



Cook Conservation Area

Photo by MRPC

Section 4. Environmental Inventory & Analysis

4.A. Geology, Soils and Topography

See Map 4: “Soils and Geologic Features” in the Appendix.

Lancaster is located along the eastern margin of the Central Upgrade Region of Massachusetts, a region of moderate relief characterized by numerous, irregularly shaped granite hills, plains, and glacial features known as Monadnocks. Where the North Nashua and South Nashua Rivers join in south Lancaster at “The Meeting of the Waters”, the main stem of the Nashua flows northward at an elevation of 220’ above mean sea level. To the north and west, rolling hills reach elevations of more than 550 feet; this area is highly conducive to rapid runoff from rain events and melting snow cover. Throughout the region, geology, soils, and topography historically determined where and how forests were interspersed with wetlands, ponds, lakes, rivers, and streams.

Bedrock

Lancaster’s bedrock is made primarily of low-grade, metamorphic rock of the Nashua belt and Worcester formations. Much of the underlying bedrock is exposed on hillsides and summits of the area and is oriented north to south.

Legacies of the Ice Age

The Wisconsin Glacier of the Pleistocene epoch, which ended approximately 12,000 years ago, was the last major advance in North America of the Laurentide ice sheet which radically changed New England's landscape. Two miles thick in places, the Wisconsin carved out the Nashua River Valley through intense scouring action as it advanced southward, and created drumlins by riding over loose bedrock. As it melted, the glacier dumped boulders, stones and soils along its southerly receding face; known as glacial till, this heterogeneous material covers much of the landscape in Worcester County and approximately 30% of Lancaster. Outwash plains were formed by melt water from the receding glacier picking up glacial till in its flow path, sorting the contents by size and water velocity, and redepositing it downstream; the region surrounding the Nashua River Valley is an example of a glacial outwash plain. Areas of glacial till generally range from gently sloping to steeply sloping, while glacial outwash usually has less relief. Alluvium sediment consists of sand, silt, or clay deposited upon the land by glacial melt water streams; alluvium deposits underlie most of the Nashua River and its stems in Lancaster. Lancaster sits in the basin of Glacial Lake Nashua, which extended over the drainage area of Boylston to Pepperell and is the largest of its kind east of the Connecticut River Valley.

Soil

Lancaster has a rich soil heritage which defines the scenic character of the Town with its hilltops, ridges, flood plains, cultivated fields, and forests, and which is important to safeguard for the use and benefit of future generations. Many of the soils in Lancaster are moderately to highly permeable, particularly the sandy soils in the vicinity of the Town's five kettlehole Great Ponds. Generally speaking, the most productive aquifers in our larger Nashua River basin are in the sand and gravel deposits located in low-lying areas near surface water bodies, and the revised Open Space and Recreation Plan continues to address aquifer protection (see Aquifers and Municipal Wells in Section 4.C. Water Resources below.) Lancaster is dependent upon the soil as a critical component of open space protection.

Soil Types

Five major soil types are found in Lancaster:

Hinckley-Merrimac-Windsor

Very deep, nearly-level-to-steep soils (slope 35%) that are excessively drained or somewhat excessively drained; found in glacial outwash plains.

Paxton-Woodbridge-Canton

Very deep, nearly level to steep soils (slope 35%) that are well drained or moderately well drained; found in uplands. Soils are suitable for farming although erosion can be a problem.

Chatfield-Hollis Series

Moderately deep and shallow, gently sloping to moderately steep soils (slope 25%) that are well drained or somewhat excessively drained; found in uplands. These soils tend to be on hills and ridges with areas of rock outcrop, with generally a shallow depth to bedrock.

Quonset Series

Very deep, excessively drained soils on stream terraces, eskers, kame terraces, and outwash plains. A kame terrace is a hill of sorted and layered gravel and sand, deposited in openings in stagnating or retreating glaciers. These soils formed in glacial outwash and are nearly level to steep slopes (slope 25%). They are on the level with the Hinckley series (acidic, high permeability, low nutrient) but have more gravel in the upper 40 inches.

Winooski-Limerick-Saco

Very deep, nearly level soils (slopes up to 3%) ranging widely from very poorly drained to moderately well drained; found in flood plains. These soils are suitable for farming although seasonable flooding and high water table can be a significant problem. This soil is a poor filter for septic tank absorption fields.

Prime Agricultural Soils

Prime Agricultural Soils is one of several types of farmland defined by the United States Department of Agriculture (USDA) as being of major importance for the nation's long range food and fiber needs. The supply of Prime Agricultural Soils is limited and wise use by Lancaster Boards and Commissions must be encouraged. Recent trends show significant loss of prime farmland to residential, industrial and commercial uses, and the loss of prime farmland puts pressure on more marginal lands. The USDA updated its soil survey for Lancaster in 2017 (as part of Worcester County, Northeastern Part) and lists soil units that make up prime farmland.

Soil and Biodiversity

The biodiversity of our flora and fauna is ultimately dependent upon the health and biodiversity of the soil; soils determine to a great extent the native plant species, native and exotic, available to wildlife for food and cover in both upland and wetland areas. Soils that are attractive for earth product removal (EPR) can also be unique and attractive for several types of natural communities, those that depend upon drought, high soil permeability, low nutrient value, and brushy and bare vegetative cover. For example, many declining bird species and several species of threatened turtles in the Commonwealth thrive in the sparse cover and brushland environment of the Pitch Pine/Scrub Oak communities often associated with sandy outwash plains, while some severely declining species of Lepidoptera (moths and butterflies) can live nowhere else; the sandy soils of Pitch Pine/Scrub Oak communities are also, however, usually highly desirable sites for the extraction of earth products. Because earth product removal physically disturbs the landscape so drastically for so long, indeed very often permanently, EPR operations can have disastrous impacts on the long term viability of the plant and animal species that depend for their survival on the areas altered.

Primary Forest Soils

Below is an excerpt (*italics*) from Natural Heritage & Endangered Species Program (NHESP) Ecologist Patricia Swain's May 6, 2009 letter to the Lancaster Open Space Committee (a copy of which is included in the Appendix):

“Lancaster is one of the towns with town-wide maps showing areas forested in the 1830s, areas of possible Primary Forest, most of which were untilled woodlots and wooded pastures (areas shown on map which is in the appendix section). Such lands have greater biodiversity than areas that have been tilled. These are not Old Growth, as they have been harvested and pastured, but the ground may not have been tilled. Harvard Forest digitized maps from the 1830s that the Massachusetts legislature mandated the Towns make. Lancaster’s map exists and shows areas that were forested in the 1830s. NHESP GIS staff took that data and combined them with information from the Massachusetts Geographic Information System’s land cover data layer made from 1999 aerial photos. Although a great deal will have gone on in those areas in the time between the map dates, some areas that were forested in both times will not ever have been tilled. Surveys of the soil structure in the individual sites are necessary to determine whether those sites are Primary Forest. 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 primarily vegetatively contribute to the higher biodiversity. In addition, a variety of species of 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 region. The Harvard Forest website contains information on the 1830s forest data layer and copies of papers with discussion of the information are located at:

<http://www.harvardforest.fas.harvard.edu/data/p01/hf014/1830readme.html> “

Areas in Lancaster of possible primary forest, that is land that has been harvested and pastured but not tilled, are:

- Lancaster State Forest.
- Land abutting the Lancaster Town (Blood) Forest between Brockelman Road and Route 117.
- Land in and abutting the Lancaster Town Forest west of Brockelman Road to Route 190 and extending down to and past Hilltop to the Eagle Ridge subdivision and into Sterling.
- Langen Road (on both sides of the discontinued Old County Road).
- Land in the far southwestern corner of Lancaster abutting South Meadow Pond and the Brandli parcel.
- Some of the land in the Cook Conservation Area/North Nashua Greenway.
- Remnants of land east of White Pond Road extending partially over to the MYSA land.

- A large block of land extending from the Fitchburg State College conservation land (north of Route 2 and west of Lunenburg Road) east and extending to the Rand Whitney facility land and north over into Lunenburg.

Prior to more recent development and earth products removal to the south of White Pond east to Lunenburg Road, this area was mapped as possible primary forest as well. Because much of Lancaster's possible primary forest has now been developed and the soils altered, priority should be considered for conserving the remaining primary forest soils. Possible priorities being:

- Land on Ballard Hill abutting the Lancaster Town Forest and abutting and surrounding the core Lancaster State Forest east to Lunenburg Road.
- Land abutting the Fitchburg State College conservation land.
- Land just east of Turner Pond and Fort Pond encompassing the Bow Brook and extending down to the YMCA's Camp Lowe and the Rockport facility.

4.B. Landscape Character

See Map 5: "Unique Features and Scenic Resources" in the Appendix.

Heading into Lancaster, one is immediately struck by the lush and open agricultural landscape, rolling hills, dense forests and by the Nashua River that threads its way through the Town. In many ways, the Nashua River is Lancaster's biggest asset and its story, and residents value the closeness to nature that living here provides. Looking to our neighbors in all directions, it is easy to see how Lancaster is unique for its remaining large blocks of agricultural lands, floodplains, and un-fragmented forested wetlands. The history of Lancaster, which is one of the oldest towns in the State, lives through its architecture, old bridges, farms, cemeteries, and distinct markers, such as Rowlandson Rock, the old Industrial School for Girls, the Thayer Mansions, Perkins campus, and the Ponakin Bridge. Lancaster's numerous hills give one an uncluttered open sense of beauty and serenity, and Lancaster has managed to retain its historic New England town character.

This is all challenged by the need to generate tax revenue with commercial development and the generic "cookie cutter" feel of sprawl that development can sometimes bring. Residential development, particularly on scenic agricultural or forest land or on the steeper slopes of some of our distinctive hills, changes the character of the landscape dramatically. The conversion of Chapter 61 lands to residential development further jeopardizes Lancaster's open and forested landscape. The Massachusetts Chapter 61, Chapter 61A, and Chapter 61B programs were created to give preferential tax treatment to those landowners who maintain their property as open space for the purposes of timber production (61), agriculture (61A) or recreation (61B). Recent changes in local zoning continue to encourage development that blends with the scenic and historic nature of our unique town. The challenge will be to retain Lancaster's landscape character and landscape while integrating some measure of preferred development.

