SECTION 4 - ENVIRONMENTAL INVENTORY AND ANALYSIS [5]

A. Geology, Soils and Topography

1. Geology

Most of Malden's topography is comprised of bedrock very near or at the surface. The bedrock was formed millions of years ago through volcanic action that has resulted in large rhyolite (equivalent of granite) deposits throughout the city. Many of these areas are located in the northern half of the city, and the rhyolite is actively being removed from the Rowe Quarry in the northeastern section of Malden. All occurrences of rhyolite within Malden are considered part of a larger geologic phenomenon called the Lynn Volcanic Complex. The Lynn Volcanic Complex defines the perimeter of activity for the ancient volcano that occurred in this specific region of New England. Following the Lynn Volcanic Complex, glacial activity resulted in the formation of drumlins within the Boston Basin. It was this activity that further defined Malden's topography by creating its highlands and lowlands. The southern portion of Malden is comprised mainly of urban soils that have been filled in or deposited throughout the city over its history and for its economic development. More specifically, many of these areas were filled to provide easier and more convenient access to the Malden River, which assisted Malden's thriving industry in the early to mid 1900's.

2. Soils

The distribution of soil types closely parallels the topographical character of Malden. Although the vast majority of the city is classified as "urban land", soil types vary markedly from north to south. North of the Pleasant-Salem Street line, soils are either shall to bedrock or are of the very poorly drained organic type. Interspersed within this area are some sites containing well-drained or even droughty gravel deposits left by the last continental glacier. Soils in the southern half of the city are even more urbanized than those in the north. They range from the well-drained gravely deposits of Belmont Hill to the moderately drained clay and organic deposits in the southeastern quadrant and along the Malden River. In the latter case, soils have been highly modified over the years by large quantities of urban fill.

[5] This section has been reproduced in its entirety with only modifications from Malden's 2001 Open Space and Recreation Plan.

3. Topography

Elevations and topography range between two extremes. The southern half and easternmost parts of the city are low and level, exhibiting only minor topographical relief and few natural ledge outcroppings. From a near sea level elevation at Nowell Creek on the Revere line, elevations rarely rise above 50 feet south of the Pleasant-Salem Street east-west corridor. The exception is in the Belmont Hill area, where a gentle glacially formed hill rises 110 feet to offer a pleasant view of the downtown Malden area. Several areas along the Nowell Creek and in the southwestern corner of the city are presently marshy.

The steep escarpments and ledge outcroppings north of the Pleasant-Salem Street corridor characterize the land morphology of the entire northern portion of the city and are in stark contrast to the benign topography of the south. Where sedimentary deposits underlie the landforms to the south, volcanic action was responsible for the physical relief of the north. The rocky hills of Malden are part of a chain known as the "Lynn Volcanic Complex". These highly eroded and glaciated hills are all that remain today of once active volcanoes. Many of these hills offer impressive views of the surrounding countryside, particularly of the lowlands to the south and east. Elevations of more than 280 feet are found in the Middlesex Fells Reservation and in Maplewood Highlands. Elevations of over 150 feet are commonplace. Linden Highlands, in particular, with elevations of approximately 200 feet, offer dramatic views of the Atlantic Ocean and the Boston skyline.

There exist three natural north-south "passes" through this line of hills. The broadest is the area between the MBTA railroad right-of-way and Main Street, following the course of Spot Pond Brook. A second narrower pass follows the old course of a major Indian trail through the eastern section of the city. This pass was utilized in the construction of the old "Newburyport Turnpike", now called Broadway, and designated as Route 99. Finally, a third winding pass exists along Lebanon Street in Maplewood, following the course of an old brook. Only the first of these passes maintains significant width and it is here, therefore, that the railroad was established and where the major development of the northern part of the city is centered.

B. Landscape Character

Malden's location at the northern edge of the Boston Basin provides a varied physical setting. The city is divided north to south between the rolling uplands of the Mystic River Watershed and the flatter lowlands of the Coastal Plain. According to the United States Department of Agriculture, Soil Conservation Division, the Boston Basin is "characterized by a relatively smooth plain with about 100 round and oval hills called drumlins that rise sharply above the plain". These drumlins were created through episodes of glacial activity where the glaciers moved over the terrain leaving behind large deposits of flat glacial till

and higher areas of land with bedrock very close to the ground's surface. This type of geology is clearly demonstrated within Malden in its highlands (north section of the city) at the Middlesex Fells, Waitts Mount, and High Rock, and in its lowlands (south section of the city) in the Edgework, Maplewood, and Linden neighborhoods. The drumlins within Malden are unique in that they fall within the only known drumlin field to intersect a coastline. These geographic highpoints in Malden are geologically related to the hills that were historically used to fill in the modern-day Boston shoreline, as well as the hills that comprise many of the Boston Harbor islands.

