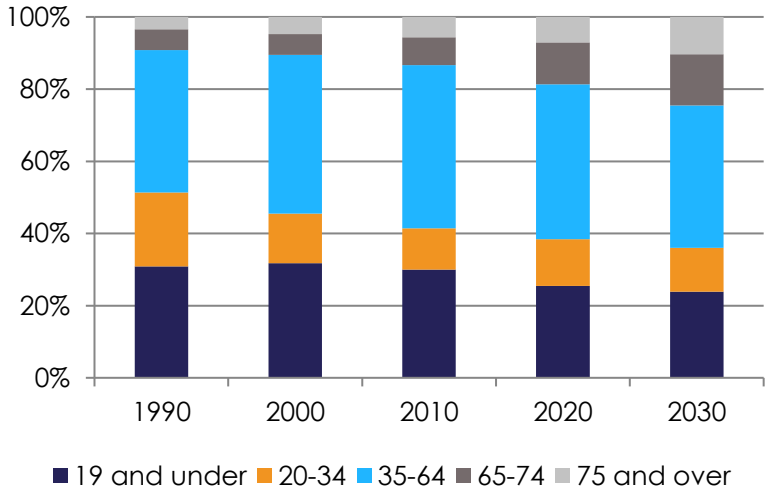
According to MAPC SR projections, Hanover's population is likely to plateau by 2030 at 14,554 people (see Figure 5). The town's population is expected to grow only 2% between 2010 and 2020, and 2.8% between 2020 and 2030. No growth is expected between 2030 and 2040.

Figure 5: Population Projections (U.S. Census and MAPC Stronger Region Projections)



Though Hanover's population may not necessarily grow, its composition is expected to change. The population 65 and older is expected to increase 48% by 2030 (based off 2010 values), by far the greatest population growth the town will see. At the same time, the population 18 and under is expected to decrease by 20%, the population 20 to 34 will increase by 10%, and the population 35 to 64 will decrease by 9% (see Figure 6).

Figure 6: Population Projections by Age (U.S. Census and MAPC Stronger Region Projections)



Hanover is less racially and ethnically diverse than the county and the state, and it has no Environmental Justice communities. The town is primarily White (96%), with a small percentage of Latino or Hispanic (1%),

Black or African American (1%), Asian (1%), and multiracial (1%) residents. By comparison, Plymouth County is 85% White, 3% Latino or Hispanic, 7% Black or African American, 1% Asian, 2% multiracial, and 3% other. Massachusetts is more diverse overall at 76% White, 10% Latino or Hispanic, 6% Black or African American, 5% Asian, 2% multiracial, and 1% other. While the majority of Hanover's population is White, the nonwhite percentage of the population increased slightly from 2.3% in 2000 to 4.2% in 2010.

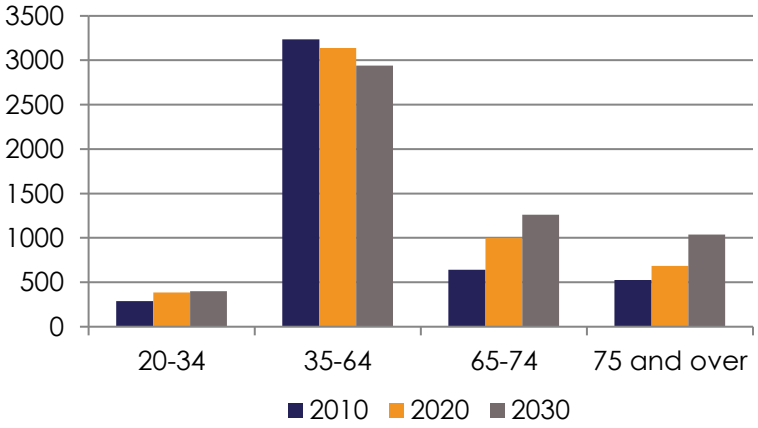
Households and Housing

As of the 2010 Census, Hanover had a total of 4,709 households. This represents an increase of 9.3% from the number of households in 2000. Concurrently, the town's population grew only 5% between 2000 and 2010, indicating that household growth is exceeding population growth in Hanover. The fact that the number of households increased faster than population is due mostly to declines in average household sizes. While the average household size in Hanover was 3.02 at the time of the 2000 Census, it decreased to 2.93 by 2010.

Hanover can certainly be considered a family-friendly community. Over 79% of the town's households are families, a half of which have children under 18. This rate is higher than in both Plymouth County and the Commonwealth, whose percentages of family households are 71% and 63%, respectively. Hanover's percentage of family households has decreased somewhat from 2000 when it was 82%.

The number of households in Hanover is expected to increase substantially by 2030. According to MAPC SR projections, the number of households is expected to grow 20% by 2030 (based off a 2010 value of 4,709 households). This includes a growth of about 11% between 2010 and 2020 and a growth of 8% between 2020 and 2030. Between 2000 and 2030, the number of households with a householder 65 years old and above is expected to rise almost 50%. At the same time, the number of households with a householder 35 to 64 years old is expected to decline by 9%.

Figure 7: Household Projections by Age of Householder (U.S. Census and MAPC Stronger Region Projections)



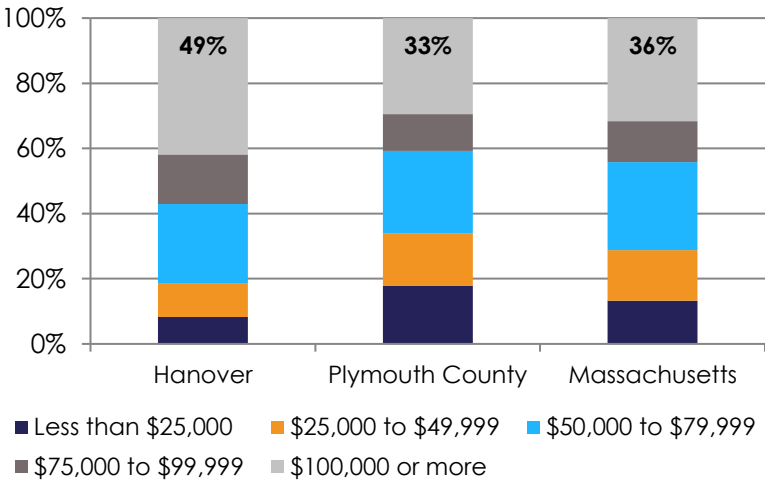
The vast majority of Hanover residents live in a single-family detached home (84% of the town's housing stock in 2010), a particularly land-intensive housing type. Only a small percentage of housing units are within a multifamily building.

Housing construction in Hanover experienced a peak between 1950 and 1970. More than half of the town's housing stock, or approximately 2,500 units, were built prior to 1970. Housing growth in Hanover has continued steadily in recent years. Between 2000 and 2010, the town built 407 units of housing. The total number of housing units in 2010 was 4,852 with an occupancy rate of 97%. Only around 12% of these housing units are occupied by renters, the rest are occupied by homeowners.

Income and Employment

According to the American Community Survey 2014 5-Year Estimates, Hanover's median household income is much greater than the rest of Plymouth County and Massachusetts: $98,750 per year for the town, $75,816 for the county, and $67,846 for the state. Almost half (49.3%) of Hanover's households earn over $100,000 per year while 33% of Plymouth County households and 36% of Massachusetts households earn that amount. Less than 10% of households in Hanover earn under $25,000 a year, compared to 20% in the county and 15% in the state. Only 2.2% of Hanover families are living below the poverty line, half of the county's poverty rate for families and a quarter of the state's rate.

Figure 8: Household Income (ACS 2014 5-Year Estimates)



Many of Hanover's residents are employed in high-skill jobs, a characteristic which reflects their higher incomes and high levels of educational attainment—almost half (46%) of Hanover's population has received a secondary or higher degree. Nearly half (45%) of Hanover's working adults are employed in professional or management jobs.

About a quarter (23%) of Hanover residents work in educational, health care, and social services industries. Other industries where resident occupations are well-represented include professional, technical,

and administrative (16%); finance, insurance, and real estate (15%); retail (13%); and construction and manufacturing (12%).

The majority of Hanover residents work outside of Hanover (80%). Of those, a little more than a fifth commutes to Boston for work. Most others work in communities just south of Boston and neighboring South Shore communities including Quincy, Braintree, Rockland, Weymouth, and Norwell.

Like other more affluent communities in the region, much of the jobs in Hanover are found in retail, accommodation, and food services industries — sectors that primarily support local and regional consumers' needs. Almost 30% of the town's jobs are within retail trade and 10% are within accommodation and food services. These jobs typically provide lower wages and require lower levels of educational attainment. Therefore, it is likely that these jobs are mostly filled by residents outside of Hanover. The average annual wage in 2014 for all industries in Hanover combined is $42,276.

The average monthly employment in Hanover in 2014 was 7,315; since only 20% of the town's residents work in Hanover, the town's population increases by more than 5,000 during business hours, which is more than a third of the town's full-time population. These jobs are most found along Route 53, where most of Hanover's retail and dining establishments are located. Major employers in town include the Town of Hanover, the Hanover Public School System, the YMCA, Cardinal Cushing Centers, Target, Walmart, McGee Toyota, and Shaw's Supermarket. When planning for open space and recreation, it is also important to understand the needs of those who work in Hanover, as these are people who likely spend around 40 hours a week in town.

Growth and Development Patterns

Patterns and Trends

Hanover's early settlers were clustered around six distinct villages: Hanover Center, Four Corners, Assinippi, North Hanover, West Hanover, and South Hanover. Hanover Center is located at the current convergence of Main Street, Center Street, Silver Street, and Hanover Street (Route 139). This area, which is recognized as a National Historic District, has remained largely unchanged for the last 100 years.

The Town's initial European settlement occurred in Four Corners, near where Washington Street (Route 53) turns into Columbia Road and connects with Hanover Street and Broadway. This area is adjacent to parts of the North River where William Barstow built the North River Bridge in 1657 and where Hanover's early shipbuilding yards were formed. Though the shipbuilding industry only lasted until the middle of the 1800s when natural resources were depleted and the winding river prevented the building of larger ships, Four Corners continued to be a bustling area. This was mainly due to the arrival of the Hanover Branch Railroad in 1864, which transported goods and passengers to and from Boston until 1938.

Prior to European Settlement, the Village of Assinippi was home to a small population of Wampanoag Native Americans. This historic village was located northeast of what is now Route 3 and at a point where an old Native American trail crossed west from the coast. In 1730, brothers Joshua and Joseph Jacobs established Jacob's Mill on Jacobs Pond, an area now in present day Norwell. Their family continued to operate the mill until a fire destroyed it in 1920. Adjacent to Rocky Swamp (the current site of the Hanover Mall), this village was quite rural until the 1950s when the area was zoned for commercial purposes. At that time, many of the buildings changed to accommodate business uses. The Hanover Mall, a one-story enclosed shopping mall with 80 stores and restaurants, was built in 1971.

North Hanover was an agricultural village centered on farming. North Hanover, the area around today's intersection of Main Street and Webster Street (Route 123), still retains many examples of early New England cape and farmhouse architecture. Before refrigeration, ice was harvested on Hackett's Pond and stored until summer in an ice house on the shore. While West Hanover, the area south of Hanover Street along Circuit and King Streets, also started as a farming community, its iron industry began as early as the Revolutionary War by using water from Forge Pond. This area was home to the Drinkwater Iron Works, which was later occupied by the National Fireworks Factory, and the Lot Phillips Box Factory, which was in operation from 1872 to 1969.

Lastly, South Hanover was located along the Indian Head River in the southern portion of the town, as its name implies. This was also an area where the iron industry prospered due to the water power of the

river. For example, the current site of Luddam's Ford Park was once the Bardin's Iron Works, which began operation in 1704. The Center of South Hanover Village was the general store, with its Post Office, at Cross Street and Broadway. The route of the Hanover Branch Railroad through South Hanover now provides walking paths along the river.

While Hanover once consisted of distinct, separate villages, population growth and the accompanying development have filled in the gaps between the villages. Today, the town can be categorized as a bedroom community where many residents commute to the City of Boston for employment. Expansion of metropolitan Boston southeastward along the "South Shore" has been rapid since 1940, when towns consisted of small centers with a business zone along the principal road network. Since Hanover is not well served by public transportation, most residents rely on automobile transportation to get to work and around town. Like many other communities in the Boston region, Hanover has been somewhat of a victim of "suburban sprawl," notably marked by the heightened reliance on the personal motor vehicle since World War II.

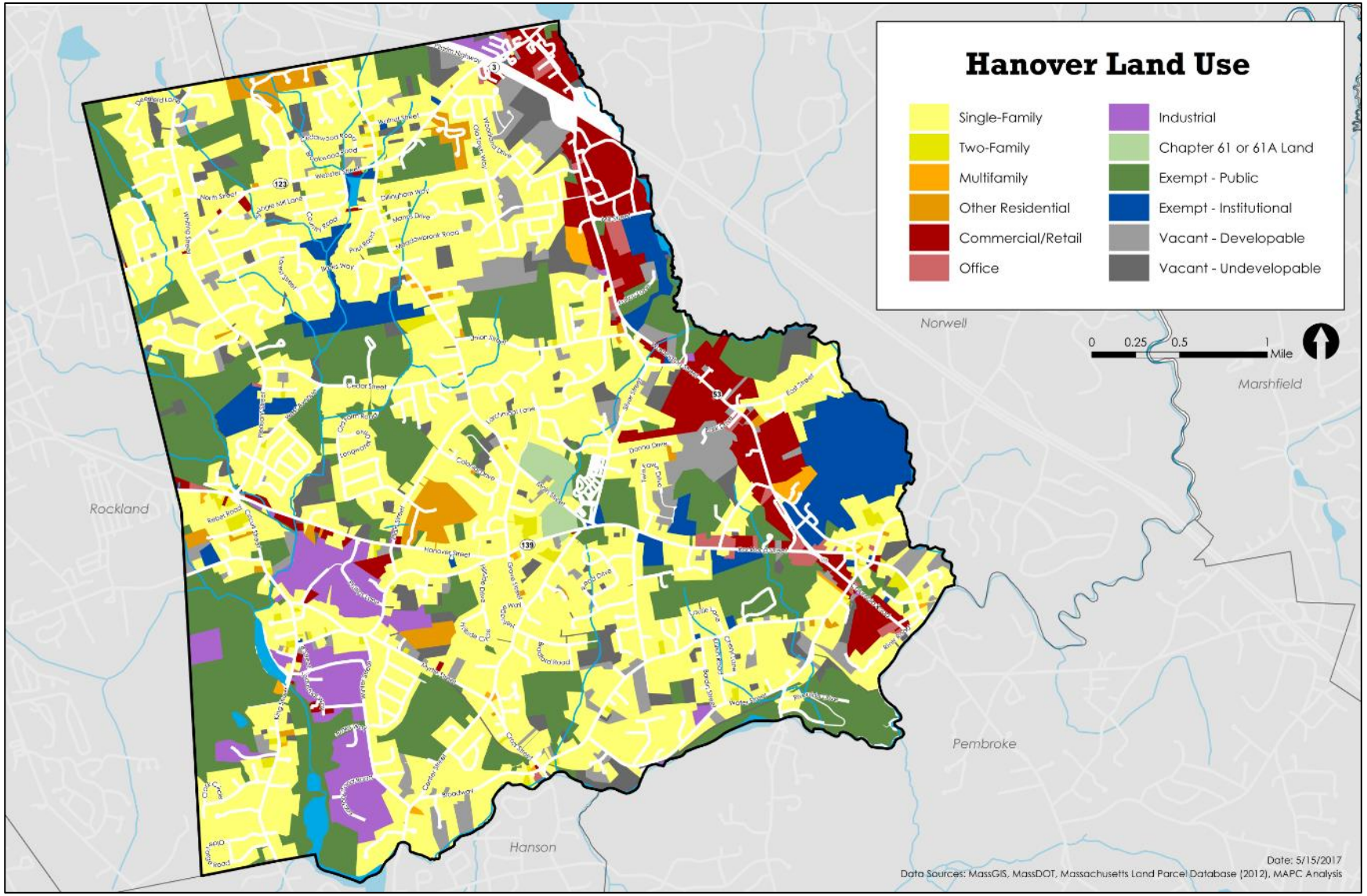
Hanover's land use is dominated by single-family properties, which make up almost half of the town's total land area. Scattered throughout the town are a few two-family and multifamily properties. Together Hanover's commercial properties, both retail and office, make up about 15% of the town's total land area and are mostly clustered along the Route 53 corridor. Less than 4% of the total land area is dedicated to industrial uses.

Almost a quarter of land is Hanover is tax-exempt because it is either publicly-owned by a government entity or owned by a nonprofit, tax-exempt institution. The latter applies to private educational facilities, religious congregations, or charitable organizations like hospitals and museums. The vast majority of the town's tax-exempt land consists of parks and open spaces.

Five parcels in Hanover are within the Chapter 61 or 61A programs. Massachusetts' Chapter 61 programs give preferential tax treatment to landowners who maintain their properties as open space—rather than developing it—for the purposes of timber production (Chapter 61), agriculture (Chapter 61A), or recreation (Chapter 61B). There are no properties within the Chapter 61B program in town.

Around 5% of Hanover's land area is developable or potentially developable for residential or commercial purposes. This is all privately owned and does not include any land being used for open space and recreation. Another 4% of land is undevelopable, mostly due to environmental constraints, such as difficult topography, or a lack of access.

Figure 9: Land Use Map



Infrastructure

Transportation

Hanover is a car-dependent community, largely due to the lack of transit options in the town. As previously mentioned, the nearest access to the Massachusetts Bay Transit Authority (MBTA) Commuter Rail is the Abington station, approximately 10 minutes by car from Hanover. The Plymouth & Brockton Street Railway (known locally as the P & B Bus) provides weekday service from Marshfield to the Braintree MBTA Station, with a park-and-ride stop in Rockland. The Greater Attleboro Taunton Regional Transit Authority (GATRA) also offers some regional, though limited, transportation services.

Hanover's traffic circulation system is dominated by Route 3 (Pilgrims Highway), Route 53 (Washington Street), Route 123 (Webster Street), and Route 139 (Hanover Street). Route 3, which is a limited-access highway that passes through the northeastern corner of the Town, regionally connects Hanover with Boston and Cape Cod. Route 53, which provides access to Route 3, runs north-south and serves as the town's primary commercial corridor. This corridor is also the site of some of the main traffic safety concerns in town due to high traffic volumes, high speeds, and limited pedestrian infrastructure.

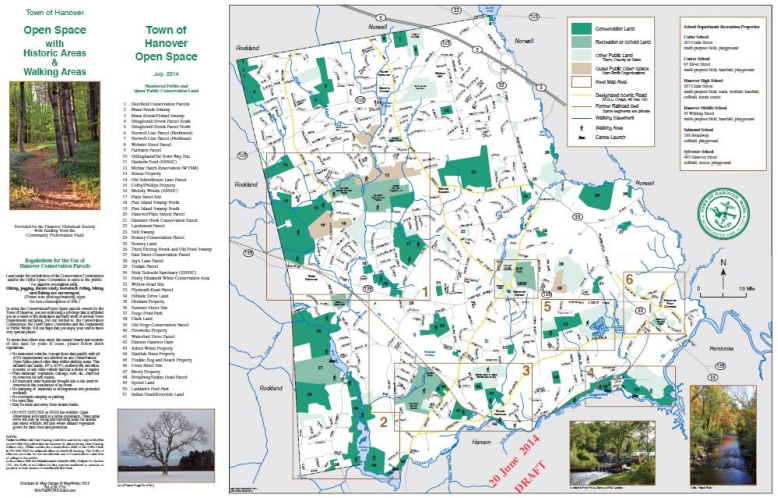
Route 53 is the most heavily traveled corridor in Hanover, in part due to the access the corridor provides to Route 3. Not only is this corridor convenient for those traveling in to and out of Hanover, but the Hanover Mall and other retail destinations along the corridor likely generate additional traffic. On a smaller scale, Route 139 is also a relatively heavily-trafficked corridor. This may be due in part to residents who commute via the Commuter Rail and drive to the Abington Commuter Rail station, which is about a 12 minute drive from Hanover Town Hall.

A common concern articulated by Hanover residents is the lack of sidewalks. Gaps in the sidewalk network deter walking as a form of transportation, and jeopardize the safety of those who do choose to walk. Some residents who walk must do so on the shoulder of the road. Sidewalks serve as a crucial buffer to keep pedestrians away from traffic, which is especially important on corridors with fast-moving traffic and lots of destinations that would attract greater pedestrian traffic. For example, the majority of Hanover businesses are located along Route 53, but only a small portion of that road has a sidewalk. The lack of bicycling infrastructure in Hanover also jeopardizes the safety of cyclists. The Town does not have any bike lanes, although there are several roads wide enough for them. Like sidewalks, bike lanes would be most beneficial in areas most trafficked by cyclists, particularly near schools.

