SECTION 4 - ENVIRONMENTAL INVENTORY & ANALYSIS

A. GEOLOGY, SOILS AND TOPOGRAPHY

1. Geology

Sterling owes its rich and rolling landscape to violent upheavals that took place over hundreds of millions of years as continents drifted apart and collided. These turbulent eons created early volcanic plains formed from Basalt dikes and fissure flows that occurred during the Acadian Mountain Building events of the Devonian to Silurian Age. This period was a 50 million year history of faulting, sediment deposition, and lava eruption that left behind the underlying bedrock that preceded the glacial ages.[1]

The *Merrimack Terrane*[2] is the underlying bedrock of most of Sterling, consisting of a group of meta-sedimentary and intrusive igneous rocks of Devonian to Silurian Age (~400 million years old). In Sterling, it consists of two distinct belts of rock including the Wachusett Mountain Belt and the Nashua Belt. The Nashua Belt is further made of two sub-belts, the Worcester formation and the Oakdale formations. The Wachusett Mountain Belt, a giant fold of crystalline rock, includes a pluton (mass of igneous rock) of Fitchburg granite that intruded as igneous rock over 400 million years ago. The Wachusett Mountain belt was thrust upward and east in Devonian time to rest on top of a block of Paxton schists [3], as illustrated in Figure 1.

The western border of Sterling rests on a five-mile wide north/south trending ridge of Fitchburg granite. I-190 and Route 12 run generally parallel to this ridge, though they trend a little more northeasterly. The eastern edge of the Fitchburg granite is banded by an uplifted fault block referred to as the *Massabesic Gneiss Uplift*. It rose with the massive intrusions of early Devonian igneous granite, prior to the upward thrust of the Wachusett Mountain Belt. This ridge is home to many beautiful antique colonial homestead farms and offers views of scenic landscapes toward Wachusett Mountain to the west and Harvard and Lancaster across the Nashua River Valley to the east.

Route 12 runs north on the Nashua Belt, a band of Silurian and Devonian age metamorphic sedimentary rock that lies between the Clinton-Newbury Fault and Wachusett Mountain Belt. It is comprised of two sub-belts, the Worcester Formation and the Oakdale Formation. The Worcester Formation is a wide band of carbonaceous slate and phyllite at the southeastern edge of the Wachusett Mountain Belt. The rolling hills and farms on the eastern border of Sterling are on the Worcester Formation and offer beautiful scenic views eastward toward Lancaster. The Oakdale Formation consists of beds of interlayered calcareous siltstones, slate, quartzite and marble, deposited in submarine fans at the base of canyons on the ocean floor. It underlies the Wachusett Reservoir, and continues north along the eastern border of Sterling.

The eastern portion of the Town of Sterling sits astride the Worcester Formation. The southern end of the formation is the drainage divide between the Nashua River watershed and the French and Blackstone River watersheds. The northeast trending Wekepeke Normal Fault Zone, a faulted fold in the Worcester Formation, runs parallel to Route 12 and I-190, east of the two roads. The fault extends from the junction of Route 9 with I-290 in Worcester northward into New Hampshire. It forms the western edge of the Nashua belt and the western wall of the Nashua Valley. The feature underlies the historic town center district and continues north. The east slope of the ridge is comprised of slate and phyllite. It intersects the Clinton-Newbury Fault in Worcester at the northern end of Lake Quinsigamond.

In Sterling, I-190 and Route 12 run parallel along this ridge to their junctions with Route 2 in Leominster. These highways cross the Stillwater River, a major tributary of the Nashua River. The river flows southeast, empting into the present-day Wachusett Reservoir at the southern end of the Nashua Valley. The Nashua Belt, comprised of easi-

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[1] James W. Skehan, Roadside Geology of Massachusetts, © 2001, Mountain Press Publishing Company

[2] A terrane in geology is a fragment of crustal material formed on, or broken off from, one tectonic plate and accreted---"sutured"---to crust lying on another plate. The crustal block or fragment preserves its own distinctive geologic history, which is different from the surrounding areas (thus the occasional term "exotic" terrane). The suture zone between a terrane and the crust it attaches to is usually represented by a fault.

[3] Skehan, James W., Roadside Geology of Massachusetts, c. 2001, Mountain Press Publishing Company

ly eroded, low-grade metamorphic siltstones, phyllites, slates, and schists underlies the Nashua Valley. The Clinton-Newbury Fault bounds the Nashua valley to the east.

The Clinton-Newbury Fault Zone forms the border between the Merrimack Terrane and the Nashoba Terrain to the east. It is a major structural dislocation consisting of west-dipping thrusts and reverse faults that marks the line of subduction where the Nashoba Terrain sank beneath the edge of the Merrimack Terrain during continental collision. The fault zone extends from the Atlantic Ocean near Salisbury in a southwesterly trending arc toward eastern Connecticut, passing under the dam that impounds the Wachusett Reservoir.

The geology of the surface layers (aka surficial geology) is a result of glacial activity. A succession of great ice sheets, estimated to have a thickness of up to two miles, scraped and wore deep grooves into the land during the Pleistocene Era, 11,000 to 1.8 million years ago. The last of these was the Wisconsinian Ice Sheet. As the glaciers advanced, materials scraped from the underlying bedrock were carried south. As the Wisconsinian ice sheet melted, it left behind dense glacial till deposits, consisting of a mixture of sand, silt, clay, gravel and boulders, that form a thin veneer over the bedrock surface throughout most of the town.

A series of glacial lakes formed in the Nashua Valley. As the glacial ice receded northward, successive great deposits of sand formed under the impounded waters of Glacial Lake Nashua at the toe of the glacier. Meltwater that occupied the confluence of the Stillwater and Quinapoxet River valleys deposited sediments that filled the southern end of the lake, leaving behind beds of sand plain. Similarly, melt-water occupied the Wekepeke valley, depositing sands that today underlie the northeast quadrant of Sterling. Eventually, the lakes increased in size and filled the Nashua Valley, encompassing an area with a combined length of 35 miles. The north flowing Nashua River drained Glacial Lake Nashua over thousands of years. Figure 2 shows the maximal extent of Glacial Lake Nashua. Over time, the water levels lowered, leaving behind extensive deposits from melting glacial ice of delta sand and gravel up to 165 feet thick. Two broad bands of stratified glacial deposits (sand and gravel) stretch across the lowlands of Sterling, forming the Stillwater and Wekepeke Aquifers.

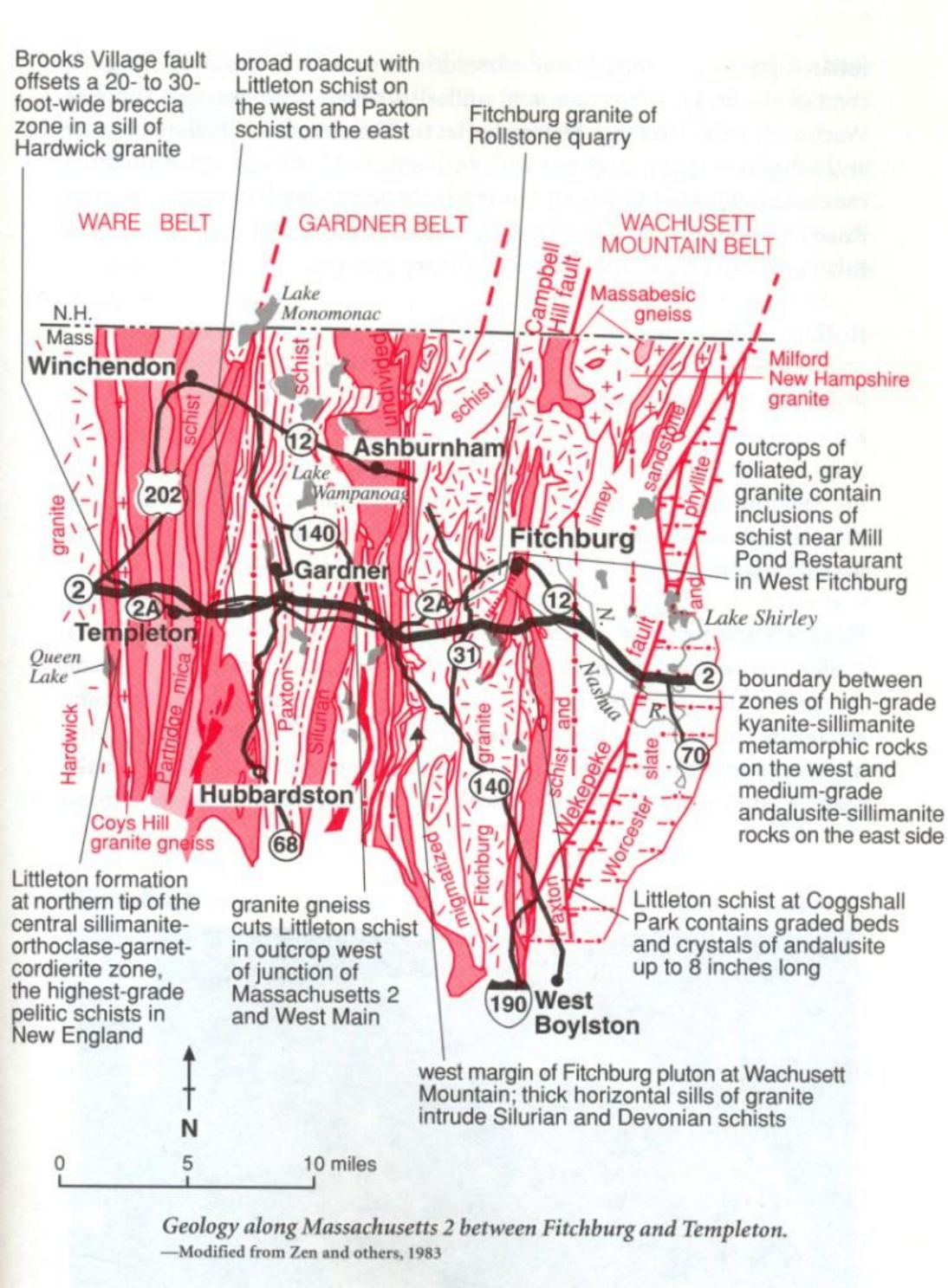
2. Topography

Geologic activity and glacial sculpting also left a deep imprint on the topography. The terrain in Sterling is very hilly with well-defined valleys. Elevations above sea level range from 330 feet where Wekepeke Brook flows into the Town of Lancaster to 1,010 feet on the northern border with Leominster. The hills surrounding the center and throughout the town were named for geographic features, such as Ridge and Redstone Hills, or for the prominent families whose farms covered them, such as Kendall, Ross, Fitch and Chace Hills, or places of origin, such as Rowley. The following hills offer many scenic vistas:

- Chace Hill
- Fitch Hill
- Hog Hill
- Justice Hill
- Kendall Hill
- Redstone Hill
- Ridge Hill
- Ross Hill
- Rowley Hill
- Sweat Hill

Much of the land on Justice Hill, Fitch Hill, and Hog Hill remains undeveloped and protected by DCR-DWSP holdings. These upland areas are highly important since they represent the watershed of the Stillwater River and the Stillwater Aquifer, providing drinking water to both the Town wells and the Wachusett Reservoir. (Refer to Appendix A, Map of Geologic Features)

The geologic history of the rolling topography created a complex drainage network of numerous streams and wetlands. These streams flow southeast toward the Wachusett Reservoir and the Nashua River Basin, following the ancient path of the glaciers. The two major flood plains in Sterling are along the Stillwater River and Wekepeke Brook, but zones of flooding exist along almost every stream, as shown on the Federal Emergency Management Administration Flood Insurance Rate Maps. These areas lie in the lowlands at the feet of the glacially carved hills.



Geology along Massachusetts 2 between Fitchburg and Templeton.
—Modified from Zen and others, 1983

Figure 4-1: Geology of Central Massachusetts (from James W. Skehan, Roadside Geology of Massachusetts, © 2001, Mountain Press Publishing Company, with permission)

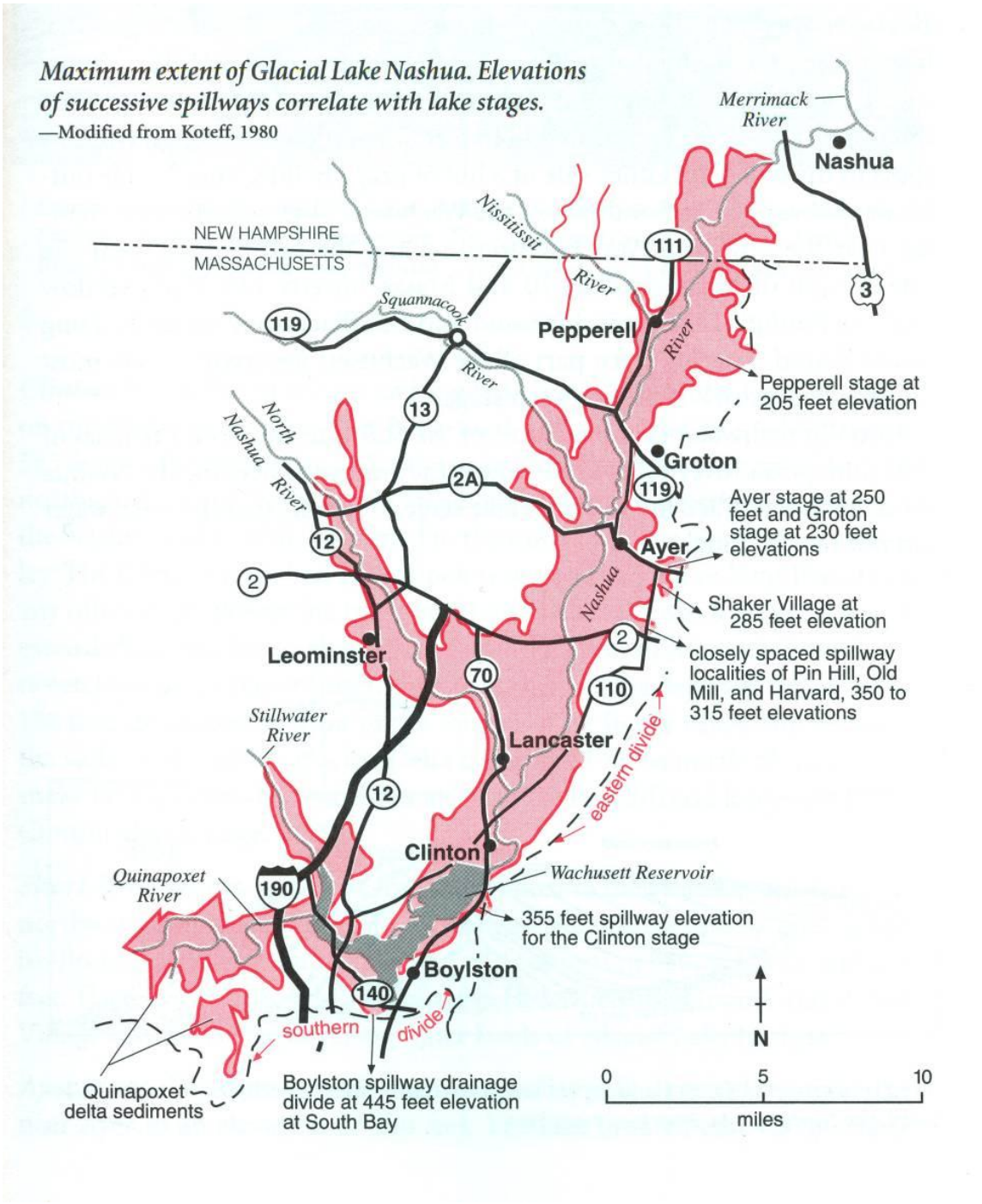


Figure 4-2: Maximum extent of Glacial Lake Nashua (from James W. Skehan, Roadside Geology of Massachusetts, © 2001, Mountain Press Publishing Company, with permission)

3. Soils

Soils in Sterling are the result of glacial activity, and include the deposition of till (heterogeneous mixture of clay, sand, and rock fragments of all sizes, ranging from small pebbles to boulders) in the uplands and sand and silt in Glacial Lake Nashua. The shores of this great lake spread along the Stillwater River and Wekepeke Brook valleys. Over thousands of years, sediments ran off surrounding hills and collected as thick layers of sand, silt and gravel on the lake bottom. When the lake drained, the rich sediments were left behind. Over time, modern day rivers and their tributary streams carved valleys and terraces into these deep, varied glacial deposits. Regular flooding of these rivers and streams enhances the soils by leaving alluvial deposits within the level areas of their floodplains.

The Natural Resources Conservation Service produced a Soil Survey of Worcester County Massachusetts Northeastern Part which includes Sterling.[4] The report describes the soils in the area, both at a general level and a specific level, and their suitability and limitations for agricultural, forestry, recreation, building, and sanitation. In general, Sterling has five naturally recurring soil associations (an area in which different soils occur in a characteristic fashion, or a landscape which has characteristic kinds, proportions, and distributions of component soils): (i) Paxton-Woodbridge, (ii) Hinckley-Merrimac-Sudbury, (iii) Peat-Ridgebury-Walpole Whitman, (iv) Hollis-Paxton, and (v) Charlton, firm substratum-Sutton firm substratum. The name of each association reflects the dominant soils in that association. The less extensive soils (which can comprise 10 to 30 percent of the soil area) are not distinguished in the name.

The soil type within a general soil area can vary widely. Commonly the properties of the dominant soils of each association have about the same degree of limitation for a particular use. Soil associations can indicate overall soil suitability, but the general soil map cannot be used as a basis for decisions concerning small plots of land. Site specific planning requires the use of the detailed soil map accompanied by the interpretive ratings on limitations produced by the Soil Conservation Service.

Paxton-Woodbridge: This association is comprised of very stony, moderately well-drained soils underlain by hardpan. It occupies about 55 percent of the town's area. It has few limitations for woodland, and if stones are removed, for agriculture. The less stony and less sloping variants of Paxton and Woodridge are considered to be prime agricultural soils. There are moderate limitations for roads and commercial, industrial and residential development using sewer systems. However, soils underlain by slowly permeable hardpan can severely limit the use of on-site sewage disposal with septic tank systems, if the hardpan layer is at a shallow depth.

Hinckley-Merrimac-Sudbury: This association occupies about 25 percent of the town and is comprised of droughty and moderately well-drained sandy and gravelly soils. Uses such as roads, commercial, industrial and residential and agricultural development may be subject to limitations ranging from slight to severe, depending on the slope gradient. The soils are rapidly permeable and readily absorb septic system effluent. However, shallow wells near septic systems may become contaminated.

Peat-Ridgebury-Walpole-Whitman: This association is comprised of very poorly drained organic and mineral soils. It occupies about 12 percent of the town. It has few limitations for wetland wildlife, but has severe limitation for residential, industrial and agricultural uses, due to high water tables and low bearing strength.

Hollis-Paxton: This association occupies about seven percent of the town. It consists of soils that are shallow to bedrock, and very stony well-drained soils underlain by hardpan. Most of this general soil area has few limitations for woodland and some recreational uses. Bedrock close to the surface severely limits the use of the area for residential, commercial, industrial and agricultural purposes.

Charlton. firm substratum – Sutton firm substratum: This association occupies about six percent of the town. Soils in this association have a range of stoniness, but all are well to moderately well drained, with hardpan at a depth of three to five feet. Most of this general soil area has few limitations for woodland and some recreational uses. Stoniness, slope and hardpan place limitations on the use of the area for residential, commercial, industrial and agricultural uses.

[4] Taylor, William, and Charles F. Holz, *Soil Survey of Worcester County, Massachusetts, Northeastern Part,* USDA Natural Resources Conservation Service, in cooperation with Massachusetts Agricultural Experiment Station.

Soil maps are currently not available for the town of Sterling. However, using Geographic Information Systems (GIS) software like ArcGIS or ArcInfo permits the user to download the soil vector (spatial) data from either the MassGIS website or the USDA Web Soil Survey website, and then manipulate the data in order to create the appropriate soils map.