Respondents to the Open Space and Recreation Survey that was sent to town residents in 2017 defined the agricultural and floodplain fields between the Town Center and Atlantic Union College as one of the town's cherished landscapes. Another gorgeous landscape is the fertile farming fields to the left and right of Route 117 driving in from Bolton. People treasure the large blocks of forestland. The South Nashua River, the North Nashua and the "Meeting of the Waters" junction in Lancaster, all of which forms the Nashua River is a signature asset to the Town. Paddling the Nashua is a breathtaking experience that can take one to place of true quiet and natural beauty; an anomaly in this ever stressful and populated world. Lancaster's landscape character is exceptional. One goal will be to increase the awareness and accessibility to the still bountiful recreational and natural assets that Lancaster has to offer. Another goal will be to integrate growth and development so that Lancaster's rural feel, scenic vistas and natural landscapes are preserved.

4.C. Water Resources

See Maps 6a, 6b and 6c: "Water Resources" in the Appendix.

Nashua River and Tributaries

Lancaster is part of the Nashua River Watershed which encompasses 538 square miles and 31 towns in Massachusetts and New Hampshire. The highest portions of the watershed are in the north and to the west towards Fitchburg. The Nashua, by flowing "against the grain" of the watershed, is slower moving than many of its tributaries, making it more vulnerable to oxygen depletion. The several dams along its length exacerbate this property. The South Nashua River begins at the outlet of Lancaster Millpond in Clinton and flows north, while the North Branch has its headwaters in Fitchburg at the confluence of Flag Brook and Whitman Brook. The North branch drops 360 feet in elevation from there to its junction with the South Nashua at the "Meeting of the Waters" at Center Bridge Road in Lancaster, creating the main stem of the Nashua which then flows 35 miles northward before emptying into the Merrimack River in Nashua, New Hampshire.

The following are major tributaries of the Nashua in Lancaster; all have been identified by the Massachusetts Division of Fisheries and Wildlife as Coldwater Fishery Resources (see also Section 4.E. Fisheries and Wildlife for additional information on Coldwater Fishery Resources):

- Wekepeke Brook
- Goodridge Brook
- Still River
- Bow Brook

Great Ponds

A Great Pond is defined as any pond or lake larger than 10 acres in its natural state. Ponds that once measured 10 or more acres in their natural state, but which are now smaller, are

considered Great Ponds by the Massachusetts Department of Environmental Protection. Lancaster has five Great Ponds with public access:

- Fort Pond
- Spectacle Pond
- Little Spectacle Pond
- Turner Pond
- White's Pond

Clinton's South Meadow Pond, which extends into Lancaster, is also a Great Pond.

Kettlehole Ponds

All of Lancaster's Great Ponds are examples of what are known as "kettlehole ponds", formed when confined basin depressions, left behind by melting large blocks of ice at the end of the last Ice Age, extended below the water table and filled with groundwater. Kettlehole ponds range in size from extremely small to hundreds of acres; the larger they are the greater the diversity of wildlife habitats they typically provide: from deep, cold water regions with high dissolved oxygen content supporting wildlife species associated with such an environment, to areas of shallower, warmer water with its typical plant and animal species. Cranberry Pond on the Fort Devens South Post, historically named Cumberry Pond, covering approximately 13 acres, is another example of a kettlehole pond. Kettle hole ponds should not be confused with kettlehole level bogs, which like kettlehole ponds, reside in confined basin depressions originally created by melting glaciers, but have evolved over centuries to have very different environmental and ecological characteristics than kettlehole ponds (see (See Priority and Exemplary Natural Communities below for more information on kettlehole level bogs).

Aquifers and Municipal Wells

Lancaster has the following medium-yield aquifers:

- Eastern part of Fort Devens South Post extending east to the Harvard border, extending north to the Shirley line in the vicinity of the Department of Corrections facility and south towards Clinton.
- An inverted wishbone-shaped aquifer from the Lunenburg/Shirley line in the vicinity of Turner and Fort Ponds south to the North Nashua River and well into Fort Devens South Post, and encompassing a good portion of the McGovern Brook and all of Spectacle Brook area of the Wekepeke Brook up to and including North Main Street to the North Nashua.
- A large portion of the southeastern corner of Lancaster bordering Clinton and Bolton, the core of which consists of a high yield aquifer area of Route 62 encompassing a portion of the Goodridge Brook, Chase Hill Road, Old Hickory Road, and White Tail Lane which is just south of Deershorn Road.

Lancaster has the following high-yield aquifers, referenced on the same map:

- Area just east of Turner Pond abutting the Lunenburg line and abutting the medium yield aquifer referenced above.
- Area directly west and encompassing Wekepeke Brook, which is in a Zone II and also contains NHESP Priority & Estimated Habitat for Rare Species (which makes this area a possible land preservation and water quality preservation target in the Open Space and Recreation Plan goals).
- Large and productive area in southeast corner of Lancaster, abutting the Bolton/Clinton line and the site of the town's two wells.

The Town of Lancaster has two groundwater supply wells in the southeast part of Town (referenced above under "high yield aquifer"). The wells supply 75% of the Town's population, with the remaining residents relying on well water (largely in the north and central part of town). The Town has also explored a test well off of Bolton Road near Forbush Mill Road and in the vicinity of the Bolton Flats, a protected area that will likely not see additional development. The Lancaster Department of Public Works (DPW) is proposing to develop this new municipal water supply well to supplement the town's existing supply. This extra well will provide the town more security in its water source because the redundancy built into the system and the flexibility of withdrawing less from one portion of the larger aquifer at any given point.

As the Town does not treat its groundwater, it must be of drinking water quality. Safeguarding this present and future source of drinking water is important, which is why the Town has protected these Zone IIs by making them part of the Water Resource Protection District.

Water Quality, Good Stewardship, and Planning for Growth

The 2017 Open Space and Recreation Survey responses and the 2017 Public Forum identified the protection of Lancaster's water supply as most important. The two biggest threats in Lancaster to water quality, which mirrors the challenges faced by most towns in the Commonwealth, are storm water runoff and the interruption of the natural hydrologic cycle. It is sobering to note that many of Lancaster's surface waters are impaired in some capacity, some more than others. Maintaining and improving surface water quality will be no easy task and will not happen by default. Lancaster residents recognize the difference between planning for growth and reacting to development proposals. Lancaster is growing and with it water demand. The Stormwater Bylaw, Illicit Discharge Bylaw, and the Lancaster Wetlands Bylaw are all measures the Town has taken to safeguard surface water quality and drinking water quality. Ultimately, all of our waters discharge to groundwater, and because Lancaster does not treat its groundwater, its protection is paramount. The Department of Public Works, Conservation Commission and Planning Board continue to safeguard Lancaster's water supply through their reviews of projects brought before their respective boards.

Relative to the above comments, the Town of Lancaster is currently working with both the Lunenburg Water District and Shirley Water District to source connections to provide water into North Lancaster. In particular, the Town recently acquired a seven acre parcel of land through tax title for open space protection in North Lancaster, abutting the Rand-Whitney Corporation, and also abutting a property within the boundaries of Shirley Water District on which the District has been working for the past several years to develop an additional public water supply. Another fifty acres of abutting land has been excavated for earth products, and the close proximity of access to Route 2 significantly increases the area's potential for commercial development, which would likely be greatly facilitated by the availability of a local public water supply. Low impact development and conservation land set aside in this area will also help to preserve water basin quality, as Fort Pond has been given the most impaired ranking (a "5" out of 5, with 1 being not impaired) on the Commonwealth of Massachusetts's December 2008 list of water bodies impaired by high nutrient loading; see Impaired Surface Water Bodies below.

Nashua River and Tributaries

The NRWA's *1995-2020 Vision for the Nashua River Watershed* lists habitat fragmentation, storm water runoff and hydrology disruption as the leading threats to the Nashua River today. Non-point pollution in the form of nutrients, thermal loading and sediment transport are insidiously affecting the watershed's environmental integrity. The report recommends the following actions for Lancaster:

- Greenway buffers, leaving a buffer of natural vegetation around all water bodies and wetlands to filter out pollutants and prevent erosion.
- Maintaining natural hydrology wherever possible, which means encouraging low impact development with a minimal change in original topography, along with incorporation of existing vegetation.
- Restricted building on flood plains leaving them in their natural state.
- Protecting aquifers and their re-charge areas.
- Protecting the rich soils in Lancaster's lowlands and floodplains.

Impaired Surface Water Bodies

Some of Lancaster's surface waters are considered impaired by MassDEP. White's Pond is considered impaired because of invasive aquatic plants. Fort Pond is considered impaired due to nutrients and will require a TMDL (Total Maximum Daily Load) plan by the State. While MassDEP has no current plans for a TMDL study on Fort Pond, water bodies slated for a TMDL undergo a watershed analysis to identify point and nonpoint pollution sources. From this analysis, a model is constructed which identifies and regulates the safe nutrient load for that water body. MassDEP does work with watershed associations like the NRWA and with citizens

groups to collect data. While South Meadow Pond has not been evaluated for a TMDL, MassDEP and the Nashua River Watershed Association have identified this pond as impaired. The National Wildlife Federation has an excellent guide titled *Tracking TMDLs: A Field Guide for Evaluating Proposed Watershed Restoration Plans*. Local towns, lake associations and individuals can take proactive measures to ensure the health of their lakes, stream, rivers and ponds. The NRWA has volunteer “stream teams” in Lancaster that have been invaluable in testing the water quality of the Nashua River, a river that is considered impaired at several locations throughout its length. Problems with odor, turbidity and E. Coli persist in certain locations depending upon the time of year and the amount of rain.

Wetlands and Floodplains

Lancaster is defined by the Nashua River and its copious floodplains, oxbows and other wetlands. Wetlands provide flood control and pollutant filtration. They support biological diversity and recharge to the groundwater. Flooding is associated with the Nashua River, which often overflows its banks, especially in the spring. In the rainy season, it is not uncommon to see regular flooding on Center Bridge Road, Route 117, Route 70, Lunenburg Road and Bolton Road, to name a few. Sometimes this flooding is disastrous. The 1930’s saw the worst era of flooding in Lancaster’s recent history. In March of 1936, a heavy snow cover, frozen ground that could not absorb water, and long period of warm rain combined to create the worst flood this century. Two years later, during the Hurricane of 1938, floodwalls built in Fitchburg in 1937 only worsened flooding downstream. In September of that year, 10 to 12 inches of rain fell in one day. To this day, smaller floods occur regularly along the banks of the Nashua River and its tributary streams. Naturally occurring geologic features in Fitchburg contribute to rapid downstream flooding. The wide valleys and steep-sided granite-ledged hills are highly conducive to rapid runoff. The 320-foot drop in elevation between Snows Mill Pond in Fitchburg and the Meeting of the Waters at Bolton Flats contributes to the swift flood runoff from Fitchburg and Leominster. Major floods crest in this area within a few hours of the end of rainfall and linger in the high-water stages for 48 hours. The Nashua and its tributary, the Still River flood plains, are most effective during the high-intensity, short-duration floods generated by Fitchburg’s hills.

