Adams Street Conservation Area
Ecological Management Plan

Prepared for the Town of Medway Conservation Commission

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The Conway School • Winter 2016

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to the Conway faculty Kate Cholakis, Mollie Babize, CJ Lammers, Rachel Loeffler, Glenn Motzkin, and Keith Zaltzberg for your devoted guidance and instruction;

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Thank you.

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EXECUTIVE SUMMARY

A VISION FOR MEDWAY: ECOLOGICAL MANAGEMENT OF OPEN SPACE

In the fall of 2015, Medway's Conservation Commission and Open Space Committee made a request to the Conway School to develop an ecological management plan for the Adams Street Conservation Area, which includes 103 acres of town-owned land. This plan provides recommendations for preserving the ecological health of these lands and increasing their recreational value. The recommendations provided can also serve as useful guidelines for managing all of Medway's open space.

ECOSYSTEM EVALUATION, OPPORTUNITIES, AND RECOMMENDATIONS

The Adams Street Conservation Area encompasses diverse ecosystems. The land is rich with many wetlands and streams and includes examples of habitat in all stages of succession from meadow, to shrub, to young forest and mature forest.

The four types of wetlands found within the study area provide diverse habitat and valuable ecosystem services such as flood control and groundwater recharge. Implementations of the guidelines within this plan could protect wetlands from degradation and preserve their valuable habitat and ecosystem services.

A former agricultural field near Adams Street will be restored to a meadow area showcasing grasses and forbs; it will serve as an example of a land cover type which is now uncommon in a town once known for its meadows. The plan provides recommendations for meadow establishment and maintenance.

Developing an approach for invasive species management will be critical to protect the Conservation Area's habitats and biodiversity and the plan provides options to begin this process. Invasive species are most pervasive in early successional or recently disturbed areas.

Mature forests appear to be healthy and provide opportunities for recreational trails. Since the forest areas are smaller than what would generally be harvested for income, there are no specific recommendations for management of forested areas other than managing invasive plants. If opportunities for acquiring additional forested land arise, the town could consider preparing a forest management plan that includes the Adams Street parcels.

RECREATIONAL NEEDS, OPPORTUNITIES, AND RECOMMENDATIONS

Residents particularly value the recreational opportunities of the trails in the Conservation Area. Existing trails are mostly concentrated within the mature forest areas and connect to the high school ballfields and Choate Park.

Proposed trails highlight a greater diversity of ecosystems at the site and as a whole, provide three miles of walking terrain. Viewing decks over the wetlands will provide opportunities for passive recreation such as bird watching. A small parking lot of off Adams Street along with additional wayfinding signs provide a visible invitation to the trail system.

The proposed meadow and woods trails provide access through the meadow, wetlands and mature forest. Some of the trails follow old stone walls as does the proposed loop trail near Choate Park. The new trail from Summer Street provides neighbors with pedestrian access to the trail system. This trail also offers access to some of the most diverse early successional habitats and forested wetlands within the Conservation Area.

RESILIENCE FOR BOTH HUMANS AND NATURE

Ecological management of the Adams Street Conservation Area accomplishes many objectives for Medway including increasing biodiversity and protecting ecosystem services.

Inviting Medway's residents to enjoy the Conservation Area realizes another objective: promoting public use and opportunities for education. The varied habitats each deliver ecosystem services. The meadow improves local food security by creating a haven for pollinators, early successional land types provide habitat for unique species, and healthy forests sequester carbon.

Just as the subject parcels provide a variety of ecosystem services, other existing and future open space parcels within Medway can be improved to provide similar benefits through ecological management of their unique features.


SCENIC ROAD
Adams St

GOALS AND PROCESS

CLIENT REQUESTS

Medway's Conservation Commission retained the services of the Conway School to develop an ecological management plan for the Adams Street Conservation Area. The Commission requested a natural resources assessment including topography; vegetation; soils; rare, threatened and endangered species habitat; wetlands; and streams. They also requested an evaluation of forestry stewardship opportunities, and an assessment of non-native, invasive species control priorities.

Along with an ecological assessment, the Commission sought a review of the current trail system and recommendations for new trails to expand active and passive recreation opportunities.

FINDING A BALANCE

The recommendations in this report take into consideration the needs of the community and the needs of the ecosystem. Since wildlife, plants and people share the Adams Street Conservation Area, recommendations must consider all their needs. Implementing management guidelines can create a better future for the land and the community.

Ecosystem services provided at the Adams Street Conservation area include nutrient recycling, soil formation, flood regulation, water and air purification, carbon sequestration (climate regulation), and cultural services of recreation and education. These services can be enhanced by proper management of the existing resources.

GUIDING PRINCIPLES

In August 2015 the Conservation Commission (MCC) and Open Space Committee approved a series of management goals to guide open space conservation for the town. These goals are used in this plan as guiding principles. They provide a solid foundation to frame site analysis and guide management recommendations. The following list of principles was extracted from the approved management goals. (Proposed Management Goals for Medway's Open Space and Conservation Lands. Approved by OSC September 1, 2015. Approved by MCC August 13, 2015.)

Guiding Principles

1. *Promote biodiversity*
2. *Build, restore, and protect natural resources to preserve ecosystem services.*
3. *Promote public use, education and engagement.*
4. *Promote corridors and linkages between open spaces throughout Medway, with adjoining towns, and at the regional level to enhance both recreational opportunities and wildlife habitat.*
5. *Protect Medway's riverfront of the Charles River, preserve the agricultural history.*
6. *Control invasive species on Town open space lands.*

Two community meetings, held during the development of this report, provided valuable information about the human needs these properties can address.

Opposite: Intersection of Adams and Summer Street.

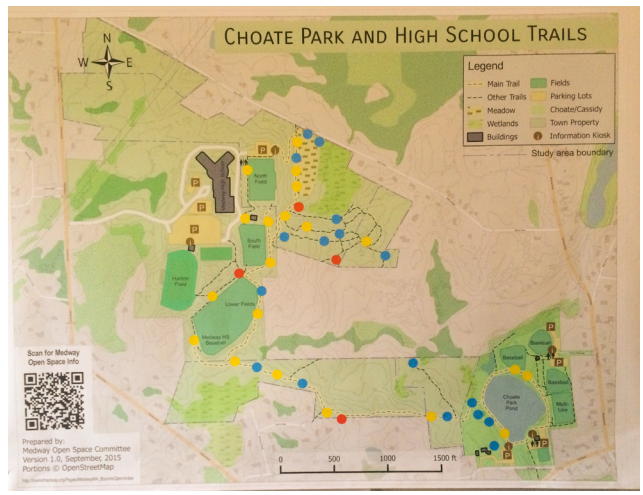
COMMUNITY NEEDS

Successful long-term stewardship of public lands requires community involvement from the beginning of the planning process through implementation and maintenance over time. Understanding community needs and goals are critical steps in developing practical recommendations within a management plan. Two community meetings were held to gather input from the community on their concerns with respect to the Adams Street Conservation Area, and to share the planning process and progress of the project.

COMMUNITY MEETING, FEBRUARY 3, 2016

At the first community meeting participants were asked to define and rank the assets and challenges of the Adams Street Conservation Area. Trails and recreation activities ranked as the number one asset in the community. The establishment of the meadow along Adams Street to provide bird, butterfly, and wildflower habitat was the second most popular asset.

