

SECTION 4: ENVIRONMENTAL INVENTORY AND ANALYSIS

The natural resources described in the Environmental Inventory play an essential role in determining Holland's future open space and recreation needs and goals. By analyzing its Environmental Inventory, the town can identify the critical natural resources that require additional protection from future development, such as areas of prime farmland soils, wildlife habitats, and water resources. In addition, the Environmental Inventory provides useful information when making informed decisions concerning future open space and recreational objectives, such as identifying parcels of land to acquire in order to reduce stress on lake and pond ecosystems.

Geology, Soils, and Topography

Geology

The underlying geology of Holland and the surrounding region is composed of Paleozoic intrusive rocks and metamorphosed sedimentary and volcanic rocks consisting of granite, gneiss, schist, and phyllite. Holland and the surrounding area was subjected to the actions of the four known major continental glaciers in North America, the most recent being the Wisconsin glacier that occurred 12,000 to 15,000 years ago. As the Wisconsin glacier moved southward, it scraped the surface of the ground and picked up soil, stone, and boulders. Its massive weight formed a compact mixture of rocks referred to as lodgment till. Above this layer, the action of the glacier formed drumlins, long, narrow hills running northwest to southeast, reflecting the direction of glacial movement. As the glacier receded, it deposited the load of soil, stones, and boulders it had accumulated as it moved southward. This mix of loose, permeable material formed a layer called ablation till. In Holland and surrounding communities, it is estimated that this layer is approximately 3 to 5 meters in depth.

The current landscape of Holland reflects its underlying geologic formations and the actions of the massive glaciers that moved south, and then receded to the north. Holland's landscape is characterized by north to northeast-trending ridges and hills created by glacial action. Hills with the greatest elevation in Holland typically have summits of exposed bedrock, which were capable of resisting the scouring action of the glaciers. The slopes of these hills range from strongly sloping to very steep. Following the receding of the Wisconsin glacier, streams began to deposit material, called alluvium, on their flood plains (United States Department 1989).

Soils

The principle soil association present in Holland is the Paxton-Brookfield-Woodbridge association. The United States Department of Agriculture (USDA) Soil Conservation Service provides the following description of the soils in this association group:

Paxton-Brookfield-Woodbridge: Very deep, gently sloping to steep, well drained and moderately well drained soils formed in loamy glacial till; on uplands (United States Department 1989 p.175).

One additional soil association is present in Holland. A narrow band of the Scituate-Montauk-Charlton soil association is present on the western border of the town. The USDA Soil Conservation Service description of this soil association is provided below:

Scituate-Montauk-Charlton: Very deep, nearly level to very steep, well drained and moderately well drained soils formed in loamy and sandy glacial till; on uplands (United States Department 1989 p.175).

The Soil Survey of Hampden and Hampshire Counties, Massachusetts, Eastern Part (United States Department 1989) provides detailed maps and descriptions of the specific soil types present in Holland. Although USDA soil maps can provide only the approximate location of specific soil types, these maps are useful when making informed decisions concerning possible development, especially concerning the preservation of Prime Farmland Soils.

Prime Farmland Soils

The United States Department of Agriculture defines prime farmland as “land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply, needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment” (United States Department 1989 p.61). Since length of growing season cannot be changed, and moisture supply can be supplemented through the use of irrigation, prime farmland preservation involves the identification and protection of the soils that possess the qualities that make them especially suitable for agricultural production.

Specific soil types are associated with areas of prime farmland. These soil types possess the following qualities: acceptable levels of acidity or alkalinity, few or no rocks, permeability to air and water, not excessively erodible, and possessing a slope range of mainly 0 to 6 percent. Table OS-6 lists the Prime Farmland Soils for Hampden and Hampshire Counties.

Table OS-6: Prime Farmland Soils of Hampden and Hampshire Counties, 1989.