While Hanover lacks on-road infrastructure for pedestrians and cyclists, it has a robust trail network throughout its open spaces. Completed in 2014, the "Open Space with Historic Areas & Walking Areas"

pamphlet provides detailed maps and descriptions of the 14 different trails throughout town. The recently redeveloped Forge Pond Park, for example, provides off-road walking and biking facilities for residents and visitors.

Excerpt from Open Space Map



A way to improve bicycle infrastructure in Hanover would be to extend the rail trail that passes through Rockland. The existing trail in Rockland is part of the LandLine Greenway Network, which was developed by MAPC in an effort to improve the connectivity of the region's bike and rail trails. The trail in Rockland ends at the Colby-Phillips property in West Hanover, and building on this connection could better link Hanover with neighboring municipalities.

Water and Sewer Systems

Population increases in the decades since World War II have increased the demand for water in the region's communities. At the same time, the amount of land available for water supply has decreased to the point where many local water agencies are having difficulty in locating and developing additional water supplies. Hanover currently relies on nine wells within four existing water supply areas—two located off Hanover Street and two located off Broadway—to supply water for the town. Together, these well sites make up 218 acres of land. The community is not a part of the Massachusetts Water Resources Authority (MWRA), which provides water and/or sewer services to about forty municipalities in the metropolitan Boston area.

The Town of Hanover does not have a public sewer system; therefore, residential, commercial and industrial properties have private septic systems. Several commercial properties have private wastewater treatment plants. In the last decade, there has been an increase in shared septic tanks for multifamily housing developments. There has also been a major increase in Groundwater Discharge Permits due to large treatment systems for commercial properties.

Long-Term Development Patterns

The Town of Hanover faces the development pressures that are prevalent throughout the region. Unguided, this added development of single family residences and strip malls will negatively affect the character and natural resources of communities, as well as their economic stability. Without provisions for the protection of open spaces, conventional, grid-like residential development patterns can slowly result in the loss of significant parcels that are presently undeveloped. Therefore, it is necessary for the Town to continue to plan and use its regulatory tools to protect its significant open space and natural resources.

Hanover's zoning bylaw was most recently amended and adopted in May 2016. The town is divided into seven base zoning districts: Residence A District, Business District, Commercial District, Fireworks District, Industrial District, Limited Industrial District, and Planned Shopping Center District. There are also six overlay districts which cover portions of the town: Flood Plain Protection District, Water Resource Protection District, Wireless Telecommunications District, Adult Use District, Interchange District, and Registered Marijuana Dispensary District.

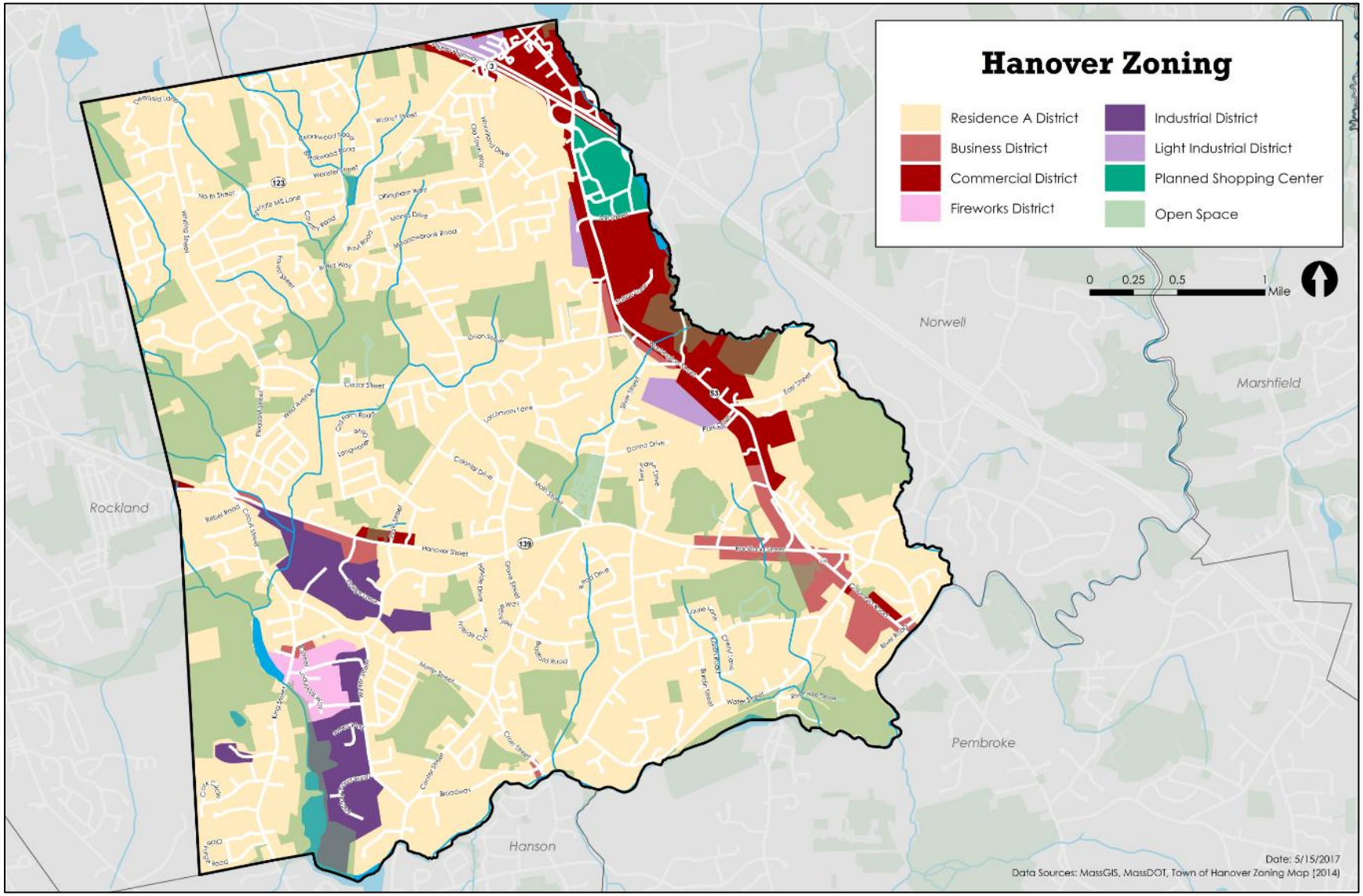
The vast majority of Hanover's open spaces and recreation facilities fall within the Residence A District. While some open space lies within the Business, Commercial, and Industrial Districts, the Residence A District is the only one that allows the following uses as-of-right: conservation areas; farming and horticulture; orchards, nurseries, forests, and tree farms; and barns, stables, and kennels for animals.

Two of Hanover's overlay districts, the Flood Plain Protection District and the Water Resource Protection District, specifically pertain to environmental projection. Both these districts were created to provide protection for wetlands, surface, and groundwater through the control of land use in sensitive areas.

The Flood Plain Protection District was created to ensure that land subject to seasonal or periodic flooding is not used for residential or other purposes when the use will endanger the health and safety of the occupants or the general public. The district's additional purposes are to assure the continuation of the natural flow pattern of watercourses, to provide adequate and safe floodwater storage capacity, to protect against the hazards of flood inundation, to preserve and maintain the water table and water recharge areas, and to preserve the natural character of land within the district.

The Water Resource Protection District includes the town's Aquifer Protection Zone and the Well Protection Zones. The purpose of the Water Resource Protection District is to protect the Town of Hanover's water supply from harmful and hazardous pollutants and contaminants by preventing the degradation of surface and ground water supplies within the district.

Figure 10: Zoning Map



The Water Resource Protection Bylaw, approved by the Attorney General in 1981 and amended in 2000, establishes performance standards which govern activities that may affect groundwater in the Water Resource Protection District. The bylaw regulates changes in land use, expansion of existing facilities, changes in drainage, wastewater disposal, logging, earthmoving, application of herbicides, pesticides and fertilizers, storage and handling of hazardous materials.

As a part of the Water Resource Protection Bylaw, new construction projects in the Water Resource Protection District must obtain a certificate of compliance from the Board of Public Works prior to the issuing of a building permit. The certificate of compliance enforces and ensures that performance standards required by the Board of Health are being met. The purposes of the specific performance standards are to: limit nitrogen loading from sewage flow and fertilizer application to amounts which will be adequately diluted by natural recharge; prevent groundwater contamination from toxic and hazardous substances; and insure that regulations regarding continued groundwater recharge, clearing, earthmoving and paving are being met.

Another regulatory tool is the Wetlands Protection Bylaw, which was approved by the Attorney General in 1986 and was most recently updated in 2009. The purpose of the bylaw is to protect the wetlands, water resources, flood prone areas, and adjoining upland areas in the town by controlling activities deemed by the Conservation Commission likely to have a significant or cumulative effect on resource area values. The Bylaw enforces no activity (except with a permit) within a 100 foot buffer around wetland resource areas. This distance increases to 200 feet for alterations to perennial rivers, streams, brooks and creeks, and lands adjoining these resource areas. No alterations can be made to lands subject to flooding or inundation by groundwater or surface water, and lands subject coastal flooding.

In May 2000, the Town of Hanover voted to approve a Water Use Restriction Bylaw to protect, preserve and maintain the public health, safety, and welfare whenever there is in force a State of Water Supply Conservation or State of Water Supply Emergency. The bylaw allows the Town to enforce any imposed restrictions, requirements, provisions, or conditions imposed by the Town or by the Massachusetts Department of Environmental Protection. Restrictions include bans and limits on outdoor watering, sprinkler use, and filling swimming pools.

Section 4: Environmental Inventory & Analysis

Geology, Soils, and Topography

Geology

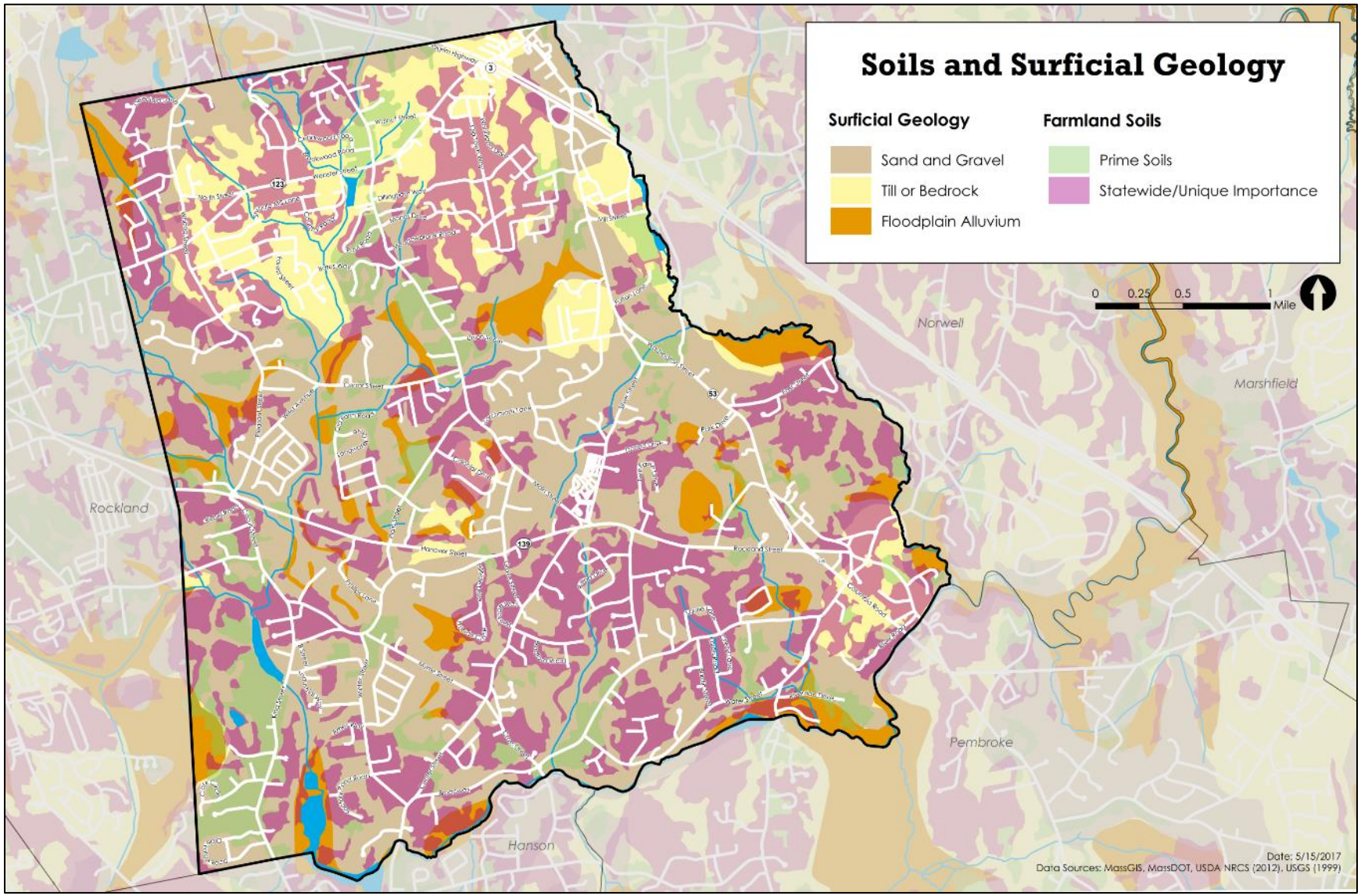
The bedrock geology of Hanover includes rocks of both igneous and sedimentary origin that have undergone low-grade metamorphic episodes. The two major rock types include a light grayish-pink to greenish-gray granite that was intruded into the existing bedrock and a sedimentary rock comprised of shale, sandstone, conglomerate, and greywacke with minor beds of fossil plants. The sediments making up the latter rock type were deposited after the intrusion of the granite, when the area formed part of the Narragansett Basin.

The two major rock types in Hanover have each undergone low grade metamorphism. The area associated with the granite, found in the eastern side of the town, exhibits mineral assemblages associated with a low grade metamorphic zone, formed during the Proterozoic Z metamorphism. These rocks often show green schist, greenstone, felsite and quartzite assemblages enveloped in granite. The rocks found mostly on the western side of town, in part of the metamorphic zone associated with sedimentary rocks, exhibit mineral assemblages typical of the Chlorite Zone. The typical chlorite-muscovite assemblages visible within these rocks were formed during a Pennsylvanian-Permian metamorphic episode 270 million years ago.

Hanover is located on the edge of the Narragansett Basin between two tectonic provinces, with several minor faults trending in a general north-south direction. The Milford-Dedham Zone, which includes the Town of Hanover, has had a complex tectonic history involving granite intruded into older volcanic and plutonic rocks millions of years ago, followed by a period of erosion, and the deposition of continental sediments on top of the older granite.

Predominately glacial sediments make up Hanover's surficial deposits, geological deposits above the bedrock (including soils). As the glaciers retreated northward at the end of the Wisconsin Ice Age, they left thick stratified drift deposits made up of well-sorted sands and gravels, and unstratified deposits made up of poorly sorted tills. More recently, organic matter has accumulated in the form of swamp deposits and alluvium has been deposited by present day streams.

Figure 11: Soils & Surficial Geology Map



The majority of Hanover's surficial geology consists of sand and gravel. In the north central section of town is an area of till or bedrock that extends along a large portion of eastern Hanover where it borders Norwell. Floodplain alluvium is dispersed throughout the community in smaller pockets.

Soils

Plymouth County's Soil Survey was updated in 2003. The five main soil categories in Hanover were identified as Hinckley-Windsor-Deerfield, Freetown-Swansea-Scarboro, Woodbridge-Paxton-Ridgebury, Plymouth-Carver, and Birchwood-Poquonock-Mattapoisett.

Hinckley-Windsor-Deerfield soils are now considered the most dominant soil unit in the Town of Hanover. In general, the soil is very deep and can range from being nearly level to steep. It is excessively to moderately well-drained. Several minor soil types are also located in this map unit such as Merrimac, Sudbury, Wareham, Pipestone, Scarboro, and Berryland. Many of the areas associated with this soil type are woodland, residential, or industrial. In general, the soils are well suited to building or development projects.

Freetown-Swansea-Scarboro soils are located at seven different locations in Hanover. Three smaller areas are located along the western border of the community, one larger and one smaller area lie toward the center of town, and two small areas lie along Hanover's eastern border. This soil unit is characterized by very deep and very poorly drained soils formed in deep to shallow freshwater organic deposits underlain by glacial fluvial deposits in swamps and depressions. The majority of the areas with this unit designation are wooded or scrub-shrub wetlands, many of which are used for cranberry production.

Woodbridge-Paxton-Ridgebury soils are located in three separate areas of Hanover: the northeast corner of town, a smaller area along the eastern town boundary, and one other area in the very southwest corner. These soil types are formed in loamy glacial till on upland hills and ground moraines. Paxton and Woodbridge soils are well suited for woodland and cropland productivity. Due to their wetness, Ridgebury soils are not, and are considered to be a wetland hydric soil.

Plymouth-Carver soils are only found along the eastern boundary of Hanover. They are excessively drained and formed in loose sandy ice contact and glacial outwash deposits. This soil type is usually forested with pitch pine, white pine, and scrub oak and is often used for home building or cropland. It is poorly suited for cultivating crops and pasture because it has low water holding capacity. This soil type is also often associated with groundwater aquifer recharge areas.

Lastly, Birchwood-Poquonock-Mattapoisett soils are located in two areas in the southeastern portion of Hanover. These soils types are deep and well- to poorly-drained. Birchwood is usually found on the foot slopes of hills, Poquonock on steep side slopes, and Mattapoisett on low-lying flat areas along drainage ways. These soil types are poorly suited for dwelling units with on-site septic tank absorption fields because of their slow permeability.

The Natural Resources Conservation Service, in cooperation with other federal, state, and local government organizations, has inventoried land that can be used for the country's food production. This effort to identify the extent and location of important farmlands designates soil as prime farmland, unique farmland, and farmland of statewide importance.

According to MassGIS, prime farmland is: "Land that has the best combination of physical and chemical characteristics for economically producing sustained high yields of food, feed, forage, fiber, and oilseed crops, when treated and managed according to acceptable farming methods." Prime farmland soils are located in patches throughout Hanover, mostly near the town's waterways. The largest contiguous area of prime farmland is in southwest Hanover, just west of Forge Pond, Factory Pond, and the southern end of the Drinkwater River. Another area with large patches of prime farmland is along Main Street in North Hanover.

A considerable portion of Hanover consists of either farmland of statewide importance or of unique importance. According to MassGIS, farmland of state importance is land that is nearly prime farmland and that produces economically high yields of crops when treated and managed according to acceptable farming methods, as determined by the appropriate state agency or agencies. Farmland of unique importance is "land other than prime farmland or farmland of statewide importance that might be used for the production of specific high value food and fiber crops." In Massachusetts, unique farmland is within peats, mucks, and coarse sands. The primary commercial crop grown on these soils is cranberry.[6]

Topography

Hanover forms part of the coastal lowland section of the New England physiographic province and has gently rolling to flat topography characteristic of this region. Hanover is shown on four USGS Topographic Maps: Whitman, Weymouth, Cohasset, and Hanover. The elevation throughout the town ranges from 10± feet above sea level at the headwaters of the North River to 177± feet at the top of Walnut Hill in the Northeast corner of Hanover. Other major hills in

[6] "NRCS SSURGO-Certified Soils" (2012), MassGIS, www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/soi.html

Hanover are Water Tower Hill at 155± feet, Tumbledown Hill at 140± feet, and King Hill at 140± feet.

Other significant topographical features include several low hills found in the northeast and northwest sections of town, and low areas containing swamps. There is a former cranberry bog, Clark Bog, in the southeast section of town on the Clark Land. There is also a sand pit in the southern part of Hanover and a gravel pit by Silver Brook.

Drainage patterns throughout Hanover are determined by an extensive swamp and brook system which feed three major waterways: the Drinkwater River, the Indian Head River, and the Third Herring Brook. Most of the drainage from the western side of town flows into the Drinkwater River, eventually reaching the Indian Head River. Other brooks flow directly into the Indian Head River and The Third Herring Brook, both of which define over half of the town's boundaries. These two waterways come together to form the North River at Hanover's borders with Pembroke and Norwell, and are a significant area resource.

Landscape Character

Various elements of Hanover's landscape make it unique and special for those who choose to live in and visit the town. Hanover has a fairly flat topography with gently rolling hills. As a result, its landscape is not segmented by any major topographical landforms. The town's geography is more defined by its numerous water resources like rivers, streams, brooks, ponds, and wetlands. These resources provide not only a home for plant and wildlife species, but also a variety of recreational opportunities for residents and visitors.

There are a number of small, yet notable, details scattered throughout Hanover that contribute to its unique character. One example is the barely noticeable, old granite marker at the intersection of Old Washington Street and Silver Street that shows motorists how many miles away Boston and Plymouth are.