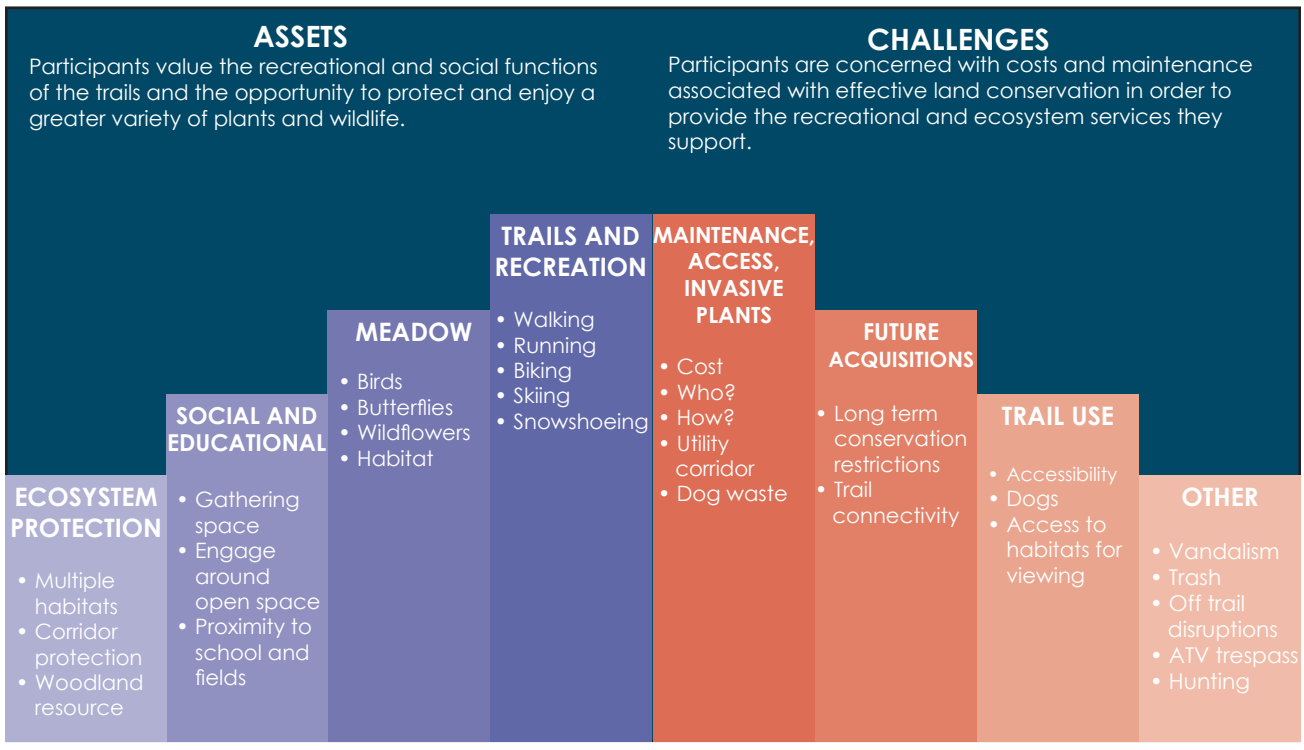
The greatest challenges identified were the cost of management and assigning responsibility for management tasks, including invasive plant removal and maintenance of the trails and meadows. The community expressed concern over public access to the utility corridor, enforcing leash rules for dogs, dog waste and lack of waste stations. Some participants expressed interest in future acquisitions and trail connectivity.



Participants identified areas in the Adams Street Conservation Area they visit and used colored stickers to indicate frequency of use.

On a map of the Adams Street Conservation Area developed by the Town of Medway, participants placed colored dots to mark areas they visit. Color distinguishes frequency: yellow =

Results from community input on the assets and challenges of the Adams Street Conservation area.



frequently, blue = moderately, red = rarely. The loop around Choate Pond, the Choate Trail, and the Woods Trails past the meadow were shown to be popular locations.

COMMUNITY MEETING, MARCH 2, 2016

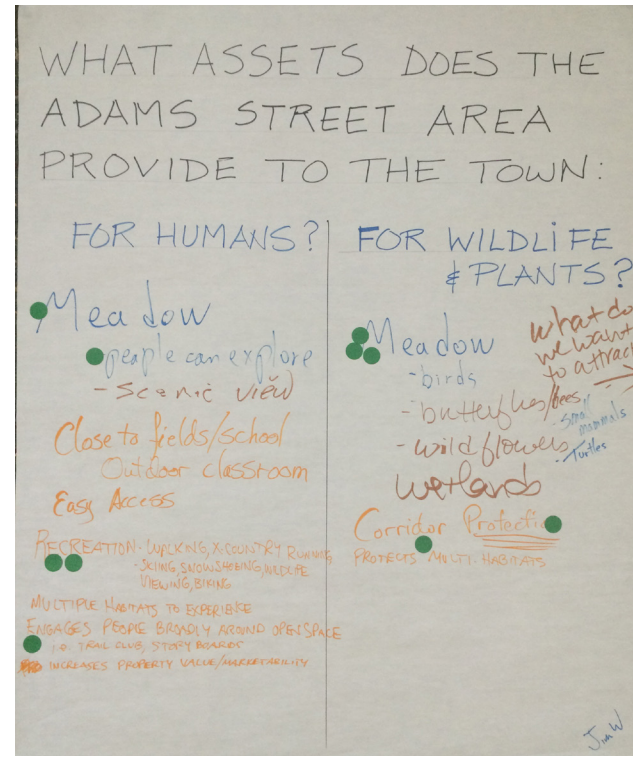
At the second community meeting participants learned about the site analyses of the properties and initial draft recommendations for the Conservation Area developed by the project team. Afterward, an open discussion captured further interests and concerns regarding the draft recommendations.

The installation and maintenance of the future meadow generated the most discussion. Participants questioned whether to take an active approach to seeding and planting, or a passive approach allowing nature to take its course. They also asked about mowing frequency and patterns and methods to clearly distinguish areas to be mowed.

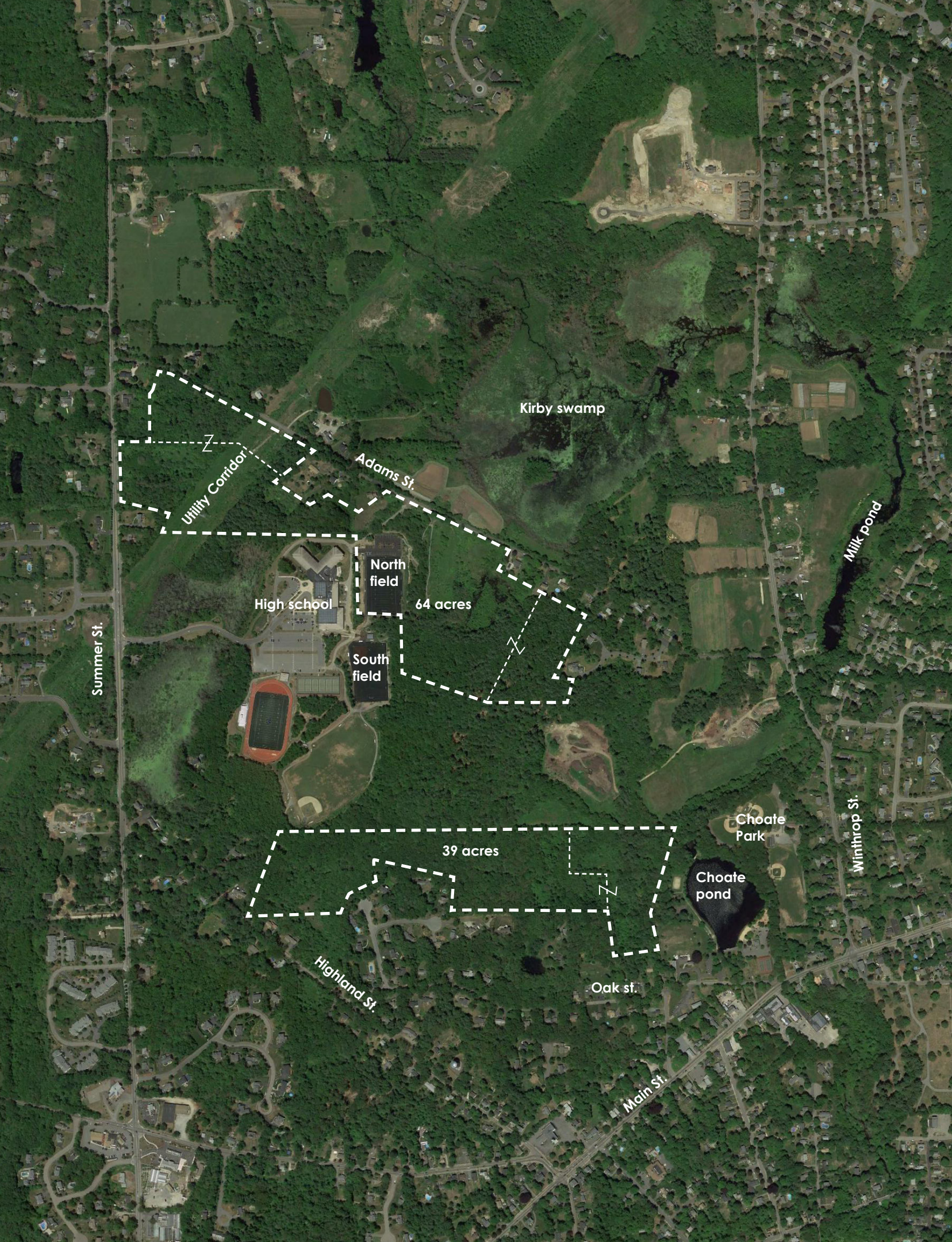
The trail system also generated much discussion. Participants expressed enthusiasm regarding having two observation spots around the returning wetlands: one adjacent to the meadow, the second connected to the Woods Trail. They voiced pros and cons regarding different trail surface materials, from mowed paths to crushed stone. Some asked about the development of new trails within wetland buffers and whether they could be rerouted to reduce foot traffic within the buffers. Some participants recommended going around wetland buffers to protect the integrity of the wetland habitats.