Maintaining the flood storage capacity of the Nashua River and its tributaries is critical to preventing catastrophic flooding. The permeable sand and gravel flood plains percolate the floodwaters and act as a giant holding tank that minimizes flood damage in populated areas downstream. Thankfully, the beneficial role of flood plains is well known and the importance of restricting development on flood plains has gained acceptance in the wake of devastating floods throughout the mid-west. Lancaster's flood plain areas are mapped by the Federal Emergency Management Agency (recently updated for 2011 and 2014).

The Town of Lancaster has a diversity of wetlands that support an abundance of wildlife as well as adding to the rustic character of the town. Because the Nashua River wetlands provide a good growing environment for sedges, reed and other riparian plants that provide sustenance to waterfowl, both the North American Waterfowl Management Plan (NAWMP) and the

Emergency Wetlands Resources Act (EWRA) of 1986 have prioritized them for protection. Moreover, since the Nashua River is a tributary of the Merrimack River System, its wetlands are also cited on the U.S. Environmental Protection Agency's Priority Wetlands of New England listing (1987). The lands surrounding these wetlands should also be protected where possible to help prevent contamination and provide a more varied wildlife habitat.

Much of the land that the Natural Heritage and Endangered Species Program (NHESP) has identified in Lancaster as habitat for Rare and Endangered Species encompasses the town's wetlands. The Fort Devens South Post contains hundreds of acres of diverse wetlands and serves as a "core" habitat adjoining the 1,667-acre Oxbow National Wildlife Refuge (which starts at the Harvard/Lancaster line) and the Bolton Flats Wildlife Management Area to the South. Harvard's Oxbow National Wildlife Refuge, named for its numerous oxbow ponds, has many wet meander scars and old river oxbows. The majority of the refuge consists of wetlands, ranging from open water, wet meadows and marshes to shrubby swamps. Although not located within Lancaster's borders, the refuge is important as a wildlife source. The Oxbow Refuge is bounded to the west by a curving, meandering portion of the Nashua River. This general area contains the largest population of Blandings turtles in the Commonwealth, a species that is threatened. Blandings turtles are particularly vulnerable because they travel significant distances in their active season (up to 2 kilometers), have low survivorship, and reproduce late in life. Continued protection of wildlife corridors is critical for their long term survival, as an adult mortality rate of 1-2% can significantly reduce population levels.

Bolton Flats WMA acreage in Lancaster is 575 acres, much of which is wetlands and floodplain forest and fields. Lancaster is proud to have the Flats Mentor Farm on a 70-acre floodplain parcel that abuts the Bolton Flats along Route 117. This unique farm supports small farmers of diverse ethnic backgrounds with land, farming infrastructure, marketing assistance, and education to sustain local farming. As Mass Wildlife manages its fields for agriculture and the declining wildlife this type of habitat attracts, support of our local agriculture is important. Bolton Flats contains fertile flood plain fields worked as farmland, and seasonally flooded ephemeral wetlands are valuable to pre-breeding waterfowl, which need the rich food resources found there to obtain the protein essential for egg laying. Shrub swamps are important nesting areas for redwings, fly catchers and other passerine (perching) birds and as roosting cover for wood ducks. Bolton Flats is intersected by the Still River and four brooks, which are bordered by wet thickets and sedge meadows. The Still River, characterized by several long, wide channels that are pond-like in appearance, originates from a spring-fed pond off Forbush Mill Road in Bolton joins the Nashua River at the north end of the flats. With silver maples shading its banks, the mile-long inlet known as the Dead River provides a tranquil resting area for waterfowl and herons among the cornfields. Many small pockets of flood plain forest lie across the river from Bolton Flats.

The 187-acre Chapman land, part of the Cook Conservation Area, near Lancaster's western border with Leominster, is a wet, forested area locally known as the Great Swamp. This area is only passable in wintertime. Further down the North Branch, several oxbow ponds emerged where years of erosion and deposition of the river's banks took place. These ponds are

favorites among otters and waterfowl. The land south of the river consists of mostly uplands, drained by several brooks that deposit into the North Branch. The former Atlantic Union College land which is between Langen Road, George Hill Road, Route 70 (Main Street) and the North Branch, both showcase Lancaster's breathtaking beauty and supports many species with its broad flat plains, oxbows, vernal pools and intersecting streams. This area routinely floods and flocks of birds are often observed in the fields and pools.

Additional Notable Wetland Areas

While not large in geographic extent, Lancaster has several pockets of habitat rich wetlands that support the full range of rare and common species that live here. Some selected areas are:

- The wetlands near South Meadow Pond near South Meadow Road and Runaway Brook Road.
- MassDEP-mapped bogs (unique ecosystems in themselves) adjacent to Fort Pond and the eastern and western side of Bow Brook, extending into an active sand and gravel site that extends into Shirley.
- Extensive wetlands within the Fitchburg State College conservation land extending south to the Johnny Appleseed Visitor Center, west to the Leominster line and North to the Lunenburg line around an active sand and gravel site.
- The extensive wetlands between the Atherton Bridge area at "Lancaster Four Corners" and the Blue Heron Pond development.
- The land abutting the Sterling Golf Course (which is a certified National Audubon Society Cooperative Sanctuary) extending north to the corner of Hilltop Road and Brockelman Road to east of the Eagle Ridge subdivision.

4.D. Vegetation

Soil, light, temperature, wind and moisture determine the vegetation of an area, which in turn determines which terrestrial species that live there. Much of Lancaster is still forested with the largest blocks being in North Lancaster and Pine Hill, and between Langen Road, Hilltop Road, Brockelman Road and Route 117 in Lancaster (the Town's Blood forest is here and abuts hundreds of forested acres and plentiful wetlands). Common forest types in this area of northern Worcester County are the Northern Hardwoods-Hemlock-White Pine and the Transition Hardwoods-White Pine-Hemlock. Hemlock, while prone to the invasive wooly adelgid, grows slowly and provides excellent winter cover to deer and other species. As these and other tree species die and are left undisturbed as "snags", they provide excellent habitat to a diversity of species from woodpeckers and owls, to wood ducks and flying squirrels.

Priority and Exemplary Natural Communities

See Map 10: “Natural Communities” in the Appendix.

Natural Communities, whether common or not, are classified primarily according to their predominant plant species. “Priority and Exemplary Natural Communities” are indicators of biodiversity of Statewide significance, usually hosting not only common species of plants and animals but also rare species on the Massachusetts Endangered Species list. Priority Natural Communities are known to have so few occurrences in Massachusetts that they are considered to be vulnerable to extirpation here, while Exemplary Natural Communities are uncommon but not rare, “apparently secure” in the State. Below are Lancaster’s documented Priority and Exemplary Natural Communities:

- Kettlehole Level Bog (Priority) – These wetlands reside in confined depressions (i.e. no inlet or outlet) formed in sandy glacial outwash, with cool water low in nutrients and oxygen, and large amounts of incompletely decomposed plant material known as “peat”. There is a kettlehole level bog on the South Post of Fort Devens.
- Alluvial Red Maple Swamp (Priority) – A variant of a red maple swamp found in low areas along rivers and streams subject to periodic overbank flooding, but are more poorly drained than true floodplain forests, and also unlike the latter, support a well-developed shrub layer. Alluvial Red Maple Swamps near old meander scars and oxbows can serve as vernal pool habitat. They are found in several places in Lancaster with a large area abutting the Oxbow National Wildlife Refuge on the Lancaster-Harvard line.
- High-Terrace Floodplain Forest (Priority) – A deciduous hardwood forest of high alluvial terrace above the zone of annual flooding. They occur on raised banks adjacent to streams and rivers or steep banks, or on alluvial terraces which are influenced by the river and are moist. These can host vernal pools and are good habitat for leopard frogs, which are in decline. Wood thrushes and veerys like this habitat.
- Low-Energy Riverbank (Exemplary) – Open herbaceous and grasses on sandy or silty mineral soils of river and stream banks that do not experience severe flooding or ice scour. A lack of mucky soils differentiates this from a wet meadow. Excellent turtle nesting habitat and should be conserved where possible. This type of community is at risk for invasive species. Unlike the High-Terrace Floodplain Forest, Low-Energy Riverbank communities are on smaller, low-gradient rivers. These habitats are prevalent along the Nashua River extending throughout Fort Devens. Other locations in Lancaster include the area by Bolton Flats and Neck Road.
- Pitch Pine/Scrub Oak (PP/SO) (Priority) – This natural community, needing to be maintained by natural or prescribed fire, is in serious decline, one of the most threatened in the State. Also known as “pine barrens”, PP/SOs are found on deep, coarse, and well-drained soils derived from glacial outwash. These soils are acidic, nutrient poor and drought prone. PP/SOs are very bio-diverse, supporting, for example, Whippoorwill and common nighthawk, while a few species of endangered and

threatened moths are exclusively dependent for their survival on PP/SO habitat. Kettle hole level bogs are not uncommon in PP/SOs since they form in the same geology and soils. PP/SO seeds are activated primarily by fire, so in the absence of natural fire events and human-induced controlled burns, the plant species in these communities, and the animal species they sustain, change drastically over time. And since PP/SOs occur on glacial outwash sandplains, which are attractive for sand and gravel mining and development, fragmentation and development have also severely reduced PP/SO communities in the Commonwealth. PP/SOs are more common to eastern Massachusetts, Cape Cod, and sections of the Connecticut River Valley than to the central part of the State. NHESP has identified a handful of towns in the State with PP/SO communities and Lancaster is one of these, with some of the last remaining PP/SO habitat in Central Massachusetts in small, remnant communities at Fort Devens South Post and the Pine Hill area of Town, which MassWildlife has made a priority to preserve and protect. The Town of Lancaster also owns a parcel within this area supporting a PP/SO community.