Alternatively, the *Web Soil Survey* website (http://websoilsurvey.nrcs.usda.gov/app/) may be used. Define the "Area of Interest" (AOI) by drawing either a rectangle or the outline of the town. After the AOI is defined, click on the "Soil Map" tab at the top in order to see the soil map units. You can then print the map or download the image file. The map will show individual soil map units, not the larger soil associations.

a). Prime Farmland Soils and Farmland

It is a priority of the USDA to identify prime agricultural farmland, which is best suited to grow food, feed, forage, fiber, and oilseed crops. Prime farmland soils produce the highest yields with minimal energy and economic resources, and farming it results in the least damage to the environment. The soils are first grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. Eight capability classes rank soils from minimal to severe in limitations. Soils with severe limitations are precluded from commercial crop production.

The soils are further grouped into sub-classes that reflect the main limitation of the soil for farming. Subclasses are designated by letters: 'E' is for risk of erosion if not properly managed, 'S' is for shallow, droughty, or stony soil, and, 'W' is for soil that is watery or that requires artificial drainage. Some characteristics that determine the degree of limitation of a particular soil for a particular use are: wetness, slope, depth to bedrock, and soil permeability. Soil information indicates what problems might arise if development were to occur on areas with unfavorable characteristics. Table 4-1 lists the categories of Prime agricultural soils found in Sterling. Most of the soils are Class II, indicating moderate limitations that may require special conservation measures. Some require measures to control erosion, some are stony, and some are wet. For the purposes of this plan the soils were aggregated in a map of the Prime agricultural and forestry soils. The Soils Map shows the locations of the prime agricultural soils.

Table 4-1: Prime Agricultural Soils in Sterling

SYMBOL	NAME	Capability Class
AgA	Agawam fine sandy loam, 0 to 3 percent slopes	I
AgB	Agawam fine sandy loam, 3 to 8 percent slopes	IIe
CaB	Canton fine sandy loam, 3 to 8 percent slopes	IIe
PaB	Paxton fine sandy loam, 3 to 8 percent slopes	IIe
MeA	Merrimac fine sandy loam, 0 to 3 percent slopes	IIs
MeB	Merrimac fine sandy loam, 3 to 8 percent slopes	IIs
SdA	Sudbury fine sandy loam, 0 to 3 percent slopes	IIw
WrA	Woodbridge fine sandy loam, 0 to 3 percent slopes	IIw
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes	IIw
PaC	Paxton fine sandy loam, 8 to 15 percent slopes	IIIe

Source: *Soil Survey of Worcester County, Massachusetts, Northeastern Part,* USDA Natural Resources Conservation Service

The deep, well-drained Agawam fine sandy loams are found in broad areas and in areas adjacent to strongly sloping soils. The soils are well suited to cultivated crops, hay, pasture, and trees. The soil has no major limitations for building or for roads, though it is a poor filter for septic tank absorption fields and effluent seepage through the substratum causes a hazard of ground contamination. Agawam sandy loams with a 3 to 8 percent slope would require farming practices that control for erosion.

The Canton fine sandy loams are very deep, strongly sloping and well drained. These soils are found on the upper slopes of hills, often in association with small areas of Paxton and Woodbridge soils. Most areas of this soil are covered with trees, and the soil is well-suited to support tree growth. It is also suited to cultivated crops, hay and pasture using farming practices that control for erosion.

Paxton fine sandy loam, on slopes of 3 to 8 percent are considered to be Soils of State[5] significance. The soils are very deep to bedrock. They are nearly level to steep soils on till plains, hills, and drumlins. Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Most areas where stones have not been cleared and slopes are steeper are wooded. Common trees are red, white, and black oak, hickory, sugar maple, red maple, gray and black birch, white pine, and hemlock.

Merrimac fine sandy loam, on slopes of 0 to 3 percent, and slopes of 3 to 8 percent. These soils are very deep, somewhat excessively drained soils formed in glacial outwash. Merrimac soils are mainly cultivated and used for growing hay, pasture, silage, corn, or truck crops. Forested areas are mostly white pine, gray birch, hemlock, red maple, and red, black, white, and scarlet oaks.

Sudbury fine sandy loam, on slopes of 0 to 3 percent. The Sudbury soils are very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level to strongly sloping soils in slight depressions and on terraces and foot slopes in areas of glacial outwash. The Sudbury series is mostly cultivated. Used for growing hay, pasture, field and truck crops. Forested areas are mainly red maple, gray birch, hemlock, larch, white pine, and red, black, and scarlet oaks.

Woodbridge fine sandy loam, 0 to 3 percent slopes, 3 to 8 percent slopes. These are moderately well drained loamy soils formed in acid subglacial till derived mostly from schist, gneiss, and granite. They are very deep to bedrock. Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, white ash, sugar maple, red maple, hemlock, and white pine.

The Soils Map shows the locations of the prime agricultural soils. Sterling has roughly three thousand five hundred eighty-three (3,583) acres of prime agricultural soils. Table 4-2 lists the acreage of the prime agricultural soils by level of protection. The Chapter 61 and 61A Programs are considered temporary protection and they provide landowners a reduction in their property taxes in exchange for keeping their land in farming or forestry uses. In addition, a lien is placed on their property. The Town also has the right-of-first-refusal with any land in the Chapter 61 Programs. Under Chapter 61A, the landowner must renew his status yearly. Under Chapter 61, the land is held for a ten year period before the owner must reapply.

Only a small percentage of the agricultural soils are on lands under Chapter 61 Forestry. About 835 acres (23%) of prime agricultural soils are on lands under Chapter 61A, and 995 acres are on lands under permanent protection (Federal or State) from development. Only 71 acres (2%) are on lands that are municipally owned. Information on lands under Chapter 61B is unavailable at this time. Over half of the acreage containing prime agricultural soils is under some form of protection. Another 1,666 acres (46%) of these desirable soils have no level of protection. Because remaining farmland in Sterling contributes to the Town's scenic and rural character, as well as its local economy, it would behoove residents interested in conserving these remaining lands to consider all farmland to be rare, and vulnerable to development, and to seek options for protection.

Conservationists appreciate both working farms and forests because productive land provides the landowner income, a possible incentive for keeping the land in its undeveloped state. Sterling has considerable acreage in the Chapter 61 A farmland program, most of which is used for wood products (60%). The balance is used primarily for truck and field crops (20%). Pastures and nurseries make up only very small percentages of the acreage under Chapter 61 A. Table 4-3 describes the number of acres voluntarily enrolled in the Chapter 61A Program.

[5] In 1991, the State Legislature designated the Paxton series as the Massachusetts State Soil

Table 4-2: Acreage of Prime Agricultural Soils in Sterling

Protection Level	**Acres***	**%**
Ch 61	16	0%
Ch 61A	835	23%
Ch 61B	N/A	
Municipally Owned	71	2%
Permanently Protected	995	28%
Acres of Prime Agricultural Soils under Permanent or Temporary Protection	1,917	54%
Acres of Privately Owned, Unprotected, Prime Agricultural Soils	1,666	46%
Total Prime Soils Acreage	**3,583**	**100%**

Sources: Sterling Assessors Records 2002; *Soil Survey of Worcester County, MA Northeastern Part*, USDA Natural Resources Conservation Service

Table 4-3: Acreage in Chapter 61A by Agricultural Category

Category	**Acreage**	**Percent of Total**	MA Tax Code References
Truck and Field Crops – Vegetables/Hay	+137.1	5.1 %	712 + 713
Wood Products, Productive Woodland including Christmas trees	933.7	34.5 %	717
Pasture	21.7	0.8 %	718
Orchard	239.7	8.8 %	714
Nurseries	0	0 %	719
Grape Vineyards	13.1	0.5 %	715
Tillable Forage Cropland	1314.3	48.5 %	716
Wet land, scrub land, rock land	48.9	1.8%	722
Other			710, 711, 720.
Total	2708.5	**100%**	

Source: Town of Sterling, Board of Assessors Database as of 4/7/2008.

b). Forestland Soils with Moderately High Productivity and Working Forests

The USDA has a policy to locate prime forestlands and protect them from conversion to non-agricultural uses. USDA funded a project by the Department of Forestry and Wildlife Management of the University of Massachusetts to define, classify, and map the prime forestlands in the state. They developed the Massachusetts Prime Forest Classification System as a model for determining the productive capacity of forests. The system assigns productivity values for both white pine (Pinus strobus) and northern red oak (Quercus rubra) to different soils throughout the State based on associated land characteristics including slope, aspect, and moisture levels. The system has nine categories of forestland soils based on productivity and wetness.[6] Prime 1, 2, and 3, Prime 3 wet, Statewide Importance and Statewide Importance wet, Local Importance and Local Importance Wet, and Unique.

Prime forestland soils support a production of white pine wood fiber at a rate greater than eighty-five cubic feet per acre per year, and northern red oak wood fiber at a rate greater than forty cubic feet per acre per year. The forestland with Prime 1, 2, and 3 soils would be the most important to conserve for commercial forest management. Soils of statewide and local importance still have the potential for producing wood products but the financial return may not be as high.

[6] "Prime Forestland Classification for Forest Productivity in Massachusetts", October 1985, University of Massachusetts, Department of Forestry and Wildlife Management in cooperation with Massachusetts Department of Environmental Management and the USDA Forest Service.

The Soil Survey for Worcester County lists the soils that are suitable for wood crops and assigns each an ordination symbol that indicates the level of productivity and the major management limitations associated with the soil. The soils are rated from 1 to 5, with 1indicating very high productivity, and 5 indicating low productivity. Major limitations are indicated with a letter: *x* for stoniness, *w* for excessive water, *d* for restricted root depth, *s* for sandiness, and *r* for steep slopes. In Sterling, the Soil Survey did not reveal any soils that were rated 1 or 2. Table 4-4 lists the soils that were rated 3, moderately high productivity, and their limitation rating.

Table 4-4: Sterling Soils Suitable for Woodland Management and Productivity

Symbol	Name	Farming Class	Prime Forest Class*	Forest Class**
Moderately High Forest Productivity				
PaB	Paxton fine sandy loam, 3 to 8 percent slopes	IIe	II	3o
PaC	Paxton fine sandy loam, 8 to 15 percent slopes	IIIe	II	3o
WrA	Woodbridge fine sandy loam, 0 to 3 percent slopes	IIw	II	3o
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes	IIw	II	3o
PbB	Paxton fine sandy loam, 3 to 8 percent slopes, very stony	VIs	II	3o
PbC	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	VIs	II	3o
WrC	Woodbridge fine sandy loam, 8 to 15 percent slopes	IIIe	II	3o
WsB	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	VIs	II	3o
Moderately High Forest Productivity with Steep Slope				
PaD	Paxton fine sandy loam, 15 to 25 percent slopes	IVe	II	3r
PbD	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	VIs	II	3r
Moderately High Forest Productivity in Stony Soils				
ChC	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	VIs	III/S	3x
ChD	Chatfield-Hollis-Rock outcrop complex,15 to 25 percent slopes	VIIs	III/S	3x
PcC	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	VIIs	II	3x
PcD	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	VIIs	II	3x
PcE	Paxton fine sandy loam, 25 to 35 percent slopes extremely stony	VIIs	II	3x
WtB	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	VIIs	II	3x
WtC	Woodbridge fine sandy loam, 8 to 15 percent slopes, extremely stony	VIIs	II	3x

Sources: *Forest Productivity Mapping of Massachusetts, Research Bulletin Number 735, Massachusetts Agricultural Experiment Station, University of Massachusetts at Amherst; **Soil Survey of Worcester County, Northeast Part, Table 8.

The table also includes their rating by the Massachusetts Agricultural Experiment Station. The Capability Class relates to their suitability for agricultural crops, and indicates their management considerations for farming as described earlier under Prime agricultural soils: *e* for erosion, *w* for wetness, *s* for stoniness. Three soils groups are listed, Paxton, Woodbridge, and Chatfield-Hollis Rock outcrop complex, in varying degrees of slop and stoniness. The Paxton series is the State soil of Massachusetts, and it is found extensively throughout Worcester County.

Trees that are best suited to the soils and to commercial wood production include Red Pine, Eastern White Pine, Norway Spruce, and European Larch. Commonly grown trees that woodland managers favor in intermediate or improvement cuttings include Northern Red Oak, Red Pine, Eastern White Pine, Red Spruce, Sugar Maple.

MacConnell Land use data for 1999 shows Sterling has eleven thousand, three hundred and thirty-nine (11,339) acres of land in forested uses. Of this acreage, Sterling has just 241 acres of land in temporary protection under the Chapter 61 Forestry Program. Roughly four thousand acres (4,000, or 35%) is under DCR-DWSP control, the town manages one hundred twenty six (126) acres for forestry purposes, and the State Division of Fisheries and Wildlife

owns ninety three (93) acres in the northwest corner of the town. Another 2,908 acres is in temporary protection under Chapter 61 A. The balance of forested lands, a total of three thousand nine hundred seventy-one (3,971) acres is privately owned and unprotected.

Most of the Chapter 61A lands have soils considered to have moderately high productivity for forestry uses (3,379 acres, 43%). Over 1,900 acres of these soils are privately owned and considered unprotected. Another 2,208 acres (28%) are considered permanently protected. Again, only a small percentage of the forest productivity soils are managed though Chapter 61 forestry. These forestry soils are located in areas deemed to have significant value as water resource districts or scenic landscapes. These aspects enhance their value as economically productive lands.

Table 4-5: Acreage of Moderately High Productivity Forestry Soils in Sterling

	Acres	**%**
Chapter 61	183	2%
Chapter 61A	3,379	43%
Chapter 61B	16	0%
Municipally Owned	236	3%
Permanently Protected	2,208	28%
Acres of Forestry Soils under Permanent or Temporary Protection	6,022	76%
Acres of Privately Owned, Unprotected, Prime Agricultural Soils	1,905	24%
Total Forestry Soils Acreage	**7,927**	**100%**

Sources: Northwestern Worcester County Conservation District and USDA Natural Resources Conservation Service, Interim Soil report for Northwestern Worcester County, Massachusetts, and Montachusett Regional Planning Commission Department of Geographic Information Systems.

c). Recreation Soils and Septic Systems

The NRCS has created a draft map for presentation purposes in this plan (See **Town of Sterling – Soils Map**). This map depicts each soil in Sterling and categorizes them by their value as prime farmland soils or soils of State/Local Importance. Each soil abbreviation on the map can be seen in relationship to the major water features in the town. Until the final release of the NCRS data, this information will not be available as a data layer, so it could not be used for analysis. It does show the location of soils best suited for recreation and septic systems.

The Soil Survey rates soils for their suitability to several categories of recreation based on the limitations or restrictive features such as wetness, slope, and texture of the surface layer. Since the Town is actively engaged in identifying potential sites for a new soccer facility, it should examine the soils that are suitable for playgrounds, which require soils that can withstand intensive foot traffic. At the time the 2002 Open Space and Recreation Plan was written, the Town was actively engaged in identifying potential sites for new recreation fields. Although extensive efforts to evaluate parcels were undertaken, no parcels were purchased for such use. Any future assessment of sites should examine the soils that are suitable for fields or playgrounds, which require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. Most of the soils in Sterling have moderate to severe limitations for playgrounds. Only the Agawam fine sandy loams have a rating indicating slight limitations. As it happens, these are also the soils best suited to agricultural uses.

In the past, the Board of Health reported that many areas of the Town are not well suited for septic systems because the soils do not perc well. For example, growth in the Center Village and at Sterling Junction (historic campground area) has taken place on soils unsuited for septic systems. Failure rates for Systems in these areas were estimated to

be around 10 percent at the time the 2002 Open Space and Recreation Plan was written.[7] Since 2002, extensive progress has been made toward improving the situation in the "Sterling Campgrounds" area of Sterling Junction. In particular, the construction of a neighborhood treatment facility within Waushacum Village (previously Camp Meeting Association) was taking place in 2008. Details about this multi-million dollar project can be found in Section 3.D.3.c. entitled "Sewage Management".

Since much of the land in Sterling poses severe constraints on the use of the septic systems, great care and consideration should be given to the location and degree of concentration of future development. It may prove useful to map the soils that are well suited to septic systems and overlay this onto the map of developable lands as determined from the EOEEA Buildout Analysis from 2001, by the Montachusett Regional Planning Commission. More recent buildout information may also be contained within the 2004 Community Development plan which was compiled by MRPC (under E0418). MRPC could develop the proposed overlay map through the funds for Local Technical Assistance from the Town's local assessment.

B. LANDSCAPE CHARACTER

The Worcester Plateau and the rolling foothills of Wachusett Mountain define the character of the Sterling landscape. Sterling is distinct for its picturesque farms nestled into the valleys and cresting the hillsides of Justice Hill, Rowley Hill, Ross Hill, Fitch Hill, Redstone Hill, and Kendall Hill. Many of these hillsides offer magnificent views across the Nashua River Valley and the hillsides of Clinton, Lancaster, and Harvard. The relatively flat valley of the Stillwater River affords a sweeping view of Wachusett Mountain (visible also from Interstate 190, above the Sterling Airport). East and West Lakes Waushacum offer refreshing views of aquatic landscapes. Associated wetlands reward visitors with frequent sightings of waterfowl such as the Great Blue Heron, and other wildlife.

DCR-DWSP ownership and protection of the watershed lands of the Stillwater River preserve many of the beautiful forested regions in the town. These forest areas were once cleared for farming, but have since reverted to secondary growth of transitional forest trees. Evidence of their early farming heritage can still be seen in the numerous stone walls that thread the landscape. The Stillwater Interpretive Farm provides a wonderful example of the changes that the landscape has endured over the past four hundred years.

The Sterling Town Center is a postcard perfect example of the traditional New England Town Center, replete with pristine white churches and meeting houses, and traditional colonial and Victorian homes. The compact development pattern of the properties in the town center is a testament to the colonial, and pre and post industrial past of rural New England. The impact of the railroad on the development of the community is also well represented in the town center.

A number of trails in Sterling provide access to the scenic landscapes in the hills and river valleys. The Sterling Rail Trail starts at the West Boylston town line, traveling northward across Worcester Road (Route 12) and ends just south of the town center, near the Old Cider Mill. Parking is available off Gates Road near West Waushacum Pond. As a top priority for trail development, the town envisions extending the Sterling Rail Trail from the town center (Newell Hill Road) northward to Chocksett Road to connect with the Stump Pond Trail, a small segment which travels eastward along Chocksett Road then northward ending at the railroad tracks near Pratt's Junction, thence to continue northward into Leominster. Planners are currently grappling with what the proper alignment should be.

The Allenwood Trail follows the back walls of two farms on a 1 mile loop with a small parking area, located off Heywood Road on the Sterling Land Trust's Allenwood Tract. The Wass Trail, on conservation land, begins at North Row Road and heads southward to connect with a trail at North Nelson Road, a discontinued historic roadway that connects Hardscrabble Road to Upper North Row Road. The town considers this trail a high priority for protection due to the potential linkage opportunities it offers. Another mile long trail follows the discontinued Hapgood Road northward from North Row Road to the Leominster City Line connecting to the Fall Brook Reservoir, and linking both the Wass Trail and the Hardscrabble discontinued road trail. In addition, ATV enthusiasts enjoy access to a three mile easement split into two unconnected segments provided by the AT&T utility company above an underground cable that runs east/west from the Princeton town line to the Lancaster town line. The half-mile Rocky

[7] Sterling Board of Health

Brook Trail, also on conservation land, runs southward from Beaman Road. At this location, the trail winds through an old mill site straddling Rocky Brook and off road parking is available.

Along the east bank of the Stillwater River on DCR-DWSP land, another trail segment exists, which begins at the West Boylston Town Line and travels northward, crossing Muddy Pond Road and ending at Interstate 190. Nearby is the Stillwater Farm Interpretive Trail, a short loop trail located west of Redemption Rock Trail (Route 140) not far from the intersection with Route 62, on a 55-acre property jointly managed by the Division of Watershed Management and the Friends of the Wachusett Watershed, Inc. The trail offers an educational experience about the relationships between natural resources, land use management, and community character.

The Waushacum Overlook Trails, developed by the Conservation Commission, are a network of trails located off Kendall Hill Road and Tara Lane on a hillside above North Cove Road, which runs along the shore of East Lake Waushacum. The Overlook project was made possible by the Town's recent acquisition of the Rittenhouse property, purchased in an effort to protect the lake watershed from development related erosion. This trail project is also a high priority for the Town as it seeks to provide linkages to nearby conservation properties above the lake.