In the opinion of participating community members, further investigation of forestry activities and parking options were both low-ranking priorities for this management plan.

Participants engaged in the Adams Street "assets and challenges" group exercise during the first community meeting.



Notes scribed by community participants at the first community meeting.


Kirby swamp
Utility Corridor
Adams St.
North field
High school
64 acres
South field
Summer St.
Milk pond
39 acres
Choate Park
Choate pond
Winthrop St.
Highland St.
Oak st.
Main St.

CONTEXT

TOWN OF MEDWAY

Medway is located along the I-495 corridor approximately 30 miles southwest of Boston. Over the three centuries since its incorporation in 1713, the town has grown into a community of about 12,700 residents. Medway's diverse landscape includes urban, suburban, small town and rural/agricultural character. The town's 11.5 square miles, the town include hills, forests, fields, stone walls, ponds, rivers, streams, marshes and swamps.

ECOREGION

Medway is located within the Southern New England Coastal Plains ecoregion. This region consists primarily of low rolling hills and many creeks and wetlands that drain the landscape. Central hardwoods and pine forest are typical throughout the ecoregion.

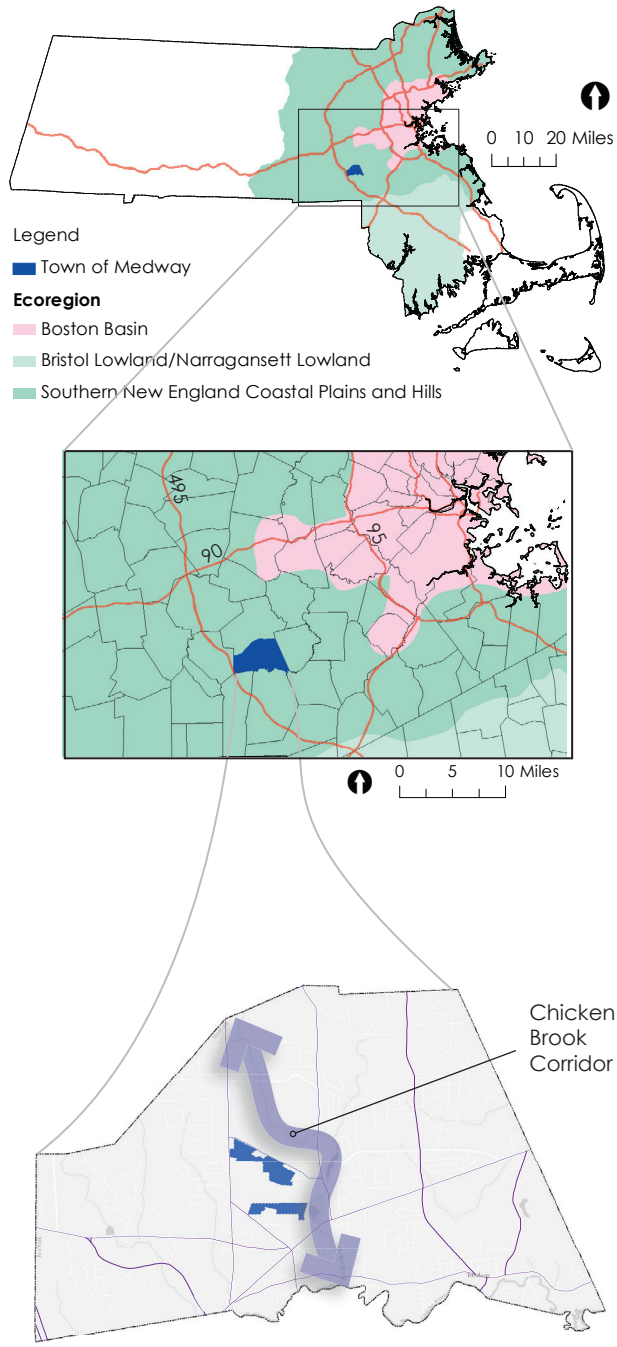
CHICKEN BROOK CORRIDOR

The corridor between Summer and Winthrop Streets, through which Chicken Brook runs, bisects the town. The study area, known as the Adams Street Conservation Area, is located within this corridor and in the center of Medway.

STUDY AREA

The Adams Street Conservation Area comprises 5 parcels, three of which are located off of Adams Street, and two located further south, west of Choate Park. The northern parcels total about 64 acres, and the southern parcels total about 39 acres, for a total of 103 acres*.

**This total acreage is derived from the Town of Medway Assessor's data.*

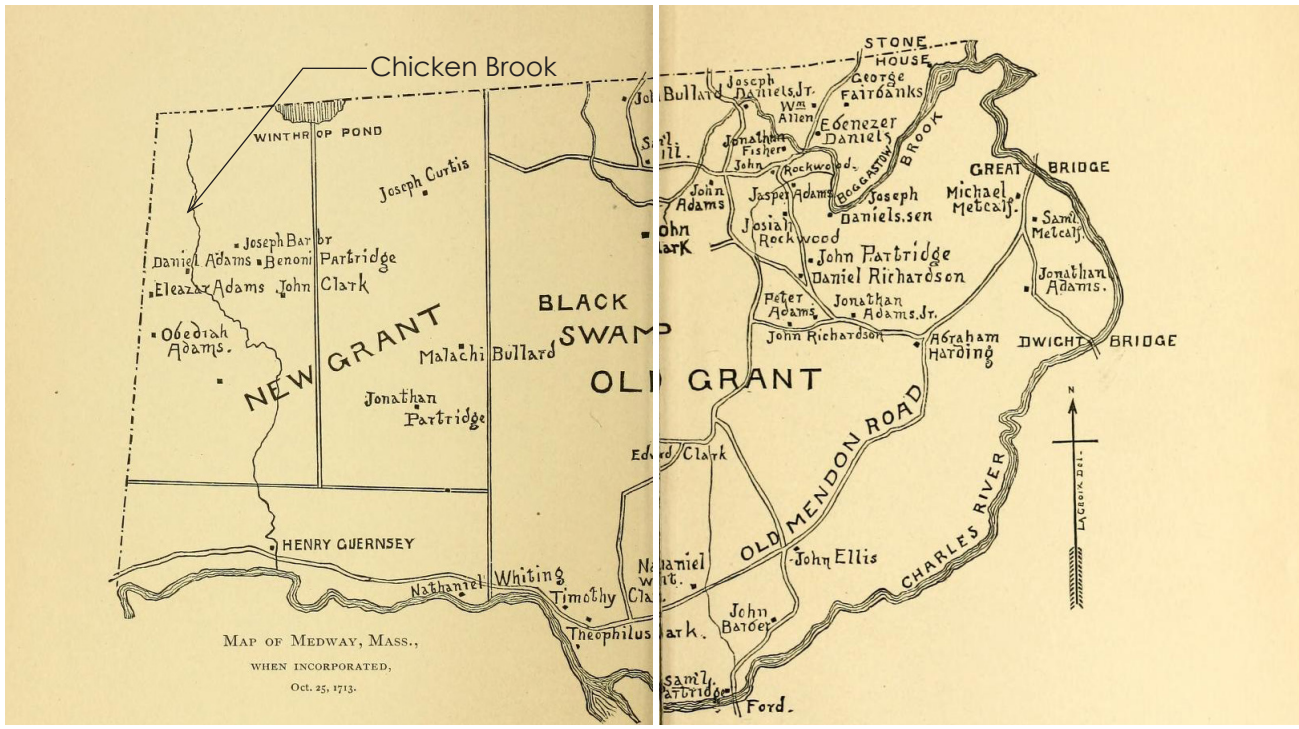


Town of Medway

Opposite: Adams Street Conservation Area, approximately 103 acres* in total.

MEDWAY HISTORY

New Grant | Old Grant



A map showing the Town of Medway when it was incorporated in 1713. The "Old Grant" to the east later became the Town of Millis. Chicken Brook figures prominently within the New Grant, as do many Adams family members (Jameson and La Croix).

The Town of Medway was incorporated in 1713, the 69th town in the Massachusetts colony. At the time of incorporation, the town included what is now the Town of Millis to the east and did not include the land west of Summer Street.