Hanover does not have a walkable, commercial downtown like many other small communities in the Boston region. The majority of the town's commercial activity is clustered along Route 53. However, Hanover does have small commercial area in the Four Corners section of town that reflects the town's rural past. The Four Corners area is located along Route 139 and is an unofficial historic area. The buildings were constructed before zoning was instated and do not have the setbacks that are now

required in town. This gives the area a very pedestrian friendly, walkable feel to it. Four Corners was actually the original business center of Hanover. According the Hanover Historical Commission, shipyards were located on the banks of the North River in the 1800s and many ships were launched in the Four Corners area.

Historic Four Corners[7]

[7] Photo source: www.cardcow.com/396197/hanover-four-corners/

Water Resources

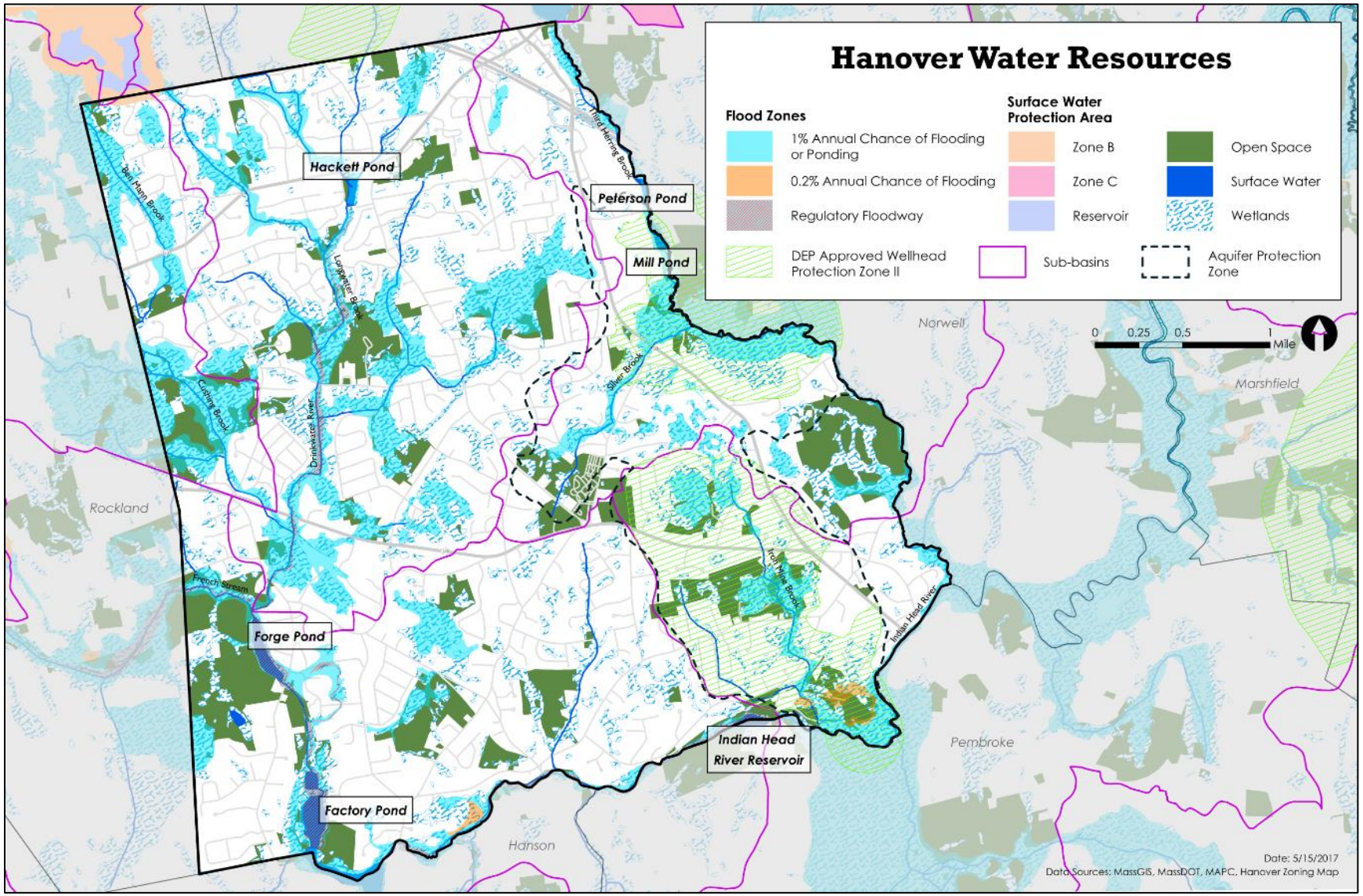
Hanover has a number of water resources and a varied natural landscape that includes streams, ponds, wetlands, and wildlife habitats. Hanover's eastern and southern borders are comprised of three main waterways, the North and Indian Head Rivers along the south and southeast, and the Third Herring Brook along the east. The latter two are both tributaries, and the town border is marked by their confluence.

Watersheds

A watershed is an area of land from which precipitation drains into a wetland system or a body of water. Hanover is located entirely in the North and South Rivers Watershed, one of 14 coastal river sub-watersheds in the South Coastal Watersheds Drainage Area. The consortium of watersheds within the South Coastal Watersheds makes up a total drainage area of approximately 241 square miles and encompasses either all or part of 19 communities.

The South Coastal Watersheds Drainage Area is one of eleven in eastern Massachusetts that discharge directly into the ocean. The southern part of the drainage area contains the Plymouth-Carver Aquifer, which provides the majority of the drinking water for the region and is a sole source aquifer.

Figure 12: Water Resources Map



The drainage area includes over 350 lakes and ponds, numerous wetlands, and Silver Lake, a 620 acre water body in that spans Pembroke, Plympton, and Kingston. They are also biologically significant because they contain a diverse and large number of rare and endangered species.

Planning for the South Coastal Watersheds has developed a variety of priorities for the area within the drainage area, including:

- Developing a Silver Lake Regional Natural Resources Management Plan through the Silver Lake Stewardship Project;
- Increasing awareness about water quality and water quantity impacts from stormwater runoff and establishing strategies that engage homeowners, developers, and public officials to protect and restore water quality and quantity from those impacts;
- Developing a Regional Open Space and Recreation Plan involving local stakeholders;
- Promoting smart growth strategies that minimize the loss of open space and biodiversity of upland, freshwater, and coastal ecosystems, and protect and/or restore ground and surface water quality and quantity from current and future land use impacts; and
- Continuing to identify opportunities to develop and nurture alliances for stream teams, lakes and ponds associations, and watershed associations in areas without environmental stewardship.[8]

Besides Hanover, the North and South Rivers Watershed contains Norwell, Hingham, Scituate, Marshfield, Pembroke, Whitman, Hanson, Duxbury, Weymouth, Rockland and Abington. A grassroots, non-profit environmental organization, the North and South Rivers Watershed Association, Inc. (NSRWA), is active in the protection of the watershed and educating the public about it. Over 1,150 households are members of NSRWA, whose goals are to:

- "Protect the watershed and promote responsible growth by working in partnerships to preserve open space, scenic vistas and sensitive natural resources;
- Educate and encourage stewardship of the watershed through public education, outreach and recreation programs; and
- Restore the water quality of the rivers by identifying and correcting adverse impacts."[9]

The organization has enabled the permanent protection of hundreds of acres of land critical to the North and South Rivers Watershed, and raised millions of dollars to enable communities in the watershed to

[8] "South Coastal Watersheds," MA EOEEA, www.mass.gov/eea/waste-mgnt-recycling/water-resources/preserving-water-resources/mass-watersheds/south-coastal-watersheds.html

[9] "About Us," North & South Rivers Watershed Association, www.nsrwa.org/about-us/

conserve land. NSRWA measures water quality and works with watershed communities to implement stormwater management techniques. It also works with communities to improve streamflow and water quantity to help restore the area's habitat for fish and other organisms. The efforts of NSRWA have also encouraged and enabled healthy outdoor recreation on the watershed's rivers and their shores, such as kayaking and fishing.

As a part of the Source Water Assessment Program (SWAP), the Massachusetts Department of Environmental Protection (MassDEP) identified land uses within Hanover's water supply protection area (the Water Resource Protection District) which may be potential sources of contamination. This 2003 effort identified ways to better protect the town's water supply and drinking water. For example, since Hanover has no sewer system, all homes in the Water Resource Protection District have septic systems. If a septic system in this district were to fail, it could be a source of microbial contamination of Hanover's drinking water. The SWAP provided recommendations for targeting this potential problem, such as educating residents on best management practices for protecting water supplies and working with the Town's to limit new residential development in the water supply protection areas.[10]

[10] SWAP Report for Hanover Water Department, MassDEP, www.mass.gov/eea/docs/dep/water/drinking/swap/sero/4122000.pdf

Surface Water

There are numerous ponds and swamps in Hanover, including: Forge Pond, Hacketts Pond, Shinglemill Pond, Peterson Pond, Mill Pond, Factory Pond (a tributary of the Indian Head River in the south of town), Pine Island Swamp, Wampum Swamp, Peg Swamp, Hell Swamp and a small portion of Beech Hill Swamp in the southwestern section of town (the majority lies in Rockland).

In addition to the rivers that form Hanover's borders (the North River, Indian Head River, and Third Herring Brook), another prominent river in the town is the Drinkwater River, which meanders through the western side of town. Numerous streams also ramble across the town, including: Ben Mann Brook, Shinglemill Brook, Silver Brook, Molly's Brook, Torrey Brook, Iron Mine Brook, Cushing Brook and Longwater Brook.

Hanover's major river is the North River. At approximately eight miles long, it is primarily a tidal river formed by the confluence of the Indian Head River and Herring Brook. The North River flows through Hanover, Pembroke, Norwell, Marshfield, and Scituate. Much of its bordering lands and marshes have been designated by the Natural Heritage and Endangered Species Program (NHESP) as priority or estimated habitat for rare and endangered species.

North River at Washington Street[11]

The North River was the first designated Scenic River in Massachusetts by the Massachusetts Department of Environmental Management pursuant to the Scenic and Recreational Rivers Act (MGL c. 21 § 17B) and the North River Commission Act (MGL c. 367 § 62) of the Acts of 1978. Designation of this Outstanding Resource Water (ORW) under the Scenic River Act means that a 300 foot corridor is regulated by the North River Commission, which oversees development in the corridor. The North River has also been designated by the Federal Government as a natural National Landmark for its characteristics, which include a coastal estuary with freshwater tidal habitat.

A small portion of northwest Hanover falls within a Surface Water Supply Protection Area. This is due to its proximity to the Rockland Abington Reservoir. The area within Hanover is part of the Zone B, the land area within half a mile of the upper boundary of the bank of a Class A water source.[12] Class A waters are those that are designated as a public water supply. They are excellent habitats for fish and other aquatic life, have a high aesthetic value, and are protected as Outstanding Resource Waters.[13]

There are a number of opportunities for recreation along Hanover's surface waterways. Trails and pathways run alongside the Drinkwater River and Longwater Brook in the Melzar Hatch Reservation and on the Hanover Middle/High School Fields, as well as along the Drinkwater River on the Fireworks Property. In addition to having trails adjacent to waterways in Forge Pond Park, Luddams Ford Park, and the Indian Head/Riverside Land, these three properties also each have a public canoe launch. Tindale Bog is used for ice skating when it freezes over in the winter. There are fishing opportunities on Hacketts Pond and Luddams Ford Pond.

[11] Photo source: Bryan Jones, www.flickr.com/photos/55925788@N06/7957551800

[12] "Surface Water Supply Protection Areas" (2017), MassGIS, www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/swp.html

[13] "Massachusetts Surface Water Quality Standards," MassDEP, www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf

Aquifer Recharge Areas

A large Aquifer Protection Zone is located within the eastern portion of the Town of Hanover and encompasses most of the Route 53 commercial corridor. This zone is defined as the area within which the surface water and groundwater directly supply the town's wells. Located within the Aquifer Protection Zone are three wellhead protection zones surrounding three well fields with a total of seven wells. Hanover has nine wells in total.

Wells in Massachusetts are required to have a Zone I protective radius of 400 feet and a Zone II protection area, the land around the well where water supply protection activities are focused. Hanover's nine wells are found in four Zone II recharge areas: one for the Philip C. Beal wells, one for the Pond Street wells, one for the Hanover Street wells, and one for the Broadway wells. While the wells are found in Hanover, some of the Zone II areas extend into Norwell and Pembroke.[14]

All of Hanover's wells are located in an aquifer that is highly vulnerability to contamination because it lacks hydrogeological boundaries, like clay, that prevent contamination migration. To ensure that the well water is safe for drinking, disinfectant is added to the Pond Street wells, Hanover Street wells, and Beal wells.[15] Hanover Water Treatment Division, within the Department of Public Works, also operates three drinking water treatment facilities, which treat approximately 520 million gallons of drinking water annually. The Pond Street Water Treatment Facility treats the three Pond Street wells for iron, manganese, organic color, and turbidity. The Beal Water Treatment Plan removes iron, manganese, and radon from the two Beal wells. Lastly, the Broadway Water Treatment Plant treats iron, manganese, small amounts of organic color in the two Broadway and the two Hanover Street wells.[16]

Broadway Water Treatment Plant[17]

[14] "Massachusetts Surface Water Quality Standards," MassDEP
[15] *Ibid*
[16] "Water Treatment Division," Town of Hanover DPW, www.hanoverdpw.org/WaterTreat.shtml
[17] Photo source: www.hanoverdpw.org/WaterTreat.shtml

Flood Hazard Areas

The Federal Emergency Management Association (FEMA) most recently updated its Flood Insurance Rate Maps (FIRM) in 2014 to reflect the actual flood risks to communities in the United States. The last time the maps were published was in 1982. The modernized data is shown in FEMA's National Flood Hazard Layer (NFHL) dataset, which depicts the areas subject to flooding, grouped by flood zone, along with the base flood elevation, when known.

According to FEMA, a regulatory floodway is a "channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height." [18] Regulating development in these floodways is key for ensuring that upstream flood elevations do not increase in the event of a storm. There is a regulatory floodway extending from Longwater Brook, to the Drinkwater River, and through Forge Pond and Factory Pond. Another regulatory floodway runs along the southern border of Hanover, from the Drinkwater River to where the Indian Head River meets Luddam's Ford Pond.

Many areas in Hanover fall into Flood Zone A, meaning that they are subject to a 1% annual chance flood hazard, also known as the 100-year flood. These areas closely correspond to the town's waterways and wetlands. Because of potential of flooding in these areas, few building structures exist in the flood zone. Most of Hanover's conservation properties have some part that is within Zone A.

Two areas in the southern portion of Hanover, one in the Indian Head/Riverside Land, and another in a wetland above the Drinkwater River, are within Flood Zone X. These areas are subject to a 0.2% annual chance of flooding, which is known as the 500-year flood. Flooding in this zone is less likely than in Zone A. Because of its location, no areas of Hanover fall within Zone V. These high-risk coastal areas, like Zone A, are subject to a 1% annual chance of flooding. Locations within Zone V are also subject to additional hazards associated with storm-induced waves.

Wetlands

The streams, brooks, and rivers in Hanover support extensive wetlands systems which generally follow the dominant drainage patterns and waterways in town.

The Drinkwater River system and contributing streams flank wetlands on the western side of Hanover. The Benn Mann Brook, Shingle Mill Brook, Longwater Brook, Cushing Brook, French Stream, and Drinkwater River all have major wetland areas associated with the channeled waterways. Hanover's generally flat topography, with low, rolling hills, an abundance of water, and favorable soils, control the local hydrology and create several large open swamps.

[18] "Floodway," FEMA, www.fema.gov/floodway

Hell Swamp, Pine Island Swamp, Peg Swamp, and a section of Beech Hill Swamp are aligned across the center of the town. Each of these swamps eventually flows into the Drinkwater River System (even the Beech Hill Swamp, which first drains into Rockland and back into Hanover along French's Stream). Wetlands in the vicinity of Shingle Mill Brook and the northern section of Drinkwater River support certified vernal pools.

Wetlands in the southeast corner of Hanover, including some historic cranberry bogs, are present along Iron Mine Brook. Another large, unnamed wetland system is present east of the Town Center. The remainder of the Indian Head River drainage area in the southern portion of town has smaller wetland areas scattered along tributaries or bordering the river.

The northeast part of town has few wetlands other than those associated with Hell Swamp, although farther south along the Third Herring Brook where the brook meets Molly and Silver Brooks, the waterway opens up to form the Old Pond Meadows. While the majority of the meadows are located in Norwell, a significant section of land in Hanover is also within the wetland system. There are also wetlands associated with tributaries to the Third Herring Brook scattered along the eastern edge of town.

Mentioned previously, Hanover has a Wetlands Protection Bylaw to protect the wetlands, related water resources, and adjoining land areas in Hanover. The Bylaw requires that any activity within wetland resource areas or the 100 foot buffer around wetland resource areas obtain a permit from the Conservation Commission.

Vegetation

General Inventory

The value of vegetation as a natural resource is unfortunately often overlooked or taken for granted in many communities. The usefulness of vegetation extends beyond its traditional role of providing aesthetically pleasing views and variety in the landscape. Woodlands, wetlands, abandoned fields and orchards are all forms of vegetation. In addition to creating a landscape, vegetation plays a variety of roles:

- Protects surface and groundwater bodies by stabilizing soils and preventing erosion;
- Acts as a visual and sound buffer between incompatible uses;
- Provides wildlife habitat;
- Provides recreational opportunities; and
- Improves air quality.

Hanover is vegetated with a variety of plant species commonly found on well-drained upland soils throughout southeastern Massachusetts. Pine and oak forests dominate the upland forests. Other common species include hemlock, swamp maple, hickory, cedar, wild cherry, and birch.

In a 2007 letter from the Massachusetts Natural Heritage & Endangered Species Program (NHESP), an official stated that, "of the rare species currently known from Hanover, many are associated with the very uncommon Freshwater Tidal Marsh and the Indian Head and North Rivers. The plants are pretty much habitat specialists to Freshwater Tidal Marshes."

Forest Land

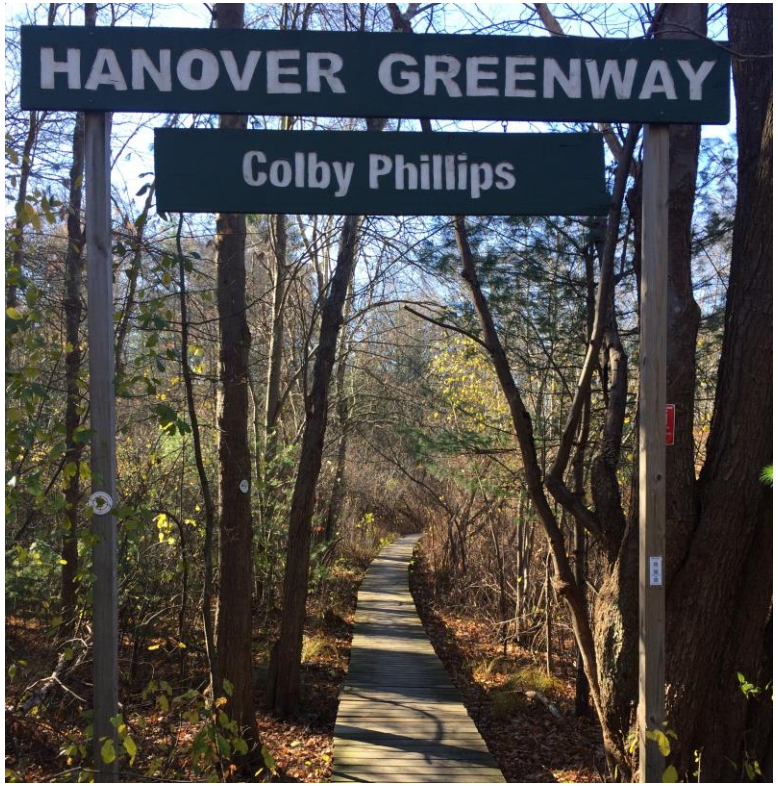
Central hardwoods/hemlock/white pine forests are the dominant forest type in eastern and lowland areas of Massachusetts, of which Hanover is in both. The main tree types in these forests are oaks and hickories. Of the central hardwood tree species, red maple, chestnut oak, black birch, and scarlet oak are all prevalent. The most common softwood is hemlock. White pine is dominant on sandy sites.

Hanover is fortunate to have large tracts of forest land throughout town. Much of these forests are within conservation land that is protected in perpetuity from development. Some of the largest forested conservation parcels in Hanover are the Colby-Phillips Property (over 130 acres), Fireworks Property (over 130 acres), and Clark Land (over 50 acres). Trails maintained by the Town's Open Space Committee crisscross many of the conservation properties and provide access to Hanover's pristine woodland areas.