The natural beauty of Sterling's landscapes is at risk in the absence of municipal land planning efforts. Specifically, there is an ongoing need to balance the demands of the sand and gravel mining industry with open space & landscape preservation. Implementation of best practices for earth removal through the Town's Earth Removal Board (ERB) is critical to this balance. The ERB is charged with enforcing the Town of Sterling's Earth Removal By-Law which is intended "to protect the health, safety, and welfare of the public by regulating the removal of earth so as not to create dust, washouts, noise, and other hazardous conditions and to protect surface and ground water". Views of the impact of past mining and earth removal on Sterling's landscapes can be seen from Chocksett Road and Worcester Road (Route 12) as well as I-190. In certain areas of town, large hillsides have been excavated, leaving behind gaping holes in both sand deposits and rock escarpments. Over time these landscapes will change as the resources are exhausted and the mining operations transition to other uses, potentially ranging from sports fields to light industrial parks.

C. WATER RESOURCES

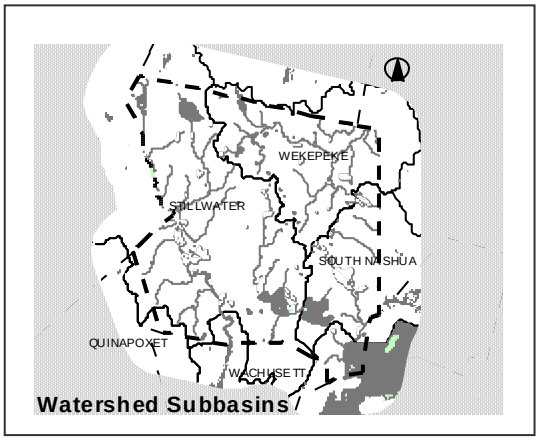
The town of Sterling has abundant water resources of excellent quality and regional importance, with its many streams, ponds, wetlands and significant aquifers. The town contains sources of pure water beyond its own present or likely future needs. The citizens of metropolitan Boston, through the Massachusetts Water Resources Authority (MRWA), are presently sharing in some of Sterling's water resources. The Stillwater River and West Lake Waushacum are part of the Wachusett Reservoir system. The town of Clinton has used water from Sterling in the past and could do so again, since it still holds reservoir lands in northern Sterling.

1. Watersheds

The entire town of Sterling is located in Nashua River Watershed. Due to the amount of watershed lands owned by the Metropolitan District Commission in what that agency calls the Wachusett Watershed, citizens may forget the large watershed context in which Sterling resides. The extreme southeast corner of Sterling is encompassed by the Wachusett Reservoir, Boston's main source of drinking water. Several other bodies of water are found in Sterling, including East and West Waushacum Ponds and the Quag, HyCrest Pond, Stuart Pond, the Clinton Basin Reservoirs and Muddy Pond. The Stillwater River is the largest stream flowing through town. Smaller streams bisect the town including the Wekepeke, South Meadow, Wilder, Scanlon and Houghton and Rocky Brooks.

Sterling has two subwatersheds of the Nashua River watershed: the Wachusett Watershed which drains into the Wachusett reservoir (of which the Stillwater River watershed is an integral part), and the Wekepeke watershed which drains into the North Nashua River.

Figure 4-4 – Nashua River Sub-basins



The Wachusett watershed covers the majority of Sterling's area to the west. The Stillwater River is its chief stream, with tributaries Justice Brook, Bailey Brook, Rocky Brook, Ball Brook, Wilder Brook, Scanlon Brook, Houghton Brook, Connelly Brook and Waushacum Brook. Quinapoxet River flows into the Stillwater at the southwestern end of the Wachusett Reservoir. South Meadow Brook flows into South Meadow Pond in Clinton.

In the northeastern quarter of Sterling lies the Wekepeke watershed, which drains to the two branches of Wekepeke Brook, and one named tributary, Lynde Brook. Beneath these two watersheds are the rich sand deposits that comprise the Stillwater and Wekepeke aquifers.

2. Surface water

Lands near water bodies offer the most attractive sites for outdoor recreation. Some water bodies have limited informal public access for boating and fishing, generally located where roadways abut the ponds, as in the case of Stuart Pond. Access to Sterling's water bodies should be improved to enhance recreational opportunities in the community.

a). Rivers, Streams, and Brooks

Stillwater River – Rising from the confluence of Keyes and Justice Brooks in Princeton, the river extends from Princeton to Wachusett Reservoir, a distance of 7.8 miles. It forms part of the western boundary of Sterling, then flows across the southwest corner of the town into Wachusett Reservoir. In its northern reaches, the Stillwater is a narrow, swift-moving stream, but below West Sterling the river opens out into a broad swamp. Then it becomes wider, with riffles and pools, creating a stream popular for both fishing and canoeing. Numerous tributaries flow into the Stillwater River including Wachusett Brook, Ball Brook, Bailey Brook, Rocky Brook, Wilder Brook, Scanlon Brook, and Houghton Brook. These brooks are noted for their value as fishing areas, historical resources, and scenic resources, as well as their relatively pristine water quality.

A surface water source of exceptional quality, the Stillwater River is designated as one of the State's 16 Recreational Natural Landscape Rivers under the Massachusetts Scenic Rivers Program. Criteria for this designation are, in addition to scenic quality: the existence of exceptional river recreation opportunities on the stream, a minimum of development along the banks, accessibility, and the presence of publicly owned land on the stream. Possible recreational opportunities offered by Recreational Natural Landscape Rivers include canoeing, kayaking, fishing, hunting and swimming.

Stillwater River has also been designated as an area of Outstanding Resource Waters. Since the Stillwater contributes to the drinking water supply of Wachusett Reservoir, protection of its presently high quality is vitally important. It is estimated that 10 to 15 percent of the total water yield of the DCR-DWSP system comes from the Stillwater. Although the DWSP has extensive land holdings along both banks of the Stillwater's lower reaches, this is not a sufficient protective corridor. Most of the river's banks are in private hands.

Route 140, a major road, runs parallel to the river. Strip development along this road could degrade water quality; much of the soil along here is not suitable for septic systems. The use of de-icing salts on Routes 140 and 62, as well as on Interstate 190 which crosses the river, also poses a threat to water quality in the river. Past salt contamination of the town well field on Route 12 was attributed to storage of de-icing salts at the DPW facilities nearby.

Wekepeke Brook - Flowing from the Clinton water supply reserves of Heywood Reservoir, the Wekepeke Brook extends along the northern tier of Sterling flowing from the Clinton Reservoir lands south east for a distance of 3.5 miles before joining the North Nashua River. The Conservation Commission named this brook as a conservation priority for the 1988 State Comprehensive Outdoor Recreation Plan (SCORP), and Greenway protection is recommended. The brook is known to be a native trout stream.

The high water quality of the brook and the underlying Wekepeke Aquifer make this brook and its watershed valuable as a source for water supplies. Lynde Brook, an important tributary, flows through an impoundment known as Fitch Basin and another pond known as Lynde Basin. Both of these waterbodies are held as part of the Clinton water reserves. Leominster also has a wellfield tapping the underlying aquifer across the northern border near the confluence with the North Nashua River. The Sterling Land Trust owns land along the river that extends from Pratts Junction Road west to the rail bed of the former Agricultural Branch, now operated by Conrail. This parcel affords public access to the Wekepeke for fishing and nature walks. In the past, the fish habitat has been threatened by road runoff from Route 12 and Pratts Junction, as well as the former landfill.

Connelly Brook – This brook flows south from Rowley Hill Road to the Quag, passing beneath I-190. It continues south through two DCR-DWSP parcels and several privately owned parcels, including the Pandolf-Perkins Quarry until it reaches Route 12. At Route 12 is passes through a culvert onto property owned by the DCR-DWSP for the protection of the Quag.

South Meadow Brook – This brook flows south east across the farmlands where Mary Sawyer of "Mary Had a Little Lamb" fame grew up. It flows to Fitch Pond through extensive wetlands, then it crosses Chace Hill Road and continues south across Rota Springs Farm into Clinton to South Meadow Pond.

Waushacum Brook – flows from East Lake Waushacum, between Sterling Junction and Sterling Campgrounds into West Boylston and its confluence with the Stillwater River. The brook is noted for its filtering wetlands. In the past, the brook also drained East Lake Waushacum, but the DCR-DWSP sealed off flow from this segment of the brook to West Lake Waushacum when East Lake Waushacum was returned to the Town.

b). Ponds and Lakes

Sterling has 12 ponds and lakes encompassing a total of 734 acres. Several of these waterbodies serve as public water supplies, and have limited recreational uses. Table 4-6 describes the lakes and their existing and potential uses. The largest ponds are the two Waushacum Lakes, the Quag and the Wachusett Reservoir.

Only East Lake Waushacum provides formal public access, at Sholan Park, the town beach, which is limited to Sterling residents. The beach is one of the most popular recreational areas in the town and it includes picnic sites a volleyball court, a half basketball court, and a boat launch. Another feature is the adjoining Swett Hill Conservation Area.

The majority of the shoreline at East Lake Waushacum is residentially developed. Careful monitoring of the lake's water is necessary to help protect its quality. According to Dr. Blodgett of the East Waushacum Lake Association (ELWA) the town is supplying funding for an aluminum treatment to curtail algae growth in the lake. The ELWA conducted a study that concluded that the water quality in the lake is affected by septic systems serving residential development along the shore, where soils with a shallow hardpan layer cannot properly absorb and filter wastewater before it reaches the lake. The effluent contributes to the summertime algae growth in the lake. Fertilizer use may also be a contributing factor. The hilly topography and poor soils of the area surrounding the lake makes development within one mile of the lake a contributing factor to pollution in the lake.

Hycrest Pond is a picturesque impoundment on Upper North Row Road below Justice Hill. The pond is owned by the DCR-DWSP and is surrounded by DCR-DWSP property and a privately owned parcel of Chapter 61A land. The area has potential for development of a nature trail through the surrounding woods, which would compliment a similar trail on nearby conservation land.

Heywood Reservoir is located on the northern border of Sterling, between Upper North Row Road and Heywood Road, at the headwaters of Wekepeke Brook. It is the primary component of the Clinton reserve water supply system.

Fitch Basin, Lynde Basin, and Spring Basin are a chain of ponds off Heywood Road that are owned by the Clinton Waterworks, and are a part of the Clinton reserve water supply system. Fitch Basin, a quiet pond off Heywood Road surrounded by woodland, is protected to the west by two parcels of conservation land. An attractive nature trail on these properties provides pedestrian access to the pond.

Stuart Pond is a privately owned pond on Lucas Road off of Justice Hill Road. The owners have contracted with the Division of Fisheries and Wildlife to place a Conservation Restriction on a portion of the property abutting the pond. Public access at Stuart Pond is restricted to non-motorized, daytime passive recreation and is limited to a 10 foot wide strip along the shoreline of Stuart Pond measured from the mean high water mark. The DCR-DWSP owns an adjacent parcel that also abuts the pond. Another two-acre parcel on Lucas Road that abuts the pond is of undetermined ownership, as of this writing.

Fitch Pond, a Great Pond, is surrounded by privately owned property with extensive wetlands, at the feet of the property where Mary Sawyer, the poetry inspiration, and her family owned a farm. The pond and associated wetlands are surrounded by hills on three sides. It is fed by South Meadow Brook, which flows from Maple Street through the Pond and continues on across Rota Springs Dairy Farm to South Meadow pond in Clinton.

Table 4-6: Inventory of Sterling's Ponds and Lakes

SITES	ACRES	CURRENT RECREATIONAL ACCESS
East Lake Waushacum	188	Town Beach and picnic area. This popular lake is used intensively for swimming, fishing, boating (motored and non-motored), water-skiing. Majority of shoreline is residentially developed.
Fitch Basin	9	Clinton water supply system, held in reserve. Headwaters of the Wekepeke Brook, drains to Lynde Basin, under MassWildlife CR and recreational policies.
Fitch Pond		Privately owned.
Heywood Reservoir	37	Clinton water supply system, held in reserve. Has recreation potential for a hiking trail that would surround the reservoir.
Hycrest Pond	90	Private access. Water body is owned by DCR-DWSP.
Lynde Basin	10	Clinton water supply system, held in reserve. A pond along the headwaters of the Wekepeke Brook
Quag Basin	36	Fishing, limited boating (no gasoline motors, boats no bigger than can be carried to top of a car), hiking and cross-country skiing on watershed lands, dogs on leashes. Prohibited: motorized recreation, bicycles, horseback riding, bicycle riding
Spring Basin	2	Clinton water supply system, held in reserve. Part of drainage system, under MassWildlife CR and recreational policies.
Stuart Pond	4.5	A privately owned pond with informal access, used for fishing. Access is restricted to non-motorized, daytime passive recreation and is limited to a 10 foot wide strip along the shoreline measured from the mean high water mark.
Stump Pond	5	Wildlife habitat. Potential for trails on town land here.
Wachusett Reservoir	225	DCR-DWSP water supply. Allowed uses: fishing from shore (no boats, no waders). Prohibited: Swimming, Horseback riding, pets.
West Lake Waushacum	112	Fishing, non-motorized boating (boats no bigger than can be carried to top of a car), hiking and cross-country skiing on watershed lands, dogs on leashes. Prohibited: motorized recreation, bicycles, horseback riding, bicycle riding.

3. Aquifers and recharge areas

Two broad bands of stratified glacial deposits (sand and gravel) stretch across the lowlands of Sterling, forming the Stillwater and Wekepeke Aquifers. Several streams and wetlands flow southeast toward the Wachusett Reservoir and the Nashua River Basin, following the ancient path of the glaciers, and recharging these aquifers. The Stillwater River is the surface manifestation of a highly productive groundwater resource, the Stillwater Aquifer. The Stillwater Aquifer is estimated to be capable of yielding 2 million gallons of water per day (GPD). The water in the Stillwater Aquifer is high in iron and somewhat corrosive.

Wekepeke Aquifer is a broad band of gravelly deposits along Wekepeke Brook extending into Leominster and Lancaster. The U.S. Geological Survey estimates this aquifer to be capable of yielding over two million gallons per day. The City of Leominster presently has wells in the aquifer, and the Town of Lancaster has recently done exploratory drilling for a potential water source. Testing by the state Department of Environmental Protection has shown the water quality of the Wekepeke to be very high. Based on yield and quality information, this aquifer offers one possible future water supply for Sterling, should it prove necessary. However, in addition to the risk of quality deterioration by industrial development, the Town's landfill, which is closed and capped, is located adjacent to the aquifer.

To preserve water quality, land uses in aquifers and their recharge areas should be carefully regulated. Because sand and gravel aquifers are porous and transmit water rapidly, they are very susceptible to pollution. Once a pollutant enters an aquifer, its movement is governed by the groundwater, and it may remain in the aquifer for an extended period of time. Sources of aquifer pollution are often located on the ground surface directly above or contiguous to the aquifer. Septic tank effluent, landfill leachate, ruptured fuel tanks, industrial chemicals and agricultural fertilizers and pesticides are possible sources of aquifer pollution. Many towns have lost water supplies from aquifer pollution.

Covering the ground above an aquifer with impervious material can reduce its productivity. Extensive paving and building can interfere with aquifer recharge. To prevent the loss of aquifer productivity, land development in an aquifer should be kept to a low concentration.

Since aquifers are found in deep gravel deposits, gravel removal is likely to occur in these areas. This can have a detrimental effect on water quality, through sedimentation from eroding pits or through the removal of gravel too close to the water table. A buffer layer of at least eight feet of gravel is needed above the water table so that subsequent land uses do not pollute the groundwater. Regulations should be adopted to require all gravel operations in Sterling's aquifers to leave this filtration layer. Sterling has adopted a good set of regulations governing erosion control.

The Aquifer and Water Resource Protection District in the Sterling Protective Bylaw protects the groundwater quality of the portions of the Stillwater Aquifer that have a potential well yield greater than one hundred (100) gallons per minute. It also protects all areas in the Town that are within either a delineated Zone II or are within a ½ mile radius of municipal wellheads lacking a Zone II delineation. Permitted uses are subject to special permit approval to ensure conformity with the bylaw. Noxious uses are prohibited. Yet, according to the Planning Board, the development potential is only constrained by fifty percent within the overlay district, as determined from the recent buildout analysis by the Montachusett Regional Planning Commission.

4. Flood Hazard Areas

Floodplains are the lowlands adjacent to streams, rivers, or lakes that are susceptible to flooding. A floodplain has two main components, the floodway and the flood fringe. The floodway is the area adjacent to the water body that is subject to frequent flooding. It serves as a channel for diverting floodwaters. The flood fringe is the area to the outer edge of the floodplain that is subject to flooding less often, and at more shallow depths. A floodplain serves two primary functions: (1) to channel floodwaters downstream, and (2) to impede the flow of floodwater throughout the area.

Historically floodplains have been desirable places for development to occur. Early parishes located near water to keep their animals, manufacturers sought fast flowing water to power their mills, and communities grew around these centers. The typically flat terrain, and the proximity to the water-powered mills, made the floodplains desirable places to build.

However these attractive attributes also put people and property at risk. Flooding in developed areas has caused significant property damage and in some cases even loss of life. Development within the floodplain not only places property in the path of floodwaters; it also reduces the absorption of waters into the ground, as more of the surface is rendered impervious. As a result, floodwaters tend to rise higher, causing more extensive damage.

The frequency of floods that are large enough to cover a specific area determines the extent of the floodplains. As an example, a 100-year floodplain has a chance of being flooded every 100 years, or a statistical probability to flood at 1% per year. A 500-year floodplain has a chance of being flooded every 500 years, or a statistical probability of

0.2% per year. Flood frequencies are calculated by plotting a graph of the occurrence and size of all known floods for a specific area and thus determining how often floods of a particular size will occur.

The Sterling Protective Bylaw established a Floodplain District that regulates land uses within the areas defined on the Flood Insurance Rate Maps (FIRM) and the Flood Boundary and Floodway maps of 1982, on file with the Town Clerk, the Planning Board, and the Building Inspector. The Bylaw prohibits any encroachments within the District unless certified by a registered professional engineer or architect demonstrating that the encroachment will not increase flood levels during the 100-year flood. The Flood Plain Protection District is depicted on the ***Zoning Map.***

5. Wetlands

Wetlands, as defined under Section 404 of the Clean Water Act of 1972, are those areas that are inundated or saturated by ground water (hydrology) at a frequency and duration sufficient to support a prevalence of vegetation (hydrophytes) typically adapted for life in saturated soil conditions (hydric soils). Wetlands are generally areas with low relief or depressions formed by glacial activity or former locations of shallow lakes and ponds. Categories of wetlands generally include swamps, marshes, bogs, fens and similar areas. Wetlands can be flooded permanently, seasonally, or only intermittently, or they can be boggy areas that simply have soils that are saturated to the surface most of the time.[8]

Wetlands provide valuable wildlife habitat. These hot spots of biological diversity support approximately forty-three percent (43%) of the nation's rare and endangered species. Inland wetlands perform crucial functions including flood storage and control and pollution filtration. They reduce flood hazards by temporarily storing peak flows during times of heavy precipitation. The filtering action of aquatic plants in wetlands protects water quality by taking up excess nutrients in surface water, releasing water of improved quality from the wetlands. They are also common recharge zones for groundwater sources. For all these reasons, wetlands in Sterling should be protected from destruction.

Many wetland types exist along the rivers, streams and ponds in Sterling, from vernal pools and forested wetlands to shrub swamps, bogs, and both deep and shallow marshes. Wetlands occupy almost 10 percent of Sterling's land area, about 1,900 acres, according to the National Wetlands Inventory maintained by MassGIS. Wetlands are found along the lower reaches of the Stillwater River, in the vicinity of Moore's Corner and along Wekepeke Brook in Pratt's Junction. A sizeable swamp surrounds Fitch Pond off Chace Hill Road in southeast Sterling. At the foot of Hog Hill in the southwest corner of town sits a 30-acre swamp. Other significant estimated wetland habitats delineated by MassWildlife include a wetland on Waushacum Brook near the Sterling Campground area and the Town of West Boylston and the Wekepeke drainage wetland on Flanagan Hill Road near the Lancaster town line. Numerous smaller ones exist along Houghton Brook, Rocky Brook, Connelly Brook and in the lowland spots of the hilly terrain.

Though the DCR-DWSP controls the wetlands of the ponds and streams around West Lake Waushacum and Stillwater River to protect its watershed, and by extension, the Wachusett Reservoir, future urban development and harmful land use practices may threaten other wetland areas in the Town.