Early surveys of the area in 1652 noted the broad meadows along the Charles River (*Early History of Norfolk County,* 540B). According to Jameson and La Croix:

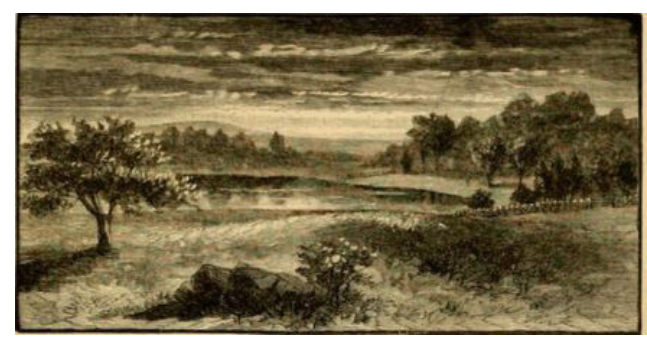
> In approaching the town from the northeast, one is struck with the extent of the broad meadows stretching several miles to the south and southwest, with the silent and sedate Charles winding gracefully through them. (10)

Of the 48 original founders of the town, eight held the last name "Adams". The Adams family name continues to be important throughout Medway's history with representatives to the state legislature, town clerks, selectmen, and school teachers among their members.

Early farming activities in the town gave way to cotton and paper mills and straw and boot factories in the 19th century, industries that grew up alongside the banks of the Charles River and Chicken Brook. Jameson and La Croix describe:

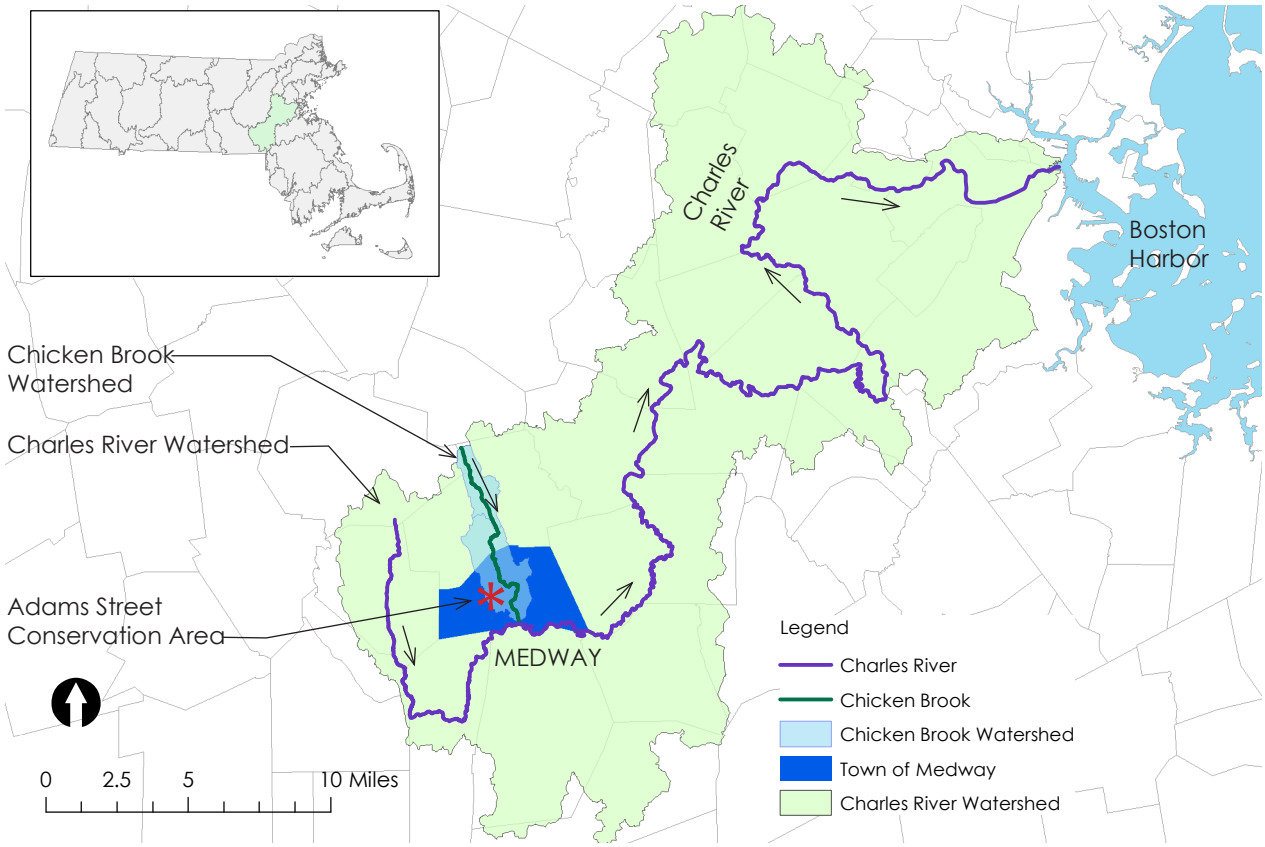
> ...the beautiful valley of the Chicken Brook, bounded by forest-crowned hills on the opposite side, dotted with farm buildings and variegated by orchards and growing crops, and with many single trees and groups, elms, oaks, hickories, and maples, scattered here and there. There are few quiet rural scenes more lovely. (12)

The brook's name comes from the story of an early settler who lost a crate of chickens to drowning while he was fording the brook (Mason 77).



The broad meadows of the region. (Jameson and La Croix 2)

WATERSHED:
CHARLES RIVER AND CHICKEN BROOK



The Town of Medway is located in the upper reach of the Charles River Watershed. The Charles River originates in Hopkinton, northwest of Medway and flows northeast to Boston Harbor. Medway is one of 35 towns in the 308 square mile watershed.

Along its 80-mile length from Hopkinton to Boston, the Charles River has a long history of use by mills and other industries starting in the 1600s. Today, there are 20 dams along its length where impounded water powered mills and the resulting ponds were used for recreation.

By the 1960s the river was polluted and frequently flooded abutting lands. In 1974, the U.S. Army Corps of Engineers undertook the "Natural Valley Storage Project" in the watershed to provide flood storage within natural areas. As a result, 8,000 acres of wetlands and surrounding lands were protected from development; Medway contains 52 acres of these protected lands.

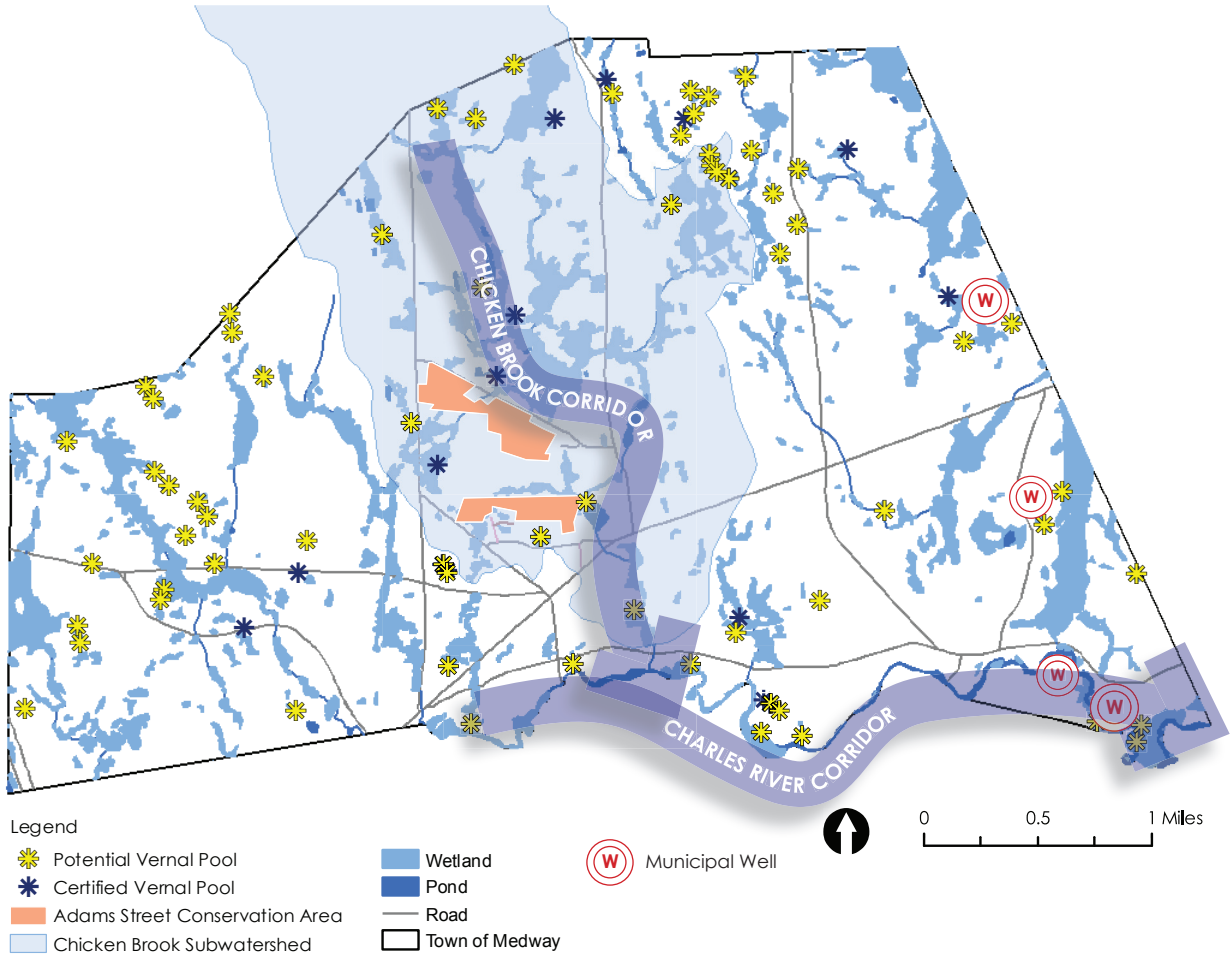
"Unchecked growth in the I-495 corridor threatens regional fresh water supplies. With high growth rates in suburbs west of Boston, there is increased demand for public drinking water and expanded sewer systems - both of which jeopardize water levels in the Charles River." (CRWA)