Hanover has areas of possible primary forest, untilled woodlots and wooded pastures which generally have greater biodiversity than areas that have been tilled. According to the NHESP, "the importance of primary

forest is that such sites retain more native biodiversity than sites that have been tilled: soil fauna and flora, microorganisms and plants that reproduce wildflowers are more common in untilled forests than previously tilled lands. The areas of 1830s forest on private land would be good targets for conservation acquisition to maintain the biodiversity of the Town and the region."

Colby-Phillips Property



Agricultural Land

Agriculture was one of Hanover's early industries. The presence of agricultural land in the town has been in decline for decades. Data available from MassGIS indicate that, in 1971, Hanover had approximately 303 acres of agricultural land consisting of either cropland or pasture. In 1985, it decreased to 252 acres. By 1999, it decreased further to 143 acres. Today, there are no known agricultural uses in Hanover.

In the mid-2000s, the Town voted to use Community Preservation Act funds to purchase the Cervelli Farm Property for open space and recreational purposes. Located on the west side of King Street, it encompassed most of the southern shore of Forge Pond. It is now the beautiful Forge Pond Park.

Agricultural land in Massachusetts is a finite natural resource that is threatened by competing land use pressure. Unfortunately, the loss of this land has a detrimental effect on environmental quality. Agricultural land reduces flooding, replenishes ground water supplies, enhances wildlife habitat, and maintains the landscape's aesthetic and historic quality. The Town of Hanover should consider if there are relevant opportunities to reintegrate agriculture into the landscape, even if it is at a small scale.

Wetland Vegetation and Rare Species

While Hanover lacks coastal wetlands due to its distance from the sea, it has an abundance of inland wetlands, areas where water is at or just below the surface of the ground. According to the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), these areas often appear dry during some seasons, but they contain enough water to support certain soils and vegetation. There is a unique tidal freshwater marsh habitat at the confluence of the Indian Head and North Rivers which is home to a wide variety of plant and animal species.

Most of the rare plant species found in Hanover are within its wetlands. As a part of the Massachusetts Endangered Species Act (MESA), the population status of rare species, whether they are plants or animals, is described using three categories: special concern, threatened, and endangered. Special concern species have either experienced a decline that could threaten the species without intervention, or whose populations are so small, localized, or dependent upon specialized habitats that they could become threatened. Threatened species are likely to become endangered in the foreseeable future. Endangered species are in danger of extirpation from Massachusetts. The two rare plants found Hanover are both endangered. There are no federally listed rare species.

Parker's Pipewort, also known as Estuary Pipewort (*Eriocaulon parkeri*), is found within the Indian Head River freshwater tidal marsh and it is a small, delicate, and erect perennial. It is grass-like in appearance and grows two to six centimeters in length, with small whitish to yellowish flowers that appear from late July to late September. The species has been endangered in Massachusetts since 1997 and was last observed in 2008.

The Estuary Beggar-ticks (*Bidens hyperborean*), herbaceous plant with yellow daisy-like or button-like flowers and opposite leaves, is a plant that is characteristic of muddy margins and exposed banks of large tidal rivers. It is considered an endangered species in Massachusetts and was also last observed in 2008. The plant is rare because it is near the southern limit of its range and fewer than five communities it inhabits are found in Massachusetts.

An uncommon, though not technically rare, plant species that has been spotted in Hanover is the water marigold (*Bidens beckii*). One of only a few members of the aquatic sunflower family, it is a perennial plant that has opposite, finely divided leaves underwater and toothed leaves above water. Its yellow daisy-like head flowers between July and September. Water marigolds are sensitive to water pollution and they are a food source for ducks.

Estuary Beggar-Ticks[19]

BioMap2

In partnership with the Nature Conservancy, the Natural Heritage & Endangered Species Program produced strategic biodiversity conservation plans for every city and town in Massachusetts in 2012. *BioMap2* is designed to focus "land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, exemplary natural communities, and a diversity of ecosystems."[20] The project was developed to protect the state's biodiversity in the context of global climate change.

As a part of the *BioMap2* mapping project, two components in each community are identified: Core Habitat and Critical Natural Landscape. Core Habitat describes areas that are crucial to the long-term existence of rare species, as well as a wide diversity of species in an intact ecosystem. According to *BioMap2*, 918 acres in Hanover is considered Core Habitat. Of this, almost 300 acres are already protected in perpetuity.[21]

Critical Natural Landscape describes large areas of natural "Landscape Blocks" that are not very impacted by development. As the world's climate changes, these areas, if protected, will provide habitat for native species, enhance ecological resiliency to disasters, and connect habitats. Over 1,000 acres of Hanover is considered Critical Natural Landscape. Of this, 312 acres are protected in perpetuity.[22]

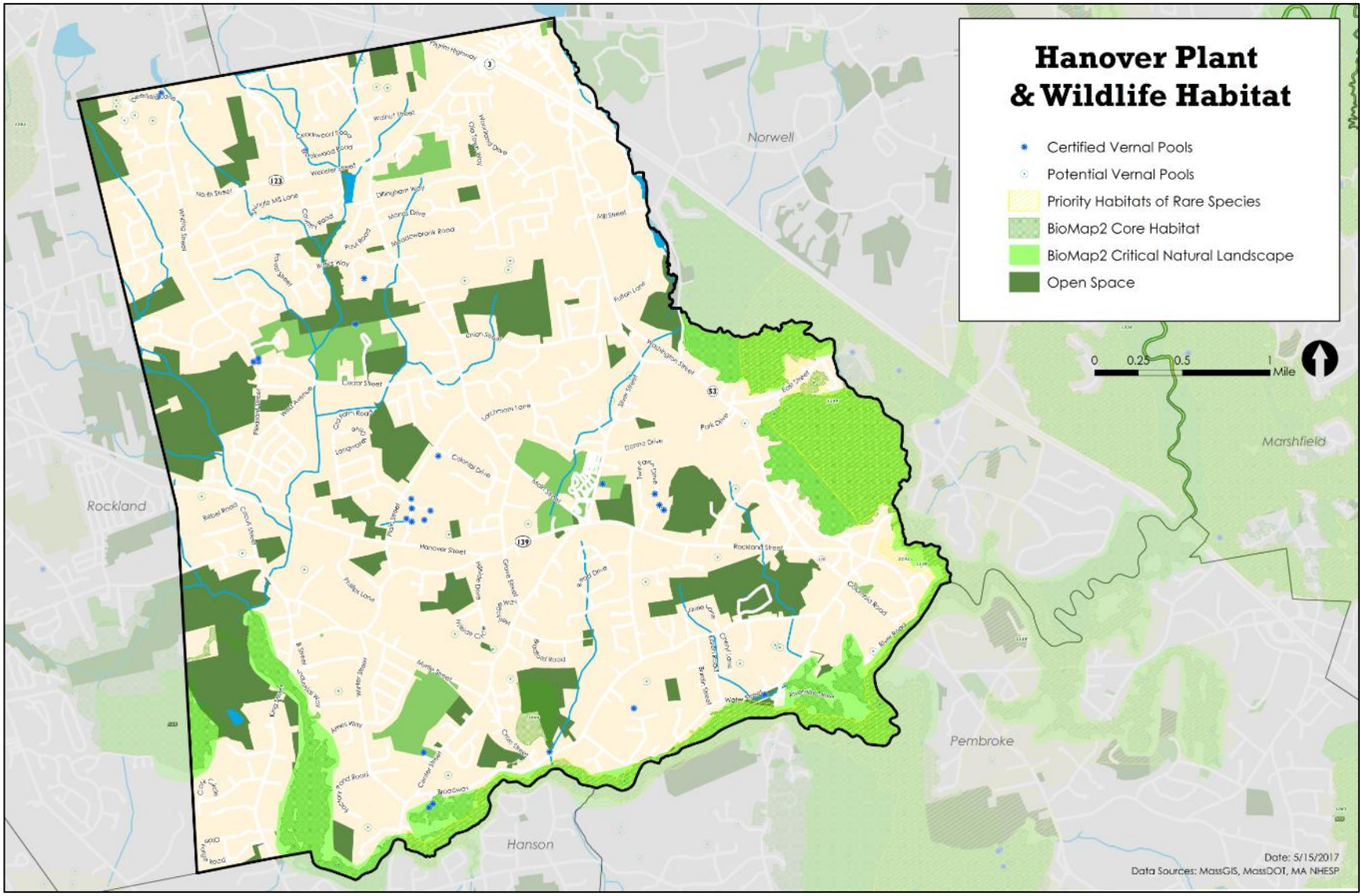
[19] Photo source: gobotany.newenglandwild.org/species/bidens/hyperborea

[20] "BioMap2," MA EOEEA, www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/land-protection-and-management/biomap2/

[21] "BioMap2: Hanover" (2012), MA NHESP, maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Hanover.pdf

[22] "BioMap2: Hanover" (2012), MA NHESP

Figure 13: Habitat Map



There are large overlaps between Hanover's Core Habitat and Critical Natural Landscape. These areas include most of Hanover's southern border along the Indian Head and North Rivers, as well as Forge Pond, Factory Pond, and the land around them. Another large area of both Core Habitat and Critical Natural Landscape is the Water Protection Area around Third Herring Brook. The Cardinal Cushing Property in eastern Hanover also represents a massive tract of this land.

Fisheries and Wildlife

General Inventory

The Town of Hanover is home to a number of wildlife species frequently found in Eastern Massachusetts. Common mammals found are rabbits, possums, raccoons, foxes (red and gray), coyotes, deer, squirrels (red, gray, and flying), bats, chipmunks, moles, mice, river otters, beavers, minks, muskrats, skunks, and fishers.

In terms of bird species, Hanover is home to owls (great horned, barred, screech, and saw-whet), hawks, egrets, ospreys, ring neck pheasants, Canadian geese, mallards, swans, great blue herons, turkey vultures, crows, blue jays, cardinals, chickadees, grackles, starlings, English sparrows, mourning doves, and more.

The marshes, wet meadows, ponds, and streams in Hanover, especially along the town's three rivers, form a wildlife corridor and provide important wildlife habitat. Hanover's abundant water features contain trout, shad, herring, chain pickerel, smallmouth and largemouth bass, yellow and white perch, sunfish, sunfish, bluegill, suckers, minnows, and other small fish. Since dams have been removed along Third Herring Brook, fish species once native to the area have returned.

Areas of the North River downstream from Hanover provide an important habitat for the spawning and migration of alewife, American shad, white perch, rainbow smelt, and Atlantic cod fish species. Atlantic salmon also use this same area for migration. In addition, the outer estuary area of the North River contains shellfish growing waters for mussels and oysters.

Vernal Pools

Vernal pools serve as an important breeding ground and home to a number of amphibians and invertebrate animals. Also known as ephemeral pools, autumnal pools, and temporary woodland ponds, these natural sites fill with water in the fall or winter due to rain and rising groundwater. They stay ponded through the spring and into summer, but tend to dry completely by the middle or end of the summer. This occasional drying prevents fish from permanently populating the pools, allowing amphibians and invertebrate species to reproduce without being targeted by fish predators.[23]

The Massachusetts Natural Heritage and Endangered Species Program has certified 24 vernal pools in Hanover as of 2015. Certification occurs according to the Massachusetts Division of Fisheries & Wildlife's *Guidelines for the Certification of Vernal Pool Habitat*. Certified vernal pools can usually be protected from development and are afforded protection under a number of state regulations, including those from the Water Quality Certification (401 Program), Title 5, and the Forest Cutting Practices Act.[24] They are also protected by the state's Wetlands Protection Act regulations if they if they meet the definitions of "wetlands" under that law.[25] There are another 50 potential vernal pools in Hanover that have been identified, but not certified by NHESP. Hanover's Conservation Commission is currently developing a plan to identify and certify all potential vernal pools in town that meet the state requirements.

Hanover's vernal pools are scattered throughout town, with the largest cluster of certified pools in a wetland area around Spring Meadow Lane near Hanover Center. There is a large cluster of potential vernal pools in northwest Hanover around Deerfield Lane. The clusters of certified and potential vernal pools provide extra habitat value for species that use them for breeding because each pool is different and provides alternate habitats in different years and seasons. Vernal pool clusters that are also in primary forests are important for biodiversity, an example of

[23] "Vernal Pools," MA EOEEA, www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/vernal-pools

[24] "NHESP Certified Vernal Pools," MassGIS, www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/cvp.html

[25] "Protecting Vernal Pools," Mass Audubon, www.massaudubon.org/learn/nature-wildlife/reptiles-amphibians/vernal-pools/protecting

which occurs in the northwest portion of town. Land that is primary forest and contains vernal pool clusters would be excellent to consider for acquisition to help protect the biodiversity of Hanover.

Vernal Pool[26]

Currently, a buffer of 100 feet around certified vernal pools is only protected by the Wetland Protection Act if that area is also considered to be a wetland. However, it is recommended that larger undisturbed buffer areas, including adjacent uplands, exist to protect vernal pools. Local bylaws can increase the amount of protection for buffer areas around vernal pools beyond what the state mandates. [27] Strengthening the vernal pool buffer requirements, educating the public about the importance of vernal pools, and continuing to identify and certify pools are all important initiatives for the Conservation Commission.

Rare Species and Natural Communities

Rare animal species are defined the same as rare plant species, and are classified as either endangered, threatened, or of special concern (see definition in Wetland Vegetation and Rare Species section) as per the Massachusetts Endangered Species Act. Four species of special concern have been found in Hanover, but no threatened or endangered species. There are no federally listed rare species.

One of two dragonflies found in Hanover that are that are species of special concern is the Spine-crowned Clubtail (*Gomphus abbreviatus*). This dragonfly is dark brown/black with bright yellow markings on the body and has green eyes. It ranges in size between one and 1.5 inches long. The Spine-crowned Clubtail typically lives near large streams or rivers that have silty or sandy bottoms. Adults may also live near riparian areas, forested uplands, and fields. Poor

[26] Photo source: vtecostudies.org/blog/vce-expands-vernal-pool-conservation-work

[27] "Protecting Vernal Pools," Mass Audubon

water quality, the disruption of natural flooding, and development of upland areas near river systems have a negative effect on their habitat. The insect was most recently observed in Hanover in 2004.

Spine-Crowned Clubtail[28]

The other rare dragonfly species is the Umber Shadowdragon (*Neurocordulia obsoleta*), last spotted in Hanover in 2003. This species is characterized by bright green eyes and metallic green highlights on the face, thorax, and abdomen. Usually less than two inches in size, they are found on lakes and rivers containing little vegetation. They also do well in artificially created habitats like reservoirs and dammed sections of rivers. The Umber Shadowdragon may be vulnerable due to shoreline development and overuse of its habitat.

Another species of special concern is the Eastern Box Turtle (*Terrapene carolina*). This turtle is small, with a dark brown or black shell and yellow, orange, or reddish markings. They are most typically found in woodlands, fields, or bogs. Threats to the species include habitat destruction, road mortality, and collection for pets. Protecting their habitat, including ensuring that it does not become fragmented, is important for the continuation of the species. The Eastern Box Turtle was last seen in Hanover in 2010.

A rare mussel, the Eastern Pondmussel (Ligumia nasuta), was last observed in Hanover in 1965. This freshwater mussel is approximately four inches in length and has a distinctive brown/black shell. Typically this mussel lives in protected areas of lakes and rivers as it is threatened by habitat alteration. Pollution that abuts aquatic habitat, runoff from hazardous materials, and gill damage to host fish by acid rain are all significant threats to this species.

The Town of Hanover is home to two natural communities that the Natural Heritage & Endangered Species Program recognizes as uncommon and/or exemplary: an Estuarine Freshwater Tidal Marsh and an Estuarine Fresh/Brackish Tidal Swamp. Both these natural communities are critically imperiled in

[28] Photo source: bugguide.net/node/view/88355/bgpage

Massachusetts.[29] Southeastern Massachusetts is also home to Atlantic White Cedar Bogs, another priority natural community for protection.

Freshwater tidal marshes are very uncommon and are a globally rare habitat. They most often occur along free-flowing coastal rivers and are characterized by salt intolerant plant species. This type of marsh is home to a number of rare species and is tracked by NHESP as a high-priority natural community. Plant species that depend upon this community type include Estuary Beggar-Ticks, Hemlock Parsley, Estuary Pipewort, and River Arrowhead. One large and high-quality example of this community type occurs on the North River, at the confluence of the Indian Head River and 4th Herring Brook.

Extensive damage to freshwater tidal marshes has already occurred from historic land uses, such as damming and filling. With the more recent trend of breaching or intentionally deconstructing dams, the potential exists for natural restoration of this habitat. Two current threats to this community type are and invasive plant species and hydrologic alteration from excessive water withdrawal. In order to help mitigate any further damage, monitoring invasive species, determining hydrologic requirements, developing a system for monitoring hydrologic stress, and preventing alteration of tidal shores should be considered.

Fresh/brackish tidal swamps are located along coastal rivers at the upper limit of tidal influence. In Hanover, one large example exists near the North River. They typically occur upstream of freshwater tidal marshes and are home to several rare and endangered plant species such as Long's Bitter-Cress, Hemlock Parsley, and Gypsywort. Characteristics of this type of natural community include a dense shrub understory and a rich herbaceous layer. Alteration of river hydrology from large amounts of water withdrawal is a threat to this type of community, so determining hydrologic requirements and developing a system for monitoring hydrologic stress should be considered.

According to NHESP, Hanover has several areas that are at least partly Atlantic white cedar swamps. Atlantic white cedar swamps are forested wetland communities with a dense canopy, deciduous shrub layer, and sparse herb layer dotted with moss. They are most commonly associated with open bogs and red maple swamps. Major threats to this natural community include clearing for direct residential and commercial development and interferences with natural hydrological processes due to surrounding development.

[29] "NHESP Priority Types of Natural Communities," MA NHESP, www.mass.gov/eea/docs/dfg/nhesp/natural-communities-facts/priority-natural-commun.pdf

Scenic Resources and Unique Environments

Scenic Resources

The Town of Hanover has a wealth of scenic resources and view sheds. Scenic resources need not be a specific view or location, but may be a combination of features that come together to create an aesthetically pleasing situation, such as a tree lined street, a rolling meadow, a hilltop, or an old farmhouse. The following places have been identified by residents as treasured scenic resources:

- Town Center
- Briggs Stable/Field
- Four Corners
- Luddams Ford
- Sylvester Field
- Cardinal Cushing Property
- Trail along the Indian Head River
- Slave Grave in Town Cemetery on King Street
- Old Stone Bridge on the Hanover/Pembroke line over the North River
- Forge Pond
- Old King Street School
- Former Clark Airport
- Vacant Doc Cook's General Store
- Hanover's designated scenic roads

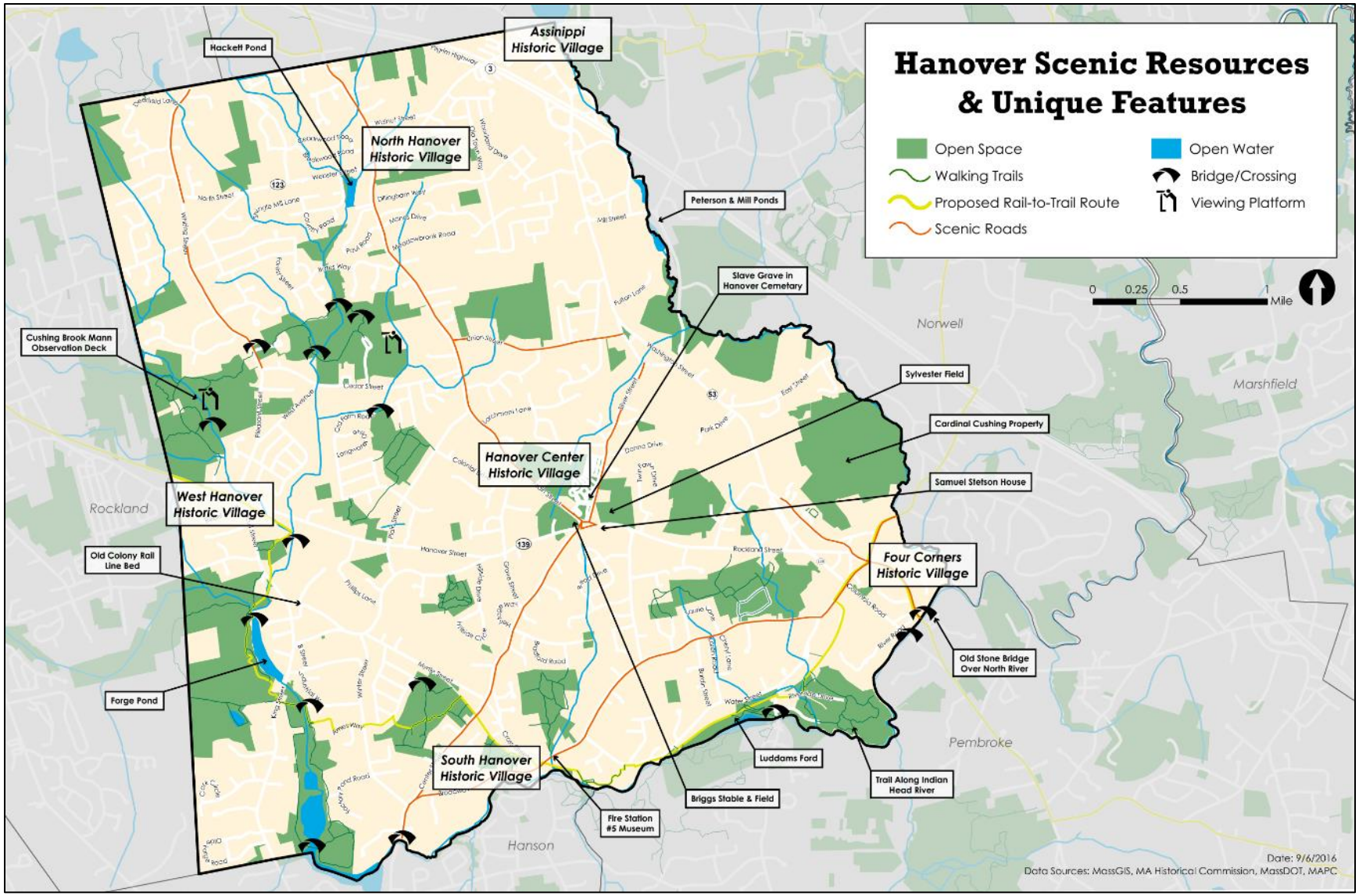
Briggs Stable[30]

Hanover has a number of officially designated scenic roadways that are tree-lined and often dotted with old stone walls. These roads lack the strip malls seen along Route 53 and represent the more rural character of Hanover's residential districts. Hanover's designated scenic roads include:

- Broadway
- Center Street
- Main Street
- Silver Street
- Union Street
- Washington Street (in the Four Corners area)
- Whiting Street

[30] Photo source: www.briggsstable.com

Figure 14: Scenic Resources and Unique Features Map



According to Massachusetts General Law c. 40 §15C, "After a road has been designated as a scenic road any repair, maintenance, reconstruction, or paving work done with respect thereto shall not involve or include the cutting or removal of trees, or the tearing down or destruction of stone walls, or portions thereof, except with the prior written consent of the planning board…"[31] Designating a road as "scenic" allows for the preservation of existing rural and natural aesthetic qualities, and thereby contributes to the overall rural character of a community.