To the extent that wetlands exist within protected aquifer recharge areas, The Aquifer and Water Resource Protection District in the Sterling Protective Bylaw protects them from noxious land uses. Similarly, to the extent that the wetlands fall within the Flood Plain Overlay District, these areas are protected from encroachment unless a certifying engineer can show that development will not significantly alter the flow dynamics of the floodplains during major storm events.

Beyond zoning, the provisions of the Federal Clean Water Act, the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40, February 14, 1997), and the Massachusetts Rivers Protection Act, as amended in 1996, provides some protection to wetlands.

The Clean Water Act prohibits virtually any ground-disturbing activities within one hundred (100) feet of all wetlands unless approved through special permit. However, historic enforcement of the law does not meet the stated

[8] Michael J. Caduto, *Pond and Brook, a Guide to Nature in Freshwater Environments*, 1990, University Press of New England.

policy of "no net loss" of wetlands acreage, nor are there adequate systems for tracking the losses annually, according to a report by the National Academy of Sciences. The United States Fish and Wildlife Service estimated that the nation was losing fifty eight thousand, five hundred (58,500) acres of wetlands to development or agriculture annually, as of 1997. According to the National Audubon Society, wetlands losses are closer to one hundred thousand (100,000) acres a year.

The Massachusetts Wetlands Protection Act prohibits removal, dredging, or alterations of any river or stream bank, freshwater or coastal wetlands, beach, dunes, flat, marsh, meadow or swamp bordering on any resource area as defined in the Act without a permit from the Commission to perform the work. Its intent is to ensure the protection of public and private drinking water and groundwater supplies, land containing shellfish, wildlife habitat, and fisheries, to control flooding, and to prevent storm damage and pollution.

The Rivers Protection Act, Chapter 258 of the Acts of 1996, creates a two hundred (200)-foot riverfront corridor on each side of a perennial river or stream, measured from the mean annual high-water line of the river, to protect the natural integrity of rivers and to encourage and establish open space along rivers. The riverfront areas protect water quality, stabilize stream banks, reduce flood peaks and downstream flooding, support fish and wildlife habitat, and protect groundwater. Riverfront areas may contain wetlands and floodplains, but intermittent streams are not subject to the Rivers Protection Act.

The law builds on the strength of the existing permitting procedures under the Wetlands Protection Act. The local conservation commission or the state Department of Environmental Protection (DEP) reviews projects located within the riverfront area. Work in the riverfront area is not prohibited, but applicants must demonstrate that their projects have no practicable alternatives and will have no significant adverse impacts. Existing structures such as single-family homes and accessory uses are exempt from the Rivers Protection Act. [9]

6. Outstanding Resource Waters

According to 314 CMR 4.00: "Certain waters shall be designated for protection under this provision in 314 CMR 4.06(3) including Public Water Supplies (314 CMR 4.06(1)(d) 1). These waters have outstanding socio-economic, recreational, ecological and/or aesthetic values. The quality of these waters shall be protected and maintained." The entire Stillwater River Watershed has received designation as Outstanding Resource Waters under the Massachusetts Surface Water Quality Standards of 1995, due to its significance to the Wachusett Reservoir and the Sterling Wells. They may be subject to more stringent regulation in accordance with the Massachusetts Drinking Water Regulations (310 CMR 22.00). The extent of the designated outstanding resource waters in Sterling is shown on the Water Resources Map.

D. VEGETATION

1. General Inventory

Sterling has vegetation characteristic of Agricultural Zone 5 combined in a picturesque mix of forests, fields and orchards. Apple orchards in Sterling and its neighboring towns serve as regional recreation centers, particularly for people from Worcester, Fitchburg and Leominster who enjoy weekend outings to pick apples and take in the fresh air.

While the majority of Sterling may be classed as Zone 5 (A and B), there are areas with microclimates ranging from 4 through 6. As of this writing, Sterling has yet to conduct a botanical survey. Neighboring towns, particularly Lancaster, have conducted extensive surveys, in conjunction with the Reuse Plans for Fort Devens and the efforts of the Nashua River Watershed Association to protect the extensive and valuable wetland resources of the Oxbow National Wildlife Refuge. Presumably, the species found in these towns would likely be found in Sterling as well. It would be worthwhile for the town to conduct its own survey. Such a survey should begin to note the effects of climate change particularly in comparison to earlier studies in neighboring towns.

[9] Athol Master Plan 2002, Natural Resources Chapter, Montachusett Regional Planning Commission

2. Forest Land

New England forests are comparatively young, since in colonial days, extensive tracts of land were clear cut for pasture and cropland. Stillwater Farm, on Redemption Rock Trail (Route 140) provides an interpretive trail describing the historical ecology of a typical New England Farm. On this trail, one can also see evidence of the devastation left by the Hurricane of 1938, which felled many trees as it passed.

Sterling is a well forested town, providing shade for many residences. To promote shade trees, the Planning Board reviews subdivision plans to assess how many trees will be cut in the development process. If a number of trees are to be cut, the Planning Board requires the developer to plant shade trees every 40 feet (plus or minus, depending on driveway locations.) Sterling has a Scenic Road bylaw to protect shade trees. Also, a bylaw in town requires that when a homeowner wishes to cut a tree on the Town right-of-way, a hearing will be held not only with the Tree Warden (who is often the Highway Superintendent) but also with members of the Planning Board with all of them having a vote in the matter.

As of 1999, over half the town is forested, at 11,340 acres. The dominant tree species are oaks, pines, maples and hickories. Some large blocks of woodlands are located in the north central part of town, and on extensive reaches of DCR-DWSP owned lands on the west and south sides of town. The Town also maintains two town forests, one in the north central part of town off Tuttle Road, the other on the western edge of town off Route 62 and Holden Road. Remaining forest lands are in private ownership. Some are listed in the Chapter 61 and 61 A programs, others are completely unprotected.

In 1971, nearly 12,400 acres were forested, but by 1977 nearly 2000 acres had converted to other uses. The trend continued through 2000, as roughly 1,000 new homes were built in Sterling. Many of these new homes were built in forested areas, though some farmland pastures and fields have also sprouted dwellings. Slowly, parts of Sterling's blocks of forests and fields are becoming more fragmented. The ***Land Use Map*** depicts the locations of the large subdivisions that were built from 1990. The loss of forested lands is further described in Section 3-D-2 Land Use Changes 1985 to 1999.

Harvard Forest digitized maps from the 1830s showing forested areas that were mandated at that time by the Massachusetts legislature. [10] [11] Sterling's map shows areas of possible Primary Forest, untilled woodlots, and wooded pastures that were forested in the 1830s.[12] Such lands have greater biodiversity than areas that have been tilled. These are not Old Growth, they have been harvested and pastured, but the ground may not have been tilled. DFW-NHESP GIS staff took those data and combined them with information from MassGIS'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 likely have never 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 DFW-NHESP notes that areas of 1830s forest on private land would be good targets for conservation acquisition to maintain the biodiversity of the Town and region. Several blocks of possible primary forest mapped by NHESP in Sterling are protected through DCR-DWSP ownership or the Wekepeke Wildlife Conservation Easement. These areas could be targeted for vegetative survey. One large block is in private ownership and therefore unprotected. The land lies between Sterling Airport and I-190. This block is part of an area that the Town has actively considered for protection for several years.

Through the Massachusetts Forest Stewardship Program, Sterling has an opportunity to encourage private owners of forested land to participate in educational programs describing principals of forest management, forest stewardship,

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[10] See http://harvardforest.fas.harvard.edu/data/p01/hf014/1830readme.html

[11] Hall, B., G. Motzkin, D. R. Foster, M. Syfert, and J. Burk. "Three hundred years of forest and land-use change in Massachusetts, USA," 2002, Journal of Biogeography 129: 1319-1135.

[12] Harvard Forest. 2002. 1830 Map Project. Harvard Forest Archives, Petersham, MA.

wildlife management, and estate planning. Their programs can serve as an alternative resource to acquiring land as it becomes available.

The priority and uncommon natural communities in Sterling include an uncommon Acidic Shrub Fen – these communities occur on peat, with sphagnum moss. They are bog like but have dense shrubs over the moss, with few openings in the shrubs. White Pine - Oak Forest is not uncommon, but much of the mapped area in Sterling is likely to be primary forest, that is, the land was probably not tilled although it may have been pastured and was probably woodlot and repeatedly logged (1830s forest discussed below). Primary forest areas retain more biodiversity, more plants that reproduce vegetatively and more soil fauna than previously tilled areas. Much of the identified area is on watershed lands.[13]

3. Rare, threatened and endangered plant species

By understanding the habitat needs of rare or threatened plants, the Town can take steps to preserve these habitats to protect the species. The Mass Wildlife Natural Heritage and Endangered Species Program documents sightings of rare and endangered species throughout the State, which is a valuable resource in making wetlands determinations and conservation decisions. Only those rare species records that are less than 25 years old are used in Natural Heritage project review associated with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and the Massachusetts Endangered Species Act Regulations (321 CMR 10.00). The listing includes the taxonomic group, scientific name, state rank, and most recent observations.

Two plants on the list of Rare Species Occurrence had been observed in Sterling, as listed in Table 4-7. One is the Roundleaf Shadbush (Amelanchier *sanguinea*), a low growing shrub found in rocky and gravelly areas. In Massachusetts it is especially noted to be found in exposed riverbeds, riverside ledges open to semi-shaded mountain ledges, in some cases in acidic rocky ledge areas. Other plant species which tend to be found with this "Species of Special Concern" include alders, hop hornbeam, columbine, harebell, silverrod and sandbar cherry.

The rare plants known from Sterling include two aquatic and two wetland species. The Dwarf Mistletoe (not reported in Sterling for over a century) normally grows on Black Spruce, and is associated with bogs. The last recorded observations of dwarf mistletoe were in a bog inundated by Wachusett Reservoir; and the golden club has been observed in a bog in Holden. The recently located Algae-like Pondweed and Terete Arrowhead are truly aquatic species. The Terete Arrowhead is most commonly found in more coastal pond, although there are other inland sites for it in Massachusetts. Both species are adapted to normal fluctuations in water levels, although they would be very negatively affected by a total drawdown, as done in some attempts to control dense aquatic growth. (Fact sheet on these plants can be found on the MassWildlife website at www.mass.gov/masswildlife)

The second plant, an orchid named the Pale Green Orchis (*Plantanthera flava*), is considered to be "Threatened" in Massachusetts. It is a leafy, single-stemmed ground orchid with tuberous roots, and broad, shining dark leaves. The upper stalk has a cylindrical spike of 10 to 40 small greenish-yellow flowers. This plant is found in sunny to semi-shaded habitats in wet, rich, moderately acidic soils which are periodically flooded, such as forested streamside Red Maple swamps, floodplains, and open wet situations under power lines where ferns, sedges and meadowsweet dominate. Historically, this orchid occurred on pond shores and wet meadows subject to periodic flooding. Threats to the species are due to a loss of the wet meadow habitats from urban encroachment. The plant does not grow in shade. To protect the species, DFW-NHESP recommends a program to prevent ecological succession, through mowing of the wet meadows. The plant is also protected by the Massachusetts Endangered Species Act from collection.

[13] For fact sheets on these habitats, see the MassWildlife website www.mass.gov/masswildlife.

Table 4-7: Massachusetts DFW-NHESP Rare Vegetation Species Occurrence List

Taxonomic Group	Scientific name	Common Name	State Rank	Most Recent Obs
Vascular Plant	Amelanchier sanguinea	Roundleaf Shadbush	SC	1940
Vascular Plant	Platanthera flava var herbiola	Pale Green Orchis	T	

Source: Natural Heritage Database, Massachusetts Natural Heritage & Endangered Species Program[14]

In addition, a 1997 report commissioned by the Town of Clinton and conducted by the Department of Civil and Environmental Engineering at the Worcester Polytechnical Institute entitled "The Land Management of the Wekepeke"[15] includes a listing of two additional rare orchid species: *Malaxis bayardii*-Bayard's Green Adder's Mouth and *Isotria medeoloides*--Small Whorled Pagonia.[16] The two orchids were identified during an Audubon Society naturalists' survey of the contiguous Wekepeke reservoir lands in Leominster and Sterling owned by the Town of Clinton. As the report only notes the two species as occurring on the Wekepeke lands and not specifically in the Sterling section it cannot be stated with certainty that they occur within the Town of Sterling.

A more comprehensive survey of Sterling's plant life by local naturalists would be very valuable and serve as a guide to setting priorities for conservation protection. An inventory of Sterling's natural communities including primary forests, and wetlands by local naturalists would provide a useful baseline for recording the existence of any rare plant species, with special attention given to the two rare orchids noted above. This could then serve as a guide in setting priorities for conservation protection.

4. Invasive Non-Native Plants

The Massachusetts Invasive Plant Advisory Group (MIPAG) defines invasive plants as "non-native species that have spread into native or minimally managed plants systems in Massachusetts. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant or disruptive to those systems."[17] Using "A Guide to Invasive Plants in Massachusetts" as a guide, OSIC committee members conducted an informal survey of easily observable invasive plants in 2008. The results are summarized below.

1. *Elaeagnus umbellata* (Autumn Olive) is an invasive plant that is becoming wide-spread along the 190 corridor and adjacent areas. The exact extent of the Autumn Olive's spread is not known. However, the MIPAG description of the species as: "A shrub occurring in uplands in all regions of the State Grows in full sun. Escaping from cultivation; berries spread by birds; aggressive in open areas; has the ability to change soil." indicates that many more areas of Sterling could provide suitable growing conditions.

2. *Rosa Multiflora* (Multiflora Rose) is described in "A Guide to Invasive Plants in Massachusetts" pg 25 as a shrub that grows throughout Massachusetts, forming dense thickets that outcompetes other plant species to dominate fallow or abandoned pasture land. In Sterling the Multiflora Rose is indeed found in abandoned or fallow pasture lands, but also in abandoned orchards, roadsides, adhering to mature trees, and in successional woods. While it is found in all parts of town and in large numbers, it seems to be most destructive to the character of abandoned or fallow pastures and orchards.

3. *Lythrum salicaria* L. (Purple Loosestrife) is described in "A Guide to Invasive Plants in Massachusetts" pg. 49 as a wetland perennial herb that spreads prolifically in open, disturbed sites with moist soils but also invades undis-

[14] See http://www.state.ma.us/DFG/dfw/nhesp/nhdat.htm

[15] "The Land Management of the Wekepeke," Department of Civil and Environmental Engineering at the Worcester Polytechnical Institute, 1997.

[16] Final Report: The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts" Massachusetts Invasive Plant advisory Group, February 28, 2005

[17] Somers, Paul; Kramer, Rachel; Lombard, Karen; Brumback, Bill: "A Guide to Invasive Plants in Massachusetts." Massachusetts Division of Fisheries and Wildlife, 2006.

turbed wetland ecosystems. It easily outcompetes native wetland plants important to indigenous wildlife. Purple loosestrife is widespread in all areas of the town, clustered in wetlands but also found in meadows and along seasonal stream margins.

4. *Celastrus orbiculatus* Thunb. (Oriental Bittersweet) is described in "A Guide to Invasive Plants in Massachusetts: pg. 28 as a rapidly- growing, climbing deciduous, woody vine that invades forest edges, woodlands, hedgerows, and early successional fields. It girdles or shades native species and can uproot or break the branches of native trees and woody plants. Again Oriental bittersweet is found all over Sterling and in just those areas described by "The Guide." In addition, large populations are found in abandoned orchards.

5. *Phragmites australis* (Common Reed) as described in "A Guide to Invasive Plants in Massachusetts" pg. 64, is a large perennial grass that grows from long, thin, compressed creeping rhizomes and forms dense colonies that crowd out other species to form large areas of monoculture. It is common in wetlands and upland, particularly where there have been disturbances. In addition to crowding out native species important to healthy wetland communities, dry stands of Common Reed create a fire hazard. This plant is found across Sterling. New stands have been noted in drainage ponds and other disturbed areas created during recent 190 construction.

The discussion above in based on an informal survey of easily observable invasive plants it indicates the widespread presence of several species that threaten the health of the natural communities present in the Town of Sterling. In a letter discussing ecologically significant natural communities, Dr. Patricia Swain of the Natural Heritage and Endangered Species Program indicates that Sterling has several areas of importance.[18] The first is 'an uncommon Acidic Shrub Fen" which she describes as a community occurring on peat with sphagnum moss which is bog-like has dense shrubs over the moss. The second important area for natural communities is" likely primary forest" which Dr. Swain defines as an area that might have been pasture and woodlot but was not tilled. She notes, "Primary forest areas retain more biodiversity, more plants that reproduce vegetatively and more soil fauna than previously tilled areas." She sites land along the Stillwater River as of particular significance for its primary forest potential, adjacent wetlands, and almost continuous undeveloped character.

Furthermore, the historic and rural character of the town is defined by the abundance of farmlands, including fields, meadows and orchards; and abundant wetlands with little or limited adjacent development. Of the five invasive species noted above all threaten these archetypical Sterling landscapes. Autumn Olive, Multiflora Rose, and Oriental Bittersweet are all destructive to the field, meadow and orchard environments while Common Reed and Purple Loosestrife threaten wetland environments.

Thus, assessment of the presences and spread of invasive, likely invasive or potentially invasive plants in the Sterling area should be included in any comprehensive survey of Sterling plant life. Such as survey should pay particular attention to effects of invasive species on Sterling natural communities as well as their effects on the field, orchards, wetlands and meadows essential to maintaining the character of the town

[18] Swain, Patricia C. Ph.D.,Ecologist, Division of Fisheries and Wildlife, correspondence, June 7, 2007

Figure 4-5: Autumn Olive (foreground) and Purple Loosestrife (background) at Muddy Pond in Summer, 2008.

(Image taken by Brian Cline)

E. FISHERIES AND WILDLIFE

1. Inventory

Sterling hosts a wide variety of wildlife species as do many towns in Worcester County. No formal survey of wildlife has been done in the town, but county lists of reptiles, amphibians, and mammals from the Massachusetts Division of Fisheries and Wildlife (MassWildlife[19]) document species most likely to be found in Sterling. A statewide checklist of birds is also available through MassWildlife though it does not break down the listing of birds by county. The Forbush Bird Club (FBC), based in Worcester is a good source of information on birds recorded in Sterling. The FBC website [20] includes bird sightings in Worcester County. Popular areas for birders in Sterling include Muddy Pond near Rte 190, W. Waushacum Lake and the fields on Redstone Hill. This year the Massachusetts Audubon Society is conducting a statewide breeding bird atlas, results from this volunteer effort will probably be useful in determining breeding bird species in Massachusetts.

As noted in the 2002 Open Space & Recreation Plan, bear and moose are the most noticeable newcomers to Worcester County. As of 2008 bears are seen much more often in town. Based on recent reports to MassWildlife, bears are

[19] See www.mass.gov/masswildlife for more information about MassWildlife.

[20] See www.massbird.org/forbush

seen with young in town. Moose have been raising young in the area since before 2002. Beaver populations continue to build dams in many areas, including more marginal habitat, a trend that has been occurring across the state [21].

Fish species— A survey of a number of streams by the Massachusetts Division of Fisheries and Wildlife intended to identify coldwater fisheries habitats in the past 3 years showed the following resident fish species: Bluegill, Brown Bullhead, Blacknose Dace, Brown Trout, Chain Pickerel, Common Shiner, Brook Trout, Fallfish, Golden Shiner, Landlocked Salmon, Largemouth Bass, Longnose Dace, Pumpkinseed, Redfin Pickerel, Slimy Sculpin, Tesselated Darter, White Sucker, Yellow Bullhead, Yellow Perch. Streams surveyed are listed in the wildlife corridors section.

In West Waushacum Lake, in a survey conducted by biologists in 1981 by the Division of Fisheries & Wildlife, revealed the following species of fish in order of abundance: bluegill, largemouth bass, pumpkinseed, yellow perch, chain pickerel, white sucker, yellow bullhead, rainbow trout, brown bullhead, rock bass, white perch and golden shiners.

The Division of Fisheries and Wildlife stocks trout during the spring in Justice Brook, Stillwater River, and West Waushacum Lake. (MassWildlife 2008 Stocked Trout Waters List) Trout stocking programs are designed for recreational fishing—a "put-and-take" program, not a program for restoring or growing trout populations in Massachusetts waters.