The Charles River is fed by 80 or more tributaries and several major aquifers. Three tributaries to the Charles run through Medway: Stall Brook, Hopping Brook, and the largest, Chicken Brook.

The Chicken Brook watershed is a major subbasin to the Charles River (7.2 square miles). The Massachusetts Division of Watershed Management (DWM) and the Charles River Watershed Association (CRWA) have monitored surface water along the brook. The 2006 DWM study reports generally good water quality conditions including excellent benthic fauna (the smallest stream dwellers) living within the cobbled bed of the brook. However, low flow summer conditions and accompanying high temperatures and low dissolved oxygen and nutrients in the brook have resulted in lower quality fish habitat and reduced biodiversity.

This lower water quality and reduced water quantities during the summer season affects Medway's drinking water supply downstream.

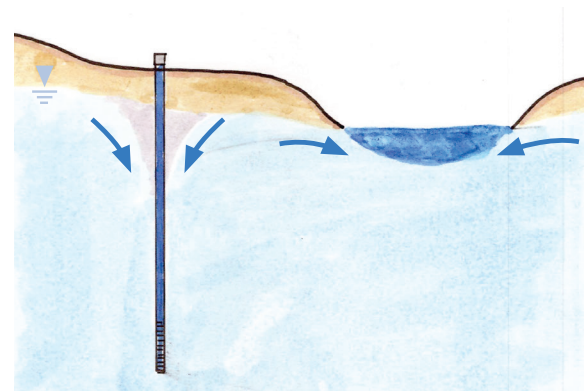
CHICKEN BROOK AND MUNICIPAL WELLS



The Town of Medway provides drinking water to residents and businesses via four local groundwater supply wells which are installed in sand and gravel deposits. The wells are located in two separate subbasins within the Charles River Basin: Bogastow Brook subbasin and Charles-Chicken Brook to Stop River subbasin (“*Water Supply*”).

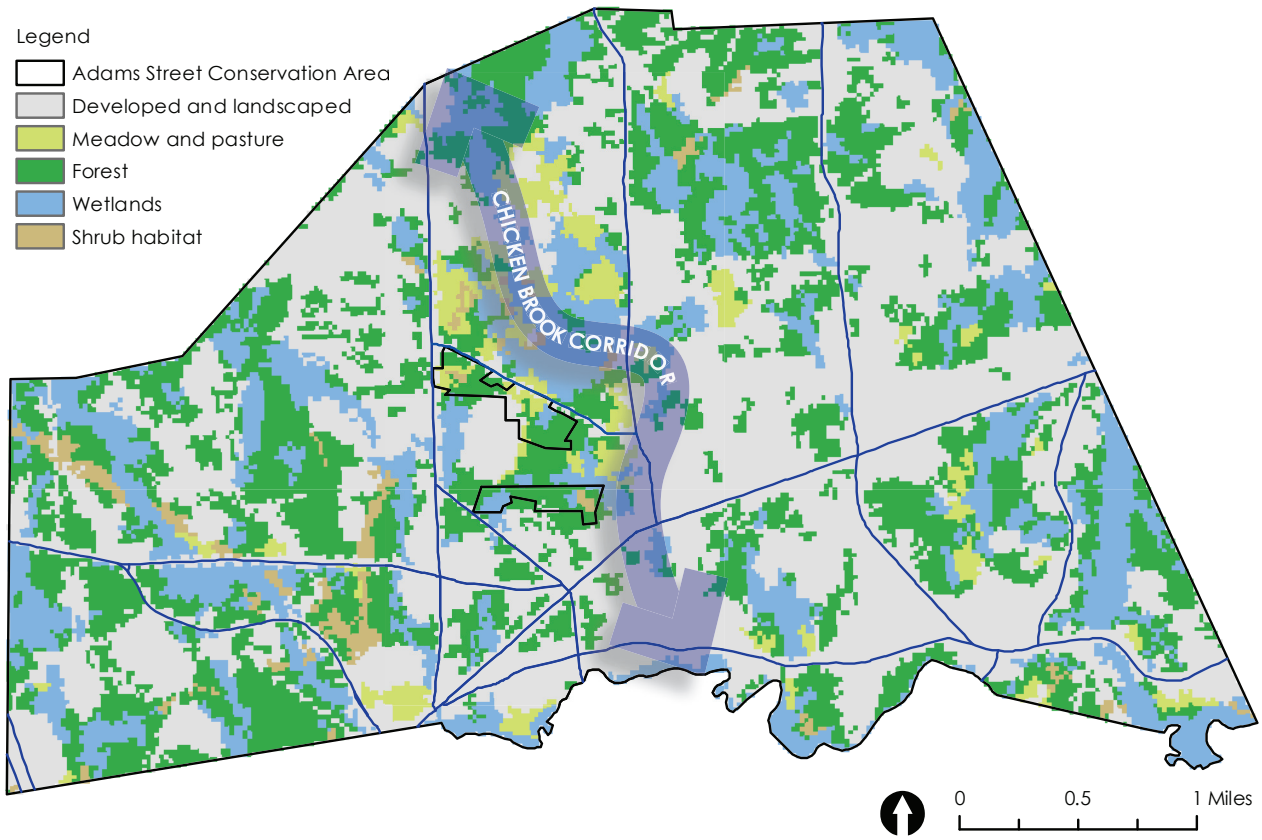
The subbasins are subject to Water Management Act (WMA) regulations which require that the town minimize impacts to river and stream base flow by limiting water withdrawals to “safe yield,” the maximum dependable water withdrawal calculated over a number of years. WMA also makes conservation and water loss reduction important priorities (Massachusetts Sustainable Water Management Initiative).

Because the drinking water aquifers are shallow and connected, development and other activities, such as agriculture, within the Chicken Brook watershed affect drinking water quality and quantity downstream. Specifically the two southern wells which are in the Charles-Chicken Brook watershed can benefit from good management practices along Chicken Brook.



A pumping well intercepts the groundwater that would flow into the river, decreasing river flow. In times of drought, the pumping well can draw from the river and reduce base flow.