USDA Map Symbol	Soil Name
MeA	Merrimac sandy loam, 0 to 3 percent slopes
MeB	Merrimac sandy loam, 3 to 8 percent slopes
MoB	Montauk fine sandy loam, 3 to 8 percent slopes
PaB	Paxton fine sandy loam, 3 to 8 percent slopes
Pv	Pootatuck fine sandy loam
SgB	Scituate fine sandy loam, 3 to 8 percent slopes
SuA	Sudbury fine sandy loam, 0 to 3 percent slopes
SuB	Sudbury fine sandy loam, 3 to 8 percent slopes

Source: USDA Soil Survey of Hamden and Hampshire Counties 1989

Holland's largest areas of Prime Farmland Soils are located in the northern section of the town. These areas include: an area of Merrimac sandy loam (MeB) on both sides of Brimfield Road at the border of Holland and Brimfield, an area of Sudbury fine sandy loam (SuA) located directly below Lost Lake, and an area of Paxton fine sandy loam (PaB) west of Rattlesnake Mountain (United States Department 1989 Soil Map 14,15).

Topography

Holland is dominated by two distinctive landform features; Hamilton Reservoir and rolling forested hills. The juxtaposition of these features give Holland its pleasing mix of open vistas over water and closed forest scenery. The soils and topography found in Holland have their origins from glaciers that blanketed the region more than 15,000 years ago. Many of the town's natural resources and distinctive features originate from this period. For example gravel deposits found throughout town were formed by alluvial outwash from when the glaciers melted. Various highpoints found in town are recessional moraines and outcropping of ledge exposed during glaciation. The complex drainage pattern found in town, with numerous wetlands, is also the result of the ice sheets that passed over the area. The resulting topography, soil composition, and drainage patterns not only provide important natural resources, such as gravel, but are also the basis for the numerous natural habitats found throughout the Town of Holland.

Landscape Character

Holland, for both residents and visitors, represents a traditional quaint New England town of by-gone days. Many residents cite the rural atmosphere, the pleasing combination of woods, wetlands and lakes, and rolling hills as the qualities that make Holland so special. Holland has a diversity of beautiful views, some preserved architectural heritage, and a rural way of life that make it stand out from its neighbor towns. However, many of these features can be adversely affected by inappropriate or poorly planned development. Views can be marred by ridge-top development. The pleasing mix of land use, such as forest and traditionally built housing, can be changed to a monotonous view of tract houses. The continued degradation of water quality in Hamilton Reservoir can impact both the visual and recreation quality of this resource. Knowing what makes Holland unique will help to guide development to complement rather than harm the unique character of the town.

Water Resources

Holland is part of the Quinebaug River watershed, which flows north through town and then combines with the French and Middle Rivers to form the Thames River. This system flows southward through Connecticut into the Long Island Sound. Holland has a great variety of water resources. These resources not only provide for important recreational opportunities and beautiful vistas, but also important wildlife habitats and drinking water sources. It is important in planning for Holland's water resources to recognize that many of these resource areas cross town, county, and state boundaries. It is essential then, that planning for the significant water

resources be at a landscape or regional scale. This does not mean however, that it is unimportant for Holland to identify and assess, the water resources that lie, either partially or wholly, within its town boundary.

Aquifers

Aquifers are an important water resource for any town to ensure protection. The protection of aquifers is vital because they are sources, or potential sources, of quality drinking water. A high quality, medium flow aquifer is located in the general area of Lake Siog and surrounding wetlands. Currently this aquifer does not provide public water for the Town of Holland, as all water in town is supplied by private wells. However, this aquifer may provide ground water for numerous private wells in Holland and Brimfield. The recharge area of the aquifer is located in the Town of Brimfield as well as in Holland. This aquifer is overlaid by impermeable layers of gneiss and schist, thus making contamination unlikely from land use located directly above this aquifer. However, land use changes in the recharge areas can lead either to aquifer contamination or a reduction of recharge capacity. This aquifer serves as an example of the necessity of planning for natural resource management and protection both at a local level and at a landscape level. It is essential that Holland and Brimfield work collaboratively to ensure the protection of this shared resource.