2. Vernal Pools

A vernal pool is a seasonal wetland contained in a depression lacking a permanent above ground outlet that appears when the water table rises in the fall and winter, when the snow melts in the late winter and early spring and, and with runoff from rain. The water lasts for a few months in the spring and early summer.[22] By late summer, a vernal pool is generally dry or is otherwise free of fish. The periodic drying does not support breeding populations of fish, but many organisms have adapted their life cycles to the seasonal desiccation. Species such as wood frogs, mole salamanders, and fairy shrimp are obligate to vernal pools (meaning that they are dependent upon the pools for their survival) and indicate the existence of vernal pools. Mole salamanders (*Ambystomatidae*) in New England include the spotted salamander, blue-spotted salamander, Jefferson salamander, and marbled salamander, according to the Natural Heritage and Endangered Species Program. Wood frogs and mole salamanders migrate to vernal pools to lay their eggs in early spring. The fairy shrimp depend on vernal pools throughout their lifecycle.

Vernal pools range in size from very small to very large, yet they are generally shallow (about three to four feet deep. Pools might be found in low areas of a forest, in the floodplain or a river or stream, within a vegetated wetland, in an open field, between coastal dunes, in abandoned quarries or natural rock formations and other areas where water might pool.

According to a letter sent in 2007 to the Sterling OSIC by MassWildlife's Natural Heritage and Endangered Species Program, there are now 22 Certified Vernal Pools (up from 19 in 2002) in Sterling with many Potential Vernal Pools (PVP) which have identified from aerial photographs, but need verification on the ground. Areas of swamps also provide habitat for vernal pool species. The PVP data are available as a datalayer from MassGIS [23]. Surveying and certifying eligible PVPs as CVP's would provide more protection to these vital wetlands. There are several clusters of CVPs/PVPs, which provide extra habitat value for these species since each pool is somewhat different and provides alternate habitats in different years and seasons. A cluster located within primary forest is likely to be particularly important for biodiversity – many examples of this combination occur along the Stillwater River and near the Wachusett on protected watershed lands. Acquiring additional primary forest lands containing CVPs/PVPs or buffering them, are a high priority for protecting Sterling's biodiversity.

3. Corridors for wildlife migration.

Due to aggressive land acquisition activity by the DCR (formerly MDC), there are certain areas that could be considered as corridors providing wildlife populations with the ability to move and intermingle with others of their kind.

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[21] Data according to MassWildlife, updated in 2008.

[22] The Vernal Pool Association of Reading Memorial High School, Reading, Massachusetts.

[23] See http://www.mass.gov/mgis/pvp.htm

Streams and rivers are "natural" wildlife corridors for some kinds of aquatic and terrestrial wildlife. The most dramatic example of such a wildlife corridor in Sterling is the protected lands of the Stillwater River sub-basin that extends through both Sterling and Princeton. (See GIS map of Protected Open Space)

Wild trout or coldwater stream habitats are generally considered uncommon in the central part of the state, but Sterling has number of streams with native trout and other coldwater dependent fish populations. A project to identify waters that the Division has designated to be Coldwater Fishery Resources (CFR) was initiated in 2001. This project has been ongoing and the CFR list is updated based on fish samples collected each year. Identified CFRs are useful as a tool highlighting environmentally sensitive areas that could be targets for habitat protection efforts. A CFR is defined as a waterbody that meets at least one of the following criteria: the presence of brook, brown or rainbow trout has been documented; slimy sculpin or longnose sucker are present; the waterbody is part of the Atlantic salmon restoration effort or is stocked with Atlantic salmon fry or parr.

Since 2002, MassWildlife has found CFRs in Wekepeke Brook, an unnamed tributary to Wekepeke Brook; Rocky Brook; Stillwater River; Scanlon Brook, East Wachusett Brook and South Meadow Brook. Two other streams, Goodrich Brook and an un named tributary of South Meadow Brook, while not having CFRs in Sterling, drain downstream to identified CFRs in neighboring Clinton.

In the 2002 Open Space Plan, the Division had noted that the Wekepeke Brook area and the unspoiled wetlands area around Fitch Pond and South Meadow Brook might also serve as corridors for some wildlife species. The Wekepeke already had some protection through the Aquifer and Water Resource Protection Overlay District. In June 2008, a conservation restriction agreement was signed between the town of Clinton and MassWildlife which protects the reservoir areas from development and allows for public access for recreational activities such as fishing, hunting, hiking and nature study. Fitch Pond and its wetlands were noted for potential protection in 2002. Since then a small subdivision was approved and partially developed on the north side of the pond, but the town negotiated for inclusion of a protective buffer and an access point. South Meadow Brook, as a perennial stream, has legal protection through the Wetlands and Rivers Protection Acts.

In Sterling there are habitats mapped by MassWildlife as BioMap Core and Supporting Natural Landscape habitats for rare plants, rare animals, and natural communities. These areas are mapped MassWildlife's Massachusetts Biomap. The BioMap identifies those areas most in need of protection to conserve biodiversity for the future. This project, conducted by MassWildlife's Natural Heritage and Endangered Species Program, identified the areas most crucial to protecting the State's Biodiversity, through an evaluation of their extensive records of rare plants, animals, and natural communities. The BioMap also includes the supporting natural landscape areas that safeguard the Core Habitat. The information on the BioMap is made available for conservation planning efforts through the MassGIS.

BioMap focuses on species of uplands and wetlands; Living Waters focuses on aquatic species. Large unfragmented conservation land provides the best opportunities to maintain populations of species and limit further species loss from the Town. Land protection by towns 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. BioMap and Living Waters polygons are available from MassGIS.[24]

4. Estimated and Priority Wetland Habitat Maps

The DFW-NHESP produces maps for use under the Wetlands Protection Act (Estimated Habitat maps, provided to the Conservation Commission and shown in reduced form in the Natural Heritage Atlas, and the Massachusetts Endangered Species Act (also in the Natural Heritage Atlas). These regulatory map data layers are also available from MassGIS. [25] These two sets of maps are created for regulatory use. Estimated Habitats are a complete subset of Priority Habitats that focus on habitat of rare wetlands wildlife. Priority Habitats are drawn for all rare species. Early planning and review of development projects under the Wetlands Protection Act regulations and Massachusetts Endangered Species Act does play a very positive role in protecting rare species habitats. Town commissions and

[24] See http://www.mass.gov/mgis/biocore.htm and http://www.mass.gov/mgis/lwcore.htm. Access may require GIS viewing software.

[25] See http://www.mass.gov/mgis/wethab.htm and http://www.mass.gov/mgis/prihab.htm. Access may require GIS viewing software.

boards are encouraged to request the assistance of the Natural Heritage and Endangered Species Program in reviewing any project proposed in the habitat areas of the regulatory areas of the maps in the Natural Heritage Atlas.

To differentiate the BioMap and Living Waters core areas from the Priority and Estimated Habitats: BioMap and Living Waters core areas identify areas particularly important for conservation planning purposes. Priority and Estimated Habitats are regulatory. The Priority and Estimated habitat maps are updated every five years, based on sightings and the latest scientific studies. The BioMap/ Living Waters report is static (data from 2001 and 2003), so misses some of the most recently identified rare species areas.

A map provided by MassWildlife of protected open space in Sterling show areas of almost continuous undeveloped lands along the Stillwater and in the north part of town; completing connections would make these into large corridors. Those areas include BioMap cores, Supporting Natural Landscapes, and 1830s forest areas that provide a remarkable example of relatively unfragmented habitat. Conservation protection of remaining unprotected land in those areas, with buffers included, would enhance the viability of these special areas - size and continuity of open space is particularly important for supporting wildlife populations. Preventing habitat fragmentation is vital in protecting the ecosystem, for the rare species on the enclosed list, as well as for additional common species.

Management and monitoring of conservation lands become important as acquisition and protection are accomplished. All wetlands particularly need to maintain their natural water regime, including normal fluctuations and connections with the uplands and other wetlands. Water quantity and quality are ongoing issues for wetlands. Another aspect of managing conservation lands that is important in many areas is controlling invasive non-native species that alter the habitat and occupy space that native species would otherwise use. MassWildlife strongly recommends monitoring conservation land, and removing non-native species before they become a problem and impact native species. (2007 Letter to Sterling OSIC on all above info on mapping and accompanying maps.)

5. *Rare, threatened and endangered species*

Numerous rare species are currently known to occur[26] or to have occurred in Sterling, some of which are protected under the Massachusetts Endangered Species Act (MESA).[27] DFW-NHESP also lists other, not regulated, indicators of local biodiversity, including delisted species, vernal pools, and uncommon or exemplary natural communities. Fact Sheets describing some of the species and their habitats are available on the agency website.[28]

DFW-NHESP has many (27) records of observations of Wood Turtles in Sterling, so protecting their habitat will protect significant populations of the species. Many but not all of the reports are from currently protected lands. Wood Turtles are associated with streams, usually fairly low gradient ones. They require both aquatic and terrestrial habitats to complete their life cycle. Rivers and streams are used extensively throughout the year for foraging, mating and overwintering. During the late spring and summer, these turtles are often terrestrial, using riparian (riverside) forests, particularly ones that have good shrub canopy cover and open areas. Most Wood Turtles stay within 1000 feet of their home stream. There are also good populations of the Spotted Turtle (formerly listed as a Species of Special Concern, the Fisheries and Wildlife Board removed the Spotted Turtle from the the Massachusetts Endangered Species Act list in 2007). Ensuring survival of Spotted Turtle populations in Massachusetts requires protecting their habitat areas, such as the wetlands and upland forests around Sterling's Stillwater River and Wekepeke Brook. Spotted Turtles use wetlands, rather than the streams or rivers themselves, and adjacent uplands for habitat. Both these species use vernal pools as part of their habitat. Both these turtles nest in open, often sandy, areas. Conservation strategies and tips for protecting rare turtles are now posted on the MassWildlife website.

Other rare wildlife species associated with streams and rivers include the freshwater mussels and the Clubtail dragonfly. The records are mostly from the Stillwater River. These species indicate the presence of good clean water

[26] Any species with a most recent observation date within the past 25 years is considered to be current.
[27] Natural Heritage and Endangered Species Program, MassWildlife, June 7, 2007 letter from Patricia C. Swain, Ph.D., Ecologist, to Marion Larson.
[28] See www.mass.gov/masswildlife

– and need good quality water to support good populations. Maintaining water quality and quantity are important for the biodiversity as well as human health.

The American Bittern and Least Bittern are water birds that nest in thick vegetation on the edges of lakes, ponds, and large slow moving rivers. Loons nest in larger ponds and lakes, usually with good forested buffers. A pair of loons nests annually on Wachusett Reservoir. The presence of such lake-using species reflects the quality of the lakes and ponds in the area, and their surrounding lands. There is good habitat for aquatic and wetland species in Sterling throughout the town.

The rare plants known from Sterling include two aquatic and two wetland species. The Dwarf Mistletoe (not reported in Sterling for over a century) normally grows on Black Spruce, and is associated with bogs. The recently located Algae-like Pondweed and Terete Arrowhead are truly aquatic species. The Terete Arrowhead is most commonly found in more coastal pond, although there are other inland sites for it in Massachusetts. Both species are adapted to normal fluctuations in water levels, although they would be very negatively affected by a total drawdown, as done in some attempts to control dense aquatic growth.

The DFW-NHESP strongly urges that efforts be made to preserve and protect the rare species habitats that support these species. The town can support this through a variety of approaches, including conservation restrictions or easements, special zoning regulations and districts, or land acquisition. Town commissions and boards are encouraged to request the assistance of the DFW-NHESP early in the planning and review of development projects under the Wetlands Protection act and other laws. The most important areas of Sterling to protect to maintain biodiversity are the areas in Priority Habitat, BioMap, and Living Waters Cores in and around the Stillwater River and Wekepeke Brook. The area around the Waushacum Ponds supports several recent rare species (as identified in observations since the BioMap work) and many potential vernal pools.

In 2006, after over a year of work, MassWildlife's Wildlife Action Plan was approved by the US Fish & Wildlife Service. This plan focuses on habitats and wildlife species in greatest need of conservation protection, and presents a number of conservation strategies for habitat protection, restoration and wildlife species conservation. Conservation strategies for birds, mammals, reptiles, invertebrates, fish and birds are included and can be helpful for land protection and management decision makers on the municipal level.[29]

F. SCENIC RESOURCES &UNIQUE ENVIRONMENTS

1. Scenic landscapes

"Protecting Massachusetts' scenic beauty will play an important role in the future desirability of the Commonwealth as a place to locate." The Massachusetts Landscape Inventory published in 1981 by the Department of Environmental Management (now Department of Conservation and Recreation) remarks that extensive areas of pastoral scenery are becoming rare due to development.[30] These areas are valuable not only for scenic beauty, but for agricultural, historic and environmental qualities Scenic landscapes play a significant role in the way Sterling residents characterize the town. Unfortunately, the loss of agricultural lands to development in the past two decades has adversely impacted Sterling's many scenic vistas.

Articles in the Meetinghouse News and The Landmark describe cases in which people spoke out against changes in Sterling. One such area, was on Kendall Hill Road where orchards and overgrown farm land turned into a housing development in 1999. A few years later, at a Selectmen's meeting, a developer presented a plan for 20 new townhouse units on Kendall Hill to be built under the Chapter 40B legislation. The town subsequently purchased the property in order to protect it (now named Wachusett Overlook). All of these many articles reflect the concern people have for preserving this rural nature. This CR process had languished for several years until the Nestle interest galvanized citizen action.

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[29] *Comprehensive Wildlife Conservation Strategy (CWCS)*, Massachusetts Division of Fisheries & Wildlife, Department of Fish and Game, Executive Office of Environmental Affairs, Revised September, 2006, www.mass.gov/masswildlife

[30] from NRWA Visions 2020 and DEM (DCR) Landscape Inventory

Current concerns include the undeveloped lands surrounding the Sterling Airport, which the town is attempting to preserve from development, and the Wekepeke Watershed lands. In 2007, the Nestle Corporation investigated the potential for a venture that would pump and bottle the spring water there. Townspeople had overwhelmingly expressed their concern that the Wekepeke lands be preserved by sending over 700 letters to the Sterling Select Board and State legislators and obtaining nearly 1,000 signatures on a petition to preserve this land. In 2008, the Town of Clinton and MassWildlife successfully completed the negotiation of a conservation restriction protecting the lands surrounding the surface waters, while preserving the right of the town of Clinton to tap its water reserves.

Numerous surveys collected from the 1980's through the fall of 2007, have expressed a common theme focusing on the preservation and positive aspects on the quality of life of Sterling's "rural character". However, other than the Town Common, respondents identified few specific places or vistas, but rather expressed an overall desire to preserve the rural character and limit development. In the 1991 town-wide Planning Survey, townspeople identified scenic landscapes at the Kristoff Farms, Justice Hill, Hycrest Farm, Davis Farm, areas around the Waushacum lakes and the intersection near Rte 62 and Rte 140 as areas to be prioritized for Open Space Protection. In the latest 2007 survey, residents strongly expressed their concern to preserve agricultural lands and farming, as well as to restrict development in open lands.

Sterling is primarily noted in the Landscape Inventory as the Sterling Unit, though a portion of Sterling is also found in the Upper Nashua Valley Unit as well. Within these two inventoried Units, several geographic areas qualified as either "Distinctive" or "Noteworthy" features. The Sterling Unit, beginning in the northwestern portion of town, identified several distinctive features. All these areas feature open fields and pastures as well as views of the Wachusett highlands. Several areas were identified as "noteworthy." Among them are:

- The lands surrounding Justice Hill and Stuart Pond due to the presence of pasture and fields, the riparian zone of the Stillwater River, and some views of Wachusett Mountain.
- The area that extends into Sterling from the Fallbrook Reservoir in Leominster, following the Wekepeke Brook drainage, which also features agricultural and open vistas. The water basins of the Wekepeke lands, which formerly supplied municipal water for Clinton and Lancaster.
- The landscape located along Rowley Hill Rd, Osgood Road, Wilder and South Nelson Road, crossing Rte 62 and I-190 to the landscape by the Sterling Airport, Greenland Road and its environs.
- The vista from Redstone Hill Road across Davis Farm with views of Clinton and Bolton Ridge.

Much of the lands featured in the Landscape Inventory unit are protected either through ownership or conservation restriction or through town conservation or agricultural protections. One agricultural restriction area is located on Tuttle Road. Another agricultural restriction protects lands on Chace Hill Rd. The orchard of the town conservation property Waushacum Overlook is protected under a Agricultural Preservation Restriction. The Massachusetts Division of Fisheries & Wildlife holds a conservation restriction on land adjacent to Stuart Pond.

Within the Upper Nashua Valley Unit, Sterling has other areas designated as either noteworthy or distinctive. These include:

- The land area and wetland around the landlocked Fitch Pond, near the junction of Kendall Hill Rd and Chace Hill Rd, is deemed "Noteworthy", but most of this land has since been developed. However, Fitch Pond still receives relatively pristine small drainage from Kendall and Redstone Hill, and has two outlets; one emptying into East Lake Waushacum Lake and the other flowing eastward toward South Meadow Pond.
- The summit of Kendall Hill is deemed a "Distinctive" feature, and on the east side of the Fitch Pond, the Landscape Inventory lists the orchards, fields and pastures of the farms on Redstone Hill as both "Distinctive" and "Noteworthy". These areas are not only scenic, they offer excellent vistas to the east of Clinton, and the ridges of Bolton and Berlin and views north to Leominster and beyond. None of the areas mentioned in this unit are known to be under any protective conservation or agricultural restrictions at this time

2. Cultural, Archeological, and Historic Areas

Sterling is rich in historic sites that testify to its colonial origins and extending through it economic success during the age of the railroad. The Town has a Historic District that is listed on the National Register of Historic Places,

and two more districts, Pottery Village and Sterling Campgrounds that could potentially be listed due to their unique historic significance. Considerable archaeological evidence of Indian encampments predating the European discovery of the continent indicates that Native Americans in significant numbers inhabited the town for thousands of years. The oldest site is on Swett Hill, where projectile points 9,000 years old have been found. Finally, a 2001 Farm Survey commissioned by the Historic Commission documented the historical significance of 57 farms and the importance of agriculture in the town.

a). Historic Sites

In 1995, the Sterling Historical Commission developed a tour and guidebook of historic sites of the Town. These sites and some others are summarized here in chronological order of significance. The sites portray the rich pre and post colonial history of the Town, as well as its development to a small manufacturing community and resort destination in the 1800's, with the advent of the railroad. Recently, the text was digitized and interest in posting the information on the Town website is under consideration.

Table 4-9: Chronologically Ordered Historic Sites and Areas of Sterling

9000 BC	East and West Waushacum Lakes Area – These lakes are located in the southeast sector of the town. Archaeological discoveries indicate that nomadic hunters lived and hunted game around the lakes as early as 9,000 years ago. By the time the Europeans arrived, the Nashaway Indians had established large villages in the area, and their sachem, Nashawhonan, now called "Sholan" was called "The Great Sachem" by the English.
1640 to Present	Chace Hill Road – This centuries-old Indian trail was the first road in Sterling from Lancaster to the Waushacum Lakes. The first English colonial explorers traveled on it as early as the 1630's. The earliest settlers of Sterling) lived in this area prior to 1720. By the 1660s it became a colonial cart path used by the settlers who owned property by West Lake Waushacum. In 1717, the town of Lancaster voted to improve the road so that it was uniformly two rods in width and to make it more passable. During the eighteenth century, it was the county road to Worcester from Lancaster. Much of the road still follows its original route. The oldest house on Chace Hill Road is believed to date to the early 1700s, a small colonial home An old cellar hold on the Chandler property is also believed to be an ancient home. The present Chandler home, built about 1790 operated for some time as a tavern.
Late 1640s to 1775	Massachusetts Bay Path - In the 1640's, the English colonists made much use of a path from Boston to Springfield that became known as the Massachusetts Bay Path. Through Sterling the path came generally over Flanagan Hill Road from Lancaster, over North Row Road, Upper North Row Road and Justice Hill Road to Princeton. Mary Rowlandson is believed to have traveled over this trail after her captivity in the February 1676 raid on Lancaster during King Philip's War and again after her release at Redemption Rock in Princeton. During the French and Indian War, colonel soldiers traveled over this trail as did soldiers during the Revolutionary War. The Bay Path fell into disuse after the Revolutionary War, when today's Route 9 became the preferred route.
1644	Indian Fort – Newell Hill Road. Built by the Massachusetts Bay Colony to protect Nashaway Indians from the Mohawk and Narragansett Indians, as part of the terms of a treaty with the Massachusetts Bay government. By order of the legislature, ten well-armed English soldiers were sent to Sterling to build a strong, palisaded fort and to guard the Nashaway. The fort was destroyed during King Philip's War and its exact location is unknown today.