MEDWAY LAND COVER



As of 2011, nearly half of Medway was covered by low, medium, and high density residential development, and a correspondingly high level of manicured landscaping. Thirteen percent of Medway's land cover is impervious (buildings and pavement). As stated in *Green Streets*:

> Research indicates that when impervious area in a watershed reaches 10 percent, stream ecosystems begin to show evidence of degradation, and coverage more than 30 percent is associated with severe, practically irreversible degradation. (16)

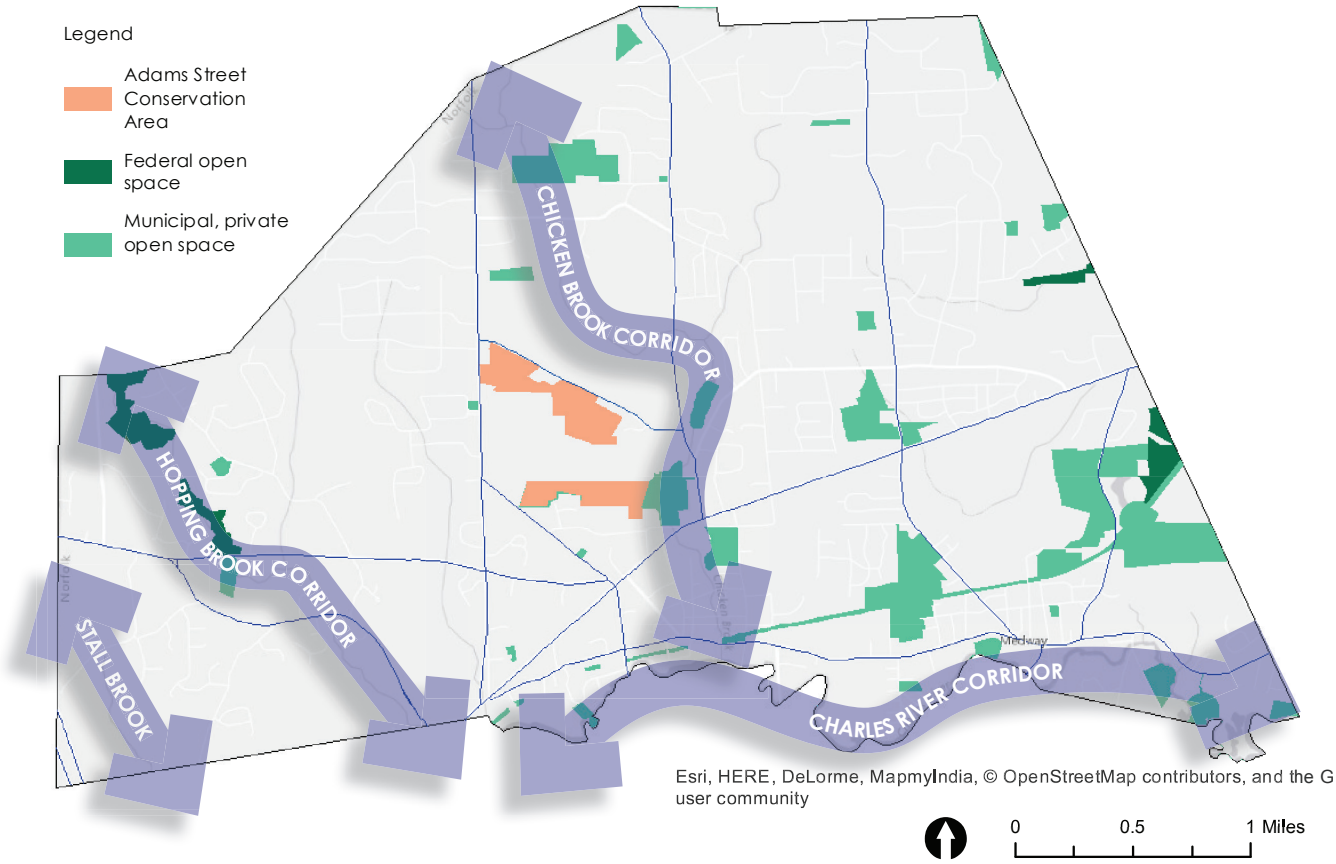
Impervious surfaces channel and concentrate non-point source pollutants into streams and waterbodies. Efforts to further evaluate the effects of impervious surfaces on wetland and stream health within the town's sub-watersheds could result in solutions to stream ecosystem degradation.

A network of wetlands and streams weave throughout the town, confining development on remaining meadow, shrub, and forest. Future development in upland habitats should be prohibited in accordance with land conservation regulations.

The Chicken Brook corridor contains the highest remaining concentration of meadow and pasture habitat. According to the 2010 Medway Open Space and Recreation Plan (OSRP), acreage of meadow decreased from 246 acres in 1971 to 30 acres in 1999. Future conservation efforts should strive to link remaining meadow habitat around Kirby Swamp and northward in the Chicken Brook corridor.

Forest cover decreased by more than 1,000 acres between 1971 and 1999 within the town, a reduction of nearly 27%. Former farmlands have been subsumed by both development and forest succession. Furthermore, young forests within the study area are heavily impacted by the spread of non-native, invasive species, a challenge to the establishment of successional communities throughout the region. Although forests occupy 28% of Medway, they may not provide quality habitat because of the influence of invasive vegetation.

PROTECTED OPEN SPACE



According to the 2010 OSRP, the Town of Medway contains a total of 54 parcels of open space; 39 parcels are owned by the Town and cover 269 acres. Within these town parcels, 68 acres are parks and playgrounds. The Army Corps of Engineers owns 15 parcels that total 52 acres.

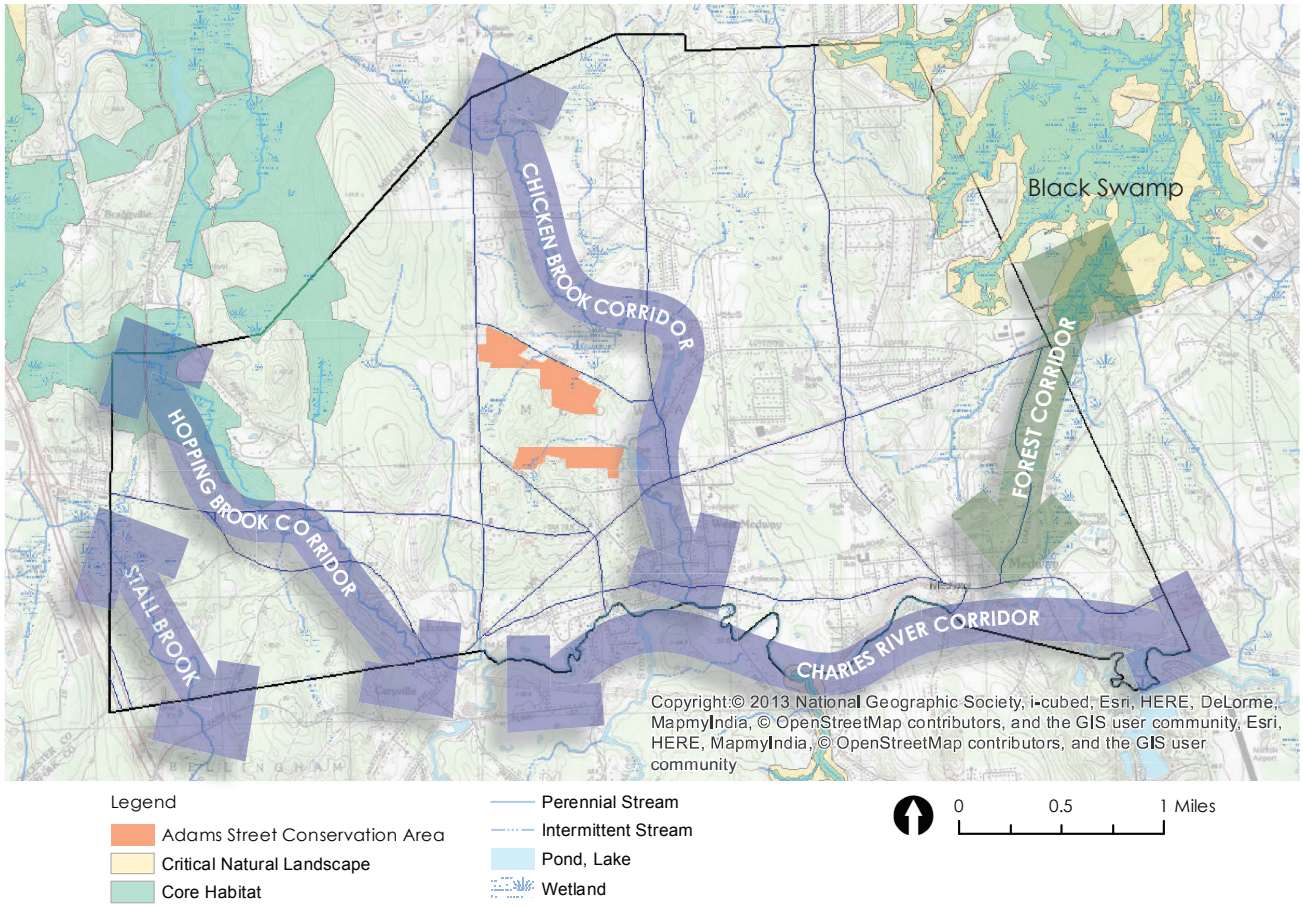
The Adams Street Conservation Area includes three parcels, acquired in 2010 and 2012, totaling 64 acres*. In sum, 385 acres of open space are under various forms of protection within Medway, totaling a mere 5.1% of the land within the town.