Cultural, Archeological, and Historic Areas

Hanover has several historic villages—Four Corners, South Hanover, West Hanover, North Hanover, Assinippi, and Hanover Center—which all have their own unique history and character. The Old Colony Rail Line, which was in operation from the mid to late 19th century, is located in the southern portion of the town traversing from west to east. The rail bed remains today and is the location of a proposed rail-to-trail walking and bike path that would extend from Hanover's border with Rockland. While part of the rail bed is owned by the Massachusetts Department of Conservation and Recreation, other parts are privately owned, complicating the process of creating a much desired regional trail network.

Hanover has a wealth of important cultural and historical sites, only some of which still remain today. Hanover Yards, in operation from 1668 to 1844, contained 11 shipyards with vessels in various stages of construction during the peak years of shipbuilding activity. From 1800 to 1808, at least ten ships per yard were built here by a work force of 400 ship carpenters. Two plaques mark the sites today. Rainbow Bridge was a footbridge across Third Herring Brook and was used as a shortcut from the Hanover Yards to Fox Hill. Named for its bowed shape, it has long since disappeared.

Chapman's Landing was the westernmost shipping point on the North River. Iron ingots were landed at Humarock for shipment to the Hanover forges. The North River built steamship "Mattakeesett" was used in this service.

Luddam's Ford was the North River's easternmost foot crossing on the Old Bay Path going from Plymouth to Boston. It was named for the guide who carried Governor Winthrop across the river on the way to visit Governor Bradford of Plymouth in 1632. The Luddam's Ford Fish Ladder was the site of Hanover's early mills and Curtis Anchor Works, which was famous for the casting of the "Constitution" anchor. By the late 1800s, this was the site of the Clapp Rubber Mills, the largest of its kind in the country. The remaining dam forces migrating fish to scale the fish ladder in their

[31] "Section 15C: Scenic road designations; improvements; fines," Massachusetts General Law, malegislature.gov/Laws/GeneralLaws/PartI/TitleVII/Chapter40/Section15C

efforts to reach spawning locations upstream. Conservation land on both sides of the Indian Head River provides canoe access to the Wampanoag Indian Passage.[32]

Before developing the Hanover Marketplace in the Four Corners area, an archaeological investigation was undertaken. The study, published in 1998 and updated in 2013, recovered over 200 pieces of pre-contact Native American cultural materials in the area, including stone tools and clay potsherds.[33]

Luddam's Ford[34]

[32] North & South Rivers Watershed Association, The North and South Rivers Guide (1993)
[33] The Public Archaeology Laboratory, Inc. (2013), Archaeological Investigations – Hanover Marketplace Project Area, www.palinc.com/sites/default/files/publications/488_Hanover_Technical_Report.pdf
[34] Photo source: obsertography.blogspot.com/2010/10/luddams-ford-park-hanover-ma.html

Environmental Challenges

Hazardous Waste Sites

The Massachusetts Department of Environmental Protection (MassDEP) maintains a database of sites in communities throughout the state where oil or other hazardous material has been released and reported. According to MassDEP's Reportable Release Lookup database, Hanover has 82 sites listed.

A notorious hazardous waste site in Hanover is the former National Fireworks Site. Between 1907 and 1970, companies that operated on the site not only manufactured civilian fireworks, but also researched, developed, and manufactured munitions and pyrotechnics for the U.S. Military. The manufacturing process generated mercury, lead, and organic solvents which were disposed of in the southern portion of the 240-acre site. The improper disposal of these hazardous wastes impacted the area's soil, wetlands, groundwater, and Factory Pond.[35]

In the 1970s, the Town of Hanover purchased about 130 acres of the former National Fireworks Site to be preserved as conservation land. An industrial park currently operates at the northern and eastern portions of the site. Since 1995, MassDEP has overseen all environmental investigations and remedial

[35] "Environmental Update: The National Fireworks Site," Town of Hanover, www.hanover-ma.gov/sites/hanoverma/files/file/file/2012_newsletter.pdf

activities related to the site.[36] Remediation of the site is in "Phase III: Identification, Evaluation, and Selection of Comprehensive Remedial Action Alternatives and the Remedial Action Plan," where cleanup options are assessed and a cleanup plan is selected.[37]

National Fireworks Site[38]

In 2011, MassDEP issued Notices of Noncompliance to a number of potentially responsible parties (PRPs) for releases at the site, including National Coating Corporation, the Massachusetts Institute of Technology, the United States Department of Defense (including the Departments of the Army, Navy, and Air Force), and others.[39] These PRPs are responsible for the future remediation of the site, which is expected to cost anywhere between $12 and $100 million.[40]

Fortunately, the Massachusetts Department of Public Health determined that there is not an increased risk of developing cancer from living near the National Fireworks Site. It has also been determined that contamination from the site has not impacted the town's drinking water supply. However, due to elevated concentrations of metals found in fish in the Drinkwater and Indian Head Rivers and Factory Pond, a Public Health Advisory for these waterbodies has been in place since the mid-1990s. While "Catch and Release" recreational fishing is permitted, A "Do Not Eat Fish" warning has been posted between Forge Pond Dam and Luddam's Ford Dam, including Factory Pond.[41]

[36] *Ibid*
[37] "Definitions of Fields Listed in Search Results," MA EOEEA, www.mass.gov/eea/agencies/massdep/cleanup/sites/definitions-of-fields-listed-in-search-result.html
[38] Photo source: www.patriotledger.com/article/20160402/NEWS/160409205

[39] Leonard J. Pinaud (2015), letter to Tetra Tech Project Manager, public.dep.state.ma.us/fileviewer/Default.aspx?formdataid=0&documentid=328709
[40] "Environmental Update: The National Fireworks Site," Town of Hanover
[41] *Ibid*

Landfills

A seven acre landfill, located on Rockland Street (Route 139) near its intersection with Route 53, was closed in 1972. In the late 1990s, the Southeast Region of MassDEP required the full assessment and capping of the landfill under the state's Solid Waste Regulations. The closure, which was constructed between 1999 and 2000, involved installing a standard solid waste cap—consisting of a gas venting layer, a high density polyethylene liner, a sand drainage layer, and a vegetative layer—over four acres of the former landfill, a paving cap covering three acres, and a passive gas collection system and surface water controls. Currently, the town is in its 25-year required monitoring period to make sure that groundwater does not migrate off-site and that any gases released on the capped landfill are being monitored and managed when necessary.

According to Hanover's Department of Public Works (DPW), solid waste disposal and recycling is now handled at the Town Transfer Station located on the westerly side of Route 53. Hanover residents have a 500 pound limit per week for their trash and they must bring it along with their recycling to the Transfer Station between 8:30am and 4:00pm on Friday through Tuesday. There is no curbside pick-up in town. At the Transfer Station, recyclables are separated and trash is sent to a waste facility in Rochester, Massachusetts.

Chronic Flooding and Stormwater Management

Stormwater in Hanover drains to a river network in the western portion of town, which then drains toward the North River. Due to this natural flow of water, there are two different types of flooding that typically occur. The first type is major flooding along the Drinkwater River and Forge Pond, which occurs about every 25 years during major storm events. The other type of flooding that occurs is more localized and where drainage networks empty into smaller rivers, streams, and ditches. This problem is exacerbated by the dumping of yard waste around town, which is a major factor in causing localized neighborhood flooding.

With continued increases in the amount of impervious surfaces in Hanover—from paved roads, driveways, parking lots, and roofs—and the removal of vegetation and trees, stormwater management is a critically important component in protecting the town's natural resources. With less vegetation to slow the flow of stormwater, promote infiltration to groundwater, and filter sediments and other pollutants, there will be more negative impacts to rivers, streams, drinking water supplies, wildlife habitats, and wetlands.

If erosion, sedimentation, and water pollution are to be controlled, low-impact development (LID) techniques can and should be encouraged by the Planning Board, Conservation Commission, and the Board of Health. Types of LID such as rain gardens,

green roofs, and porous pavement implement small-scale hydrologic controls that mimic the natural hydrologic regime of watersheds while still allowing development to occur.

Rain Garden[42]

Homeowners and developers also have important roles to play in addressing this issue, as LID can be implemented as a cost-effective technique at the lot and building level. LID techniques have been utilized at the Target site since it was redeveloped, including pavement that allows water penetration and vegetated islands. The Town of Hanover is currently not utilizing LID techniques at a municipal level, though it could benefit greatly from a Low-Impact Development Bylaw. The Town could also benefit from a Stormwater Bylaw or Cluster Bylaw to help manage runoff, stormwater, and drainage issues.

New Development

As just mentioned, the new development of residential and commercial structures—and the impervious surface that comes with them—coupled with the removal of valuable open space can have negative effects on water quality and management. As it pertains to this plan, it also acts as a competing interest to setting aside land for conservation and recreation.

Finding a balance between growth and sustainability is a challenge for most Massachusetts communities. In Hanover, which is a residential community with a strong commercial base, there is the challenge of balancing both types of growth with the Town's capacity to service it. While encouraging commercial growth benefits the overall tax base, Hanover's major commercial area along Route 53 is located in the Aquifer Protection District. As such, managing Hanover's water supply area with future growth will continue to be a challenge.

[42] Photo source:www.epa.gov/soakuptherain/soak-rain-rain-gardens

The Town of Hanover does not have a public sewer system; therefore, residential, commercial, and industrial properties have private septic systems. Several commercial properties have private wastewater treatment plants. If septic systems fail, they can contaminate surface and groundwater resources.

Impaired Water Bodies and Pollution Sources

A number of waterbodies in Hanover are considered by the U.S. Environmental Protection Agency to be impaired or threatened for one or more uses and requiring a Total Maximum Daily Load (TMDL). They are also known as Category 5 waters. According to MassDEP, "A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can accept and still meet the state's Water Quality Standards for public health and healthy ecosystems."[43] Areas in Hanover that are pathogen impaired segments requiring TMDLs include: the headwaters of the Iron Mine Brook to the confluence with the Indian Head River; the Headwaters of the Third Herring Brook to the confluence with the North River; the Drinkwater River, from Whiting Street, through Forge Pond, to the inlet of Factory Pond; and the North River from the confluence of the Indian Head River and Herring Brook all the way to Marshfield and Scituate.[44]

The Iron Mine Brook, Third Herring Brook, and Drinkwater River segments are pathogen impaired because of elevated counts of fecal coliform and E. coli bacteria. The North River is impaired due to the presence of the same pathogens, in addition to Enterococcus.[45]

In terms of Hanover's impaired water bodies, the suspected source for the pathogens in the Iron Mine Brook and Third Herring Brook is discharge from municipal separate storm sewer systems. The suspected sources for those in the Drinkwater River are stormwater, agricultural runoff, and discharge from the Rockland Wastewater Treatment Plan. The North River's impairment is due to stormwater pollutants.[46]

Other water quality issues can make a water body impaired and requiring a TMDL. In addition to its pathogen impairment, the Drinkwater River contains other pollutants including metals, noxious aquatic plants, and nutrients. It also has issues regarding organic enrichment, low dissolved oxygen, and turbidity. Forge Pond shares many of these same pollutants and issues. The Indian Head River, North

[43] "Total Maximum Daily Loads (TMDLs) Basics," MA EOEEA, www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdls-basics.html

[44] "Final Pathogen TMDL for the South Coastal Watershed" (2014), MassDEP & EPA, www.mass.gov/eea/docs/dep/water/resources/n-thru-y/scoastl1.pdf

[45] *Ibid*

[46] *Ibid*

River, and Factory Pond all have metal pollutants, and the Indian Head River also has nutrients, organic enrichment, and low dissolved oxygen.[47]

To prevent pollutants from reaching the town's waterways, effort should be made to educate residents on topics related the proper disposal of lawn and yard waste, application of fertilizer and pesticides, disposal of pool water, inspection and ongoing maintenance of septic systems, and more. From a water quality perspective, it is also important to reduce the amount of sand and salt used on winter roads and driveways.

It will be important to build in strong safeguards to protect the town's aquifer so that hazardous substances, excess nitrogen, and other pollutants do not impact the town's water supply.

Invasive Species

Invasive plant species are an issue in all Massachusetts communities. These plants, which are exotic in origin, threaten the integrity of natural communities due to their ability to out-compete them. The major and most problematic invasive species within Hanover are glossy buckthorn (*Rhamnus frangula*), Japanese barberry (*Berberis thunbergii*), oriental bittersweet (*Celastrus orbiculata*), black swallowwort (*Cynanchum louiseae*), Japanese knotweed (*Polygonum cuspidatum*), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and Asian milfoil.

Glossy buckthorn grows in both upland and wetland areas, and forms a monoculture such that other plants cannot grow. It is a shrub or small tree that can grow up to 22 feet and have a 10 inch wide trunk. Eliminating the species through fire is a common eradication technique, but it should only be done under supervision. Young plants can be easily removed by hand pulling as the root systems are shallow.

Although Japanese barberry is technically an upland species, the thorny shrub can also grow on hummocks within wetlands. It is a dense, spiny shrub with brown branches and small leaves. It typically it alters soil pH, nitrogen levels, and biological activity in the soil. A good management technique is not planting Japanese Barberry, an ornamental plant, in the first place.

Oriental bittersweet tends to grow in upland areas, and is the problematic vine in Hanover. It is a deciduous woody perennial plant that grows as a climbing vine and trailing shrub. It typically smothers existing vegetation that dies from shading or breakage. Usually a combination of chemical and manual methods works to eradicate this species.

[47] "Summary of Waterbody Assessment and TMDL Status in MA," www3.epa.gov/region1/npdes/stormwater/ma/305b303dStats/tblReporting_Hanover.pdf

Black swallowwort is limited to upland areas and is a type of vine that can form patches that crowd out native vegetation. It is tolerant of a range of moisture and lighting conditions. To prevent it from establishing itself, early detection and management are important. Best practice is to remove all of the plants at a site.

Oriental Bittersweet[48]

Japanese knotweed is prevalent through Hanover. Although typically an upland species, it can grow within the outskirts of wetlands as well. This species is extremely difficult to eradicate, can grow to over ten feet in height, and forms dense thickets that often alter natural ecosystems. It spreads very quickly and is a threat to riparian areas. Grubbing and hand removal are common eradication techniques, though the entire plant, including roots must be removed.

Purple loosestrife is one of the worst invasive species found within wetlands. This species has purple flowers, adapts well to natural and established wetland areas, and forms dense homogenous stands that restrict and suffocate native plant species. Small infestations can usually be pulled by hand, but for larger problems, herbicides may be necessary.

Along with purple loosestrife, common reed is the worst invasive species found within wetlands. Common reed is a tall grass that flowers in July or August and spreads by sending out rhizome runners. The plant can invade native communities rapidly and change marsh hydrology, which affects wildlife habitat. In areas where there is a significant population, the species is best eradicated by using herbicides.

[48] Photo source:
www.maine.gov/dacf/php/gotpests/weeds/bittersweet.htm

Section 5: Inventory of Lands of Conservation and Recreation Interest

Introduction to the Inventory

The first step in being able to make decisions about future needs for open space and recreation is to have an accurate account of existing lands and facilities. This section contains an inventory of all conservation, open space and recreation lands, both publicly and privately owned.

Open space in a community is valuable for several reasons. Land is a finite resource and there is only so much in any one city or town. Leaving areas in their natural state, it not only helps define community character, but it also provides crucial habitat and corridors for wildlife and plants. In addition, and particularly relevant in the Town of Hanover, open space helps protect drinking water supplies.

Determining where the open space and recreation land is located in Hanover is the beginning stage of fully understanding what resources the town has and how best to manage them. Once this land has been identified, it is important to ensure its protection and maintenance into the future to help guarantee that many more generations of residents can enjoy them.

Hanover's open space and recreation resources are shown in Figure 15. The "Inventory of Lands of Conservation and Recreation Interest for the Town of Hanover" (Figure 16) corresponds to the inventory map and includes columns for:

- **Site Name**: Indicates the name of the site.
- **Owner/Manager**: Indicates the owner of the property and the agency or department responsible for managing and maintaining the parcel. Usually the two are the same.
- **Current Use**: Describes what the site is currently used for. For the purposes of this plan, most sites are either used for conservation (non-facility based) or recreation (facility based), though there are also a number of sites used for water supply protection and historical/cultural purposes.
- **Recreation Potential**: Potential for recreational activities is identified for land not currently used for recreational purposes, as well as land already being used for such purposes. Conservation land is generally deemed to have limited recreation potential except for passive recreation such as hiking and walking.

Cemeteries, water protection areas, and other similar lands are presumed to have no recreational potential.

- **Condition**: Identifies the site condition as excellent, good, fair, or poor. Condition was assessed based on conversations with members of the Open Space Committee, Parks and Recreation Committee, and Conservation Commission. Since the Town does not have a proxy by which to assess the condition of its facilities, this categorization was based a subjective decision by members of the committees.

- **Public Access**: Indicates if the public can access the site.

- **Zoning District**: Identifies the zoning district in which the site is located.

- **Level of Protection:** Indicates if the site, either by virtue of its zoning, ownership, existence of deed restrictions, or by the fact that it has received state or federal funding, is protected against conversion to some other use. All of the open space land listed in this inventory is either permanently protected or has limited protection.
- **Type of Protection**: For sites with limited or permanent protection, identifies the means through which it is protected.

- **Grant Program**: Where applicable, identifies the source of funding for the acquisition of the parcel, including public grants, private donations, deed restrictions, etc. The largest source of grant funding for Hanover's open space and recreation lands has been the Community Preservation Act (CPA).

- **GIS Acres**: Identifies the site's acreage via GIS calculations, or identifies an approximation of acreage in cases where specific information is not attainable. One acre is equal to 43,560 square feet.