1663	Charlestown Grant – In 1663, the General Court of Massachusetts Bay Colony granted 500 acres upon present day Kendall Hill for the use of the town of Charlestown. Kendall Hill and surrounding areas had been explored as early as 1641 by Thomas King, who believed that iron, silver and other precious metals might be found here. Iron was mined intermittently, and low-grade silver was also mined. The silver mine was abandoned following the great earthquake in 1755 that collapsed a shaft of the mine, trapping some miners forever within its depths. In 1777, the land was sold to Josiah Kendall, who, with his brothers, had settled upon the hill about 1740, and who gave the name to the entire hill. Today the silver mine and part of the original grant are part of DCR holdings to protect the DCR water supply. The remainder of the grant has been developed as part of the Hampton Rhodes development.
1675	Redemption Rock Trail – State Route 140 extends from Route 2 to Narragansett Bay in Rhode Island This old Indian trail served as the main road for travel between the Nipmuck and Wampanoag Indians. It passes by many historic sites including Redemption Rock, in Princeton, where Mary Rowlandson was redeemed from her Indian captors after months of captivity in 1675. The Zebedee Redding homestead and the homes of the Pottery Village Historic District are located on the Redemption Rock Trail.
1676	East Lake Waushacum Massacre– An historic marker at the town beach of East Lake Waushacum marks the memory of an Indian massacre during King Phillip's War in May of 1676. Nashaway women and children who were fishing on the lake. The Massachusetts Bay soldiers killed eight women and sold 29 women and children into slavery in the West Indies, including the wife and son of Shoshanim, a Nashaway sachem, who was one the main generals in King Philip's War. The actual massacre took place near the former outlet to West Lake Waushacum at the Indian weir.
1707	Indian Fight Site – Rowley Hill Road. In 1707, Indians attacked a garrison in what is now Marlboro, killing several settlers. Jonathan Wilder was taken hostage. The colonists overtook the Indians at this site on Rowley Hill Rd near Heywood road. Wilder, two colonists and nine Indians were killed in the ensuing fight. Today only a marker stands to recall the history of the site.
1720	Chocksett Settlement – Princeton Road/Beaman Road/Osgood Road. In 1720, this area was known as Chocksett. The first Chocksett settler, Gamaliel Beaman, moved from Boston in 1720. The house at #3 Beaman Road is said to be the site of Gamaliel's home and may contain part of the original home. The name "Chocksett" extended to the whole town, until separation from Lancaster in 1742, when the town was incorporated as Sterling. Three Kendall brothers, Josiah, Ezekiel, James and sister, Elizabeth settled on the Hill which bears their name, in 1740 Their homes were located at 96 Kendall Hill Rd. (now the Rittenhouse property), 60 Kendall Hill Rd (now the Smiley property) 55 Kendall Hill Rd.
1736	Chocksett Cemetery – This cemetery is the first cemetery in Sterling, and is where many of the earliest settlers are buried. It has two entrance gates, one on Maple and the other on Clinton Rd (Route 62) both .just outside the center.
1750 1806-1889	Sawyer Homestead -108 Maple Street, listed on the National Register of Historic Places 9/13/2000. The former home of Mary Elizabeth Sawyer, immortalized in the poem "Mary Had a Little Lamb" by John Roulstone, the house was built in approximately 1750 and has always remained in the Sawyer family. It was built in the middle of the field with only paths in any direction. Mary Elizabeth was born in this house in March, 1806. In 1830, the road now known as Maple Street was built. The school she attended and where the lamb followed her to school was located on the corner of Redstone Hill and Rugg Roads. At that time, John Roulstone was studying in Sterling for Harvard College with his uncle, Reverend Samuel Capen, when he authored the poem. Several efforts to repair and restore the house failed. The house was destroyed by fire in 2007.
1756	Legg Cemetery – 43 Redemption Rock Trail. Robert Thomas, the founder of the Old Farmer's Almanac is buried in this cemetery.

1759	Ebenezer Buss House – 382 Redemption Rock Trail. Determined eligible for inclusion on the National Register of Historic Places 06/05/1980. This house is also included in the Pottery Village Historic District.
1760	Fairbanks Family Cemetery – Chace Hill Road, near Rota Springs Farm. Jebez Fairbanks, who gained much fame as an Indian fighter in the late 17th century, settled in this area shortly after 1700. He also served in the House of Representatives in 1714 and from 1721 to 1724. At about 1750, the Fairbanks family suffered a smallpox epidemic. No one who died of smallpox could be buried in the Town cemetery, so the Fairbanks began their own family plot on Chace Hill Road. The last Fairbanks died in the mid 1800's.
1777	Richardson Tavern – Located on Route 62 just before the Princeton town line, Richardson purchased this property in 1777. Benjamin Richardson was born in Leicester and served as a captain in the Revolutionary War under Lord Stirling, with whom he became friends and for whom Sterling is named. His friends included George Washington, with whom he shared a birth date, and the Marquis of Lafayette, who visited him in 1824 on his tour from Boston to New York. He was a prominent citizen of Sterling, one of its incorporators, and was involved in town politics most of his life. Benjamin's son, William, improved the house and added a large arched hall, which was used as a Masonic Hall. At its height, this farm had four barns, a chair ship, a cider mill, a store and a gristmill. The house was also a frequented tavern on the stage road from Boston to Albany, until the coming of the railroad removed much of the traffic. However, the Richardson family continued to run it as a tavern until 1894. Henry David Thoreau stayed overnight on his famous walk to Wachusett. This site is included in the Pottery Village Historic District.
1790	Stillwater Farm – This farm was originally an Indian habitation site. The Indians were still living on the west side of the Stillwater River as late as 1720. The Farmhouse was built by Zebedee Redding, a captain in the Revolutionary War, around 1790 on the Indian travel route known as Redemption Rock Trail. Redding died in 1856 and is buried in the Legg Cemetery. The Barn was built in 1868. The farm was purchase in 1990 by the DCR-DWSP and is currently operated as an Interpretive Trail illustrating the succession of forest growth and human effects on the environment.
1809-1850	Mary Sawyer's School House: - (c. 1809-1850) The school she attended and where the lamb followed her to school was located on the corner of Redstone Hill and Rugg Roads. Though now gone, this historic schoolhouse was once located on Redstone Hill Road at Rugg Road. An historic marker now stands at the location of the former schoolhouse.
1820	Oak Hill Cemetery – Clinton Road (Route 62), located across the road from Chocksett Cemetery.
1825	Pottery Village – this village in West Sterling consists of 31 sites aligned along Route 140 (Redemption Rock Trail) and the Stillwater River, and three sites on Beaman Road. The Village is significant as a small, mid-nineteenth century village that grew around two industrial complexes, the Buss Family Mills and the Tolman Pottery Works, between 1825 and 1850. The survival of architectural styles from the mid-18th through the nineteenth century and the remains of two mills make the area a significant historic and archaeological resource. The village is listed with the National Register of Historic Places as a Potential Historic District.
1835	West Sterling School House – The River District Schoolhouse, located on Princeton Road (Route 62), near the West Sterling ball field. It was established in 1835 when the student enrollment in the first school house had become too big. The land for the school was purchased from Robert Thomas, the originator of the Old Farmer's Almanac, and was built between 1835 and 1840. The River District School House remained in use until 1935 when the Butterick School opened. The town continues to own this building. Today the building houses Sterling Land Trust. The brick Schoolhouse (11 School St) Was built in 1835 to house the students of the center district. For 100 years, it was the only brick schoolhouse in Sterling. The bricks used in its construction were manufactured at the Wachusett Pottery Works. The school is on the National Register of Historic Places.

1850	The Stuart Needle Shop – So. Nelson Rd. is the location of a farmstead owned by Samuel Sawyer in the 1720's. In 1746, Charles Stuart bought 70 acres of the original farm from Jonathan Biglo. In 1850, Silas and Lucian Stuart moved a building to the property and built a house on the old farm-house foundation. Lucian Stuart invented the sewing machine needle and manufactured them at this site for many years.
1850	Hasting – Jones – Wheaton House – 14 Campground Road, Preservation Restriction placed on the property on June 25, 1982.[31] Listed on the National Register of Historic Places.
1850	Sterling Camp Meeting Association Campground – This sixty acre area just east of Sterling Junction was a summer colony for groups of Methodist Churches in the Worcester area, made possible by the introduction of passenger rail service in the 1840s. Originally church members camped in tents for a week during the summer to participate in recreation and religious services. In the decades following the Civil War, it evolved into a year-round community of 142 cottages owned by the Sterling Camp Meeting Association. The nearby Waushacum Park area had great recreational opportunities, such as boating, fishing, a dance hall, a bowling alley, a restaurant, a skating rink, and a baseball diamond. These resources ended with the construction of the Wachusett Reservoir. Today the Camp Meeting Association properties are listed on the National Register of Historic Places. The campground is eligible to become a Historic District.
1850	Sterling High School was built in what is now the Sterling Light Department building.
1890	Sterling Inn – Route 12. This Inn was built in 1890 as a replacement for the Old Sterling Inn that burned in 1759.
1915	Sterling Mill Works – This building is the old Sterling Cider Mill. Today it is an arts and crafts colony offering studio space for artisans of hand blown glass, sculptured candles, quilts and hand made furniture. It also houses an antique store and a panoramic model of the village in 1915, complete with a model of the turn of the century rail service as it existed.
1935	Butterick School was built as a Works Project Administration project in 1935 to provide employment for Sterling men during the Great Depression. Also the stone bath house and fireplaces were built at the public beach on East Lake Waushacum.
1955	Houghton School on Boutelle Road was built and named for Florence Houghton, a popular and long-time teacher in Sterling.
1970s	Rocky Brook Conservation Area – This area was set aside to preserve the remains of two mill foundations that mark the old Rocky Brook Chair Manufacturing site. At the height of the chair making industry in the 1820s, chairs were the staple export commodity of Sterling. The fast running Rocky Brook provided power to turn the lathes. Nearby, a trail leads visitors through the DCR-DWSP protected lands of the Rocky Brook. The site has roadside access and access off a driveway just east of the site. The mill foundations are on both sides of the road, however the town-owned land is on the south side of Beaman Road.
2007	Waushacum Overlook – Based upon recommendations from the 2002 Open Space and Recreation Plan, and in conjunction with the Trust for Public Land, the Conservation Commission, East Lake Waushacum Association, and residents, the town voted to preserve 62 acres of the of Kendall/ Butterick/ Rittenhouse homestead.

Source: Sterling Heritage Trail: A Tour of the Historic Sites, The Sterling Historic Commission, 1995.

Sterling Historic District. In 1991 the Sterling Historical Commission created a Historic District in the center of town to highlight the old village center (see Special Landscape Features map). The district is listed in the National Register of historic Places as a Local Historic District, commencing April 14, 1988. The district is roughly bounded by Main, Maple, Pine, School, and Bird Streets, Meeting House Hill, Princeton, Worcester, Newell Hill, and Hough-

[31] Worcester South District Registry of Deeds, Book 7492, page 62.

ton Roads. The Sterling Historical Society has created a map covering a walking tour past many historic sites. Table 4-10 describes the historic sites within the district and places them within their chronological context.[32] The town code corresponds to the location on the tour.

Table 4-10: Sites in the Sterling Historic District

Date	Tour Code	Location/Historic Note
1742		Town Pound – Meetinghouse Hill Road – part of a parcel donated by the Sawyer Family in 1742.
1742	1	Town Common: A three acre parcel donated by the Sawyer family was the site chosen for a Meeting House, stables and two "noon" houses (one for men and one for women) in 1742. Until 1924, there were three churches facing the common. Mary Had a Little Lamb Statue is prominently featured on the Town Common. This statue, commemorating the inspiration for the Poem "Mary Had a Little Lamb", by John Roulstone, was dedicated in 1991.
1759	6	Mitchell House: Resting on the site of one of Sterling's oldest taverns (1759), which was destroyed by fire. Through the past two centuries three different Inns have occupied this site.
1778	7	Josiah Leavitt House: c. 1778. One of the earliest fine homes of Sterling. Later sold to Joel Houghton and his wife, Mary Kendall, who passed on the home to their daughter, Fannie and her husband, Samuel Wilder. The property has remained in the Wilder family.
1788	9	Moses Smith House/Shop: c. 1788. The shop was rebuilt in 1795 after a fire destroyed the shop and all the town records in the possession of Mr. Smith, the town clerk. The second floor of the shop was used as a meeting hall in the 19th century. A tunnel that connects the two buildings is said to be the place where Moses Smith kept his supply of rum. Legend has it, that the tunnel was also part of the Underground Railroad.
1792	8	Joseph Loring House: c. 1792. Joseph Loring, a clockmaker, ran a general store on this site. The house was later owned by the Estabrooks who continued the business. Originally a single story home, a second story and a brick facade were added when the home was moved to this site.
1835	11	Town Hall: c. 1835. The present building is actually the second structure to occupy this site. The first Town Hall was built here in 1801 and later moved to its present location on Worcester Road. Construction of the Town House in 1801 made Sterling the first town in Worcester County to separate church and town business..
1838	12	Old Universalist Church: c. 1838. Used by various denominations until the 1940's. In the Greek Revival style, it once had two front doors and a steeple.
1840	2	Bartlett-Butterick Building: c. 1840. Originally built as a general store and post office, Ebenezer Butterick made the first sewing pattern here in 1863. The second floor once housed the town library for ten years.
1843	4	First Church of Sterling: c. 1843. The existing building is the third church built on the site. The first church was built in 1742, the second church was built in 1800 and the present structure was built after a fire destroyed the second building in 1842. Classrooms and a Parish Hall were added in the 1950's.
1850	10	Commercial Block: c. 1850's. Originally two houses and a barn occupied the site. The first floors of the houses were shops.
1855	20	The Old Brick School House – Today it is the Legion Hall

[32] Sterling Historic District, a Brief History and Walking Tour, Sterling Historical Commission, 1991. Historic research compiled by Maryanne Macleod

1885	17	Sterling Library: c. 1885. Built by Edwin Conant, a Sterling native, in memory of his daughter.
1935	3	Mary Ellen Butterick School: c. 1935. Built on the site of Baptist Church and Waite-Goodnow residence. Mary Ellen purchased the property, and donated the land to the town for a school and a park.

Sources: State and National Registers of Historic Places, Sterling Historic Commission

b). Historic Farms

In August of 2001, the Sterling Historical Commission completed a survey of historic farmsteads in Sterling.[33] The intensive project was funded with a Survey and Planning Grant from the Massachusetts Historical Commission (MHC) and matching Town funds. The survey was tailored to document surviving farmstead complexes to prepare for a community-wide preservation plan. The project established the historical context of the agricultural properties, and their eligibility for nomination to the National Register of Historic Places. The following criteria were used to determine whether a property warranted inclusion in the survey:

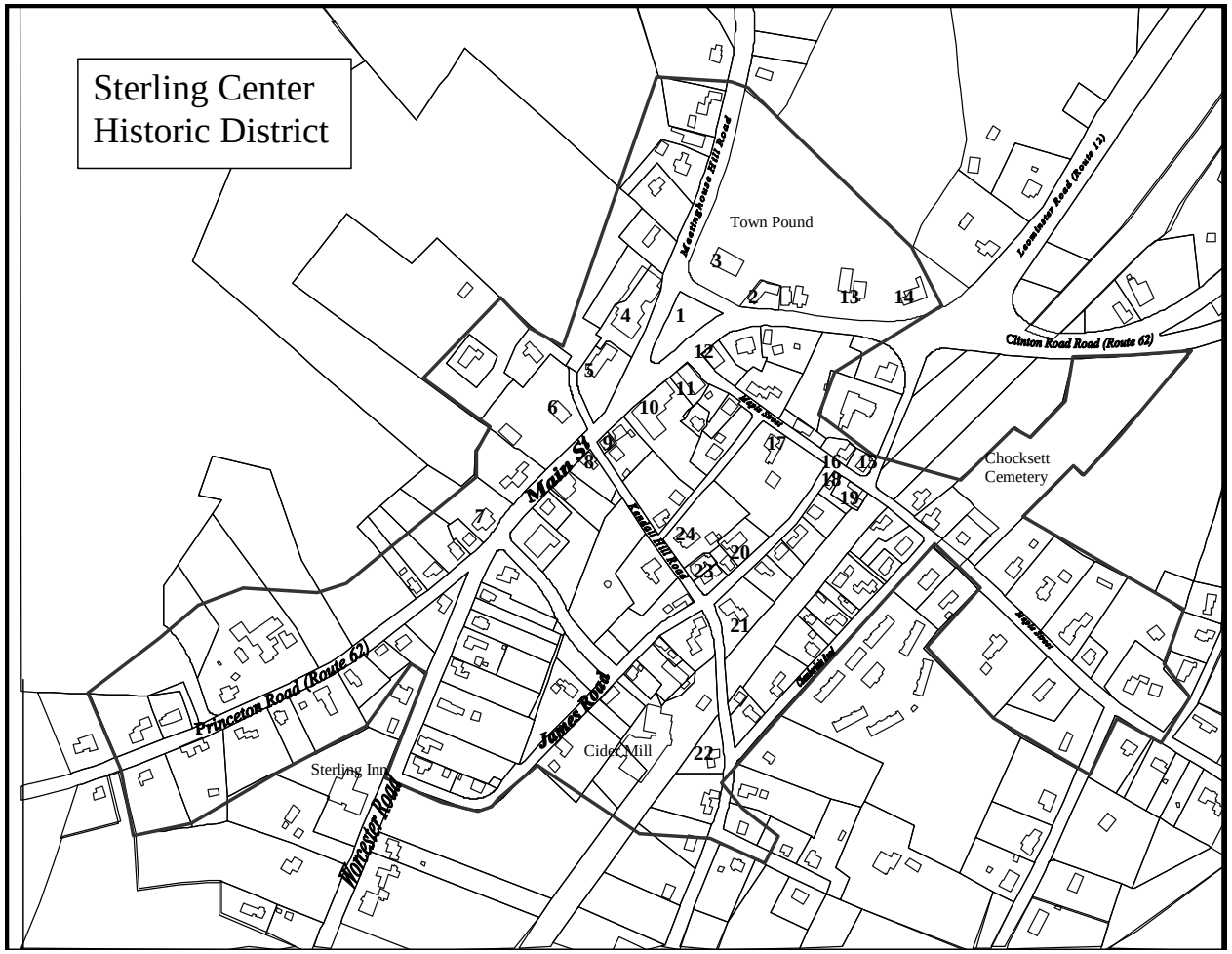
1. Historic or architectural importance, including National Register Eligibility
2. Endangerment, by demolition, deterioration, or alteration,
3. Lack or inaccuracy of prior documentation
4. Some remnant of a property's agricultural history, such as a dwelling, significant outbuilding, or agricultural landscape

The 57 farms surveyed were categorized as individual properties or farm areas depending upon the amount of historic resources found at each property. A total of 10 individual properties were found to be eligible for listing on the National Register of Historic Places. Some of the individual properties may also be eligible as part of a district. Most of the farms are now inactive and many of the barns and outbuildings in Sterling are deteriorating, and the written and photographic record may eventually be all that remains of the agricultural architecture. Table 4-11 lists the properties and their eligibility for the National Register of Historic Places.

These beautiful farmsteads are a primary element of the prized rural character of Sterling. Often these landscapes overlap with the important water resources of the Town. Efforts to preserve the historic value of these properties should be complemented with similar efforts to protect the landscapes they rest upon.

[33] Forbes, Anne McCarthy, and Schuler, Gretchen G., *Historic Farmsteads Survey, Final Report,* August 2001.