Open space parcels are widely dispersed throughout the town. Though somewhat connected through stream corridors, these parcels could benefit from additional connectivity.

The central location of the Adams Street parcels provides multiple opportunities to connect to other open space parcels, wetlands, pastures, and forest habitats. Connectivity, the process of reducing habitat fragmentation by developing habitat corridors, is a critical element to improving habitat throughout Medway. Habitat linkages via utility corridors are also an important component of connectivity within Medway (see pg 60).

**This total acreage is derived from the Town of Medway Assessor's data.*

BIOMAP 2 SUMMARY



By studying where ecologically rich lands are located, the Town can look for ways to enhance connectivity of existing protected lands. BioMap2 is a program of the Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (NHESP), within the Massachusetts Department of Fish and Game. It is an effort to protect the state's biodiversity in the face of climate change.

There are two primary data layers, Core Habitat and Critical Natural Landscape, that are important to identify. Core Habitat:

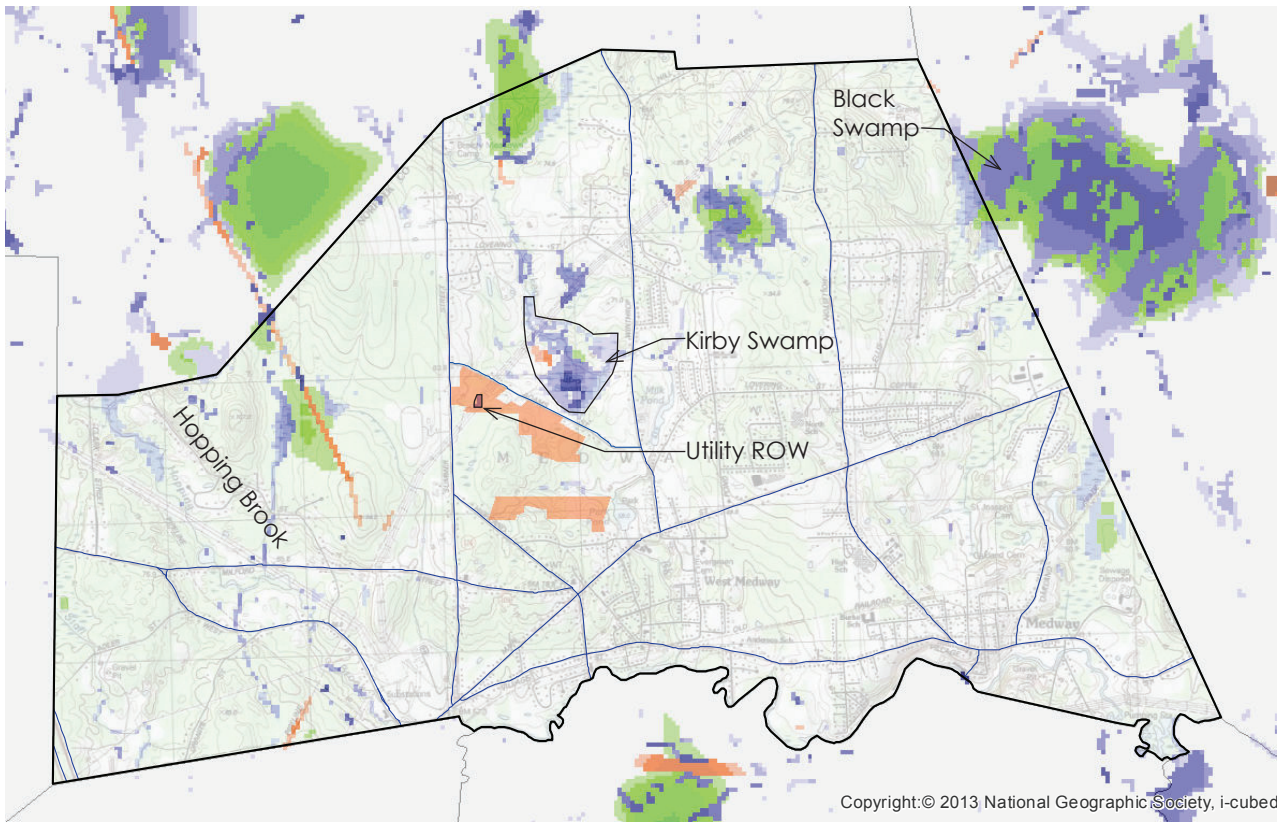
> ...identifies key areas that are critical for the long-term persistence of rare species and other Species of Conservation Concern, as well as a wide diversity of natural communities and intact ecosystems across the Commonwealth. *(BioMap2 9)*

Critical Natural Landscape "identifies large natural Landscape Blocks that are minimally impacted by development." *(BioMap2 9)* Although no Core Habitat areas are identified within the Adams Street Conservation Area, four Core Habitat areas and one Critical Natural Landscape area are identified within Medway. Three areas identified as Core Habitat are located In the northwest near Hopping Brook, and in the northeast, one area of Core Habitat and one area of Critical Natural Landscape exist in the Black Swamp.

The riparian corridor along Hopping Brook and adjacent forest land contains several rare species including the spotted turtle (*Clemmys guttata*) and the four toed salamander (*Hemidactylium scutatum*). In the northeast, identified core habitat supports the Spatterdock darner (*Rhionaescha mutata*).

These identified habitats are important to biodiversity within Medway. Connectivity of the BioMap2 Core Habitats and Natural Landscape Blocks to other open space parcels and the Adams Street Conservation Area could result in enhanced biodiversity and other ecosystem services.

CONSERVATION ASSESSMENT AND PRIORITIZATION SYSTEM



Legend

Adams Street Conservation Area

IEI, Index of Ecological Integrity
Top 50% of the Landscape

Forests

Shrubland

Freshwater Wetland & Aquatic

50-60 60-70 70-80 80-90 90-100

The University of Massachusetts (UMass) Landscape Ecology Laboratory Conservation Assessment and Prioritization System (CAPS) is "an ecosystem-based (coarse-filter) approach for assessing the ecological integrity of lands and waters and subsequently identifying and prioritizing land for habitat and biodiversity conservation." Ecological integrity is defined as "the ability of an area to support biodiversity and the ecosystem processes necessary to sustain biodiversity over the long term." (*CAPS*) The UMass data provide another way for Medway to rank and prioritize areas for protection and conservation.

The landscape metrics UMass used to develop the Index of Ecological Integrity (IEI) ranking include connectivity, traffic volume, distance from roads, and unimpeded stream flow. The focus is not just on rare species habitat but on overall ecological integrity. The mapping depicts the top 50% of lands with the highest ecological integrity.

Whereas in Biomap 2 Core Habitat and Critical Natural Landscape have been identified in three areas on the periphery of Medway, CAPS has identified additional areas within the Chicken Brook corridor that could be important to biodiversity and ecosystem health. Specifically, Kirby Swamp and an area within the Conservation Area utility corridor have high value for freshwater wetland and aquatic habitat.

Recognizing and connecting all areas with ecological value will be important to increasing Medway's biodiversity and ecosystem health.

SURROUNDING USES

The Adams Street Conservation Area is surrounded by single-family detached residential development; many of the homes are landscaped with lawns while others are built into wooded areas. A 47-acre private property under Chapter 61A and the high school (completed in 2003) divide the Conservation Area into two distinct sections. The northern section includes an artificial turf sports field and a parking lot. Chicken Brook meanders around the Conservation Area through two constructed ponds, Milk Pond and Choate Pond. Agricultural fields north of Adams Street abut the Conservation Area and provide connectivity to pasture habitat. A large wetland west of the high school drains north across the Conservation Area to Kirby Swamp and Chicken Brook.