Forest Blocks

Lancaster is fairly unique in this section of Central Massachusetts for having intact, large blocks of forests, often associated with wetlands and adjoining floodplain fields. There are large blocks of forest in the areas of North Lancaster, Pine Hill, the Town Forest, Ballard Hill, Bolton Flats WMA, and the North Nashua River. The power line corridors that often connect them facilitate movement, and are of themselves excellent wildlife habitat. It will be an important challenge for Lancaster to develop North Lancaster in such a way as to retain and connect these large blocks of vegetation wherever possible. Habitat fragmentation is one of the leading causes of biodiversity loss in the Commonwealth, second to stormwater runoff and the loss of natural hydrology.

Lancaster Town Forest

In 1946, Arthur Blood donated approximately 120 acres of land in the vicinity of Brockelman Road to the Town of Lancaster. Both the Town Meeting vote and deed from Mr. Blood stipulated that the property was to be used as a Town Forest in perpetuity and to provide a camping area for the Boy Scouts and Girls Scouts. Mr. Blood's donation was combined with adjacent land already owned by the Town to create the original 197-acre Arthur W. Blood Town Forest. Through the acquisition of additional parcels over the years, the Arthur W. Blood Town Forest, come to be more commonly known as the Lancaster Town Forest, has grown to its current size of just over 422 acres, spanning both sides of Brockelman Road. While the ~72.2 acres of the Town Forest under the care, custody, and control of the Conservation Commission is protected under the provisions of Article 97, the Town's ownership of nearly all of the remainder of the Forest pre-dates the inception of Article 97. The Town of Lancaster nevertheless considers the entire Forest to be permanently protected, honoring the wishes of the donor since his original 1946 gift of land. The Lancaster Town Forest is shown as protected open space on the 2012 BioMap2 Report. Expansion of the Town Forest has been a high priority for land protection efforts in recent years, a new 10-year Forest Management Plan was created

for the Town Forest in 2014, and in the late fall/winter of 2016-2017 the Town Forest was logged sustainably, to enhance forest health, for the first time in nearly 35 years.

Eugene Christoph Memorial Wild Forest

At the Annual Town Meeting held on May 2, 2016, voters approved the transfer of Town-owned parcels 32-17, 32-18, and 32-19 on Hilltop Road, together totaling 25± acres, to the Conservation Commission's control. The Town Meeting vote included the designation of nearly twenty acres of the land (Parcels 32-18 and 32-19) as the "Eugene Christoph Memorial Wild Forest" in memory of Mr. Christoph's many years of dedicated volunteer service to the Town of Lancaster. Per Mr. Christoph's expressed desire to preserve the older-growth oaks he discovered within it, the Memorial Wild Forest will never be logged. Trail access to the Christoph grove, including a wetland boardwalk, has been constructed for an Eagle Scout project.

Eagle Ridge Conservation Area, aka "Sugarbush"

In 2009, the Lancaster Cub Scouts in cooperation with the Conservation Commission, were awarded a National Grid/DCR Urban Forestry Grant to plan and manage the planting of 100 sugar maples on Conservation Commission jurisdictional land. They will be planting American chestnut and black walnut for diversity. They are in the process of developing a walking trail for public access as a hiking area.

Public Shade Trees

In 1899, the Massachusetts State Legislature recognized the vital role that community trees play protecting our local environment and economies. In that year, they created the position of community Tree Warden and then endowed this individual with the noble charge of "the care and control of public shade trees." Today, the legacy of this foresight is embodied in Massachusetts General Law (MGL), Chapter 87, Shade Tree Law.

We are lucky here in Massachusetts, for some places have no laws protecting community trees, and they can be planted on a whim or removed at will. But under MGL Chapter 87, no one may plant or prune a public tree without permission of the Tree Warden (this includes cutting roots). And no one, including the Tree Warden, may remove a public tree without a duly advertised and posted public hearing. These provisions recognize, not only the value of trees as a part of community infrastructure, but also the need for our community forest to be managed by someone who is qualified by training and experience to act as a steward of this vital resource.

Further, in 1987 Massachusetts passed the Scenic Roads Act (MGL Chapter 40, Section 15c). Under Chapter 40, no public trees can be trimmed, cut or removed for the purposes of road repair, maintenance, reconstruction or paving without the prior written consent of the Planning Board.

The following is a list of the scenic roads in the Town of Lancaster:

Bolton Road
Bolton Station Road
Brockelman Road
Buttonwood Lane
Center Bridge Road
Chace Hill Road
Creamery Road
Deershorn Road
Fort Pond Road
George Hill Road
Goss Lane
Harvard Road – from Packard Street to Seven Bridge Road to Pine Hill Road
Hilltop Road
Ice House Road
Lancaster Road
Langen Road
Lunenburg Road – north of Route 2
Mill Street
Neck Road
Old Common Road
Otis Street
Old Union Turnpike
Packard Street
Parker Road
Ponakin Road – from Lunenburg Road to North Main Street
Redstone Hill Road
Route 70 – from the southerly boundary of Lancaster, through Lancaster, to the northerly boundary of Lancaster
Seven Bridge Road and a portion of Main Street designated as Route 117 – from the easterly boundary of Lancaster to the westerly boundary of Lancaster
South Meadow Road
Shirley Road
Sterling Road

4.E. Fisheries and Wildlife

State-listed Rare Species and Species of Conservation Concern

See Map 9: “Priority and Estimated Habitats and Certified Vernal Pools” in the Appendix.

Presented below are excerpts (*italics*) from former Natural Heritage and Endangered Species Program Ecologist Patricia Swain’s letter written for the 2009 Open Space and Recreation Plan summarizing Lancaster’s State-listed rare species and Species of Conservation Concern (her letter is included in the appendix):

“The enclosed list of rare species, known to occur in or to have occurred in Lancaster, has species protected under the Massachusetts Endangered Species Act (MESA), Certified Vernal Pools (ten in Lancaster), and other, not regulated, indicators of local biodiversity, including watch-listed plants, de-listed species, and priority natural communities. Any MESA-listed species with a most recent observation date within the past 25 years is considered to be current. Older dates may be species occurrences that have not been recently inventoried, or they may be lost from Lancaster as land use has changed – several are species of grasslands and farm fields. Fact Sheets describing many of the MESA-listed species and their habitats are available on our website at:

http://www.mass.gov/dfwele/dfw/nhesp/species_info/mesa_list/mesa_list.htm

We encourage inclusion of the list of species in the town and their fact sheets in the open space plan. This letter and any of the material supplied with this letter or referenced here may be included in the Plan.”

“Lancaster has several distinct types of habitats used by the rare species in town: wetlands, pitch pine/scrub oak communities, grasslands, and those areas mixed with forest. Several of the currently known rare animal species in Lancaster are associated with rivers, their tributaries, and the wetlands around them. Freshwater mussels and dragonflies and damselflies occur in the Nashua River and its tributaries. Both groups of species are good indicators of water quality and their presence speaks to the improving conditions in the Nashua. Although the turtles and salamanders have varied habitat requirements, they all require wetlands and adjoining forests.”

“Lancaster has records of several species in the suite of ‘secretive’ or inconspicuous marsh birds that use dense marshes. The suite of marsh birds that includes the Least Bittern (E), Marsh Wren (not listed), and Sora (not listed) are generally considered to be sensitive to disturbance. The marsh habitat of these species is also used, at least seasonally, by Eastern box Turtles (SC), Wood Turtles (SC), Blandings Turtles (T), and a large variety of more common species.”

The Pitch Pine/Scrub Oak (PPSO) community mapped explicitly as an NHESP natural community in Lancaster at Devens is the core of an extended area providing similar habitat for habitat specific moths in Lancaster. The caveat here is that the extended area has not been evaluated on the ground as a community occurrence. The areas in Devens were visited and mapped during a property level survey in 1993 when it was noted that the community was extensive in surrounding areas on the post but not sampled. Most of the PPSO and other sandplain communities (ranging from Pitch Pine Oak Forest to open grasslands) are in a mosaic concentrated on the east side and south end of Devens, but also extending onto private property to the southeast. The abundance of dependent moth species and several rare, grassland plant species indicate the presence of a good, and large, block of habitat. Recurrence of fire on different areas of the larger community on a regular basis is very important to maintain the habitat.

Several of the plant and bird species were more common when pastures and open fields were more abundant, and now these species tend to be found in places where there are periodic disturbances that keep the land open. Henslow's (E), Grasshopper (T), and Vesper ((T) Sparrows, Upland Sandpiper (E), and Northern Harrier (T) are species of grasslands or grassland/ shrub land mixes (each has particular preferences within the variation of grassland habitat). Long-eared Owls (SC) are forest birds that forage in openings and also declined with declines in farming. Houghton's Flatsedge (E), Bicknell's Crane's Bill (WL), New England Blazing Star (SC), and Wild Lupine (WL) are species of dry sandy openings – such as sand plains with Pitch Pine/Scrub Oak communities or in old fields. Sweet Coltsfoot (E), the two orchids, Leafy White Orchid (T) and Pale Green Orchid (T), and Pendulous Bulrush (WL) are species of sunny or intermittently sunny, cold seepy areas, that might have been pastured (and therefore more abundant) in the past but have returned to a more shaded, forested condition with the decline of agriculture. Before widespread openings were available, such species probably moved among areas with temporary openings, as they are likely to do now. Maintaining large blocks, or as large as possible, of habitat where natural disturbances can occur and slowly recover provides habitat for many naturally rare species as well as more common ones.

Protecting any unprotected areas of the Priority Habitats and BioMap cores would protect habitat of multiple rare, and also common, species and enhance their viability. Several areas of town conservation land and the town forest, and Lancaster State Forest and Bolton Flats WMA are in BioMap core areas. Protecting areas adjacent to existing conservation land limits fragmentation and maintains a variety of habitats. Large un-fragmented conservation land provides the best opportunities to maintain populations of species and limit species loss from the Town. Land protection that ties in with open space in other municipalities, and other protected open space, public or private is one way to provide important large areas of biodiversity protection. For example, much of the 1830s forest is in private conservation land, but there are areas adjacent to the Town Forest that continue to be targeted as important areas for biodiversity protection. In Lancaster, there are several BioMap core areas – the areas of most importance to protect in order to maintain the biodiversity of the Town, region, and state, as discussed above. Protecting land within the core areas will enhance the habitat value of existing conservation land and protected open space. A large BioMap Core (C590) occupies much of the town and extends eastward into adjoining towns. A Living Waters Core, LW212, is included in C590 for different species. Cores C494 and C567 extend into Lancaster from the north. C494 follows the Nashua River to the north and is separated by Route 2 from C590. Core 567 is separated from C590 by areas un-sampled for rare species that might support them, and was designated as SNL, Supporting Natural Landscape.”