Wetlands

Like many towns in the area, Holland has a wealth of wetlands, covering approximately 11% of the town's land area. Wetlands provide many functions that contribute to maintaining the quality of the environment, such as control of local flooding, pollution filtration, and recreational and scenic opportunities. Wetlands are also vital in helping to maintain the biological diversity found in Holland. Many of the species found in Holland are dependent on wetlands for some part of their life cycle. The U.S. Fish and Wildlife Service national Wetlands Inventory Program has delineated and mapped many of the major wetlands found in Holland. They include a wide variety of wetland types including flood plain forests, cattail marshes, red maple swamps, and vernal pools. Many of these wetlands occur in mosaics with more than one type of wetland occurring in the complex.

Major Water Bodies

Probably the most defining feature of Holland is the 413-acre Hamilton Reservoir. In 1865 the Quinebaug River was dammed, creating Hamilton Reservoir. The present dam was constructed in 1956, after a flood caused the previous dam to rupture and flood large areas of town. Hamilton Reservoir plays an important role in Holland. It provides year-round flood protection, beautiful vistas, and is the source for a considerable amount of the economic activity in the town, mostly from recreation related activities. The town has rights of way on small areas of land for access to Hamilton Reservoir with one developed boat ramp; in addition there are numerous private and commercial ramps and marinas.

Adding to the variety of water resources in Holland are the numerous ponds, streams, and brooks found throughout the town. These areas provide recreational opportunities, wildlife habitat, and scenic beauty. Lake Siog (also known as Holland Pond) is the next largest body of water in town after Hamilton Reservoir. It is much used for fishing, swimming, and boating, with a public boat ramp providing access. There is a small town-owned beach, which is undeveloped.

There are other ponds in town, including Lost Lake, a beautiful lake located in deep woods, accessible only by foot through pine woodland. Many of the streams and brooks in town, such as May Brook and Stevens Brook, have native trout populations and are popular areas for fishing. Located on the Quinebaug River is a designated canoe trail, with a total of four miles of trail between Lake Siog Park north to East Brimfield Reservoir in Brimfield and Sturbridge. This trail offers a pleasant trip through a variety of habitats, with areas to stop and picnic or swim.

Vegetation

Holland has a mosaic of different types of habitats: forests, wetlands, old fields, and agricultural lands. For the most part, the plant communities found in town are typical of southern New England. The plant communities found in Holland today are very different than what occurred prior to European colonization. Originally, the area covered by Hamilton Reservoir was a fertile river valley and was probably dominated by extensive riverine vegetation, floodplain forests, and meadows. However, much of this area had been cleared for agricultural use in the early years of colonization. With the creation of the reservoir the town lost much of its valuable agricultural lands.

Forestland is the predominant vegetation cover in the town. This forestland not only provides an abundance of timber and opportunities for recreation, but also provides wildlife habitat and watershed protection. The forest types found in Holland today largely result from the soil types, elevation, and past land use history. West and south facing slopes typically support the oak-hickory forest type, while the north facing slopes are dominated by hemlock and northern hardwood forests. Stands of white pine occur on sandy outwash soils and abandoned fields. Red Oak forests are found on thin, stony soils. Cottonwoods and silver maples are found in flood plain areas. The dominant species of tree found in Holland are hemlock, red, white and black oaks, and sugar maples. White pine, white ash, red maple, black birch, and paper birch are also present. Holland also has some more unusual tree species, such as chestnut oak. Common under-story plants include huckleberry, blueberry, shadbush, mountain laurel, azalea, and hornbeam.

Agricultural Lands

Throughout most of its history, Holland was an agricultural community. Although agriculture has declined substantially over time, farms and farmland still play an important role in Holland by maintaining the town's agricultural heritage, serving as a sustainable form of economic development, and protecting open space lands from development.

The most recent land use data for the Town of Holland was compiled in 1999 by the Massachusetts Geographic Information System (Massachusetts Geographic 1999). This data indicates that approximately 263 acres of land were in agricultural production in Holland in 1999. Approximately 215 of these acres were cropland and 48 were pasture.