Figure 15: Open Space and Recreation Inventory Map

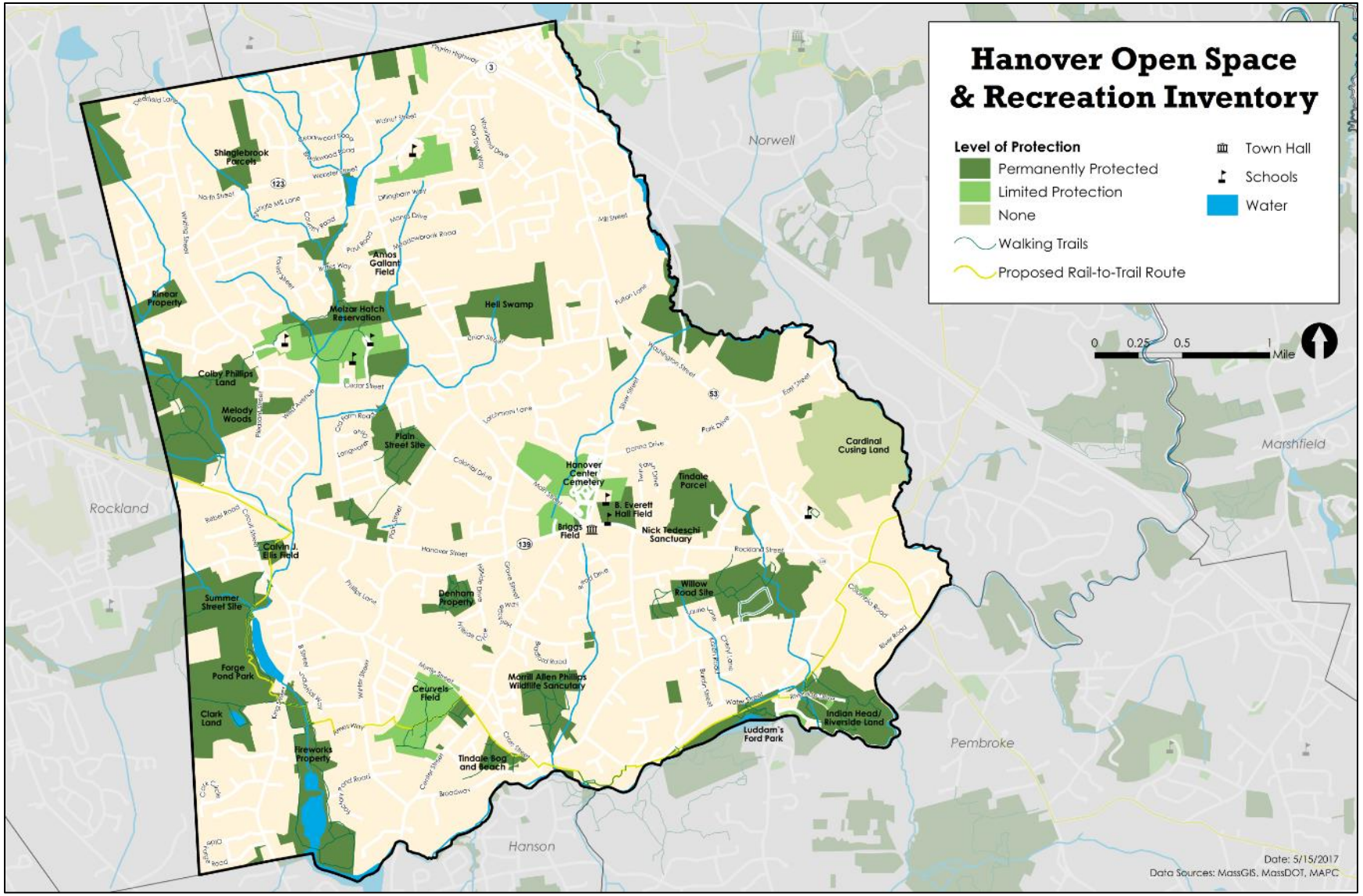


Figure 16: Inventory of Lands of Conservation and Recreation Interest for the Town of Hanover

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
OWNER - TOWN OF HANOVER											
Albert White Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	0.71
Amos Gallant Field	Town of Hanover	Town of Hanover Parks and Recreation Committee, Board of Selectmen	Recreation (activities are facility based)	Active – baseball field	Good	Yes	Residential	Permanently Protected	Article 97	None	2.90
B. Everett Hall Field / Sylvester School	Town of Hanover	Town of Hanover Parks and Recreation Committee, Board of Selectmen	Recreation (activities are facility based)	Active - ball fields, tennis and basketball courts, playgrounds	Good	Yes	Residential	Permanently Protected	Article 97	None	20.17
Bailey Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	5.95
Beal / Riverside Drive Well Property	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area	N/A	No	Residential	Permanently Protected	Article 97	None	47.79
Bonney Conservation Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	6.04
Bonney Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	1.29
Briggs Field	Town of Hanover	Town of Hanover Parks and Recreation Committee, Board of Selectmen	Recreation (activities are facility based)	Active - baseball field	Good	Yes	Residential	Permanently Protected	Article 97	None	1.19
Broadway / Indian Head Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	1.80
Broadway Well Site	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area	N/A	No	Business / Residential	Permanently Protected	Article 97	None	98.45

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Calvin J. Ellis Field	Town of Hanover	Town of Hanover Parks and Recreation Committee	Recreation (activities are facility based)	Active - baseball fields	Good	Yes	Residential	Permanently Protected	Article 97	None	11.66
Cedar & Jr. High Schools	Town of Hanover	Town of Hanover School Department	Recreation (activities are facility based)			Yes	Residential	Limited	None	None	76.02
Cedar Street Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - vernal pool	Wet	Yes	Residential	Permanently Protected	Article 97	None	21.42
Center Elementary School	Town of Hanover	Town of Hanover School Department	Recreation (activities are facility based)	Active - ball fields, playground		Yes	Residential	Limited	None	None	9.14
Ceurvels Field / Senior Center	Town of Hanover		Recreation (activities are facility based)	Active - baseball field; trails	Good	Yes	Residential	Limited	None	None	71.88
Clark Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - cranberry bog, trails	Good	Yes	Residential	Permanently Protected	Article 97	None	56.85
Clark Land	Town of Hanover	Town of Hanover Conservation Commission, Board of Selectmen	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	7.91
Colby-Phillips Conservation Area	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	58.98
Colby-Phillips Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	71.03
Cross Street Site	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	4.33
Denham Property	Town of Hanover	Town of Hanover Board of Selectmen	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Conservation Restriction	None	23.76

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Dillingham / Old Town Way Site	Town of Hanover	Town of Hanover Conservation Commission	Recreation and Conservation	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	5.92
East Street Conservation Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	3.99
Emily Elizabeth White Conservation Area	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	5.29
Fairbairn Parcel	Town of Hanover	Town of Hanover Conservation Commission	Recreation and Conservation	Passive	Good	Yes	Commercial	Permanently Protected	Article 97	None	1.19
Fireworks Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	132.83
Forge Pond Conservation Area	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails		Yes	Residential	Permanently Protected	Article 97	CPA	34.43
Forge Pond Park	Town of Hanover	Town of Hanover Parks and Recreation Committee	Recreation (activities are facility based)	Active - playing fields	Excellent	Yes	Residential	Permanently Protected	Article 97	CPA	40.97
Hacketts Pond Dam	Town of Hanover		Historical/Cultural			Limited (members only)	Residential	Limited	None	None	0.45
Hammer Hook Conservation Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	3.33
Hanover Center Cemetery	Town of Hanover	Town of Hanover Department of Public Works, Board of Selectmen	Historical/Cultural	None - cemetery		Yes	Residential	Limited	None	None	33.10
Hanover High School	Town of Hanover	Town of Hanover School Department	Recreation (activities are facility based)	Active - ball fields, tennis courts		Yes	Residential	Limited	None	None	17.44

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Hanover Street Well Protection	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area			Residential	Permanently Protected	Article 97	None	7.60
Hanover Street Well Site	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Yes	Business / Residential	Permanently Protected	Article 97	None	24.65
Hell Swamp	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	88.17
Hillside Drive Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	1.14
Hobart Swamp	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	18.93
Indian Head / Riverside Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	35.53
Jays Lane Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	3.05
Luddams Ford Park	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails, fishing, canoe launch	Good	Yes	Residential	Permanently Protected	Article 97	None	29.26
Mann Brook Swamp	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	9.98
Merry Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	57.02
Morrill Allen Phillips Wildlife Sanctuary	Town of Hanover	Town of Hanover Board of Selectmen	(Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	72.50

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Murtha Property	Town of Hanover	Town of Hanover Community Preservation Committee	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	CPA	4.30
Norwell Line Parcel NE	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	14.33
Norwell Line Parcel NW	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	2.36
Old Ford Conservation Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	3.20
Old Washington Street Corner	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	0.03
Pine Island Swamp North	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	24.13
Pine Island Swamp South	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	19.61
Plain Street Site	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	54.44
Plymouth Road Site	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	3.13
Pond Street Well Protection	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		No	Commercial	Permanently Protected	Article 97	None	39.00
Rinear Property	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	23.24

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Salmond School Fields	Town of Hanover	Town of Hanover School Department	Recreation (activities are facility based)	Active - ball field	Good	Yes	Residential	Limited	None	None	2.49
Shinglemill Brook Parcel North	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	28.61
Shinglemill Brook Parcel South	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	9.76
Sproul Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	5.64
Stasiluk Nava Land	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails		Yes	Residential	Permanently Protected	Article 97	CPA	8.51
Summer Street Conservation Area	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	105.09
Third Herring Brook And Old Pond Swamp	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Commercial	Permanently Protected	Article 97	None	50.32
Third Herring Brook Pond	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Commercial	Permanently Protected	Article 97	None	4.48
Tindale Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Article 97	None	14.81
Tindale Bog & Beach	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - skating area	Good	Yes	Residential	Permanently Protected	Article 97	None	16.63
Union Cemetery	Town of Hanover	Town of Hanover Department of Public Works	Historical/Cultural	None - cemetery		Yes	Commercial	Limited	None	None	1.92

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Water Protection Land	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Yes	Residential	Limited	None	None	0.26
Water Protection Land	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Yes	Residential	Permanently Protected	None	None	0.60
Water Protection Land	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Yes	Residential	Permanently Protected	None	None	1.48
Water Protection Land	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Yes	Commercial	Permanently Protected	Article 97	None	1.09
Water Protection Land	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	None - stormwater management area		Limited (members only)	Residential	Permanently Protected	None	None	1.44
Water Street Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Good	Yes	Residential	Permanently Protected	Article 97	None	1.27
Water Tank Site	Town of Hanover	Town of Hanover Department of Public Works	Water Supply Protection	Passive		No	Residential	Permanently Protected	Article 97	None	0.66
Webster Street Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	2.77
Webster Street Parcel	Town of Hanover	Town of Hanover Board of Selectmen	Conservation (activities are non-facility based)	Passive	Good	yes	Residential	Limited	No	CPA	45.00
Whiting Village Conservation Area	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	21.55
Whiton Court Parcel	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive	Wet	Yes	Residential	Permanently Protected	Article 97	None	6.60

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Willow Road Site	Town of Hanover	Town of Hanover Conservation Commission	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Article 97	None	32.50
OWNER - OTHER											
Briggs Land	Briggs Family	Briggs Family	Private Land	None - private		No	Residential	Limited	Chapter 61	None	37.79
Briggs Riding Stable	Briggs Family	Briggs Family	Riding Stable	Active – horseback riding		Limited (members only)	Residential	Limited	Chapter 61A	None	19.60
Cardinal Cushing Land	Cardinal Cushing Centers, Inc.	Cardinal Cushing Centers, Inc.	Private Land	Passive - trails		Yes	Residential	None	None	None	208.76
Hacketts Pond	South Shore Natural Science Center Inc.	South Shore Natural Science Center Inc.	Recreation and Conservation	Passive - fishing		Yes	Residential	Permanently Protected	Conservation Restriction	None	6.44
Indian Head Drive / Plymouth County Land	Inhabitants of Plymouth County	Plymouth County	Recreation and Conservation	Passive		Yes	Residential	Limited	None	None	3.23
Indian Head Drive Boat Launch	Commonwealth of Massachusetts	MA Division of Fisheries and Wildlife	Recreation (activities are facility based)	Passive - boat launch		Yes	Residential	Permanently Protected	Article 97	None	1.94
Longwater Brook CR	LaMarre Family	Wildlands Trust	Conservation (activities are non-facility based)	Passive		Limited (members only)	Residential	Permanently Protected	Conservation Restriction	None	5.56
Longwater Woods Preserve	Wildlands Trust	Wildlands Trust	Conservation (activities are non-facility based)	Passive - trails		Yes	Residential	Permanently Protected	Conservation Restriction	None	40.82
Melody Woods	South Shore Natural Science Center Inc.	South Shore Natural Science Center Inc.	Conservation (activities are non-facility based)	Passive		Yes	Residential	Permanently Protected	Conservation Restriction	None	42.51

Site Name	Owner	Manager	Current Use	Recreation Potential	Condition	Public Access?	Zoning District	Level of Protection	Type of Protection	Grant Program	GIS Acres
Melzar Hatch Reservation	Wildlands Trust	Wildlands Trust	Conservation (activities are non-facility based)	Passive - trails	Good	Yes	Residential	Permanently Protected	Conservation Restriction	None	37.50
Nick Tedeschi Sanctuary	South Shore Natural Science Center Inc.	South Shore Natural Science Center Inc.	Conservation (activities are non-facility based)	Passive		Limited (members only)	Residential	Permanently Protected	Conservation Restriction	None	14.12
Norwell Cemetery Property	Town of Norwell	Town of Norwell	Historical/Cultural	None - cemetery		Limited (members only)	Residential	Limited	None	None	9.02
South Shore Regional School	South Shore Regional School	South Shore Regional School	Recreation and Conservation	Active - ball fields		Limited (members only)	Residential	Limited	None	None	33.05
Stone CR	Stone Family	Town of Hanover	Water Supply Protection	Passive		No	Residential	Permanently Protected	Conservation Restriction	None	0.17

Levels of Protection

Permanently Protected

According to the State's Division of Conservation Services, municipally-owned land is permanently protected if it is deeded to and managed by the local Conservation Commission or by the Parks and Recreation Committee. It is also permanently protected if the city or town received state or federal monies for the improvement or purchase of the land. Typically, land owned by municipal agencies and the local school system should not be presumed to be permanently protected. Public land is also considered to be permanently protected if it is owned by Executive Office of Energy and Environmental Affairs (EOEEA) agencies or by a nonprofit land trust.

Some private property can also have a protected designation if it is indicated in the property deed, if the property has an agricultural preservation restriction or a conservation restriction, or if the Department of Environmental Protection has placed a restriction on the property for wetland protection or conservation purposes.

During the update process for this plan, a GIS analysis was conducted to determine the amount of Hanover's open space that is permanently protected. The data for this analysis was provided by the Commonwealth of Massachusetts via the Office of Geographic and Environmental Information (MassGIS). Approximately three-quarters of the land on Hanover's open space and recreation inventory is permanently protected from future development.

The vast majority of open space in Hanover is protected by Article 97 of the Constitution of the Commonwealth of Massachusetts. Article 97 protects publicly-owned lands used for conservation or recreation purposes. In order for a property to be sold, transferred, or converted to a different use, Article 97 requires a 2/3 vote at Town Meeting in support of the disposition, a 2/3 vote of the Massachusetts legislature in support of the disposition, they must demonstrate compliance with applicable funding sources, and the municipality must file an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA). During correspondence with Melissa Cryan of the Division of Conservation Services, she confirmed that land dedicated to recreation or conservation purposes is protected by Article 97, which means that the land is permanently protected.

A conservation restriction is an agreement that is bound legally between a landowner and a "holder," or grantee. The landowner agrees to limit the amount and/or use of a specific property in order to protect its unique or specific conservation values. A specified amount of time for the conservation restriction can be noted, or the conservation restriction can be in perpetuity. A conservation restriction is recorded at the Registry of Deeds. For example, the Town of

Hanover holds a conservation restriction on the 24-acre Denham Property, and it is managed by the Board of Selectmen.

Nonprofit conservation and environmental organizations often hold conservation restrictions in the State of Massachusetts. In Hanover, many of the conservation restrictions are held by the Wildlands Trust, a local land trust, including the 37.5-acre Melzar Hatch Reservation. The South Shore Natural Science Center, a nonprofit environmental education organization, holds conservation restrictions on Melody Woods, Nick Tedeschi Sanctuary, and land around Hacketts Pond. In addition, the Town of Hanover holds a conservation restriction on a small parcel of the Stone property for water supply protection.

An easement is typically listed on a property deed and allows permanent access to a property for a specific purpose, such as for walking trails. It is a right of use, not a right of possession. There are no recreation-related easements in Hanover.

Limited

Parcels in this inventory have limited protection if they are legally protected for less than perpetuity (i.e. short term conservation restriction) or temporarily protected through an existing functional use. These lands could be developed for other uses when their protection expires or when their functional use is no longer necessary. In Hanover, this includes all of the school properties, cemeteries, and area of Hacketts Pond Dam that is accessible for abutters.

Massachusetts General Law Chapter 61, 61A, and 61B Programs encourages preservation of agricultural (61A), recreation (61B), and forest land (61) in Massachusetts for ten-year terms. Landowners can ensure the long-term protection of their property by receiving a tax benefit if they agree to the terms of Chapter 61. If an owner wants to take property out of Chapter 61 designation, the Town can recover the tax benefits given and they have the right of first refusal to purchase the property if the land is sold for residential, commercial, or industrial purposes. There are Chapter agreements on the Briggs Riding Stable and another large property owned by the Briggs Family in Hanover Center.

None

This category includes land that is totally unprotected by any legal or functional means. This land is usually privately owned and could be sold without restriction at any time for another use. The only site on Hanover's inventory designated as having no protection is the Cardinal Cushing property. Cardinal Cushing Centers, a nonprofit educational center for persons with intellectual and developmental disabilities, owns and manages over 200 acres of land along Third Herring Brook. Some of this land falls within the Town's Aquifer Protection District and much of it is

environmentally sensitive. Hanover's Open Space Committee has a continued interest in working with Cardinal Cushing Centers to permanently protect their land from future development.

Section 6: Community Vision

Description of Process

As described in Section 2, the Town of Hanover hired the Metropolitan Area Planning Council (MAPC) to conduct an update of its 2008 Open Space and Recreation Plan, and this effort was done in conjunction with Hanover300, a master plan for the town. During the course of the OSRP update process, MAPC organized a series of pop-up trail walks, held a public forum, created a survey that was completed by 279 people, and met numerous times with the Town of Hanover's Open Space and Recreation Plan Committee.

Community engagement was a critical component of this plan, and having an outreach strategy with diverse components was an effective way to reach Hanover residents. The OSRP survey was perhaps the most effective means of engagement, as 279 Hanover residents shared their views on open space and recreation through that means. Detailed results of the survey, as well as other feedback from the community, can be found in Section 7 of this plan.

Statement of Open Space and Recreation Goals

In 1979, the Town of Hanover prepared its first Open Space and Recreation Plan under the guidance of the Conservation Commission. The plan prioritized a list of parcels for acquisition, evaluated site specific improvements for existing Town-owned properties, and recommended set of land use controls to be implemented. The Plan also presented an overall strategy for open space preservation. The 1987 update focused on resource protection and passive recreation rather than active recreation. In 1997, the plan took into consideration all of the growth pressure that Hanover and the surrounding region was facing and developed five general goals.

This OSRP update, as well as the 2008 update, have been expansions of earlier work. These more recent efforts have focused on the desire to guide growth, preserve additional open space parcels, protect sensitive natural resources, expand recreational amenities, and retain the community's character. The goals of this update also focused on the need to improve collaboration amongst the various stakeholders working to support open space and recreation in Hanover, as well as the need to expand access to and education about the town's resources.

During the February Community Assets Forum, attendees had the opportunity to prioritize and comment on the plan's goals and objectives. Their

feedback was incorporated into the creation of the following seven goals:

1. Improve coordination and collaboration among Town boards and departments and with conservation organizations to promote protection of critical areas in Hanover.

2. Preserve and protect critical natural and scenic areas in Hanover.

3. Encourage sustainable growth and development that is consistent with the character of Hanover.

4. Maintain and improve public access to conservation parcels and their recreational opportunities.

5. Establish a long-rate strategy for protecting Hanover's drinking water supply.

6. Maintain and enhance recreational facilities for the enjoyment of Hanover residents and visitors of all ages, abilities, and interest.

7. Improve public awareness of and education about Hanover's open space and recreation assets.

Section 7: Analysis of Needs

Introduction

The Town of Hanover has maintained its rural, small town charm ever since it was incorporated almost three centuries ago. Hanover has always been regarded highly in terms of its location to Boston and Cape Cod, and its open space amenities and sensitive natural resources have become important to the town's identity. At the same time, Hanover has experienced a large amount of population growth and development over the last few decades. Though this population growth is projected to slow in coming decades, the number of households in town is expected to grow significantly.

Depending on the density of future development that occurs, this growth could potentially threaten the persistence of open space and recreation lands in Hanover that have not been protected in perpetuity. Further, this may limit the ability to acquire new sites for conservation and recreation purposes as a result of competition for land. Many residents have expressed concerns about the residential and commercial growth that has occurred in Hanover. It is important that the Town is able to manage this growth while maintaining its rural feel.

For now, there is an opportunity to continue acquiring and protecting additional undeveloped parcels of land which exist in the community. There are also options to enhance and increase the amount of recreational programming and facilities. Protecting such land from future development not only ensures continued recreational opportunities for Hanover residents, but also maintains vital habitat for wildlife, protects the drinking water supply, and more.

Though acquiring additional lands for conservation and recreation is important for both the community and the natural environment, it does come with additional needs related to funding, staffing, and coordination. The Town of Hanover must think holistically about all these elements as it analyzes its needs and prioritizes its plan for open space and recreation in the future.