The Natural Heritage & Endangered Species Program (NHESP) has designated a riparian corridor along the North Nashua River from the Leominster boundary east its confluence with Wekepeke Brook, and then south along the Wekepeke to the Sterling town line, as Priority Habitat and Estimated Habitat for Rare Species (Wekepeke Brook is also a designated Coldwater Fishery; see Coldwater Fisheries below.) Pine Hill is another area of designated Priority Habitat and Estimated Habitat for Rare Species, as is much of the South Post of Fort Devens. MassWildlife has purchased land in the Pine Hill area within the last several years,

extending the acreage of the Bolton Flats Wildlife Management Area (WMA). As this part of Lancaster lies within a landscape scale block of intact wildlife habitat several thousand acres in size, includes rare and declining natural communities, and links Oxbow National Wildlife Refuge with the Bolton Flats WMA, MassWildlife has a strategic plan to preserve more of the Pine Hill area through additional acquisitions; in particular, the agency has expressed an interest in a 35-acre Town-owned parcel (Map 26, Parcel 2) abutting the WMA and which supports an intact Pitch Pine/Scrub Oak community. Another important component of this plan is a 40-year Conservation Permit issued to a gravel extraction operator pursuant to the provisions of the Massachusetts Endangered Species Act. The Conservation Permit strictly limits the annual amount of extraction and mandates restoration of the natural habitat impacted or removed from the site.

Coldwater Fisheries

The Massachusetts Division of Fisheries and Wildlife has identified streams throughout Massachusetts that provide important habitat for native cold water fisheries (Coldwater Fishery Resource, “CFR”). In Lancaster these are:

- Wekepeke Brook
- Goodridge Brook
- Still River (which originates from a spring-fed pond off of Forbush Mill Road in Bolton and flows through Harvard)
- Bow Brook

The higher dissolved oxygen content and lower nutrient concentrations found in CFR’s attracts several species of fish and other aquatic wildlife not found in warmer waters. Several of the CFR streams support significant turtle populations as well. Coldwater fisheries are highly sensitive to the detrimental effects of increased temperature, pollution, changes in hydrology, and nutrient input. Undeveloped buffers along CFR streams are critically important to maintain shade and mitigate the inflow of stormwater runoff harmful to water quality and wildlife habitat. Culverts in all streams should be properly designed, installed, and maintained to allow movement of fish, turtles and other aquatic species.

Bartlett Pond Dam Removal

The century-old, municipally-owned Bartlett Pond Dam was located where North Main Street (Route 117) crosses over Wekepeke Brook, a tributary to the North Nashua River, impounding the Wekepeke to create Bartlett Pond, at one time a locally very popular recreation area. The dam, 84 feet in length, originally included built-in turbines to generate hydro-electric power for the Bartlett Chair Factory.

Bartlett Pond Dam was removed in 2014, a collaborative project between the Town of Lancaster and the Massachusetts Division of Fisheries and Wildlife, the culmination of several years of planning, permitting and fundraising. The Massachusetts Department of Conservation and Recreation’s Office of Dam Safety had determined several years prior that Bartlett Pond

Dam was in very poor condition and in critical need of repair or removal by the Town of Lancaster, which as the owner of the property, was responsible for the dam. After a thorough cost analysis of repair vs. removal options by the Town's engineering consultant, it was agreed that removal would be much less expensive, primarily because the accumulated sediments behind the dam were generally free of toxins requiring removal and disposal. Also, by removing the dam another 1500 feet of Wekepeke Brook would be unimpeded to its junction with the North Nashua, completely restoring a free-flowing Wekepeke along its entire 5.5 mile length, providing a great ecological benefit, particularly for the Wekepeke's importance as a Coldwater Fishery Resource.

Work on the dam removal and the adjacent park began in March 2014. The entire park area was reconstructed to accommodate the changing path of Wekepeke Brook and enhance the grounds as an attractive amenity for visitors. All work was completed in June 2014 followed by a year of monitoring by the Conservation Commission.

The positive impact of the dam's removal on wildlife habitat was apparent almost immediately. It was already known that the Wekepeke Brook, as a CFR, supported a breeding population of native brook trout upstream of the late dam and pond, but the latter two presented an insurmountable obstacle to the species' expanding its range downstream. Five weeks after the start of work to remove the dam, a survey of the downstream stretch of Wekepeke, between its confluence with the Nashua River and the road crossing on Rt. 117, yielded 18 brook trout ranging in size from 57mm-231mm. Another 13 trout ranging in size from 47mm-176mm were found in the newly restored stream channel where the pond had previously existed.

The dam removal has also improved the water quality of the Wekepeke Brook, which was classified as a distressed water basin. The removal of the dam and concrete impoundment has allowed for the replacement of warm still water with free flowing, oxygenated, cooler, deeper water which has had a large-scale benefit for the local habitat.

Today, the entire conservation area has been converted into a peaceful park alongside a restored natural wildlife area, together known as Robert Frommer Park and Bartlett Conservation Area. Visitors can learn about the Wekepeke history through display and signage, can throw a line in the water, meditate over its beauty, and eat lunch while taking it all in.

In the future, we hope to create trail access to other trail systems in and abutting Lancaster. Trails can be blazed into the Lancaster Town Forest and into the Town of Sterling and its trails.

BioMap2

See Map 11: "BioMap2" in the Appendix.

"BioMap2", produced in 2012 by The Massachusetts Natural Heritage and Endangered Species Program (NHESP), identifies and describes areas designated by NHESP as "Core Habitat", locations of the Commonwealth's highest quality, most sensitive, and uncommon biodiversity sites. The State's best and most viable occurrences of rare plant and animal populations live in

Core Habitats, which also include exemplary natural communities and aquatic habitats; given the critical importance of healthy Core Habitats to the protection of Massachusetts's biodiversity, their good stewardship is a very high priority. Toward that end, BioMap2 is largely intended to be a planning tool to aid in focusing new land conservation initiatives and the management of existing conservation areas. The Priority and Estimated Habitat Map is used for regulatory purposes in the administration and enforcement of the Massachusetts Endangered Species Act. BioMap2's second component, "Critical Natural Landscape", provides buffer areas around Core Habitat to best ensure the latter's safety from potential disturbance by indirect impacts of development outside Core Habitat.

As of the completion of BioMap2, Lancaster supports 7,822 acres of Core Habitat, of which 1,456 acres (18.6%) were legally permanently protected, while 2,684 acres of Critical Natural Landscape are located in Lancaster, of which 867 acres (32.3%) were permanently protected as of the completion of BioMap2.

The Core Habitats for Lancaster are:

Core 2887

A 5,549-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and several Species of Conservation Concern.

This Core Habitat extends north-south, occupying much of Lancaster's eastern third, including the South Post of Fort Devens and the Bolton Flats State Wildlife Management Area. This Core's primary natural feature is the main stem of the Nashua River, which, along with three of its tributaries in Massachusetts, the Nissitissit River, the Squannacook River, and Unkety Brook, are the watery framework for a complex landscape supporting an exceptionally high number of rare and uncommon species. Forty-one such turtles, dragonflies, freshwater mussels, salamanders, plants and other species inhabit these rivers, brooks, and vernal pools. Good populations of the globally rare Brook Floater mussel inhabit the Nissitissit River, while the equally rare Ringed Boghaunter dragonfly can be found in four boggy sites across this large Core Habitat. The wide-ranging and regionally rare Blanding's Turtle inhabits almost all of this Core; these turtles use many parts of this landscape throughout their decades-long lives, from feeding and over-wintering in deep vernal pools and buttonbush swamps to nesting in open, sunny, well-drained fields and abandoned gravel pits.

This Core Habitat supports a Pitch Pine/Scrub Oak Natural Community in good condition, with intact natural processes like fire, and good species and habitat diversity. Pitch Pine/Scrub Oak Communities are globally rare, fire-dependent, and shrub-dominated, with scattered trees and occasional openings. They develop on dry, poor, usually sandy, soils providing habitat for many rare species, in particular for four State-listed rare moths found in no other type of habitat than Pitch Pine/Scrub Oak. Other important Natural Communities in this Core include Alluvial Red Maple Swamp, High-Terrace Floodplain Forest, Low-Energy Riverbank, and Kettlehole Level Bog. (See Priority and Exemplary Natural Communities above for additional information.)

Core 2163

An 861-acre Core Habitat, includes much of the Lancaster Town Forest and surrounding area, featuring Forest Core, Wetland Core, and a Species of Conservation Concern, the Spotted Turtle.

Strong populations of Spotted Turtles in good habitat - large, unfragmented, protected open space continue to be of interest for the conservation of this species. This small, dark-colored turtle with yellow spots on its carapace inhabits a variety of wetlands year-round and nests in nearby uplands during spring. Road and collection are the primary conservation concerns.

Core 2217

A 599-acre Core Habitat featuring Wetland Core and a Species of Conservation Concern, the Wood Turtle. This Core Habitat is located on the north side of the North Nashua River, includes most of Cook Conservation Area.

The 98-acre Wetland Core is among the largest 20% of Wetland Cores Statewide and in this ecoregion.

Wood Turtle habitat is streams and rivers, preferably with long corridors of undeveloped, connected uplands. They also use fields and early successional habitat extending up to 500 meters on both sides of the waterways. Mowing and roads are the primary causes of mortality. Collection is also a conservation concern.

Core 2141

A 634-acre Core Habitat featuring a Species of Conservation Concern, the Blandings Turtle. The North Nashua River and a number of small tributaries run through the middle of this Core Habitat, which is bounded roughly by Route 117 to the north, Route 70 to the east, George Hill Road to the south, and Langen Road to the west.