Wildlife

The great variety of wildlife in Holland is very important to many of the town's residents and visitors. Bird watching is a popular activity for many, as are fishing and hunting. As one person said, "Knowing that there are turkeys, bluebirds, and deer living next door makes this place all the more special." The types of wildlife species found in a town are dependent in part on the types of habitat found within the town. In general terms, the wildlife communities found in Holland can be characterized as typical of those in many southern New England areas, and is dominated by species that are adapted to forested lands.

Mammal species common in Holland include white-tail deer, cottontail rabbit, raccoon, coyotes, woodchuck, porcupine, red fox, mink, otter, beaver, numerous small mammal species, and an occasional black bear. There are numerous bird species that can be found in Holland as well. Many, such as neo-tropical migrant songbirds, breed in various habitats found throughout the town. Several species that are dependent on large, un-fragmented forest tracts are common breeders in some areas of Town. These include wood thrush, veery, ovenbird, black and white warbler, scarlet tanager, and piliated woodpecker. Many species of migrant birds also pass through Holland during the spring and summer migration, stopping to feed and rest before moving on. The bird species list for Holland numbers over 200.

The diverse natural habitats that occur throughout the town are habitat for many species of amphibians and reptiles. Many of these species are dependent on wetlands for some stage of their life cycle. Included in this list are bullfrogs, spring peepers, and red backed newts. In general, the wildlife habitat found in Holland is typical of Southern New England. There is a large amount of maturing mixed hardwood forests or mixed hardwood/conifer forests with scattered areas that are dominated by water and developed lands. However, unlike many areas throughout the region where the large blocks of forested habitat have been fragmented by suburban development, there are still relatively large, un-fragmented tracts of forestland. While it is true that edges (where two different habitat types meet) attract a diversity of species, many species require forest interior habitat that has no edge present. When large blocks of forest are bisected by roads, power lines and housing developments, edge is created. The overall result is the reduction of forest interior habitat for those species that depend on it. The maintenance of the biological diversity found in Holland depends, in part, on the maintenance of some large un-fragmented forestlands.

Mobility is essential for wildlife. Many species of wildlife need to move between different habitats. For example, many species of salamander's winter in the uplands areas, then migrate to vernal pools to breed in spring. Wildlife also needs to be able to find mates and young need to disperse. Recognizing this need for movement is vital to maintaining viable wildlife

populations. Thus, habitat corridors are a vital element in the landscape, especially as more and more habitat becomes fragmented.

In addition to the species of wildlife listed above, Holland also provides habitat for a number of rare wildlife species. Table OS-7 provides a list of rare wildlife species in Holland.

Table OS-7: Rare Wildlife and Plant Species in the Town of Holland, 2003

Taxonomic Group	Scientific Name	Common Name	Most Recent Observ.
Fish	<i>Notropis bifrenatus</i>	Bridle Shiner	1996
Amphibian	<i>Ambystoma opacum</i>	Marbled Salamander	1997
Reptile	<i>Clemmys guttata</i>	Spotted Turtle	1996
Mammal	<i>Myotis sodalis</i>	Indiana Myotis	1938
Mussel	<i>Alasmidonta undulata</i>	Triangle Floater	1996
Mussel	<i>Strophitus undulatus</i>	Creeper	1996

Source: Natural Heritage and Endangered Species Program, Department of Fish, Wildlife, and Environmental Law Enforcement, Rare Species by Town: Holland, 2003.

Scenic Resources and Unique Environments

Holland has a wealth of scenic resources contributing to its rural character and scenic beauty. There are outstanding vistas of natural features throughout town, such as views of Hamilton Reservoir with wooded hills as a panoramic backdrop, or Lake Siog glimpsed through the wooded landscape. However, ill planned development, for example, on ridgelines and mountainsides, can have an adverse impact on these treasured scenic views. Holland also has remnants of its colonial and agricultural past still in evidence. The Town Common area is not only the center of town with the school, Town Hall and playing fields, but also one of the few areas where there are several historical buildings located, such as the library and the church. There are several old family and town cemeteries located throughout the town. There are a few scenic drives, such as Marcy Road or Vinton Road, that wind past scenic vistas, providing views of open fields and old farm houses, and travel under beautiful, old maples.