Figure 4-1: Sterling Center Historic District



1. Town Common
2. Bartlett-Butterick Building
3. Mary Ellen Butterick Building
4. First Church of Sterling
5. Sterling Library
6. Mitchell House
7. Josiah Leavitt House
8. Joseph Loring House
9. Moses Smith House/Shop
10. Commercial Block
11. Old Town Hall
12. Old Universalist Church
13. First Church Parsonage
14. Old High School (Light Dept)
15. Grange Hall
16. Station-Master's House
17. Sterling Historical Society House
18. Copeland Gun House
19. Manasseh Houghton House
20. Old Brick School
21. Kendall House
22. Amini Brooks House
23. Pratt House
24. Moses Thomas House

Sources: Sterling Historic Commission, Sterling Assessor's Office

Town of Sterling with assistance fromMontachusett Regional Planning Commission and

Nashua River Watershed Association

Table 4-11: Historic Farmsteads in Sterling

Historic Name	ST. #	Street Name	Assessors Map	Year	Inv #	NR Status
Chace-Chandler Farm / Meadowbrook Farm	191- 209	Chace Hill Road	110, 131	1700s-late 20th c.	E	Eligible
Clinton Road Farms	100	Clinton Road	70	ca. 1796-mid 1960s	K	
Wright-Flanagan Farm	64-70	Flanagan Hill Road	47	late 18th-late 20th c.	L	
Taylor-Boutelle-Kristoff Farm	70	Greenland Road	125	mid 19th-late 20th c.	O	
Goss-Hawkins-Broderick Farm / Sunny Crest Orchards	24	Hawkins Lane	109	late 18th -20th c.	G	
Carey-Wilder Farmstead / Dun Rovin Farm	6	Heywood Road	43, 54	ca. 1796-mid 1960s	AA	
"Sagatabscot /Old Holman Place	19-21	Johnson Road	118	ca. 1802- mid 20th c.	R	
Stuart-Williams Farm	105	Justice Hill Road. Cut-Off	15, 16	ca. 1870-ca. 1950s	AG	
Gould- Blanchard Farmstead	175	Justice Hill Road	13, 18	1898-mid 20th c.	AE	
Kendall Farms	31	Kendall Hill Road	106, 111, 112	late 18th - 1950s	F	Eligible
Stuart-Nelson Farm	34	Lucas Road	4	early 19th-mid 20thc.	AH	Eligible
Happy Hollow Farm	10	Merrill Road	139, 159	ca. 1895-1970s	Q	
Palmer-Lewis & Martin-Lamarche Farmsteads	35	North Row Road	23, 30	1790s-mid 20th c.	AB	
Lewis Homestead	71	North Row Road	23, 30, 31	1790s-mid 20th c.	AC	Eligible
33-46 Princeton Road Allendale Academy	33	Princeton Road	105	1840s-1870s	N	Eligible
Richardson Tavern	321	Princeton Road	98	mid 18th-late 19th c.	T	Eligible
Brown Farm	7, 25	Princeton Road	93, 105	early 19th - mid 20th	M	Listed
Heman Kendall Farm	132	Redemption Rock Trail	123	ca. 1829-mid 20th c.	P	Eligible
Redding-Chandler Farm / Stillwater Farm	228	Redemption Rock Trail	107	1790s-mid 20th c.	S	Eligible
Goss-Butterick Farms	170	Redstone Hill Road	89	early 19th early 20th	H	
Davis Farms	140, 150	Redstone Hill Road	89, 90	ca. 1790-late 20th c.	I	Eligible
Hycrest Farm / Sylvester Roper Homestead	5	Roper Road	4, 5, 12-14, 18, 19	ca. 1804-mid 20th c.	AF	Eligible
Butterick-Nourse Farm	26	Rugg Road	90	late 18th -mid 20th	J	Eligible
Bigelow-Stuart Farmstead	23	South Nelson Road	55	mid 18th-mid 19th c.	W	Eligible
Old Nelson Place	53	South Nelson Road	56	ca. 1800-mid 20th c.	V	
Taft-Listowich Farm	70	Taft Road	74	mid 19th-late 20th c.	U	
Jeremiah Burpee Farmstead	29	Tuttle Road	64, 73	1732-40	X	Eligible
Maple Brook Farm / Uriel Tuttle Farm	155	Tuttle Road	44	ca. 1800-mid 20th c.	Y	Eligible
Crystal Brook Farm / Jewett-Tuttle Farm	192	Tuttle Road	43, 54	ca.1740-early 20th c.	Z	Eligible
205-230 Upper North Row	205-230	Upper North Row Road	20	ca. 1800-1950	AD	

Table 4-11: Historic Farmsteads and Areas in Sterling

Historic Name	ST. #	Street Name	Map and Lot	Year	Inv #	NR Status
Old Whitney Place/Seven Pines Farm	109	Beaman Road	77-19	ca. 1785/ ca. 1849	105	Eligible
Fairbanks, Paul Farm	95	Chace Hill Road	133-05	early 1800s	296	
Bailey, Milton House	117	Chace Hill Road	133-03	ca. 1848	292	
Truell, G.W. House (1898)	181	Clinton Road	88-13	1800s	301	
Unknown	31	Flanagan Hill Road	28-01	early 1900s	186	
Old Eager House	17	Griffin Road		late 18th c.	57	
Putnam, Andrew Maj. House/ Windsor Farm	77	Heywood Road	21-08	ca. 1786	27	Eligible
Roper, Asa House	49	Justice Hill Road	41-03, 41-05	1790s	71	
Bailey-Breck-Rugg Farm /Clearview Farm	4	Kendall Hill Road	106-11	ca. 1800	65	Eligible
Sawyer-Butterick Farmstead	96	Kendall Hill Road	129-02	mid 19th c.	50	Eligible
Clark, Samuel House	22	Legate Hill Road	24-17	mid to late 1700s	41	
Keyes-Burpee House	226	Leominster Road	29-01	1819	173	Eligible
Smith-Hosmer-Robinson House	32	Maple Street	92-16	ca.1840	29	Listed
Merrick Roper House	12	Meetinghouse Hill Road	93-66	ca. 1850	134	Listed
Porter, Capt. John Farm	63	Newell Hill Road	127-12	ca. 1830s	298	
Burpee-Osgood House	54	Osgood Road	75-39	ca. 1750/ca.1835	122	Eligible
"Hilldale" / Jonathan Buttrick/Benjamin Houghton Ho.	98 & 99	Osgood Road	63-32	1791	121	Eligible
Whitcomb, Col. Asa House	146	Princeton Road	95-06	mid 18th c.	63	
Buss- Harris House	169	Princeton Road	96-23	ca.1790s	164	
Barnard-Springer-Rugg Farm	80	Redstone Hill Road	90-01	ca. 1780s	205	
Pratt-Buree Farmstead	7 & 15	Rowley Hill Road	84-20	early 19th c.	132	
Sawyer-Rugg Farm / Sholan Lodge	48	Rugg Road		1868	206	
Roper-Nelson Farmstead	1	South Nelson Road	42-05	ca.1780-90s	110	
Burpee, Moses House	36	Tuttle Road	64-05	ca.1775/1907	127	Eligible
Wilder Homestead	7	Wilder Lane	76-13	ca. 1784	93	Eligible
Buck, Silas House	14	Wilder Road	96-11	early 19th c.	158	
Johnson-Burpee-Wiles House	35	Wiles Road	87-02	late 18th /mid 19th c.	169	

Source: Forbes, Anne McCarthy, and Schuler, Gretchen G., *Historic Farmsteads Survey, Final Report,* August 2001. for the Sterling Historical Commission

c). Archeological Sites

The waning of the Ice Age left three lakes, East and West Lakes Waushacum and Fitch Pond; and numerous ponds and streams such as the Stillwater River, the Wekepeke Brook and their tributaries. For thousands of years before the arrival of the Europeans, an indigenous people inhabited the area around these freshwater ponds and streams. They left behind many artifacts that reveal the ancient history of the town, which can still be found today. The artifacts offer evidence of four periods of ancient indigenous occupation of the Sterling land area. The Sterling Historical Society has many fine artifacts dating to these periods in its collection.

The oldest habitation sites include the hilltops surrounding the lakes, Swett Hill, Kendall Hill and Newell Hill. The three oldest projectile points found in Sterling, were discovered by Maryanne MacLeod on these hills. Approximately 9,000 years old, these points belong to a period known in archaeology as *Early Archaic*, dates from 10,000 to 8,000 years ago. People then lived a nomadic lifestyle, following big game, such as mammoth that roamed over a tundra-like landscape. At that time, the Waushacum Lakes, Fitch Pond and the lowlands of Sterling center were one huge lake. This was also a time of radical environmental and climatic change.

The Middle Archaic Period, 8,000 to 6,000 B.C., is represented by a large increase in native population with an accompanying greater number of sites. These include the lands around the Waushacum Lakes, Sterling Center, the Chace Hill Rd, Flanagan Hill Rd., Albright Rd., and the Stillwater River drainage. The lifestyle, though still semi-nomadic, included more settled areas around lakes and ponds where people could avail themselves of the abundant food resources. Artifacts typical of this time include woodworking tools, such as adzes and axes, and projectile points made from local stone, such as Sterling argillite and quartz.

The Late Archaic, 6,000 to 1,700 BC, and the Terminal Archaic, 1,700 to 700 BC are well represented in Sterling's ancient history. The Historical Society houses many drills, knives, scrapers, pestles and mortars from this time period in its collection. A sizable population engaged in a semi-nomadic seasonal round of activities, ranging from hunting, fishing, and food gathering. Known site areas include all sites previously mentioned. Burial sites, believed to date to this period, have also been discovered. Two of them, on Kendall Hill and on Flanagan Hill, were destroyed by development, despite attempts to save them. A third site on Campground Rd. still remains and it is hoped that this one will be preserved.

The Early Woodland (700 BC to 200 BC) and the Middle Woodland (200 BC to 500 AD) Periods were times of great change for the indigenous people. Pottery and agriculture were introduced. By the Late Woodland Period (500 AD to 1,500 AD) there were many agricultural sites in Sterling. Cornfields covered much of the plains extending from Sterling center to the West Boylston town line and the flat lands along Route 62 to the Lancaster town line. Fewer artifacts from these periods have been found in Sterling, but this is true of southern New England as a whole.

d). Unique Environments and Recreational Assets

Scenic Vistas/Scenic Roads – Sterling is blessed with many rural roads that offer scenic vistas of its historic farmlands and pastures, barns and farmhouses. In the highlands of the town, these can roads offer longer range views of the surrounding valleys and nearby hills of neighboring towns, most notably, Wachusett Mountain. The best view of the mountain is afforded from Muddy Pond Road, not far from Chocksett School. Here, open fields and the peat bogs lie in the floodplain lands of the Stillwater River. Across from this area, on the north side of I-190, the Sterling Airport takes advantage of the extensive lowlands for its runways.

The Waushacum Lakes – These beautiful lakes in the southern part of town offer attractive scenery and some wonderful opportunities for lake trout fishing. At East Lake Waushacum the Town beach at Sholan Park affords local residents a range of summer recreational activities including swimming, sunbathing, volleyball, basketball, picnicking, fishing and boating.

The Sterling Rail Trail – The non-profit Wachusett Greenways[34] is leading efforts to develop the abandoned rail bed of the Fitchburg and Worcester Railway into a pedestrian rail trail currently referred to as the Sterling Rail Trail. Since 2002, Wachusett Greenways completed a critical trail section between the Sterling Cider Mill (in Sterling Town center), across a bridge at the causeway between the Quag and West Waushacum Pond, to Gates Road (See 2008 Open Space Inventory map for the status). The bridge at the causeway was reconstructed from two surplus pedestrian bridges left over from Boston's "Big Dig". The completed trail section, comprised of compacted stone dust, is primarily under the control of the DCR-DWSP except for the cider mill section which is private property.

There is a plan to extend the trail northerly just east of Route 12 to the Chocksett Road vicinity through lands owned by the Town of Sterling immediately west of Oak Hill Cemetery, onto a pending Wachusett Greenways easement through industrially-zoned lands ultimately leading to Chocksett Road.[35] The interim northern endpoint of the trail is expected to be in the vicinity of Chocksett Road just south of the Exit 6 interchange of I-190 and Route 12 and the Sterling Police Station. The trail will also diverge from the rail bed in that vicinity since the historic rail bed follows the current path of Route 12 at that point. Full trail development through the privately owned easement is expected to take a period of 5 to 10 years and is partially dependent on the development of a proposed industrial park. Planning efforts must give special attention to the safe crossing of Chocksett Road, especially given 40B and other development pressures in that region of the Town. In particular, the Town of Sterling and MassHighway need to critically evaluate options for safe pedestrian passage as part of the redesign of the Chocksett Road [36] and Route 12 intersection since commercial amenities on the opposite side of Route 12 are likely to be of interest to trail users. MassHighway has proposed the possible installation of a traffic circle or rotary.

Further extension of the trail along the I-190 corridor is of interest and may include lands within the Town of Lancaster and City of Leominster. It is tentatively proposed that the lands trusts of each respective town will lead this evaluation. At this stage, planning efforts have focused on identifying trail pathways and barriers. Determining the appropriate trail type has a longer horizon, though there is interest in developing the trail with a future use as a means of alternative transportation to the I-190 Exit 7 interchange (Jungle Road area) and ultimate connection to Leominster.

The Sterling Rail Trail (aka "Sterling Spur") is a piece of the development of the Mass Central Rail Trail (MCRT) which rail trail enthusiasts[37] hope will someday connect at least 24 communities from Boston to Northampton, MA. Although the Sterling Rail Trail does not lie on the historic path of the MCRT, Wachusett Greenways has already identified a suitable connection to the MCRT in Oakdale following Gates Road to Bean Road, which becomes Prescott Street in West Boylston. From there, the recommended pathway uses Pleasant Street, an inactive, unpaved, historic road owned by the Town of West Boylston to reach Route 140 in Oakdale (see Figure 4-6). This pathway currently involves pedestrian crossing of Route 12 at Gates Road with no special pedestrian cross walks or signage. Wachusett Greenways and Sterling volunteers are working to identify ways in which the pathway of the trail can be modified to improve both safety and user experience along the trail.

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[34] See http://www.wachusettgreenways.org/ for more information on the non-profit Wachusett Greenways. See http://www.wachusettgreenways.org/WG%20Trail%20Map.htm for a trail map.

[35] The pending easement is intended to pass through privately owned parcels which are slated for light industrial development. The landowners agreed to extend this easement to Wachusett Greenways contingent on the Town of Sterling's willingness to rezone the property to Light Industrial Use. The rezoning took place at the May 14, 2007 Annual Town Meeting.

[36] Chocksett Road is a state-owned "cutoff" which connects the Exit 6 interchange to Route 62, Leominster and Clinton.

[37] See http://www.masscentralrailtrail.org/ for information on the Mass Central Rail Trail Coalition.

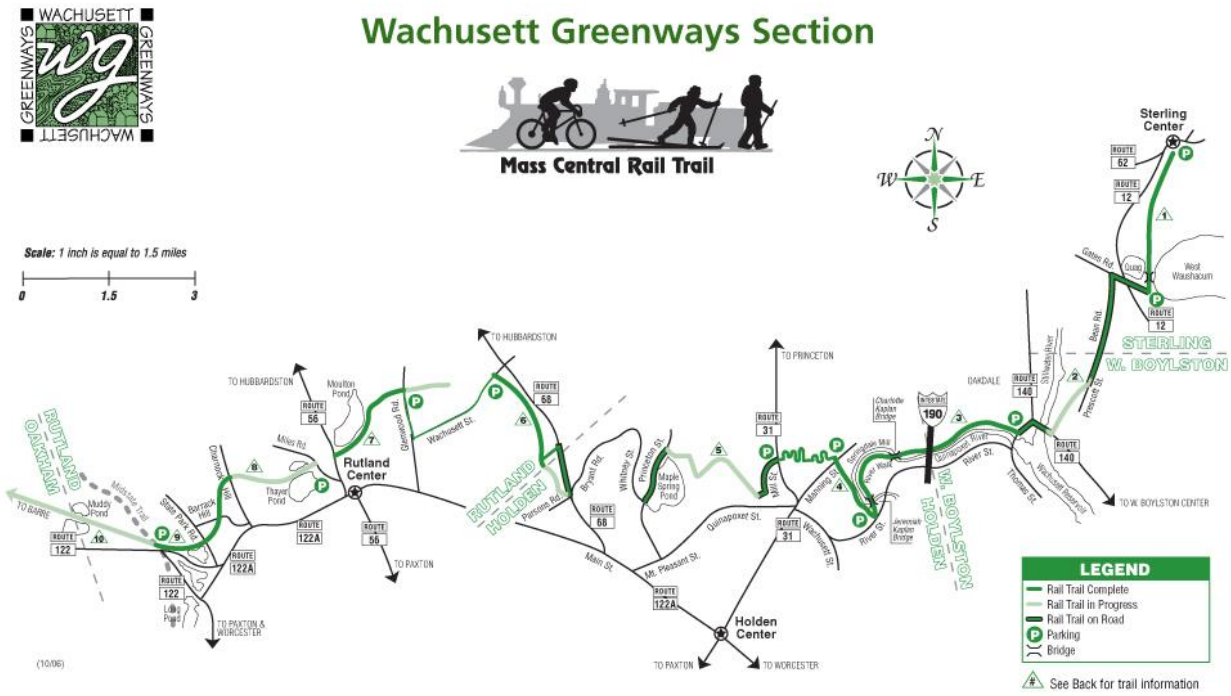

Figure 4-6: 2007 Wachusett Greenways Trailways Map[38]

Sterling Greenery Community Park - In January of 2005, a group of enthusiastic Sterling residents formed the Sterling Play Area and Recreation Committee (SPARC) to work as a sub-committee with the Recreation Department to design and raise funds for the development of an outdoor public park. They considered several locations and eventually chose a town-owned parcel located on the corner of Muddy Pond and Griffin Roads, due to ease of access, availability of parking and open space, and natural features (e.g. a pond) that provided a unique setting for the park. The Sterling Select Board gave the committee approval to build the park in the summer of 2005.

SPARC conducted extensive research to determine the most appropriate design for the park to accommodate people of all ages and abilities. The committee visited nearly 30 playgrounds in the area, collected feedback through a self-administered survey distributed at public locations and through a suggestion box at the Sterling Fair, and conducted a focus group with children of various ages. In January of 2006, the committee also solicited parents of children with disabilities for input through a survey administered to members of Central Massachusetts Families Organizing for Change, a nonprofit that helps provide opportunities for people with disabilities and their families. The research revealed that the community wanted a safe place (free of charge) where people could engage in a variety of fun and unique activities and socialize with each other. Specific needs included:

- Make play structures interesting and different
- Fence in the play area
- Provide open space for running around
- Provide infant and toddler swings
- Provide group gathering spots and picnic areas
- Address pest control
- Make equipment suitable for children with physical limitations
- Maintain park equipment and grounds.

[38] Source: http://www.wachusettgreenways.org/Trail%20map%20Info.html

The committee researched the top playground equipment manufacturers in the area. They selected Ashland-based Goric Marketing Group to design the play equipment due to extensive experience building fun and unique equipment accessible to kids of all ages and abilities.

To meet these needs, the Committee developed a park design incorporating many elements, such as a fenced-in state-of-the-art playground for 2-5 year olds and separate playground equipment for 5-12 year olds, walking paths, sitting areas, a pavilion and natural elements (trees, shrubs, flowers, and plants). Primary elements of the park include a playground enclosed by a gated fence featuring a net structure, rubber bridges, a playhouse, swings, and wheelchair accessible walking paths encircling the pond and connecting with the Chocksett School athletic fields. Separate areas within the playground will be designated for kids under five and for kids aged 5 to 12. The park will incorporate science/nature themes into the types of playground equipment (e.g. frog to climb on, mushrooms to jump over, and equipment demonstrating the principals of physics) and other aspects of the Park to engage kids and adults. Landscaping, using low-maintenance native plants to reduce water dependency, will help delineate the play areas and enhance the natural beauty of the area, and a pavilion for group gatherings will provide protection from the sun. The pavilion, benches, picnic tables, walking paths, landscaping, and science/nature theme elements are all intended to make the Park inviting to both adults and children.

Sterling Greenery Community Park is open to the public daily from dawn to dusk, and is easily accessible from Muddy Pond and Griffin Roads. The park will also provide opportunities for adults to socialize while walking on nature trails or sitting at benches and picnic tables. To date, S.P.A.R.C. has generated considerable public and private support for its efforts and plans to pursue a PARC grant for phase II of the project, which will include the purchase and installation of additional playground equipment.