Blanding's Turtle is a medium sized turtle. It inhabits a mix of seasonal pools, marshes, shrub swamps, forest, and open uplands. After overwintering in the deep mud of wetlands, Blanding's Turtles move overland to vernal pools and shrub swamps to feed and mate. Loss of only a few adults annually can cause populations to decline as they do not reproduce until late in life (14-20 yrs), and have low replacement rates due to low nest and juvenile survivorship. Roads are the primary cause of adult mortality.

Vernal Pools

See Map 9: "Priority and Estimated Habitats and Certified Vernal Pools" in the Appendix.

Lancaster has thirty-two (32) certified vernal pools (see [Table 4-1](#)) and a large number of Potential Vernal Pools, identified by NHESP via analysis of aerial photography. Fortunately, since passage of the Lancaster Wetlands Protection Bylaw, vernal pools and their associated

buffer zones are protected regardless of certification. A challenge in development project review will be to allow for adequate vernal pool buffers, which many scientists recommended at between 300 and 600 feet, which is more extensive than the 100 foot buffer zone vernal pools currently have. Adequate buffers are needed because many of the species that breed in vernal pools travel to and from upland habitat, some extensively. Clusters of vernal pools are particularly important to biodiversity because each pool is somewhat different and provides alternate habitat in different years and seasons. Connecting vernal pools and vernal pool clusters to each other ensures adequate genetic transfer through amphibian dispersal (generally, turtles range further but many salamanders and frogs do not). While vernal pools are literally scattered throughout Lancaster, areas of likely vernal pool clusters are:

- In 2013 NHESP certified an additional 10 pools in Cook Conservation Area near the North Nashua River. There likely remain other potential vernal pool locations in and near Cook.
- Land on the south side of the North Nashua River between Route 70 and Route 117, some of which is NHESP Priority habitat.
- Area east of White Pond Road and west of MYSA land.
- Lancaster Town Forest and land abutting to the east of the discontinued Old County Road and extending west of the Town Forest on Brockelman Road.
- Land in vicinity of Hilltop and Brockelman Roads extending down into the Eagle Ridge subdivision.
- Floodplain and forests between Langen Road and Main Street/Route 70.
- Bolton Flats.
- Inlet stream area to South Meadow Pond (Lancaster).
- Pool area near Crescent Street.
- Area between Mill Street Extension and Bolton Station Road, kitty corner from DPW well site property.
- Area just east of the Bolton Fairgrounds at Lancaster on Route 117 extending west to Shirley Road (in non-contiguous pockets).
- All throughout Fort Devens South Post.

- Area between Johnny Appleseed Visitor Center and Orchard Hills Athletic Club on Route 2.
- Area abutting the Wekepeke Brook off of Jungle Road, west of Route 190.
- Interspersed pockets between Turner Pond and Shirley Road encompassing the Rand-Whitney Company (large vernal pool on Fort Pond Road) and a sand and gravel site that extends north into Shirley.
- Atherton Bridge area on Bolton Road extending into the Blue Heron Pond development.
- Parker Family Forest/New England Forestry Foundation land, the Thayer Forest New England Forestry Foundation land, and the Confarm Forest New England Forestry Foundation land off of Langen Road.
- Turner Pond area in vicinity of Lancaster Land Trust property abutting a bog.
- Area intersecting Deershorn and Sterling Roads abutting the Goodridge Brook.
- Wetland area south of the former Bartlett Pond extending west to Route 190.
- A large vernal pool system between Ponakin Road and Route 70, abutting Conservation Commission-owned land.

Additional Wildlife Notes

Lancaster lies within the North Atlantic flyway, second only to Plum Island in migratory value, and provides a safe foraging and resting area for large numbers of migrating waterfowl, shore birds, passerines, and raptors. The Oxbow National Wildlife Refuge and the Bolton Flats Wildlife Management Area are well known as major stopover points during bird migrations.

The acreage of the Fort Devens South Post in Lancaster is approximately 5,000 acres. The 1996 US Department of Defense Appropriations bill stated that when the site is decommissioned, it will be annexed to the US Fish and Wildlife service to be added to the Oxbow National Wildlife Refuge, except for 100 acres which will go to the Town of Lancaster.

4.F. Scenic Resources and Unique Environments

See Map 5: “Unique Features and Scenic Resources” in the Appendix.

This section of the 2000 Open Space and Recreation Plan opens by saying, *“Despite constant development pressures and the booming real estate market of the 1980s, the central Nashua River valley is still largely an area of open space, farms and forests. Thankfully, it has not yet been overtaken by urban and suburban sprawl. Indeed Lancaster Center and the centers of*

surrounding communities like Bolton and Harvard look much the way they did 100 years ago, with colonial houses and large shade trees lining the streets.” While Lancaster indeed has changed, particularly with residential development in South Lancaster and with limited development in North Lancaster, the essence of our Town has remained the same, which is unusual in this area of Central Massachusetts. Some of our larger blocks of forest and wetlands are gone and much of our agricultural land now have homes, but generally speaking the Town still retains its small town New England look and feel. Certain areas significantly add to the community’s character and have been defined by Open Space and Recreation Plan survey respondents and public forum attendees to include:

- Our hills, such as Ballard Hill and George Hill.
- Our open meadows and agricultural fields on the Nashua floodplains, such as the Bolton Flats and the area between Atlantic Union College and the Town Green/Town Hall complex.
- Our moraines and drumlins scattered throughout the town, such as Dexter Drumlin and much of North Lancaster.
- The Nashua River and its stems and tributaries.
- Lancaster’s numerous wetlands and oxbows, surrounded by lush floodplain fields.
- The old mansions and historic buildings throughout town and the ancient cemeteries.
- Our numerous ponds.
- The 5,000-acre Fort Devens South Post that continues into the Oxbow National Wildlife Refuge.
- Forest areas, scenic roads, horse farms and apple orchards.

Area of Critical Environmental Concern (ACEC)

In 1982, the Department of Environmental Management published the “Massachusetts Landscape Inventory: A Survey of the Commonwealth’s Scenic Areas.” The Bolton Flats Wildlife Management Area, Oxbow National Wildlife Refuge, and surrounding orchards and farmland were identified. The Central Nashua River Valley ACEC is approximately 12,900 acres in size and is located in Bolton (700 acres), Harvard (1,850 acres), Lancaster (10,100 acres) and Leominster (250 acres). The heart of the Central Nashua River Valley ACEC is the 20-mile riparian corridor of the North Nashua and Nashua Rivers situated south of Route 2 in Leominster, Lancaster, Bolton and Harvard. Associated with this corridor are extensive surface waters, wetlands, floodplains and aquifers, as well as inter-related riparian and upland wildlife and rare species habitat, forest, farmlands, and publicly and privately-owned open space. During the summer of

1993, meetings were held with the adjoining towns of Harvard and Bolton to present a regional approach to establishing the ACEC. On August 11, 1993 the Lancaster Board of Selectmen voted to approve the ACEC proposal; the ACEC was officially designated in 1993. Map 5, titled “Unique Features and Scenic Resources”, identifies the location of the ACEC in Lancaster.

The Cook Conservation land contains much of the original homestead of Johnny Appleseed, a national folk hero and had been closed to the public for many years. In 2007, the Lancaster Friends of the Nashua River (LFNR), a sub-chapter of the Nashua River Watershed Association was successful in re-opening the area which extends from Route 70 westward along the Nashua River to I-190. The adjacent Chapman-Goodale conservation lands and the Chickering lands were included to expand the area open to the public for hiking, birding, mountain biking and other passive recreational activities.

In 2014, students from the Worcester Polytechnic Institute completed a boundary survey of the three parcels and further mapped out a trail system to enable the public to define their location throughout the area. In 2015, LFNR erected signs at each individual trailhead to identify trail users location. LFNR continues to maintain and upgrade trails each year, and the Cook Conservation Area now provides over five miles of trails that take one through a diversity of habitats. The area has become the most popular passive recreation destination in the community and sees moderate to heavy usage on a daily basis throughout the year.

In 2016, LFNR established a “blue trail” along the Nashua River for canoeists, kayakers and other paddlers that pass through the Cook Conservation Area to provide a waterside visual experience along the banks of the river. The trail was initiated as part of an Eagle Scout project which cleared the land portion of the trail from the end of Main Street down to the riverbank. From here paddlers could embark on a 3.5-mile journey from the Leominster town line and end at the Pellicchia Conservation Area, just south of the Cook Conservation Area on Route 70.

Over the next several years, LFNR will continue to develop the blue trail to other existing access points along the Nashua River that have existed prior to the blue trail designation. These include launch/take-out point at Langen Road, Main Street and Route 117.

The reopening of the Cook Conservation Area has stimulated further interest in the development of hiking trails in other locations throughout Lancaster. A trail inventory has been created for parcels within the Lancaster Town Forest, Thayer Memorial Forest, Parker Family Forest, Bolton Flats Wildlife Management Area, Atherton Bridge Greenway, Ballard Hill CA, Turner Pond CA, Eagle Ridge CA and the Winsor CA.

Archeological Resources

From the 2000 Open Space and Recreation Plan, “In addition to its colonial heritage, Lancaster also boasts an ancient heritage that dates thousands of years prior to the arrival of the first settlers. The Nipmuc Indians hunted, fished and settled here as far back as 3,500 years ago, although evidence suggests that Native Americans passed through the area during the Paleoindian Period (12,000 to 10,000 BP). The natives at this time were nomads who hunted game across tundra and a single-fluted point attests to their presence in Lancaster. Excavations

of the Nashua River floodplain unearthed stone tools and projectile point types from the Late Archaic Period (5000 to 3000 BP), when warmer weather throughout the region fostered long-term settlement for the first time. The Protohistoric and Contact Period (1500 to 1650 AD) saw the arrival of the Nipmuc Indians, a regional subgroup of the southern New England Algonquins. The name Nipmuc means “fresh water people” and the local subgroup that inhabited the area were called Nashaway (meaning “river with pebbled bottom”). The Meeting of the Waters at Four Corners, where the North and South branches of the Nashua converge, was the site of long-term settlement for the Nashaway who hunted, fished and farmed the land.”

4.G. Environmental Challenges

Hazardous Waste Sites

The Town of Lancaster does not have any active hazardous waste handling or disposal sites.

The South Post of Fort Devens, an active military training area with a history dating back to World War II, is located in the northeastern quadrant of Lancaster. The area consists of approximately 18,000 acres (5,000 in Lancaster) of woodland, fields and managed open space. The South Post includes several areas where historical disposal sites may include excess munitions that were disabled and destroyed. The various ranges on this site are also expected to include unexploded ordinance. These areas have been investigated and mapped by the Department of Defense. The United States government is the owner of the property and responsible for management of the land.