Summary of Resource Protection Needs

Water Supply and Groundwater

Protecting Hanover's water resources from contamination is important for Hanover residents, as well as for the Town government. This need has been reflected in the creation of a Water Resource Protection District within the Zoning Bylaw, and passing Water Resource Protection and Wetland Protection Bylaws.

There are additional ways the Town can actively protect drinking water from contamination, and there is a need on the part of the Board of Health to better identify issues and enforce them when they are found. Similarly, with regard to failing septic systems, it is important to address the problem as quickly as possible in order to prevent the effluent from entering the town's surface waters and groundwater. Currently, a failed system may not be permitted for repair, upgrade, or replacement for months.

The Town can also assess options other than using sand and salt on its roadways during the winter, which contributes negatively to water quality. The Town should also review the regulations pertaining to the "grandfathering" of certain potentially harmful commercial and industrial enterprises in the Water Resource Protection District. Even though some uses were permitted to operate in this district in the past, the continuance of such practices poses threats to drinking water supplies. While future commercial uses may not technically be "harmful," the Town of Hanover will constantly have to balance the fact that Route 53 runs right through its Aquifer Protection Zone.

Low-impact development (LID), a component of green infrastructure, is one way to help control water quality issues while still allowing development to occur. Implementing types of LID such as rain gardens, green roofs, and porous pavement should be encouraged, and potentially even required, by the Town as a part of the development approval process. This could be in the form of a Low-Impact Development Bylaw or incentives for utilizing LID techniques, such as a discount on water bills. The North and South Rivers Watershed Association (NSRWA) has worked with other watershed communities to reduce stormwater pollution through both town-wide regulatory changes and green infrastructure and could likely provide assistance with this task.[49] An excellent opportunity for Hanover to utilize LID techniques could be during the redevelopment of the Hanover Mall site during the next few years.

While water quality is important, so is water quantity. 2016 was a particularly dry year for Hanover and the rest of Massachusetts. The Town of Hanover imposed water restrictions on June 21, 2016 which restricted outdoor water use to certain times of the day for odd

[49] "Stormwater Remediation," NSRWA, www.nsrwa.org/environment/restoring-water-quality/stormwater

numbered homes on odd days and even numbered homes on even. Further, only hand held hoses were allowed; sprinklers were forbidden. The Town also required all private wells to be registered with the Department of Public Works. According to the Town's website, this was done "in order to in order to ensure an adequate supply of water for drinking and firefighting purposes, as well to protect streamflow for aquatic life."

Since groundwater and aquifers do not adhere to political boundaries, the Town should consider adopting a more regional approach to protecting drinking water. On July 8, the state's Secretary of Energy and Environmental Affairs issued a Drought Advisory for the Southeastern area of Massachusetts. According to the U.S. Drought Monitor, much of Eastern Massachusetts, including Hanover, was in an "Extreme Drought" as of August 30, 2016.[50] Since these were issues that affected, and will continue to affect, the entire region, Hanover would benefit from increased cooperation with neighboring towns. This is particularly relevant because Hanover draws from the same water supply and aquifer as Norwell.

[50] "Hydrologic Conditions in Massachusetts: August 2016 Summary," Massachusetts Water Resources Commission, www.mass.gov/eea/docs/dcr/watersupply/rainfall/reports/2016/august-2016-hydrologic.pdf

Invasive Species

Invasive species are a problem because they limit the ability of native species to reproduce and thrive. Conservation land should be monitored for invasive species, particularly plants, so they can be removed before they overwhelm native populations. There is a need for citizens to provide better information about the invasive species they see to the Conservation Commission so they can be better tracked and managed.

In order to successfully identify invasive species, there is a need for educational programming that informs residents about what invasive species are, and why and how they can be monitored. However, there is only a limited capacity on behalf of Town commissions and their volunteers to actually remove invasive species if they are found. At the very least, residents can be educated about the importance of using native species for gardening and other uses so they do not further exacerbate the problem.

Habitat and Biodiversity

As referenced in the Environmental Inventory and Analysis section of this plan, Hanover is home to a freshwater tidal marsh, a very rare uncommon and globally rare habitat. Located in southeast Hanover at the confluence of the Indian Head and North Rivers, the freshwater tidal marsh is home to a number of rare plant and animal species and is considered a

high-priority natural community by the Natural Heritage & Endangered Species Program.

While much of the land in the freshwater tidal marsh is protected in perpetuity by the Town of Hanover, there are some parcels that lack such protection. Hanover should consider working with surrounding towns and land trusts to protect remaining open land in the marsh area which contain significant areas of biodiversity and maintain ecosystem functioning in the riparian and estuarine areas. It is important to conserve the remaining unprotected land in the freshwater tidal marsh, including buffers around it, to support wildlife populations.

Protecting freshwater tidal communities also requires protecting the water regime that maintains them. This involves allowing tidal influence to continue, as well as protecting the health of the upland areas and wetlands that support tidal communities. Particular areas to preserve include primary forests and certified and potential vernal pools.

Though habitat fragmentation is an issue that threatens ecosystems of rare and common species, the North and South Rivers Watershed Association has been active in removing barriers that can lead to fragmentation. The group recently removed culverts from the Iron Mine Brook to the Indian Head River to restore a passage for fish populations. Their significant advocacy has also led to the removal of the Tack Factory Dam, owned by the Cardinal Cushing Centers, on the Third Herring Brook. Removing this dam opened up 8.4 miles of instream habitat in the Third Herring Brook system for river herring, American eel, sea lamprey, and more.[51]

There appears to be a knowledge gap in regard to wetlands in general in Hanover. In particular, there is a lack of awareness amongst residents about what activities are allowed and prohibited around wetlands. An educational campaign is needed to inform homeowners and business owners about regulations pertaining to wetlands and on the importance of these resource areas. Because people in town are unaware of these regulations, or choose to ignore them, encroachment on wetland areas is a problem the Conservation Commission faces.

Competition for Land Resources

This plan has detailed the importance of conserving land for the benefit of the environment and natural habitats, as well as for the enjoyment of people through passive and active recreation. Since land is a finite resource, competition exists in all communities over what it is should be used for. Hanover has seen a particularly fast pace of commercial and residential growth in the last few decades, and so much of what was once open space has already been developed.

[51] "Tack Factory Dam Removal Complete," NSRWA, www.nsrwa.org/tack-factory-dam-removal-open-8-4-miles-stream-habitat

Physically, Hanover's open space is fairly dispersed throughout the community, with the exception of the northeast corner of town near the Hanover Mall. Along the Rockland and Hanover border, there are several large clusters of open space which include the Clark Land, the Summer Street Conservation Land, and the Colby-Phillips Property; the Fireworks Property is slightly southeast from Colby-Phillips. Another cluster is located along the Hanover and Pembroke line which includes Luddam's Ford Park and the Indian Head/Riverside Land.

The Town should assess opportunities to acquire and protect parcels of land to create and connect large tracts of open space in Hanover. It should also specifically target land for water supply protection in its Water Resource Protection District. The reality is that there are not many large chunks of land left in town, with the main exception being the Cardinal Cushing's property. Over the years, the Town has engaged in talks with Cardinal Cushing about protecting its land in perpetuity, and this continues to be a priority of the Open Space Committee. Residents at the Community Assets forum suggested that the Town needs to plan to be ready if and when this land becomes available.

When considering which parcels to acquire, the Town can utilize the "Land Acquisition Worksheet," which was created by the Open Space Committee during the 2008 Open Space and Recreation Plan update process. In lieu of identifying specific parcels, the committee decided to adopt criteria that they would consider when land became available. The criteria were turned into a worksheet that is filled out with each new property that they review. The worksheet is shown in Figure 17.

Figure 17: Land Acquisition Worksheet

Parcel Name: Assessed Value:
Map and Parcel: Acreage:
Location: Tax Title:

Criteria	High (10-8 points)	Medium (7-3 points)	Low (2-0 points)	Score
Water Supply	Within 1,000 feet of public well or well site	In watershed protection zone	Within recharge zone	
Floodplain	Velocity zone	Zone A	Zone X	
Agricultural	Operating farm	Chapter Lands: 61, 61A, 61B	Other	
Linkage	Current linkage to waterfront, conservation, or protected land	Potential linkage to waterfront or conservation land	Other	
Recreation	Strong need, land appropriate	Suitable if modified	Not suitable	
Urban Green Space	Open land in densely settled area, suitable for pocket park	Not densely settled area, suitable for pocket park	Not likely	
Water Access Point	Yes	No	No	
Wildlife Habitat	Endangered or rare species	Part of wildlife corridor or vernal	Other	
Wetlands	Yes, upland buffer greater than 50 feet	Yes, buffer less than 50 feet	No	
Development Potential	High	Medium	Low	
Scenic Value	High	Medium	Low	
Local Preference	High	Medium	Low	
Buildings Present	None	One building	Multiple buildings	
Unique, Townwide, Historic, or Public Value	High	Medium	Low	

The 2008 OSRP identified a concern about increasing demand leading to the overuse and potential degradation of the Town's most popular recreational areas such as Luddam's Ford, Colby Phillips, and Sylvester Field. While it is still important to regularly maintain these sites and have a management strategy in place, the completion of Forge Pond Park in 2014 has largely alleviated concerns about overuse at other sites.

Summary of Community's Needs

Past and Current Needs

The 2008 OSRP update highlighted a number of the community's needs in regard to open space and recreation. A major issue identified in that plan, as well as the 2007 Parks and Recreation Master Plan, was that of insufficient recreation facilities. At that time, there was not sufficient field space to accommodate the programming that the Parks and Recreation Department would have liked to offer. For example, there were no dedicated lacrosse fields, softball was under-fielded, there was a lack of informal playing fields, and there was a need for a park support building with space for restrooms, storage, and a concession facility.

All the aforementioned community needs have been addressed with the construction of Forge Pond Park. Now, lacrosse has dedicated field space on Sundays at the park, and soccer uses this space on Saturdays. There are now three additional ball fields at Forge Pond Park for softball to utilize, and the site offers a wealth of informal playing fields. In addition, Forge Pond Park Pavilion has a concession area with picnic tables, restrooms, a mechanical room for irrigation and wells, and storage rooms.

Other issues, such as a lack of parking at recreational facilities, have been ameliorated by Forge Pond Park. The last plan also identified a lack of accessibility for

persons with disabilities at open space and recreation facilities. While improvements can certainly be made to other sites to make them more accessible, Forge Pond Park is completely ADA accessible. The site has plentiful ADA accessible parking, bathrooms are accessible, and the walking paths through the park are paved and wide enough to accommodate a wheelchair.

The 2008 OSRP explained that there was not enough accessible information about open space and recreational programming in town, and many efforts have been made to improve this. The Parks and Recreation Department and Open Space Committee now have a plethora of information for residents to access online, and they also disseminate information via paper flyers, email listservs, social media, and local newspapers. Further, the 2014 Open Space Map provides a wealth of information about open space, recreational, and historical assets in Hanover and copies of the map can be found throughout town.

A community need identified in the last plan that remains relevant today is a desire to maintain and protect scenic byways and views. The OSRP Committee is particularly concerned about Sylvester Field in Four Corners, which is privately owned with no restrictions. In addition, residents still support the construction of a paved bike path in town. There is now such a path that runs through Abington and Rockland on the old Hanover Branch Railroad line, and there is a great deal of support for continuing it through Hanover. The major impediment is that some of the old rail line is on private property. The Town has worked with MAPC to identify other possible routes for the bike path that would not require easements for construction on private property.

Also still needed in Hanover are more sidewalks, specifically on the commuter roads and routes leading to and from the schools. During the Community Assets Forum, residents suggested developing a plan for the construction of sidewalks on Main Street, Broadway, Center Street, Whiting Street, and Webster Street.

Open Space and Recreation Survey

As a part of the Open Space and Recreation Plan process, MAPC created an online survey to allow residents to voice their preferences and ideas regarding open space, natural resources, and recreational amenities in town. Over 270 residents completed the survey and offered their thoughts about open space and recreation in Hanover.

Almost everybody (97%) who completed the survey agreed that preserving Hanover's open space and natural areas is important to them. Almost three quarters (73%) of all respondents agreed strongly with this. While it is possible that the people who chose to complete this survey may be biased towards appreciating open space, it is still a significant figure. Almost all respondents also agreed that Hanover's existing open space contributes positively to overall

quality of life (96%), that the Town needs to be proactive about preserving what open space is left (94%), and that the Town should identify key parcels to preserve and remain undeveloped (96%).

Survey respondents felt that open space to protect Hanover's water resources and drinking water is the most important element to preserve in town; about 83% of people felt this is very important, and another 15% felt it is important. This was closely followed by open space for passive recreation (such as for walking, hiking, and canoeing); over 97% felt this was important or very important to preserve. Respondents also felt it important to preserve open space to protect the character of the town and to protect natural resources and wildlife. They felt less strongly about preserving open space from development (83% felt it important or very important) and preserving places and buildings of historical and cultural value (80% felt it important or very important).

The people who took this survey felt that the best way for the Town to preserve open space is by promoting awareness of open space amenities through education and outreach; 83% of respondents felt this was important or very important. They also thought it would be important to preserve open space by developing incentives to encourage dedication of open space by developers, pursuing funding sources for open space acquisition, and acquiring additional open space. Respondents felt least favorably about creating a local land trust to preserve open space.

In terms of personal decisions to promote open space and conservation, almost half (47%) of respondents said they would personally volunteer time to the Open Space Committee's initiatives. Another 31% said they would donate funds to purchase land, 21% said they would revise their deed to restrict/limit future development on all or a portion of their property, and 18% said they would contribute a conservation restriction. While 13% of respondents said they would donate their land to the Town, state, or land trust for preservation, another 19% said they would sell all of or a portion of their land to the Town for fair market value. Only 4% said they would sell all of or a portion of their land to the Town for a bargain price. For all of these personal decisions, many respondents indicated they were unsure of their answer or that the option was not applicable to them.

According to the survey results, Forge Pond Park is the most popular site for active recreation in Hanover; over 90% of respondents have visited at least once a year, and 58% visit at least 15 times a year. The next most popular site is B. Everett Hall/Sylvester Field, where 84% of respondents visit at least once a year. Use of other recreational facilities was much lower: 11% use Calvin J. Ellis Field, 9% use Briggs Field, 6% use Amos Gallant Field, and 6% use Ceurvels Field. A striking 41% of respondents had never even heard of Ceurvels Field, but that is likely due to its recent name change from Myrtle Field. School sites were not included on this survey.

In terms of passive recreation opportunities, Forge Pond and French's Stream Trails are the most utilized (86% of respondents visit them at least once a year). Luddam's Ford Park and its trails followed as the most popular, with 71% of respondents visiting them at least once a year. Roughly half of respondents visit the Indian Head River and Trails (53%), Fireworks Trails (53%), and Colby-Phillips Conservation Area and Trails (50%). Far fewer respondents visit other conservation properties and trails such as the Denham Pond Trails (15%), Chapman's Landing and Iron Mine Brook Trails (19%), and Folly Hill and Bog Iron Trails (22%).

For respondents who do not visit or use Hanover's open space and recreational amenities, 84% say it is because they do not know about locations. Another 24% say it is because of a lack of parking and 16% it is because safety concerns. Respondents do not appear to be particularly concerned about crowdedness, the poor condition of facilities, or a lack of convenience to travel to sites.

Roughly half of respondents to the survey would prefer to obtain information about Hanover's open space and recreational amenities through the Town of Hanover website (55%) email listservs (52%), and via social media websites like Facebook and Twitter (47%). Though some still rely on word of mouth, the newspaper, and the mail, tech-focused outreach appears to be the most preferable.

Almost 40% of survey respondents feel that their recreational needs are met in Hanover; another 50% feel that their needs are somewhat met. The most popular activities that respondents and their families participate in, in order of popularity, are walking, hiking, bicycling, jogging, and soccer. Activities that respondents and their families want more of the most, in order of popularity, are ice skating on a pond, skating on an ice rink, swimming, playgrounds, and canoeing/kayaking.

Finally, the survey asked respondents to identify priorities for open space and recreation in Hanover. Almost 97% of respondents identified the maintenance of existing walking trails as either somewhat important, important, or very important to them. This was followed by the repair/maintenance of existing athletic fields at 92%. The other priorities, in order of importance, are:

- Create linkages for existing walking trails
- Improve informational/interpretive signage at trails and parks
- Acquisition of additional open space
- Bike paths, on-road
- Bike trails, off-road
- Addition of walking trails
- Addition of programming: camps, classes
- Construction of small neighborhood parks/playgrounds
- Create town gathering places
- Establish indoor community recreation center
- Construction of new playing fields
- Create community dog park
- Equestrian trail linkages

Summary of Management Needs

Maintenance

A need for more manpower in the Department of Public Works to maintain fields was discussed in the 2008 OSRP. The need remains today even though the staff has increased in size. Attendees at the Community Assets Forum suggested outsourcing the landscaping at Forge Pond Park to a private landscaping service to relieve DPW.

Staffing needs that have been addressed since the last plan include increasing the part-time Park and Recreation Administrator to full-time and expanding the Planning Department by hiring at least another part-time Planner; the Planning Department now has a full-time Assistant Planner.

The most prevalent maintenance need is for the town's trails. Forum attendees mentioned a desire for the Town to better maintain and clear trails of blockages. While the Open Space Committee does an excellent job with this, they are only a handful of volunteers who are already doing the most they can. Also suggested was annual trash cleanups coordinated with DPW and volunteers or civic groups, such as the Boy and Girl Scouts or Lions Club.

Coordination and Communication

In order to successfully implement this plan, coordination and communication among the various actors working to support open space and recreation in Hanover is imperative. This has been lacking both historically and presently. The Open Space Committee and Parks and Recreation Department should be in charge of implementing this OSRP together through regular meetings and exploration of funding opportunities.

The 2008 OSRP identified a need for better coordination between DPW and the School Department regarding facilities on properties owned and managed by the School Department. Hanover has since created a Facilities Department that combined maintenance for the two entities, alieving issues regarding coordination.

Potential Change of Use

The majority of open space in Hanover is protected via Article 97 of the Massachusetts Constitution because it is Town-owned and dedicated to conservation or recreation purposes. This means that this land must be managed by the Conservation Commission or Parks and Recreation Committee to be afforded the Article 97 protection. Lands that are managed by the Board of Selectmen, for example, are not afforded the same protection (unless they

have some other deed restriction) even if they are being used for open space. The Town should consider putting some of these properties under the management of the Conservation Commission so they can be shielded from potential development, such as Morrill Allen Phillips Wildlife Sanctuary.

While Article 97 technically provides permanent protection, there is the possibility that land can be converted to a different use if it goes through a laborious disposition process. As such, the Town should consider obtaining permanent conservation restrictions for its recreation and conservation lands so their protection in perpetuity is secured.

Section 8: Goals & Objectives

The following goals and objectives were created by the Hanover Open Space and Recreation Plan Committee using input from the public process, and feedback from the Community Forum Assets has been incorporated:

Goal 1: Improve coordination and collaboration among Town boards and departments and with conservation organizations to promote protection of critical areas in Hanover.

- Objective 1.1: Improve communication and coordination with the Planning Department and Planning Board to target properties that come up for acquisition (such as by tax title) or development. Work to secure open space protection, recreational opportunities, and public access.
- Objective 1.2: Improve communication and coordination with the Conservation Commission on land protection and habitat restoration.
- Objective 1.3: Establish a working relationship with the Department of Public Works and Board of Health to promote protection of Hanover's drinking water supply.
- Objective 1.4: Improve communication and coordination between the Open Space Committee and Parks and Recreation Committee.
- Objective 1.5: Improve the working relationship with the Board of Selectmen and Town Manager. Keep them informed about planned activities and priorities for preservation and recreation.
- Objective 1.6: Continue collaboration with Hanover's Historical Commission, Historical Society, Community Preservation Committee, and outside conservation entities such as the Wildlands Trust and North & South Rivers Watershed Association on preservation and recreation projects.

Goal 2: Preserve and protect critical natural and scenic areas in Hanover.

- Objective 2.1: Review and update list of lands of interest for possible future protection.
- Objective 2.2: For properties that are already designated as open space, but have only limited or temporary protection, work to protect properties in perpetuity.

- Objective 2.3: Inform residents about the benefits of preserving open space, including the financial incentives (such as tax reductions) for doing so.
- Objective 2.4: Continue outreach efforts to local landowners and pursue the protection of high priority parcels.

Goal 3: Encourage sustainable growth and development that is consistent with the character of Hanover.