Today, these highpoints are predominantly undeveloped due to either steep grades, which make access difficult, or challenging subgrade conditions that are not conducive to economical construction. Waitts Mount, High Rock and much of the Middlesex Fells are heavily wooded in areas where pockets of soil exist between exposed bedrock. The low, flat areas of Malden are predominantly comprised of residential neighborhoods. These areas were developed in the early 1900's to accommodate Malden's growing community and were more easily developed than the steep, rocky slopes to the north. In fact, most of the flatter terrain within Malden has been developed for residential, industrial, or municipal use.

C. WATER RESOURCES

1. Surface Waters

Malden River

The first Europeans in Malden settled along the banks of the Malden River. The river served as the major means of transportation and trade during Malden's early development. Today, the river has become a physically severed and forgotten resource.

The Malden River lies toward the southwestern part of Malden near Medford. The river once ran through the downtown section of Malden north of Charles Street until the 1960's when this section was placed in a closed culvert. The portion of the river near the Oak Grove MBTA station is located in an open culvert. South of Charles Street near Canal Street, the river continues as open water for 1.3 miles (0.7 miles in Malden) until joining the Mystic River near the Wellington MBTA Station. The river is fed by the Spot Pond Culvert, the Saugus Branch Culvert, and the Fells in Melrose.

Approximately 100 years ago, Malden industrialists convinced the U.S. Government to straighten and deepen the river course south of Charles Street in order to create a federal channel for use by industry. As a result, recreational access to the river became limited. The construction of the Amelia Earhart Dam in the 1960's further changed the character of the Malden River. The dam

blocked the tidal flushing of the river, so today; the river has characteristics more of a lake or a reservoir.

The Mystic Valley Development Commission (MVDC) received funding from the United States Environmental Protection Agency and the United States Army Corps of Engineers to study the quality of the Malden River's water and sediments and to propose methods to improve the water quality of the river.

The U.S. Army Corps of Engineers (USACE) in partnership with the MVDC developed the "Malden River Ecosystem Restoration Detailed Project Report and Environmental Assessment". Restoration of the Malden River ecosystem to the "highest quality that it can reasonably support and sustain" is the overriding project goal for the MVDC and USACE. Numerous ecosystem restoration components were developed and evaluated as building blocks for a comprehensive strategy designed to restore the environmental quality of the Malden River ecosystem. These measures are directed towards the three primary restoration objectives: wetlands restoration, aquatic habitat restoration and riverine migratory restoration.

The primary elements of the recommended plan were developed through the detailed evaluation of the Mystic/Malden River ecosystem characteristics. The elements are as follows:

- Removal of 36,000 cubic yards of invasive species along 14.9 acres of the riverbank corridor and replanting with native wetland plant species;
- Creation of 5.4 acres of emergent wetland within the existing oxbow;
- Placement of 4,400 cubic yards of gravel/sand substrate to create 2.8 acres of fish spawning habitat;
- Miscellaneous debris removal and disposal; and
- Operational changes at the Amelia Earhart Dam to improve fish passage for anadromous species.

Finalization of Detailed Plans and Specifications is estimated to be completed in May 2010 with construction scheduled between March 2011 and June 2013.

Townline Brook
Townline Brook lies on the east side of Malden near the border of Revere and Everett. The brook is a 1.7 mile (1.0 mile in Malden) long surface water body that runs from Broadway to Rumney Marsh in Revere.

The Metropolitan District Commission (MDC) placed the brook in a concrete culvert for its entire length; however, the brook remains subject to tidal flows. MDC has current plans to upgrade the floodgate near the Revere Cinemas to better control flood tides and to allow regular tidal flows. The tidal flows greatly influence groundwater levels in some adjoining Malden and Revere neighborhoods. The Linden neighborhood in Malden has the most substantial flooding problems as a result.

The brook runs along the southern edge of the privately-owned Holy Cross Cemetery. An unpaved MDC access road runs the length of the culvert and may offer the potential for a short linear park. A large strip of open land lies between the fence of the MDC land and a berm in the Cemetery. A large undeveloped parcel (of approximately 2 acres) is also located along this access road.