One brown field site has been developed on the town line that includes land area in the Town of Lancaster. A parcel straddling the Lancaster/Clinton town line, east of Main Street and south of Carter Street included historical industrial uses. The structure and use had been abandoned and allowed to partially collapse. As part of a redevelopment project, the structure was razed and the site cleaned of debris and contaminated soils. Residential condominiums were developed on the Clinton portion of the property. The Lancaster portion of the site was restored to a natural condition and maintained with the property as open space.

Numerous small, residential landfills existed throughout the Town. These landfills and burn sites predate municipal waste handling and current health regulations. All have long been abandoned and overgrown. Two municipal waste sites exist in the Town. One older site is located south east of the intersection of Mill Street Extension and Bolton Station Road. This site was capped with an earth cover and abandoned when a new landfill site was developed off Lunenburg Road. The Lunenburg Road site has since been closed and capped with a membrane cover. This capping work took place in the early 1990s. Presently, the Town of Lancaster does not offer solid waste collection as a municipal service. The Board of Health approves and monitors private collection companies that contract privately with individual homes and businesses.

Areas of Chronic Flooding

The Nashua River, together with its North and South Branches, passes through the Town of Lancaster. The areas adjacent to this river system include significant flood plains. The river itself has a relatively flat slope as it leaves the Town and heads to the north. As a result, water tops the river banks and fills the flood plain for several days following a major rain event in the local area or at higher locations in the Nashua River watershed. The South Branch of the Nashua River includes the impoundment behind the Wachusett Dam. This impoundment is part of the greater Boston water supply and under the control of the Massachusetts Department of Conservation and Recreation. Releases of excess water from the dam during the days following a major rain event can exceed the bank capacity of the South Branch and the Nashua River. The release of water is a particularly critical issue when the Nashua River is already near capacity from North Branch flows.

Chronic flooding takes place in areas where roadways, residential and commercial development are located within the mapped flood plains. These areas generally include Seven Bridge Road (Route 117) from the railroad crossing east to the town line, Center Bridge Road from the railroad crossing east to Lower Bolton Road (Route 110) and Bolton Road from the railroad bridge east to Center Bridge Road. Homes and commercial buildings along Center Bridge Road and Bolton Road can be flooded or isolated during periods of high water. Other areas of open space flood regularly without impact to traffic or developed properties. These areas are adjacent to the river as it flows between North Main Street (Route 117) and Main Street (Route 70). These areas include cultivated farm fields and hay fields as well as woodlands. State-owned open space adjacent to the Nashua River from Center Bridge Road north to the Town line also floods on a regular basis. Impacts are limited to crop damage and the temporary rerouting of major traffic flows from Route 117 onto the local roadways.

Groundwater and Surface Water Contamination

The Town of Lancaster has experienced a number of hazardous material spill responses that is commensurate to its rural and residential nature. The most common type of spill is the release of petroleum-based products through leaking underground fuel storage tanks, ruptures of in home heating oil tanks and the accidental rupture of vehicle fuel tanks. Extended clean up and response activities have been required for petroleum product releases at the site of former Industrial School for Girls, a state-owned property located along the Bolton town line between Old Common Road and Lower Bolton Road (Route 110). A similar clean-up action has been completed at a convenience store and filling station at the intersection of Center Bridge Road and Lower Bolton Road. The Town of Lancaster has also completed the removal of an underground storage tank and petroleum product release at the Highway Department garage located off Center Bridge Road north and west of the above mentioned convenience store and filling station.

A new public water supply was approved off North Main Street and adjacent to the North Branch of the Nashua River near the Leominster town line. This supply was to be developed to supply the demand of an office park southwest of the Lunenburg Road Old Union Turnpike intersection. The office park development was to serve the Digital Equipment Corporation with funding for the water supply coming from the park developer. When the plans for the park

work shelved due to a downturn in the economy, the plans to develop the approved public supply were also delayed. The test well site was recently tested again for water quality with plans to revive the source approval. Elevated levels of chlorides were found in the groundwater together with increased levels of sodium, calcium and magnesium. These contaminants, often associated with road deicing, would require treatment of the water supply. Due the increased cost and the need to chlorinate the municipal water distribution system, the plans to develop the supply were again abandoned. It is assumed that the development of the Interstate 190 project and subsequent use which took place at approximately the same time as the initial well testing led to the increased levels of chlorides.

Active and historical agricultural uses within the town may also lead to the contamination of groundwater or surface water. Orchards and cultivated agricultural fields can be the source of contaminants from past and ongoing use of pesticides, herbicides and fertilizers. The contaminants may enter the groundwater through infiltration or the receiving surface water through stormwater and spring melt run off together with inundation by flooding. In areas where a public water supply is not available, the Town takes precaution to mitigate the risk of human contact with these contaminants. The Board of Health requires the initial testing of privately-owned wells for contaminants including those related to agricultural uses. Subdivision regulations also allow for the installation of test wells and water quality analyses in areas where public water supplies are not available.

Surface waters are also at risk for contamination from illicit discharges. The historic connection of sanitary waste lines, septic system overflows and grey water lines to private and municipal drain systems results in the introduction of bacterial contamination and waste loads to the surface water. These sources have been eliminated as they have been identified. A municipal sewer system has been extended in to the Lancaster center district from South Lancaster. Homes with failing septic systems or unknown waste discharges have been connected to the municipal sanitary sewer whenever practical. Protecting recharge in areas not service by Town water continues to be a challenge to protect private wells.

The Town has also adopted important bylaws that include an Illicit Discharge bylaw that prevents and controls the discharge of private drains and sump discharges to the municipal drain system. A separate Floor Drain regulation also controls the direct connection of floor drains in non-residential facilities to a ground or surface water discharge. These bylaws require drains to be connected to the municipal sanitary sewer if available, or a tight tank must be installed. Other bylaws regulate stormwater runoff, water withdrawal from ponds and streams, and wetland protection.

Other environmental challenges the Town of Lancaster must face include the stringent protection of riparian areas and insuring they provide connection to upland habitat. Invasive species have become an ongoing problem especially in riparian areas, and management plans to exercise control should be developed. As additional open space is acquired, Lancaster will need to provide appropriate oversight and management to insure their long-term success.

Public education and stewardship are important components to protecting Lancaster's open space and efforts will be needed to instill conservation ethics in younger generations.

Erosion and Sedimentation

Land development projects and other land use conversions, and their associated changes to land cover, permanently alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, which in turn have led to increased flooding, stream channel erosion, and sediment transport and deposition, and decreased groundwater recharge.

As the area of house and building roofs, parking lots and road surfaces increase, the rate of stormwater runoff from these surfaces increases, along with the preponderance of greater flooding. Unregulated stormwater runoff from historic development has led to the flooding we see today.

Land development projects and other land use conversions also contribute to increased non-point source pollution and degradation of receiving waters.

The impacts of post-development stormwater runoff quantity and quality can adversely affect public safety, public and private property, drinking water supplies, groundwater resources, recreation, aquatic habitats, fish and other aquatic life, property values and other uses of lands and waters.

These adverse impacts can be controlled and minimized through the regulation of stormwater runoff quantity and quality from new development and re-development, by the use of both structural and non-structural Best Management Practices.

Localities in the Commonwealth of Massachusetts are required to comply with a number of both State and Federal laws, regulations and permits which require a locality to address the impacts of post-development stormwater runoff quality and non-point source pollution.

The United States Environmental Protection Agency has determined that it is in the public interest to regulate post-development stormwater runoff discharges in order to control and minimize increases in stormwater runoff rates and volumes, flooding, post-construction soil erosion and sedimentation, stream channel erosion, and non-point source pollution associated with post-development stormwater runoff.

The Town of Lancaster has established a Stormwater Management Bylaw to provide reasonable guidance for the regulation of post-development stormwater runoff for the purpose of protecting local water resources from degradation. This Bylaw regulates the post-construction stormwater controls for both new and re-development projects.

Forestry Issues

The Town of Lancaster recognizes the need to create a town-wide land management plan that addresses forestry, recreational access, and wildlife habitat management for municipally-owned land. However, land jurisdiction is spread out over several committees and boards and there is no central management authority creating a town-wide plan for land management, including forestry. It is crucially important that public comment and public involvement are included in the planning process for timber harvesting on public lands owned by all Lancaster citizens.

Lancaster Town Forest

With more than 30 years having elapsed since the Lancaster Town Forest's last timber harvest in 1982, the Lancaster Town Forest Committee decided to commission the preparation of a 10-Year Forest Management Plan (FMP) through the Massachusetts Department of Conservation and Recreation's *Forest Stewardship Program* and associated *FY14 Community Forest Stewardship Grant*. As described by the Town Forest Committee on page 3 of the FMP:

"We would like to enhance the overall health of the forest environment by practicing sustainable forest management, preserving critical habitat, and providing appropriate recreational use of the Forest. In addition we would like to expand the current forest to include neighboring unprotected forest land as it becomes available."

Further, as described in the Forest Management Overview on page 6 of the FMP:

"The primary objective of the Town of Lancaster Blood Town Forest Committee is to preserve and enhance the Forest's ecological health, conserve the Town Forest's natural habitat for threatened and endangered plants and wildlife, and promote responsible use of the Forest's abundant resources for recreational and educational purposes."

In the winter of 2016-2017, approximately 100 acres of the Town Forest was logged, the first timber harvest under the Town Forest's new FMP. These funds will provide seed money as Lancaster pursues future grants to protect important open space within the community. As the town currently evaluates accessibility of its properties to persons with disabilities, it is important to consider access to the Town Forest, both the entrance and a circumferential trail that would be compliant with the American with Disabilities Act.