The natural environment in Holland is outstanding in some unique ways. Located throughout town are several high points with rock outcroppings, large amounts of undeveloped floodplain, and a diversity of wetlands and water resources including sizable lakes and swamps. Holland also has a large amount of prime forestland, with more than 3,000 acres of forestland with light or moderate harvest suitability.

Significant Historical Sites and Scenic Resources

The locations of the following historical sites and scenic resources are identified on the Scenic Resources and Unique Environments Map.

Map ID #	<u>Historical Site or Scenic Resource</u>
1	Hamilton Reservoir
2	Lake Siog (Holland Pond)
3	Lost Lake
4	Quinebaug River
5	Eleanor Smith Residence
6	Town Cemetery
7	Town Library
8	Rattlesnake Mountain
9	Marcy Road
10	Vinton Road
11	Congregational Church

Environmental Challenges

Holland's major environmental challenge is preventing the further degradation of water quality in Hamilton Reservoir. Hamilton Reservoir is a valuable natural resource that plays a central role in maintaining the community's identity and economic well-being. The numerous seasonal and year-round residences adjacent to the reservoir provide substantial property tax revenues to the town without requiring a significant amount of municipal expenditures (schools, public safety, services, etc.). Hundreds of seasonal visitors come to Holland each year to enjoy the recreational opportunities provided by the reservoir. These visitors help support local commercial establishments that might not be viable without the business generated by this seasonal influx of customers. It is clear that threats to the environmental health of Hamilton Reservoir can translate into threats to the town's community identity and financial stability.

In 1983, the Diagnostic/Feasibility Study for Hamilton Reservoir described numerous conditions that have led to the degradation of the water quality at Hamilton Reservoir. These conditions include:

- The soil types around the reservoir are not well-suited for underground sewerage disposal
- Due to slope and soil conditions, 80 % of the immediate shoreline of the reservoir has the potential for significant bank erosion
- Storm run-off is the greatest contributor to sedimentation of the reservoir

- Approximately 450 septic systems were within 100 feet of the shoreline in 1983
- The shallow depth of the reservoir exacerbates the negative conditions that are currently degrading water quality (Diagnostic 1983).

Much of the dense residential development surrounding the reservoir is located on steep slopes and on soils that are subject to moderate to severe erosion. Dirt roads and driveways serve a significant number of these residences. During periods of heavy rain, storm run-off carries soil from these unimproved roads into the reservoir leading to sedimentation. Due to its relatively shallow depth, the reservoir is especially vulnerable to the negative effects of sedimentation.

Pollution from residential sources also poses a serious threat to water quality at Hamilton Reservoir. Inadequate or faulty septic systems can release effluent into the reservoir's waters. In addition to posing a threat to human health, the effluent often contains phosphates. In order to adapt to this increased level of phosphates, the reservoir ecosystem compensates by increasing plant growth. Controlling rampant weed growth in the reservoir is costly and often requires introducing chemicals into the aquatic ecosystem.

Before developing a water management plan, it is necessary to have detailed data on water quality, levels of sedimentation, and potential sources of point and non-point pollution. It has been over ten years since a comprehensive study of water quality has been conducted at Hamilton Reservoir. In order to make informed water management decisions, up-to-date water quality data will be required.

Although Holland has large expanses of forested lands that serve as valuable wildlife habitat and recreational resources, increasing development pressures are likely to lead to the conversion of these lands to residential development. The town will need to employ a number of growth management tools to ensure that an appropriate balance between future development and the protection of natural resources is achieved. The unplanned development around Hamilton Reservoir and its resulting environmental problems can serve as useful reminders of the importance of planning for future growth with the preservation of natural resources in mind.