Fellsmere Pond
Fellsmere Pond is owned and maintained by the State's Department of Conservation and Recreation (formerly known as MDC.) In 2006, the City of Malden petitioned the State Legislature for control of Fellsmere Pond. The City received $175,000 from DCR. The funds were used to clean-up the pond and implement several improvements, including the installation of fountains. In addition, there is an active Friends of Fellsmere Pond group that has worked to control the influx of geese at Fellsmere Pond. The Friends Group has a trained dog and a canoe and volunteer periodically patrol the pond.

Forestdale Cemetery
A small surface pond that provides habitat to ducks and geese exists within the Forestdale Cemetery. A small wetland area also exists between the Forestdale Cemetery and Pine Banks Park.

Pine Banks Park
Pine Banks Park is owned by the Cities of Malden and Melrose and managed by the Pine Banks Park Trustees. The cities received funding from the State's urban Self-Help program to construct a multi-purpose synthetic field at Pine Banks Park. The field was completed in May 2007. The new field provides much needed open space for the residents of Malden and Melrose.

Pine Banks park features a small pond in the Melrose portion. Some unmapped wetland areas exist within Pine Banks, as well.

2. FLOOD HAZARD AREAS

Malden River
Limited areas along the Malden River lie in the flood zone. The channeling of the River and the Amelia Earhart Dam limit the extent of these flood areas.

Townline Brook
Lands along this brook in Malden are within the 100-year flood hazard zones and this area is subject to tidal surges of seasonal storms and hurricanes.

Linden Area
The area between Oliver and Salem Streets lie within the 100-year flood hazard zones, and are subject to flooding in large storm events.

Other Areas
Areas of Forestdale Cemetery and Roosevelt Park (immediately behind the Salemwood School) also are within flood hazard zones.

3. WETLAND AREAS

In addition to the wetland areas that lie along the Malden River, Townline Brook, and the Forestdale Cemetery, some isolated wetlands exist in the Middlesex Fells Reservation and the undeveloped highlands of Malden.

4. AQUIFER RECHARGE AREAS

Malden does not contain any public water supply aquifers. Malden receives its public water from the Massachusetts Water Resources Authority (MWRA) reservoirs in the Middlesex Fells Reservation.

D. VEGETATION

1. General Inventory

The natural vegetation of Malden has been highly modified by the urban environment. Originally, almost completely forested by the central hardwoods group, only certain park, ledge, or wetland areas in the northern part of the city remained forested. The Middlesex Fells Reservation and adjacent private parcels are the largest areas of continuous natural forest within Malden. Pine Banks Park also contains a significant amount of forested land, including a number of large pines. These two areas comprise essentially all of the quality woodlands within Malden. Other wooded areas are smaller and of varying quality. Tree species native to the area include oak, maple, hickory, cherry, ash, locust, elm, birch, aspen, beech, pine, and willow. Elsewhere in the city, vegetation is restricted mostly to lawns, and ornamental and shade trees.

2. Rare, Threatened and Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program has informed us that that there are no rare, threatened, or endangered species listed within Malden.

E. Fisheries and Wildlife

1. Inventory

Wild bird and animal life in Malden is quite limited. The densely settled areas see only migratory song birds, while the more rural areas near the eastern, northern, and western city limits house small mammals and larger birds such as squirrels, rabbits, raccoons, woodchucks, pheasants, ducks, and hawks. Ducks (both domesticated and wild) are particularly common at Fellsmere Pond, Spot Bond Brook, and Pine Banks Park; and as pollution issues are continuing to be addressed along the Malden River, shore birds and waterfowl are beginning to reappear there.

Goldfish, carp, shiners, sunfish, pickerel, bass, frogs, and turtles are found particularly in Fellsmere Pond, and to a lesser extent, in the pond at Forestdale Cemetery. Those species more tolerant of urban conditions have begun to return to the Malden River.

2. Wildlife Corridors

Malden currently contains no active wildlife corridors. It is the hope of the City that as redevelopment along the Malden River is implemented, the water quality of the river will improve and provide wildlife habitat within that emerging river system. It is also the hope that the Bike to the Sea Path project will one day provide a link between some of the open spaces not only for park users, but for some wildlife within the city, as well.

3. Rare, Threatened and Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program has confirmed that that are no rare, threatened, or endangered species listed within Malden.

F. Scenic Resources and Unique Environment

1. Scenic Resources

Malden contains a number of rock outcroppings that offer dramatic vistas of the City of Malden, its surrounding communities, the Boston skyline, and the Atlantic Ocean. These outcroppings include High Rock, Maplewood Highlands, Linden Highlands, Waitts Mount, and portions of the Middlesex Fells Reservation. High Rock, Waitts Mount, and the Middlesex Fells Reservation are all protected open spaces.