Development Impacts

The Town of Lancaster has a long history of creating and improving zoning and land use bylaws, rules, and regulations to not only prevent and mitigate negative environmental impacts of development and related land use activities, but also to pro-actively encourage development that is more desirable from an environmental perspective. In the last 10 years, members of the Town's land use boards, staff, non-profit organizations, and volunteer citizens-at-large have collaborated to draft and obtain Town Meeting approval for several new regulatory bylaws, including the Wetlands Protection Bylaw (2007), Stormwater Control Bylaw (2007), and Water Withdrawal Bylaw (2010). In addition, Town Meeting has approved the following amendments

to the existing Zoning Bylaw addressing large-scale residential development, commercial and industrial development, and solar arrays:

Article IV § 220-15 (2008) – Flexible Residential Development

With Flexible Residential Development, administered by special permit through the Planning Board, Lancaster has created a set of development provisions allowing greater flexibility and creativity in residential development in order to gain:

- Location of development on sites best suited for development, and protection of land not suited for development, reflecting such considerations as:
 - Permanent preservation of open space for agriculture, conservation or recreational use, especially in large contiguous areas within the site or linked to off-site protected areas.
 - Protection of water bodies, streams, wetlands, wildlife habitats, and other conservation resources.
 - Protection of the character of the community through preserving open space within view from public roads, preservation of stone walls and other historic landscape features, preservation of scenic vistas, and through siting of dwellings at low-visibility locations.
 - Protection of street appearance and capacity by avoiding development close to such streets, except in already compactly developed areas.
- Efficient patterns for construction and maintenance of public facilities and services such as streets and utilities.
- Privacy for residents of individual lots.
- Avoidance of unnecessary development costs.

In this type of development method, administered by special permit through the Planning Board, no less than 40% of the land area designated in the flexible development shall be for meeting open space requirements.

Article III § 220-8.7 (2009) – Integrated Planning Overlay Districts

The Town has also used a zoning technique called Integrated Planning Overlay Districts (IPODs) to provide design flexibility and efficiency in the siting of development, services and infrastructure, conserve open space, preserve the rural, historical character of the Town, and provide for a diversity of lot sizes, building densities, and housing choices to accommodate a variety of age and income groups, and to allow the integration of land for residential, rural,

recreational, community, retail, service, commercial and industrial uses. In this type of development method, administered by special permit through the Planning Board, no less than 20% of the land area designated in the IPOD shall be for meeting open space requirements.

Article XVII § 220-76 (2016) – Ground-Mounted Solar Arrays

Temporary impacts of ground-mounted solar arrays during construction can include erosion and sedimentation, while wildlife habitat and scenic views are often impacted more permanently. Under Lancaster's Zoning Bylaw prior to the enactment of Article XVII, ground-mounted solar photovoltaic installations required site plan review by the Planning Board and a special permit from either the Planning or Zoning Board of Appeals depending on the zoning district involved. In reaction to a large commercial solar array constructed in 2014 adjacent to a densely populated residential area, and the subsequent near-approvals of one more array (denied by the Zoning Board) in another residential area, Annual Town Meeting in 2016 approved Article XVII, which requires all ground-mounted solar arrays to go through site plan review and those in Residential and Neighborhood Business Zoning Districts to obtain a special permit from the Planning Board.

Article XVII has been highly effective in reducing impacts to residential areas by requiring for all ground-mounted solar arrays a 200-foot setback from lot lines in Residential and Neighborhood Business Zoning Districts, and a 200-foot buffer strip of land around all existing structures in Residential and Neighborhood Business Districts. Article XVII also requires mitigation of visual, noise, and artificial lighting impacts to the maximum extent practicable with vegetation and/or other suitable measures.

Earth Product Removal Advisory Committee

There are several earth product removal operations currently active in Lancaster, with the ever-present possibility that more will open up given the commercially highly desirable soils found in the Town, the legacy of the last Ice Age. Actual and potential environmental impacts of earth product removal (EPR) include, but are not limited to, deforestation, erosion, and sedimentation of wetlands. EPR in Lancaster is allowed by right under Article IX of the Town's Zoning Bylaws when it is incidental to construction of structures authorized by a building permit from the Building Inspector, or a new street approved by the Planning Board; otherwise EPR, in particular commercial EPR operations, requires a special permit from the Board of Selectmen.

In order to assist the Selectmen in the administration and enforcement of EPR permits, in 2015 the Board established, and is the appointing authority for, the EPR Advisory Committee comprised of representatives of the Town's various volunteer land use boards and associated staff. The Selectmen rely on the EPR Advisory Committee for guidance and recommendations on nearly all aspects of the EPR permitting process, but especially the review of technical information and data submitted by permit applicants with the initial application package and regularly thereafter as work on-site proceeds.

Additional areas of interest to the EPR Advisory Committee include addressing issues of non-compliance with the terms and conditions of EPR permits should any such concerns arise, and

other environmental regulatory jurisdictions that projects might be subject to in addition to Article IX, such as the Massachusetts Wetlands Protection Act and/or other Town of Lancaster Bylaws.

Additional Environmental Challenges

The environmental challenges that our community faces are the same that our region faces, as follows:

- Loss of environmental integrity, which is the ability of an area to support plants and animals and the natural processes necessary to sustain them over the long term (*Mass Audubon*).
- Nonpoint source pollution of our surface waters.
- Disruption of the natural hydrology of our streams and rivers and wetlands due to development.
- Inadequate culverts and other stream and river crossings that block movement and fragment the aquatic environment; inadequate dams and dam maintenance.
- Water withdrawals from surface waters for bulk transport and delivery.
- Greenhouse gas contribution to global warming.
- Fragmentation of large, connected blocks of forests and forested wetlands; loss of vegetative cover along riparian corridors.
- Loss of Lancaster's soil biodiversity caused by conversion of prime soils to development and by sand and gravel mining.
- Conversion of agricultural lands to residential subdivisions or the incremental conversion of agricultural land for residential development, house by house.
- Loss of flood storage capacity and filtration, owing to development on flood plains.
- Invasive species, a big problem in Lancaster, which prevents natural communities that have evolved here over millennia from thriving.
- Erosion and sedimentation.
- Access of our communities trails and pathways, poor maintenance of trails and wetlands crossing, and erosion owing to foot traffic and off-road vehicles.

- Redevelopment of brownfield sites.
- Lake and pond eutrophication owing to anthropogenic (originating from humans) causes.

MassDEP, in partnership with the New England region of the federal Environmental Protection Agency (EPA), has identified the following priorities in Massachusetts for FY 2016-2019:

- MassDEP will work to strengthen its bonds with municipalities and other stakeholders.
- Develop “cutting-edge” information technology systems.
- Improve regulatory evaluation and performance.
- Support the Cape Cod Regional Water Quality Plan.
- Transfer implementation and oversight of the NPDES Program from Federal to State management.
- Greenhouse gas reduction to slow climate change and develop a clean energy economy.
- Advance renewable energy and energy efficient development.

The Department of Conservation and Recreation (DCR) through its “Renewing a Commonwealth Vision for DCR Forests” initiative, is engaging experts, stakeholders and the general public in an interactive dialog to create a renewed vision for the stewardship and management of DCR forestlands. As the DCR oversees the Lancaster State Forest, this will impact Lancaster. Additionally, the state owns considerable acreage in the Bolton Flats Wildlife Management Area.

Energy and Climate Change

Mass Audubon’s ***Losing Ground*** was updated in June 2014. With the cumulative effects of natural lands already converted to development and with disturbances brought on by climate change, it is important to design our built environment to have minimal effects on natural processes, states the report. Lancaster remains in the “sprawl frontier”. Towns within ten miles of Interstate 495 are particularly vulnerable. For the period April 2005 to April 2013, Lancaster ranked in the top ten towns state-wide for the rate of natural land conversion. Lancaster and Clinton had the higher density of climate resilient land conversion of its neighbors. Unfortunately the Town has less than 16% of its most climate resistant land permanently protected according to the *Losing Ground* report. Since the 2009 OSRP update, the Town of Lancaster has protected over two hundred (200) acres of additional climate-resistant BioMap 2 habitat.

Lancaster is looking toward the future in energy management and reduction of greenhouse gases (GHG). Formed in 2010, the Lancaster Energy Commission has a charter to advise and make recommendations on energy use, energy monitoring and energy efficiency measures in the Town-owned facilities.

In 2010, the Town received the Green Community designation by the MA Department of Energy Resources. This designation mandates that the Town's municipal facilities and vehicles must reduce energy consumption by 20%. To achieve this goal, the Commission has undertaken the following actions:

- Energy audits – completed for the Town Hall, Police Station, Fire Station three DPW buildings, Library and Community Center. Building envelope improvements were recommended for all these facilities.
- Heating systems – replaced four heating systems at the Police Station, Central Fire Station, South Fire Station and Library. The system at the South Fire Station was switched from propane to natural gas in 2016.
- Lighting – installed lighting upgrades in most of the Town's buildings, including LED lighting at the Library.
- Energy controller systems – installed two systems at the two DPW well pumps.
- Insulation and weatherization measures – installed at the Town Hall, two DPW facilities and South Fire Station.
- Electric vehicle and electric vehicle docking station to replace the Inspectional Services/Assessor's vehicle.
- LED street lighting.
- The Commission also spent a great deal of time on the analysis and selection of the HVAC system for the Prescott Building renovation project. The Commission worked with the architects, engineers, project manager and Town Administrator to plan an HVAC system that is cost-effective, energy-efficient and sustainable for a 30-40 year life span.

Other Green Initiatives

- Constructed a Town-owned Solar Array facility at the former landfill site on Lunenburg Road. See the Solectria web site for an up-to-the-hour accounting of our energy generation.

<http://www.solrenview.com/SolrenView/mainFr.php?siteId=1549>

The Town's municipal buildings have received significant electricity credits due to the net metering of the solar array which are then applied to the building's electric bills.

- Municipal Aggregation – the program was rolled out in 2012. The opt-in rate was 90% of the town's residents that are now saving on their electricity rate compared with the rate from National Grid. The program continues to be extremely popular with an electric rate that is as much as a third lower than the rate charged by National Grid.
- Fuel Management System – the Town is monitoring gasoline and diesel fuel consumption with a fuel management system, called *Fuel Master*. This monitoring device has been installed in all of the Town's vehicles and on the gas pumps and monitors the amount of fuel consumed by each vehicle.

It continues to be our goal to have measurable results in the reduction of electricity and fuels. 2016 was an excellent year as we saw an 11.7% decrease in our overall consumption when compared with our baseline year of 2008, and 2017 saw a 9% decrease.

The Commission will continue to monitor each facility and vehicle and maintain a reporting system that will show fiscal savings, as well as a reduction in our carbon footprint. This year we compiled an extensive list of improvements/upgrades for each of the Town's municipal buildings. We will actively seek funds to make these improvements over the next two years.