- Objective 3.1: Update Hanover's land use and environmental bylaws and regulations (Zoning Bylaw, Wetlands Protection Bylaw, and Subdivision Rules & Regulations) to ensure that development is consistent with the town's rural character, encourages open space preservation, and is designed well.
- Objective 3.2: Encourage development that preserves open space by building at a somewhat higher density through the use of Open Space Design (OSD) or Natural Resource Protection Zoning (NRPZ).
- Objective 3.3: Amend Subdivision Rules & Regulations to promote low impact development (LID) techniques and green design.
- Objective 3.4: Work with the Planning Board and Conservation Commission to protect significant natural and fragile resource areas during the design and permitting stages of development.

Goal 4: Maintain and improve public access to conservation parcels and their recreational opportunities.

- Objective 4.1: Continue to focus on walking trail creation, maintenance, and informational outreach.
- Objective 4.2: Continue to map and mark existing walking trails, access points to trails, and other passive recreational options on open space sites.
- Objective 4.3: Improve and create additional opportunities for recreation such as equestrian trails, bike trails, and water access.
- Objective 4.4: Keep an up-to-date inventory of conservation lands, including natural resources they contain, and rules and regulations for their use.
- Objective 4.5: Review parking availability at each area, and work with the Department of Public Works to add parking where needed.

- Objective 4.6: Recruit additional volunteers for the maintenance of passive recreational facilities, especially walking trails. Improve relationship with the Department of Public Works to obtain assistance with upkeep of conservation parcels.
- Objective 4.7: Improve pedestrian safety around and between conservation and recreation sites by adding crosswalks and expanding the town's sidewalk network.

Goal 5: Establish a long-range strategy for protecting Hanover's drinking water supply.

- Objective 5.1: Prioritize protection of available land abutting or adjacent to the Water Resource Protection District to act as a buffer to prevent contamination.
- Objective 5.2: Work with neighboring towns to formulate a regional plan for groundwater and surface water protection.
- Objective 5.3: Work with neighboring towns and land trusts to protect remaining open land in the area around the Freshwater Tidal Marsh and Indian Head River.
- Objective 5.4: Ensure there is coordination regarding the protection of water quality and quantity (such as for permitting, constructing, and monitoring wells and septic systems).
- Objective 5.5: Work to implement the Water Use Restriction Bylaw when there is a State of Water Supply Conservation or Emergency.

Goal 6: Maintain and enhance recreational facilities for the enjoyment of Hanover residents and visitors of all ages, abilities, and interest.

- Objective 6.1: Repair and update existing sports fields.
- Objective 6.2: Maintain existing sports fields.
- Objective 6.3: Create small, local parks, like a playground or street hockey rink, in various areas of town, particularly in areas currently underserved by neighborhood recreational facilities.
- Objective 6.4: Keep an up-to-date inventory of all the recreational facilities and programming Hanover.
- Objective 6.5: Use the ADA section of this plan to address needs of special user groups, including the elderly and persons with disabilities, and provide additional facilities and programs that meet the needs of these groups.

- Objective 6.6: Address recreational needs identified in the 2012 Statewide Comprehensive Outdoor Recreation Plan, such as creating neighborhoods parks and increasing the availability of water-based recreation.
- Objective 6.7: Continue to oversee the day-to-day maintenance and improvements of the recreation facilities under the Parks and Recreation Department's jurisdiction, such as the fences, bleachers, dugouts, and other appurtenances.

Goal 7: Improve public awareness of and education about Hanover's open space and recreation assets.

- Objective 7.1: Develop programming regarding conservation matters.
- Objective 7.2: Continue to hold guided walks through existing open space as a form of education and outreach. Work with other Town groups such as the Council on Aging, School Department, and Scouts on joint activities.
- Objective 7.3: Reach out to new Hanover residents by including trail maps and other materials on conservation in welcome packets.
- Objective 7.4: Continue to provide information about open space and recreational programming in the newspaper, related Town websites and social media platforms, and through direct mail and email.
- Objective 7.5: Continue to promote and advertise recreational programming provided by the Parks and Recreation Committee, as well as area organizations like the Hanover Youth Athletic Association.

Section 9: Seven-Year Action Plan

The Seven-Year Action Plan details the actions and activities that should occur over the next seven years to successfully implement the Hanover Open Space and Recreation Plan. These action items provide specific recommendations for meeting the goals and objectives that were formulated in Section 8.

Acronyms for Town parties responsible for implementation of the action items are listed as such:

- BOH: Board of Health
- CC: Conservation Commission
- CPC: Community Preservation Committee
- HC: Historical Commission
- DPW: Department of Public Works
- OSC: Open Space Committee
- PB: Planning Board
- PRC: Parks and Recreation Committee
- TM: Town Manager
- TP: Town Planners

The Action Plan is arranged sequentially beginning with the first goal and the associated objectives and actions to facilitate the achievement of this goal. For each action, a timeframe for when the proposed action should be taken is listed. Short-term recommendations fall within the 2017-2018 timeframe, mid-term recommendations fall within the 2019-2021 timeframe, and long-term recommendations fall within the 2022-2024 timeframe. Recommendations that are ongoing are marked as such.

Potential funding sources listed in the Seven-Year Action Plan include:

- Community Preservation Act (CPA) funds appropriated by the Hanover Community Preservation Committee
- Conservation Partnership Grant (CPG) through the MA Division of Conservation Services
- Recreational Trails Program Grant through the MA Division of Conservation Services
- Sierra Club Trail Grant
- Local Acquisitions for Natural Diversity (LAND) Program through the MA Division of Conservation Services
- Land and Water Conservation Fund (LWCF) grant through the MA Division of Conservation Services
- American Hiking Society's National Trails Fund
- Parkland Acquisitions and Renovations for Communities (PARC) through the MA Division of Conservation Services

Figure 18: Seven-Year Action Plan Matrix

Goal 1: Improve coordination and collaboration among Town boards and departments and with conservation organizations to promote protection of critical areas in Hanover.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**
Objective 1.1: Improve communication and coordination with the Town Planners and Planning Board to target properties that come up for acquisition (such as by tax title) or development. Work to secure open space protection, recreational opportunities, and public access.			
Action 1.1.1: Hold regular meetings with the Town Planners to identify properties that may come up for acquisition or through tax title or the development process.	OSC, CC, TP, PB	Ongoing	
Objective 1.2: Improve communication and coordination between the Open Space Committee and Conservation Commission on land protection and habitat restoration.			
Action 1.1.2: Jointly work to identify key parcels for acquisition/preservation that can be brought under Conservation Commission control.	OSC, CC	Ongoing	
Objective 1.3: Establish a working relationship with the Department of Public Works and Board of Health to promote protection of Hanover's drinking water supply.			
Action 1.3.1: Hold an annual strategy session with the Department of Public Works, Board of Health, and North & South Rivers Watershed Association to discuss protection of the drinking water supply.	OSC, CC, DPW, BOH	Ongoing	
Objective 1.4: Improve communication and coordination between the Open Space Committee and Parks and Recreation Committee.			
Action 1.4.1: Hold quarterly meetings between the Open Space Committee and Parks and Recreation Committee to discuss relevant matters and progress on implementing the OSRP.	OSC, PRC	Ongoing	

Action 1.4.2: Sponsor joint activities.	OSC, PRC	Ongoing	
Objective 1.5: Improve the working relationship with the Board of Selectmen and Town Manager. Keep them informed about planned activities and priorities for preservation and recreation.			
Action 1.5.1: Meet with the Board of Selectmen and Town Administrator to discuss the Open Space and Recreation Plan and its implementation.	OSC, PRC, BOS, TM, TP	Short-term	
Action 1.5.2: Work with the Town Manager to identify priority parcels for acquisition and/or permanent protection.	OSC, CC, TM, TP	Ongoing	
Objective 1.6: Continue collaboration with Hanover's Historical Commission, Historical Society, Community Preservation Committee, and outside conservation entities such as the Wildlands Trust and North & South Rivers Watershed Association on preservation and recreation projects.			
Action 1.6.1: Work with the Community Preservation Committee to identify suitable parcels for acquisition with Community Preservation Act funds.	OSC, CC, CPC, TP	Ongoing	CPA
Action 1.6.2: Work with local nonprofit organizations, such as the Wildlands Trust, to apply for grant funding for land acquisition in Hanover.	OSC, CC, TP	Ongoing	CPG
Goal 2: Preserve and protect critical natural and scenic areas in Hanover.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**
Objective 2.1: Review, update, and prioritize list of lands of interest for possible future protection.			
Action 2.1.1: Update inventory of parcels that are of interest to the Town for acquisition and are currently undeveloped or desirable to purchase.	OSC, CC	Ongoing	
Action 2.1.2: Track ownership and any contact made with landowners of desirable parcels.	OSC, CC	Ongoing	

Action 2.1.3: Prioritize inventory using the "Land Acquisition Worksheet" and other tools such as "Mapping and Prioritizing Parcels for Resilience" by Mass Audubon and Nature Conservancy.	OSC, CC	Ongoing	
Objective 2.2: For properties that are already designated as open space, but have only limited or temporary protection, work to protect properties in perpetuity.			
Action 2.2.1: Consider transferring the care and custody of unprotected parcels to the Conservation Commission.	CC	Short-term	
Action 2.2.2: Add conservation restrictions to as many designated open space parcels as possible.	CC	Ongoing	
See Action 1.6.1			
Objective 2.3: Inform residents about the benefits of preserving open space, including the financial incentives (such as tax reductions) for doing so.			
Action 2.2.1: Educate residents about the State's Chapter 61 long-term land protection programs and their benefits for landowners.	OSC, CC	Ongoing	
Objective 2.4: Continue outreach efforts to local landowners and pursue the protection of high priority parcels.			
Action 2.4.1: Develop and disseminate a Frequently Asked Questions handout for landowners interested in information about protecting their land.	OSC	Short-term	
See Action 2.1.2			
See Action 1.6.1			
Goal 3: Encourage sustainable growth and development that is consistent with the character of Hanover.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**

Objective 3.1: Update Hanover's land use and environmental bylaws and regulations (Zoning Bylaw, Wetlands Protection Bylaw, and Subdivision Rules & Regulations) to ensure that development is consistent with the town's rural character, encourages open space preservation, and is designed well.			
Action 3.1.1: Adopt a Scenic Road Bylaw to formalize the application and review process of projects along designated scenic roads.	PB, TP	Short-term	
Objective 3.2: Encourage development that preserves open space by building at a somewhat higher density through the use of Open Space Design (OSD) or Natural Resource Protection Zoning (NRPZ).			
Action 3.2.1: Develop an Open Space Design or Natural Resource Protection Zoning Bylaw.	PB, TP, CC	Mid-term	
Objective 3.3: Amend Subdivision Rules & Regulations to promote low impact development (LID) techniques and green design.			
Action 3.3.1: Amend Subdivision Rules & Regulations to maximize amount of open space maintained in proposed developments.	PB, TP	Short-term	
Action 3.3.2: Investigate the potential of further utilizing Low Impact Development techniques and/or developing a Low Impact Development Bylaw.	PB, TP	Mid-term	
Objective 3.4: Work with the Planning Board and Conservation Commission to protect significant natural and fragile resource areas during the design and permitting stages of development.			
Action 3.4.1: At the design/permitting state of developments, discuss with developers the significant natural and fragile resource areas that may pertain to a project.	OSC, CC, PB, TP	Ongoing	
Action 3.4.2: Work to place conservation restrictions on significant natural and fragile resource areas during the development of larger properties.	OSC, CC, PB, TP	Ongoing	Funds from developer through Community Benefits Agreement

Action 3.4.3: Work with developers and property owners to integrate low-impact development techniques into the design of their properties.	PB, TP, CC	Ongoing	
Goal 4: Maintain and improve public access to conservation parcels and their recreational opportunities.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**
Objective 4.1: Continue to focus on walking trail creation, maintenance, and informational outreach.			
Action 4.1.1: Continue to distribute the 2014 "Open Space with Historic Areas & Walking Areas" map.	HC, OSC	Ongoing	
Action 4.1.2: With feedback from residents, develop a list of potential new trails for construction.	OSC	Mid-term	Recreational Trails Program Grant, Sierra Club Trail Grant, LWCF
Action 4.1.3: Continue to maintain existing trails to ensure safety and ease of access.	OSC	Ongoing	Recreational Trails Program Grant, Sierra Club Trail Grant, LWCF
Action 4.1.4: Work with the Conservation Commission to review placement of new trails in order to avoid impacts to important natural resources, including wetlands and rare species.	OSC, CC	Ongoing	
Objective 4.2: Continue to map and mark existing walking trails, access points to trails, and other passive recreational options on open space sites.			
Action 4.2.1: Update the 2014 "Open Space with Historic Areas & Walking Areas" map in the future if new trails are added to the Hanover system.	OSC, HC	Mid-term to long-term	CPA
Action 4.2.2: Add signage to trailheads where it is lacking and needed.	OSC, CC	Short-term	American Hiking Society's National Trails Fund
Objective 4.3: Improve and create additional opportunities for recreation such as equestrian trails, bike trails, and water access.			

Action 4.3.1: Assist with any "rail-to-trail" initiative assembling a through bike trail in Hanover on the former railroad bed and nearby lands.	OSC, BOS, TP	Ongoing	Recreational Trails Program Grant
Objective 4.4: Keep an up-to-date inventory of conservation lands, including natural resources they contain, and rules and regulations for their use.			
Action 4.4.1: Develop an inventory of conservation lands and update it as needed.	CC, OSC	Ongoing	
Objective 4.5: Review parking availability at each area, and work with the Department of Public Works to add parking where needed.			
Action 4.5.1: Identify conservation lands and trails lacking safe parking and add additional parking where it is needed/appropriate.	CC, OSC, DPW, TP	Mid-term	
Objective 4.6: Recruit additional volunteers for the maintenance of passive recreational facilities, especially walking trails. Improve relationship with the Department of Public Works to obtain assistance with upkeep of conservation parcels.			
Action 4.6.1: Establish a group of volunteers responsible for creating and maintaining trails.	OSC	Short-term	
Action 4.6.2: Work with local civic groups, such as the Boy and Girl Scouts and the Lions Club, to organize trail cleanups.	OSC	Ongoing	
Action 4.6.3: Utilize volunteers to assist with invasive species monitoring and removal.	OSC, CC	Ongoing	
Objective 4.7: Improve pedestrian safety around and between conservation and recreation sites by adding crosswalks and expanding the town's sidewalk network.			
Action 4.7.1: Develop a plan for adding sidewalks to key roadways in town, specifically in areas where trails do not connect.	TP, DPW	Mid-term	
Action 4.7.2: Seek funding for the construction of additional sidewalks in Hanover.	TP, DPW	Mid-term and long-term	Chapter 90 and TIP funds

Goal 5: Establish a long-rate strategy for protecting Hanover's drinking water supply.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**
Objective 5.1: Prioritize protection of available land abutting or adjacent to the Water Resource Protection District to act as a buffer to prevent contamination.			
Action 5.1.1: Target outreach about land protection to property owners in or near the Water Resource Protection District.	OSC	Ongoing	
Action 5.1.2: Continue to work with the Cardinal Cushing Centers to bring their land under permanent protection.	OSC, CC, TP, TM	Ongoing	
Action 5.1.3: Acquire land that comes available in or near the Water Resource Protection District.	OSC, CC, TP	Ongoing	LAND, LWCF
Action 5.1.4: Work with the North & South Rivers Watershed Association to identify priority parcels for protection of Hanover's drinking water.	OSC, CC	Ongoing	
Objective 5.2: Work with neighboring towns to formulate a regional plan for groundwater and surface water protection.			
Action 5.2.1: Contact representatives in neighboring towns biannually to discuss groundwater and surface protection means.	CC, TP	Ongoing	
Action 5.2.2: Work with the Metropolitan Area Planning Council's to schedule a South Shore Coalition event on water protection, in conjunction with the North & South Rivers Watershed Association.	TP	Short-term	MAPC
Objective 5.3: Work with neighboring towns and land trusts to protect remaining open land in the area around the Freshwater Tidal Marsh and Indian Head River.			

Action 5.3.1: Work with Pembroke and Norwell to nominate an area surrounding a portion of the North River/Indian Head River as an Area of Critical Environmental Concern.	OSC, CC, TP	Mid-term	CPA
Objective 5.4: Ensure there is coordination regarding the protection of water quality and quantity (such as for permitting, constructing, and monitoring wells and septic systems).			
Action 5.4.1: Review the existing system for addressing failing septic systems and identify ways in which it can be approved.	CC, BOH	Short-term	
Action 5.4.2: Investigate the potential of using another substance besides sand/salt on the roadways during the winter as a way to further protect drinking water.	CC, DPW	Mid-term	
Objective 5.5: Work to implement the Water Use Restriction Bylaw when there is a State of Water Supply Conservation or Emergency.			
Action 5.5.1: Continue to provide information on water restrictions on the Town website when there is a State of Water Supply Conservation or Emergency.	CC, DPW	Ongoing	
Goal 6: Maintain and enhance recreational facilities for the enjoyment of Hanover residents and visitors of all ages, abilities, and interest.			
Objective 6.1: Repair and update existing sports fields.			
Action 6.1.1: Update the Parks and Recreation Master Plan from 2007 to address current recreational facility needs in Hanover.	PRC, TP	Mid-term	
Action 6.1.1: Seek funding for necessary updates to Hanover's sports fields and other recreational resources.	PRC, TP, CPC	Ongoing	CPA, PARC, LWCF
Objective 6.2: Maintain existing sports fields.			

Action 6.2.1: Create a maintenance plan for sports fields in town.	PRC, DPW, TP	Mid-term	
Action 6.2.2: Regularly maintain sports fields, and consider outsourcing landscaping work at high-maintenance sites like Forge Pond Park.	PRC, DPW	Ongoing	
Objective 6.3: Create small, local parks, like a playground or street hockey rink, in various areas of town, particularly in areas currently underserved by neighborhood recreational facilities.			
Action 6.3.1: Work with Hanover Build the Boards to identify an appropriate location for a street hockey rink in town.	PRC, CPC, TP	Short-term	CPA
Action 6.3.2: Investigate the potential of adding small, local parks in areas where there are no recreation amenities available, such as the northern portion of town.	PRC, CPC, TP	Ongoing	CPA, PARC
Objective 6.4: Keep an up-to-date inventory of all the recreational facilities and programming in Hanover.			
Action 6.4.1: Inventory all recreational programming provided in Hanover, including what is provided by the Hanover Youth Athletic Association, and update the inventory annually.	PRC, HYAA	Ongoing	
Objective 6.5: Use the ADA section of this plan to address needs of special user groups, including the elderly and persons with disabilities, and provide additional facilities and programs that meet the needs of these groups.			
Action 6.5.1: Provide structural changes identified in the ADA Self-Evaluation and Transition Plan to make more facilities accessible to persons with disabilities.	PRC	Ongoing	CPA
Action 6.5.2: Work with the Hanover Senior Center to identify opportunities for additional recreational programming for Hanover's older adults.	PRC	Mid-term	
Objective 6.6: Address recreational needs identified in the 2012 Statewide Comprehensive Outdoor Recreation Plan, such as creating neighborhood parks and increasing the availability of water-based recreation.			

Action 6.6.1: Work with the North & South Rivers Watershed Association to host regular canoe and kayak paddles along Hanover's rivers.	PRC, OSC	Ongoing	
See Action 6.3.2			
Objective 6.7: Continue to oversee the day-to-day maintenance and improvements of the recreation facilities under the Parks and Recreation Department's jurisdiction, such as the fences, bleachers, dugouts, and other appurtenances.			
Action 6.7.1: Monitor the recreation facilities under the Parks and Recreation Department's jurisdiction and provide maintenance as needed.	PRC	Ongoing	
Goal 7: Improve public awareness of and education about Hanover's open space and recreation assets.			
Objective/Action:	**Parties Responsible**	**Timeframe**	**Funding Source**
Objective 7.1: Develop programming regarding conservation matters.			
Action 7.1.1: Partner with local environmental organizations to bring in speakers for talks.	OSC	Ongoing	
Action 7.1.2: Continue to identify and certify vernal pools, and distribute information about them to residents.	CC, OSC	Ongoing	
Objective 7.2: Continue to hold guided walks through existing open space as a form of education and outreach.			
Action 7.2.1: Hold monthly guided walks during the non-winter months on Hanover's conservation lands.	OSC	Ongoing	
Action 7.2.2: Work with other Town entities such as the Council on Aging, School Department, and Scouts to organize group walks.	OSC	Ongoing	
Objective 7.3: Reach out to new Hanover residents by including trail maps and other materials on conservation in welcome packets.			
See Action 4.1.1			

Objective 7.4: Continue to provide information about open space and recreational programming through various outreach channels.			
Action 7.4.1: Display information about Hanover's open space and recreational programming in the newspaper, related Town websites and social media platforms, and through direct mail and email.	OSC, PRC	Ongoing	
Objective 7.5: Continue to promote and advertise recreational programming provided by the Parks and Recreation Committee, as well as area organizations like the Hanover Youth Athletic Association.			
See Action 6.4.1	PRC	Ongoing	

Section 10:
Public Comments

Letters of support will be included in final draft.

Section 11: References

All references are listed as footnotes throughout the document.