2. **Characteristic and Unusual Geologic Features**
Malden's geology is largely defined by the Lynn Volcanic Complex. The Complex is comprised of soils that originated from an ancient volcano that occurred in this specific region of New England. Over time the volcanic ash settled and compressed into a rock- our naturally occurring bedrock – and is classified as a rhyolite/felsites rock that is genetically identical to granite. This volcanic action is what created our varied topography and specific types of soils that occur within Malden.

3. **Cultural, Archaeological and Historical Features**
Established in 1634, Malden history is deeply rooted in business and commerce. Located just outside of Boston, early Malden settlers were too far from deep water for shipbuilding and the land proved too rocky for any significant, long-term farming. It seemed that Malden was destined for something different, and early established itself as a mill and factory town. It is this focus on industry that has propelled Malden's evolution through its 350 years.

Even though much of Malden's history may not be readily visible in its predominantly "new" downtown (much of it being built within the last 50 years), a few significant reminders still stand as a testament to Malden's rich past and early town contributors. According the Massachusetts Historical Commission (MHC), Malden has eight sites listed on the National Register of Historic Places. These sites represent some of the oldest sites in Malden as well as significant examples of period architecture within the community.

Listed Sites

- **Bell Rock Cemetery** –established sometime before 1649 – Formerly known as the Sandy Bank Burying Ground, this site holds many historic and artistically notable gravestones. It is thought to be Malden's oldest public site.
- **Bell Rock Memorial Park** – 1908 – This is the site of Malden's first and second meeting houses, and the current site of Revolutionary War, Civil War, and WWII memorials honoring Malden war heroes. The park site was designed by the nationally recognized and noted landscape architects, Olmstead Brothers, to receive a Bela Lyon Pratt (widely noted for his public artwork in New England) bronze sculpture, The Flag Defenders, which still stands in the site today.
- **Converse Memorial Building (Malden Public Library** – 1885- This building was designed by noted architect H.H. Richardson (also noted for Trinity Church in Boston) in honor of Frank Eugene Converse, the slain son of Malden's first mayor, Elisha Converse, on a site selected and designed by Frederick Law Olmstead. Built of varying colors of granite block, it is one of Malden's most beautiful buildings.

- **Charles A. Daniels School** -1906-Desgined by the influential architectural firm of Brainerd and Leeds, the school is an important example of early 20th century architecture. From 1880 to 1910, ten public schools were built to accommodate Malden's rapidly growing population. The Daniels Schools, the largest and most significant of the new schools, was named in honor of Charles A. Daniels, former headmaster of Malden High School. Daniels was considered the "father" of Malden's public school system, and a progressive and innovative leader in the field of public education.
- **Wilbur Fiske Haven House** – 1866-The Wilbur Fiske Haven House is an Italianate/Mansard style residence of wood construction that was built for hardware merchant Wilbur Fiske Haven. The house survives today as the sole remaining example of its many Victorian counterparts within Malden and has been meticulously restored.
- **Middlesex Fells Reservoirs Historic District** -1893 –This is one of the first sites owned by the Commonwealth that was preserved specifically through the efforts of the Metropolitan Park Commission (then known as the Metropolitan District Commission and now known as the Department of Conservation and Recreation) for public recreation and enjoyment. A 2,070 acre tract of land including portions of Malden, Medford, Melrose, and Stoneham, it was set aside as a nature/wildlife preserve open to the public.
- **Odd Fellows Temple** – 1907 – The Malden Odd Fellows Building has a Venetian façade with fine terra cotta ornament. The building was constructed to function as a meeting place for both the Old Fellows Lodge (for men) and the Rebekah Lodges (for women). The Independent Order of Odd Fellows, from which these groups were derived, was an international secret fraternal and benevolent society that originated in England in the 18th century.
- **Waite Brick Block** – 1852 –Malden's oldest brick building, built in the Greek revival style, is curved to reflect its contemporary Main Street alignments. The building represents Malden's sole link to its early commercial beginnings.
- **St. Paul's Parish Church -1911** – Designed by R. A. Cram

Potential Sites:

- **Davenport Estate** – 1892 –This house was designed by the Boston architecture firm of Chamberlain and Austin. The Colonial Revival house was built for noted furniture maker Albert H. Davenport. Davenport's East Cambridge factory produced furnishings for some of the most elegant residential and institutional interiors of the day, such as the Grover Cleveland White House and the Royal Palace in Hawaii. The Davenport House is a fine example of 19th century mansions built by successful industrialists of the time. It stands next to the Converse Library on Salem Street.