G. ENVIRONMENTAL CHALLENGES

A number of environmental challenges face communities today that stem from both current and earlier uses of land and Sterling is no different. Though many people view Sterling as a relatively rural community, the town is host to a number of small businesses, farms, light industrial companies, airport, as well as mining and soil production operations. A major north-south connecting interstate highway cuts across Sterling. The town's geographic location as well as the rural atmosphere attracts residential development (contributing to an ever-increasing network of roads), and the presence of a major drinking water supply and all of its attendant land use restrictions combine to provide some significant environmental challenges.

Water quality and quantity issues are of high importance and concern as will be noted in the following paragraphs. Water is an integral part of life for people and other living things, but is often overlooked until a situation develops that prevents people from drinking, fishing, swimming or otherwise utilizing water for other activities related to business and manufacturing. The Wachusett Reservoir and associated lands protecting it has probably kept Sterling from facing even more difficult water quality issues—the Stillwater River drainage area is heavily regulated, contributing to higher water and soil quality. In late 2009, the highway superintendent was quoted in a local newspaper that within the next 5-10 years, there will be requirements for expensive filtration coming down from the state, as well as a probably infrastructure breakdown on the older parts of the water delivery system. The cost of deferring maintenance or renovations will be very high if the town does not pay attention to this basic life element of its citizens.

Concerns about water quantity have also been expressed by town officials and citizens. These concerns were expressed when Nestle proposed in 2008 to explore the potential for taking water from the Clinton Wekepeke basins. Issues about water quality and quantity were part of the controversy. Though bordering the Wachusett Reservoir, Sterling is not a recipient of water from the DCR-DWSP.

Ongoing noise concerns from quarry and asphalt operations at Pandolf-Perkins have yet to be completely resolved and algal blooms at East Lake Waushacum, one of several that have occurred in the past 2 decades continues to be a source of concern for citizens. An emerging concern about earth removal, soil production, and blending in town may bear future scrutiny. Some of this activity is occurring adjacent to the Wekepeke Aquifer, in Lancaster near Rte I-190.

1. Water Quality

a). Wellhead contamination

Recent contamination of perchlorate at a new wellhead location off Rte 12 (with 3 new well locations) near Quag deserves special attention. At this time, the new wells are shut down and the town is operating with one well. Concern has been expressed that the contamination source may be from blasting explosives from Pandolf-Perkins. Mark Semenuk, formerly of the Department of Public Works, confirmed that the DPW approached Pandolf-Perkins and was told that Pandolf-Perkins Co. Inc. does not use perchlorate-containing blasting chemicals. Piles of blasted rock between Jewett Rd. and I-190 at a large pond (potentially the result of beaver damming of a stream that feeds into the Quag) could possibly be historically blasted materials partially submerged with outflow heading toward the three new wells near the Quag. Risk of surface contamination is high at all current well sites along Routes 140 and 12 due to application of road salt and stormwater runoff, as well as chemical spills or leaks.[39] Heavy salt use and spray by both the state and the town along sections of Route 12 at times seems excessive. Critical sites might benefit from locally controlled reduced salt use regulation to protect water, soil, and habitat.

b). Arsenic

Some Sterling residents have expressed concern about arsenic. According the MassDEP, arsenic (chemical symbol As) occurs naturally in soil and bedrock in many parts of the United States, including parts of Massachusetts. Arsenic occurs as a contaminant in some groundwater in Massachusetts, most frequently in the central part of the state. Drinking water from bedrock wells, also called drilled or artesian wells, and less frequently from shallow or dug wells, may contain arsenic. Arsenic has no smell, taste, or color when dissolved in water, even in high concentra-

[39] per Mark Semenuk, DPW; Sterling SWAP/DEP document

tions, and therefore only laboratory analysis can determine the presence and concentration of arsenic in water.[40] Activities that could have left arsenic residuals in Sterling include apple orchard spraying, possible historic coal ash disposal, and use of some pressure treated wood. The town rejected an opportunity to acquire the Wyndhaven Farm on Taft Road when it was released Chapter 61A due in part to concerns about site remediation of arsenic contamination. The former water department supervisor noted that there was an interest in expanding municipal water supply to some of the areas in town that are at higher elevations, though there are some concerns that with this action, more residential development would follow the new lines.

c). Aquifer concerns

Sterling's industrial zone, located on Route 12, near the I-190 interchange, is also located above the Wekepeke Aquifer, posing potential risks to water quality. The water in the Stillwater Aquifer is high in iron and somewhat corrosive. There is a history of plugging at the West Sterling well due to iron corrosion.

d). East Lake Waushacum

The East Lake Waushacum Association (ELWA) monitors water clarity and the DPW monitors bacterial counts at Sholan Park. According to a Satellite Ground Truthing study conducted from 1996 through 1998 by the Massachusetts Water Watch Partnership, the U.S. Geological Survey, and the Mass. Department of Environmental Management, East Lake Waushacum is in a nutrient rich relatively eutrophic state. Algal blooms have occurred a few times in the past decades and again there was a bloom in the summer of 2009 in some coves. ELWA has arranged for a consulting firm to look into potential solutions beyond alum treatments. The BOH health agent questioned what other alternatives could be considered and the affect past alum treatments have had on the lake ecology. This may be an opportunity for ELWA, the Conservation Commission, and the BOH to host a fisheries biologist and water quality expert from MassWildlife and MassDEP for an informational forum. Development of a sewage treatment facility in the vicinity of the lake should be considered, though others point out this could open the door to even more development. The 2002 OSR Plan recommended pursuing a Community Development Block Grant for this but it did not happen. The success story of Wauschacum Village (Campgrounds) may serve as a model, although the infrastructure needed at the lake is likely to be more complex. Pollution issues facing East Lake Waushacum include increased nutrients that support algae growth and bacterial contamination from animals and septic systems.

2. Soils

Soils manufacturing/blending seems to be a growing business in Sterling and does not appear to be controlled by the Earth Removal Bylaw (ERB). This could affect water quality especially in the Wekepeke Brook area where an operation is on going.

3. Animal Waste

Concerns exist for the condition of the pond at the Sterling Greenery Community Park due to the presence of migratory waterfowl. Fencing meant to keep children away from the road specified in the design of the SPARC park layout may help mitigate nutrient load to the pond in the play area, though some regular users of the park say that geese are frequenting the pond and surrounding grassy areas. Pumps in the pond at the park run in the winter, but the pond does freeze over.

The Recreation Department has noted evidence of dog waste at Sholan Park beach. Town rules prohibit dogs at the Sholan Park, but it is common to see them and their byproducts. Some dog owners walk their dogs on school property, though their diligence in cleaning up after their pets is often inconsistent at best, particularly in the winter months. The situation requires owner education and enforcement of Town policies. Again, it seems to be a problem of inconsiderate dog owners and lax enforcement.

4. Non-point Source Pollution

Non-point source pollution is a growing concern for water-resource protection interests across the State. Non-point source pollution is contaminated run-off that flows into surface and ground waters. Potential sources of contaminants include underground storage tanks, failing septic systems, salt/sand applications to roadways, fertilizer run-off from lawns and golf courses, some agricultural activities, heavy equipment dumps, gas stations, animal wastes, and

[40] Information on testing and testing laboratories for landowners with private wells can be found at http://www.mass.gov/dep/water/drinking/arswell.htm.

run-off from residential developments. These land uses may lead to the runoff of sediments, pesticides, arsenic, lead, fertilizers, chlorides, effluent, and hazardous wastes into water bodies, and they should be monitored and restricted in areas that are particularly sensitive to contamination.

5. Salt contamination

Salt contamination of Town Well #2, located adjacent to Route 12 near Greenland Road, has been a problem. Water from these wells has exceeded recommended limits for sodium concentration. The salt entered the well from a previously open salt pit, but the well is also contaminated from salt spread on Route 12 during icy driving conditions. (Such salt use has since been reduced.) The well is flushed periodically to dissipate the salt. Routes 140, 62, and I-190 intersect the Stillwater River's watershed and present the possibility for contamination from road salts and spills resulting from highway accidents. Concerns still exist about salt storage in Sterling. The Bean Rd. and Rte 12 site is very close to Quag in the vicinity of a relatively high water table. The site is recessed and tends to flood. The Chocksett Rd. site operated by MassHighway is adjacent to a major Wekepeke feeder stream which flows into Stump Pond. A Sterling DPW site contains a pile of untreated sand and the site lies very close to the wellfield. All three sites are in Zone II. See Water Resources Map.

6. Landfills

The old Sterling landfill located off the junction of Chocksett Road and Rte 12 is ironically located in the midst of the Wekepeke aquifer, a medium yield aquifer. Methane gas releases still affect the police station located on the site. In the winter and spring of 2008-2009, the landfill served as a staging area for the transportation and chipping of down trees from the December ice storm that knocked out power for 2 weeks in some areas of town. The Town has also considered this site as a possible location for a dog park in the past year.

7. Sedimentation/Erosion

Though sedimentation may be of concern to Sterling residents, Mass DEP has not identified impaired waters that are contributing sediments or phosphorous loading on a scale of major concern in Sterling. The Stillwater River is relatively undeveloped and much of the watershed lands that drain into the Stillwater are protected by DCR-DWSP. Development occurring in this area requires an extra sign-off from DCR-DWSP as any activities are of concern in protecting water quality. It should be noted that this water supply is the largest gravity fed drinking water system that is not utilizing an expensive filtration process that many other water suppliers must undertake.

Meetinghouse Hill Road has experience chronic erosion, but in the spring of 2009, after a number of days of heavy rain, a complete blowout of a residential driveway and the road made the local and state media pages and television. Conservation agent Matt Marro reported that drainage from Rte I-190 was sloped toward a stream in the vicinity. Marro worked with MassHighway to address the situation—suggesting that MassHighway utilize an adjacent detention pond area constructed when I–190 was built. Though clearing of vegetation in the vicinity of the detention pond did take place in the summer of 2009 nothing has occurred since the summer. Marro reported that he calls MassHighway once a month for a progress update.

8. Hazardous Waste and Chemicals

According to information in the state's database of reported hazardous waste releases or hazardous waste sites maintained by Mass DEP, Sterling has experienced 32 reported instances of releases or waste sites since 1994.[41] (See Appendix G for a table of reported instances since 2000, along with a list of definitions of acronyms used).

a). Underground Storage Tank (UST) Locations

MassDEP also maintains a database of underground tank locations. The database lists 17 UST locations in Sterling.[42] Of the 17 locations, 11 sites had removed all underground tanks. Of the remaining active UST locations, one is a residence for which there is no tank information or inspection, two other locations have no information on overfill or spill prevention systems in place. (See Appendix H)

[41] Mass DEP web page: http://www.mass.gov/dep/cleanup/index.htm
[42] Mass DEP web page: http://db.state.ma.us/dep/ust/ustResultsPage.asp

b). Toxic Chemical Use Reports

Roughly 600 industrial facilities in Massachusetts must report annually on toxic chemicals used and toxic byproducts generated at the facility. Each year, as facility managers prepare to report toxic chemicals released to the environment or transferred off-sited under the federal TRI, they must also report on the use of those chemicals under the state Toxic Use Reduction Act (TURA) program. Companies are required to report if they meet certain criteria. Industries required to report include mining, manufacturing, transportation, wholesale and other certain services. All companies which use more than 10,000 pounds or 25,000 pounds (depending on how it is used) of one of the chemicals on certain lists must report toxics use in the same terms: manufactured, processed, otherwise used, total use, generated byproduct, shipped in product, and releases. It should be noted that the most recent information is 2007. The Toxic Use Reduction Institute website (http://turadata.turi.org/WhatIsTURA/index.html) lists two facilities in Sterling that submit reports on the use of benzoperylene, lead compounds, and polycyclic aromatic compounds:

Pandolf-Perkins Company Inc., 194 Worcester Road—Reports benzoperylene and polycyclic aromatic compounds on site every year since 2003.

Fiberoptic Components LLC, 2 Spratt Technology Way –In 2005 Fiberoptics reported benzoperylene and polycyclic aromatic compounds on site, while they have reported lead compounds every year since 2001.

9. Air/Noise

There have been continuing complaints focusing on air quality and noise from the operations at Pandolf-Perkins Inc, a concrete, asphalt and quarry company, over the years. The company, located on Rte. 12, not far from the center of town, has operated for decades. Residential development has crept closer to the operation over time, but long-time residents of the area noted in 2006 that problems appear to have worsened. Newspaper articles dating back to 2006 from the Holden Landmark serve as a chronology of citizen frustration. It should be noted that another rock mining operation in the Chocksett Road area is also near residents, but it appears that the operations are not as severe as Pandolph-Perkins. In 2006, selectmen were petitioned, a citizens group formed and informational meetings and hearings were packed. Residents have asked for noise suppression devices and relief from early morning start ups (5:00 AM). Concerns about dust circulating carcinogens and obscuring traffic sight lines on Rte 12 were noted. In 2007 at a meeting, improvements were noted by nearby residents.

Following several inspections in 2006 and 2007, the Massachusetts Department of Environmental Protection (MassDEP) assessed penalties to the Pandolf-Perkins Co., Inc. in 2008, totaling $85,000, for violations of state water management, air quality, hazardous waste management, and toxic use reduction regulations. In addition to complying with all applicable regulations and paying a penalty of $23,034, Pandolf-Perkins must design and implement an air pollution control mitigation plan and monitor dust, odor, and noise emissions from its processes.

Since that time, the quarry has encased some loud equipment, paved roads, and performed maintenance on industrial machinery. The company is applying water to the quarry grounds and blast sites to minimize dust clouds and is performing smaller blasts. Though an official with MassDEP noted that Pandolf-Perkins Co. Inc. has made significant improvements towards air-borne dust minimization, water conservation, and waste oil spill prevention, residents in November of 2009 still complained to selectmen about the lack of change in facility operation hours. The plant often starts up at 5:00 AM. The noise from the asphalt plant dryer appears to be the biggest problem and one resident is looking into some kind of noise dampening equipment installed in a similar plant located in Barre.

10. Forestry

a). Possible Primary Forest Locations

As mentioned in the Vegetation area, maps from the 1830's in Sterling show forested areas, which the DFW–NHESP has noted may be areas of Primary Forest. Some of these mapped areas are within protected open space, but a few areas on private lands could be targets for conservation acquisition to maintain biological diversity in the town and region. The largest block of unprotected possible Primary Forest in question lies between the airport and Rte I-190, an area that the Town has considered for acquisition in past years.

b). Ice Storm Damage

In December of 2008, a 100-year ice storm of epic proportions swept into central and western Massachusetts. Communities in central and northern Worcester county were severely impacted by the 2-3" of ice that accumulated on every branch and tree trunk in the county. Trees and branches of all sizes toppled on to power lines, houses and

buildings, roadways and hayfields. Power for some areas in Sterling was not restored for two weeks. Municipalities struggled to deal with clearing roadways of fallen trees. FEMA, MEMA and the National Guard coordinated clean-up efforts throughout the county. Utility companies from other parts of the country also assisted in the effort. Economically, area tree cutting services experienced a boom in business and many tree cutting services from other parts of the country also were seen in town and the region looking for business for weeks following the storm. Chainsaws were a difficult item to find for sale in the region for a month or so. Maple syrup producers suffered extensive damage to their tap lines. The aftermath challenged farmers in keeping their livestock watered and fed, even though many had generators.

The dramatic change to the landscape will be noticeable for years to come. Many people with military service commented that the forests looked as if they had been shelled; many crowns were totally or partially destroyed. "Widowmakers" are visible along tree lines, hanging from large trees and falling when during times of high winds or heavy snow.

The Landmark, a regional weekly paper, posted an article in December 2009 that focused on a group of students led by graduate student, Zachary Christman, and geography professor, John Rogan from Clark University.[43] They were measuring the effects of the ice storm in the nearby community of Paxton at Moore State Park. Students noted that oaks and maples suffered severe damage compared to hemlocks and white pines—possibly because of the flexibility of the coniferous trees. Forests with a mix of both conifers and deciduous (leaf bearing) trees suffered less damage than did deciduous stretches of forestland. Based on comparisons of satellite photos of the area taken in the summer of 2008 to images taken in 2009, there was a 30 percent reduction in vegetation over much of the area, with some areas reduced by 60 percent. Some trees may become more susceptible to diseases or insect pests because of the ice storm. Professor Rogan commented that it could take anywhere from 20 to 100 years for the areas affected by the ice storm to return the pre-ice storm scenario, "but visibly, you will not notice [the damage] in as little as five years.

In a recent publication from the UNH Extension Service, foresters and wildlife biologists from NH, ME, and CT pointed out that the effects of ice storms on wildlife can be of real benefit, and collectively agreed on a number of points:[44]

- The most noticeable impact on wildlife and their habitats is the sudden creation of lots of dead, dying, and downed wood. The fallen and damaged hardwoods allow more light to reach the forest floor. Over the next few years, wildflowers, grasses, shrubs and tree seedlings will emerge in these sunlit openings. In spring, many wildlife species will frequent these openings in search of fresh green growth and juicy berries.
- Birds that nest in tree cavities, such as woodpeckers, nuthatches, and chickadees, will have more trees to choose from for nesting and foraging. More dead wood on the forest floor often leads to an increase in insect abundance. Since insects are important food sources for birds and their offspring, more insects may lead to more birds.
- One of the missing habitat features in our woodlands today, is a large amount of fallen woody debris of all sizes. The ice storm created a bonanza for creatures that inhabit the forest floor, Salamanders, frogs, snakes and other small animals will find refuge under and in this debris. Landowners don't need to spend any money to create this habitat, the ice storm did it for us. Leaving fallen woody debris throughout the forest floor is better for wildlife than "cleaning up the woods" and landowners in Sterling need to be informed about this situation. Concern about increased forest fire danger may be valid; however, fallen wood can pick up sufficient moisture to minimize fire hazards.

c). Asian Long Horned Beetle Infestation

In August of 2008, the city of Worcester confirmed evidence of the Asian Longhorned Beetle (ALB), an exotic pest, in many of its trees. The Asian Longhorn Beetle is an invasive species native to China. It was first discovered in the U.S. in New York in 1996, and has also been found in Chicago and New Jersey. The beetles cause damage by tunne-

[43] The Landmark, December 2009, (http://www.thelandmark.com/news/2009-12-23/Paxton_News/Clark_students_study_ice_storms_effects_on_local_f.html)

[44] "Wildlife Weathers the Storm," written by Foresters and wildlife biologists from NH, ME, and CT, published by the UNH Extension Service (http://extension.unh.edu/forestry/Docs/wildstrm.pdf)

ling within the trunks and branches of trees, disrupting the sap flow and weakening and eventually killing them. This pest attacks a wide variety of hardwood trees, particularly maples, and is considered a serious threat to the nursery, lumber, wood products, maple syrup, and tourism industries in our state. If it became established over a large area, it could also significantly disrupt the forest ecosystem.

The Massachusetts Department of Conservation and Recreation, the Massachusetts Department of Agricultural Resources, and the City of Worcester and other affected municipalities are working with the U.S. Forest Service and USDA APHIS-PPQ in coordinating a management plan to eradicate ALB in Massachusetts. A survey of the area was conducted and beetles were found in the southern portion of Holden, a town that borders Sterling. Surveys and reporting efforts are ongoing to determine the extent of the infestation, and regulatory management to prevent movement of host trees and wood out of the infested area. By December of 2008, the southern portion of Holden was found with ALB. In September of 2009, the regulated area where host trees and woods cannot leave the area had expanded to Boylston and West Boylston, bordering the Wachusett Reservoir. By December of 2009 the regulated area was expanded to include the entire town of West Boylston, directly adjacent to Sterling. Trees and wood may not be moved out of the regulated area by anyone. Infested trees by the thousands have been removed and destroyed in Worcester and Holden, and susceptible host trees may be treated. Replanting efforts are ongoing in Worcester. At the time of this writing, January 2010, there have been no reports of ALB in Sterling, but due to the nature of the situation, it behooves the Town to be aware that this pest may not be far from town, if it is not already present. If ALB is found in Sterling, private and public landowners with forest cutting operations, homeowners with firewood and people with downed or dead trees will be prohibited from removing natural wood materials (e.g., twigs, branches, trunks, logs and stumps) regardless of whether or not the materials are infested.[45]

[45] Materials and information on Asian Longhorned Beetle identification, signs of ALB, maps of the regulated area and other related links are found at on the USDA Natural Resource Conservation Service site: http://www.massnrc.org/PESTS/alb/