- **Fellsmere Park** – 1894 – The original park design is attributed to the firm of Olmsted, Olmsted, and Eliot, nationally recognized and noted landscape architect professionals. Arthur A. Shurcliff, also a nationally known and recognized landscape architect, restored the site with the WPA in 1936.
- **First Baptist Church** – 1891 –Designed by Boston Architect H.S. McKay, the Romanesque Revival granite structure stands next to the H.H. Richardson designed Converse Library built in the same Romanesque style.
- **Waitt's Mount** – 1629 –Waitt's Mount, known early on as Mount Prospect, was first explored by early settlers William, Richard and Ralph Sprague. In 1775, colonists watched bursts of gun and cannon fire from its heights during the Battle of Bunker Hill. In 1778, a beacon fire was laid on the summit to warn colonists of impending invasion from the Atlantic coast. During WWII, searchlights and an anti-aircraft battery were positioned on its peak. In the 1920's, the site was the scene of a "fresh air camp" for local children, and benefitted from WPA labor efforts that constructed masonry and stonewalls on the perimeter of the site. These events have established its importance within Malden as a significant open space both practically and historically.

It is our understanding from the MHC that Malden contains five recorded archaeological sites. However, not many details are known about these sites as all of the current information was reported through amateur archaeologists. The MHC believes that these five may only represent a fraction of the actual number of sites because Malden has never been subject to a systematic survey by professional archaeologists. The general locations of the known sites are within the upland areas on the north side of the city (Massachusetts General Law, Chapter 9, ss.26A,27C, prohibits the exact locations of these sites from being made publicly known.) It is speculated that Native Americans may have been attracted to these areas for the easy access to stone at rock outcroppings. It was from this stone that they could craft their essential tools.

4. Areas of Critical Environmental Concern

Malden enjoys many of the scenic advantages of the nearby Rumney Marsh Area of Critical Environmental Concern (ACEC) located on the fringe of Rowe Quarry.

G. Environmental Challenges

1. Hazardous Wastes

Please see the Department of Environmental Protection's (DEP) Bureau of Waste Site Cleanup Map included in Appendix.

2. Landfill

According to DEP's landfill listing, Malden has no major landfill disposal areas. There are some vague references to dumping sites with little or no supporting documentation on file. Even if these sites do exist, they are estimated to be at least 30 years old as Malden's solid waste has primarily been sent to Saugus since the early 1970's.

3. Development Impact (Erosion, Chronic Flooding, Sedimentation)

As Malden is largely built out, typical development impacts such as traffic congestion and urban runoff have long been felt. Erosion has not been presented as a significant issue associated with new development given Malden's existing high percentage of impervious surface area and when considering the native composition soils as primarily bedrock.

Flooding has been increasingly problematic in the neighborhoods adjacent to the Town Line Brook and the Linden Brook. Recent trends in development, such as building in lowland areas identified as flood zones on Federal Emergency Management Agency (FEMA) maps, have increased the occurrence and severity of flood events in those areas. The City's drainage capacity is also taxed by new development in highland areas that do not adequately capture stormwater runoff into the City's systems. Properties below these developments have experienced many problems in more recent storm events.

Sedimentation has become a problem in the Town Line Brook. It is difficult to determine if the accumulation of sediments in the Department of Conservation and Recreation (DCR) box culvert is a result of irresponsible development practices or other activities along the banks of the brook. The Commonwealth is looking into the possibility of removing sediment from the brook in an effort to increase the capacity during storm events and prevent additional flooding during high tides. The Commonwealth also installed new tide gates designed to control the level of water entering the brook in significant storm events.

4. Ground and Water Pollution

Ground water contamination is much easier to identify and monitor than water pollution. The Massachusetts Contingency Plan (MCP) has created a process for classification and remediation of contaminated sites. (See chart by DEP's Bureau of Waste Site Cleanup in Appendix) Water pollution is a much more difficult problem to assess as most contaminants have mixed with other sediments underwater. The River's Edge Project has done some analysis to determine the level of contamination that exists within the Malden River. One major component of the project is to restore the river as much as practicable and introduce recreational opportunities along its bank.

5. Brownfields

The City of Malden actively pursues the redevelopment and adaptive re-use of brownfield properties. The River's Edge Project represents the most ambitious effort to remediate contaminated and underutilized parcels for the creation of new economic opportunities. The goal for the River's Edge Project is to convert 200 acres of underutilized industrial land with a significant contamination history into a modern, productive, employment-generating, tax-producing development including a mix of office, residential and new recreational amenities on and around the reclaimed Malden River.