Residential development surrounds the site. This neighborhood is just west across Summer Street.
(Bird's Eye View from Bing Maps)

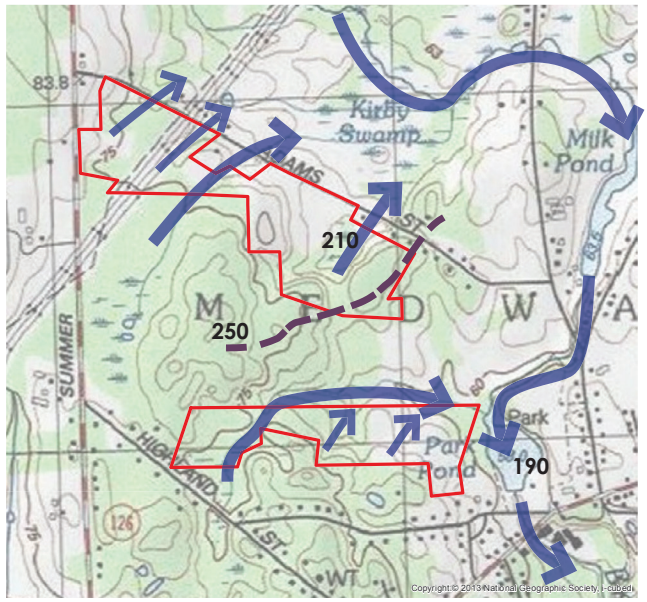
ECOLOGICAL PATTERNS

Ecological patterns of topography, soils, hydrology, and vegetation greatly influence the composition and health of the landscape. Human activities further influence and often disrupt these patterns through urban development, use of natural resources, and introduction of non-native plant species.

Non-native and invasive species introduced to the Adams Street Conservation Area through agriculture, horticulture, and natural seed dispersal negatively influence the quality of habitat on-site and beyond. Understanding how these patterns affect the site will guide appropriate solutions to preserve and restore ecological health of the land.

Opposite: Early successional habitat includes a wide range of vegetation layers that support a diversity of species.

TOPOGRAPHY, HYDROLOGY AND SOILS



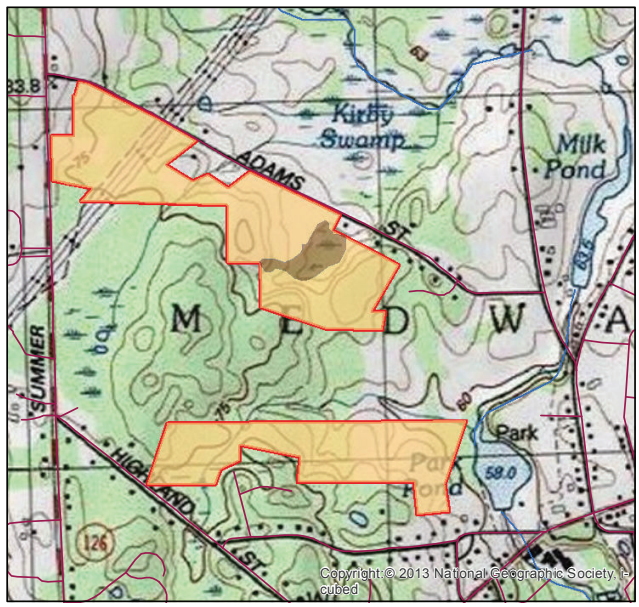
Legend
- Adams Street Conservation Area
- Ridge line
- Water flow direction
- 190 Approximate elevation in feet

0 500 1,000 Feet

TOPOGRAPHY AND HYDROLOGY

The Conservation Area drains to Chicken Brook. The two parcels are separated by a low ridge which divides the drainage areas. The northern portion drains northeast through culverts under Adams Street to Kirby Swamp which then discharges to Chicken Brook. The southern portion flows north and northeast directly to Chicken Brook, entering above Choate Pond. The drainage areas are local and small ranging from about 30 acres to 168 acres. Elevations range from 190 at Choate Pond, to 250 at the high school and 210 within the wetland at Adams Street.

The drainage patterns influence water quality and storage. Topographical changes foster different habitats and enhance the recreational experience of the area. Variations in terrain provide interesting trail experiences and opportunities for views.



Legend
- Adams Street Conservation Area
- Scarboro and Birdsall soils
- Canton, Woodbridge, Ridgebury, Whitman, and Sudbury fine sandy loam

0 500 1,000 Feet

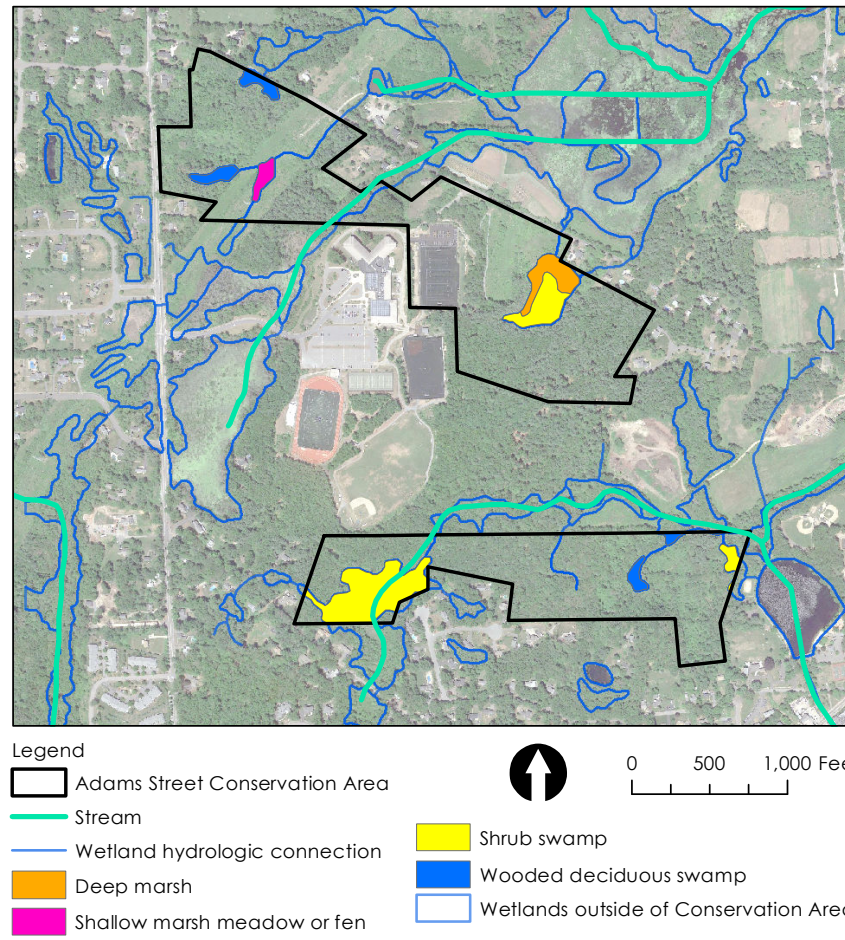
SOILS

Most of the soils within Medway and the Adams Street Conservation Area are fine sandy loam. These soils are well-suited for trees and agriculture and provide a good basis for the forests and meadows found in the Conservation Area. These soil types are also supportive of building foundations making them desirable for land development.

The other soil type found within the Conservation Area, Scarboro and Birdsall, is a combination of a very fine sandy loam and a mucky sandy loam. These are very poorly drained soils that exist within the wetland area in the northern portion of the study area. These soils provide a healthy substrate for the wetland ecotype and ensure its long term viability. These soils are important to preserve the ecosystem services wetlands provide including drinking water and protection from flooding.

WETLANDS AND STREAMS

Adams Street Conservation Area Wetlands Summary:
Shrub swamp - 5.8 acres
Forested swamp - 1.3 acres
Deep marsh - 1.2 acres
Shallow marsh - 0.4 acres



The Massachusetts Wetlands Protection Act (WPA) and the Town of Medway local by-laws provide protection to wetlands and streams and adjacent land areas by controlling allowed disturbances.

WETLANDS AND STREAMS

The Conservation Area contains about nine acres of wetlands including swamps and marshes. The map (above) shows how the many smaller wetlands are hydrologically connected to other wetlands and streams. Two streams cross the study area, one in the northern parcel and one in the southern parcel, moving water from wetlands towards Chicken Brook.

Swamps are characterized by saturated soils during the growing season and standing water during certain times of the year, and are dominated by shrubs or trees. In the Adams Street Conservation Area, shrub swamps are the most prevalent wetland type and include alders, high-bush blueberry, and silky dogwood. Several small half-acre forested swamps are also found within the parcels.

Marshes are frequently or continually inundated with water and characterized by emergent soft stem vegetation adapted to saturated soil conditions. The deep marsh located near Adams Street and the small shallow marsh within the utility corridor are important resources. They can sustain a vast array of plant communities that in turn support a diversity of wildlife. The deep marsh at Adams Street is habitat for cattails, tussock sedge as well as cinnamon fern and blue flag.

ECOSYSTEM SERVICES

Wetlands and streams serve vital roles in flood protection and water quality. Their presence in a watershed helps to reduce damage caused by storm events by slowing and storing flood water. They uptake nutrients, thereby cleaning runoff before it reaches other water sources. In addition to improving water quality through

WETLANDS AND STREAMS

filtering, some wetlands maintain stream flow during dry periods, and many replenish groundwater.

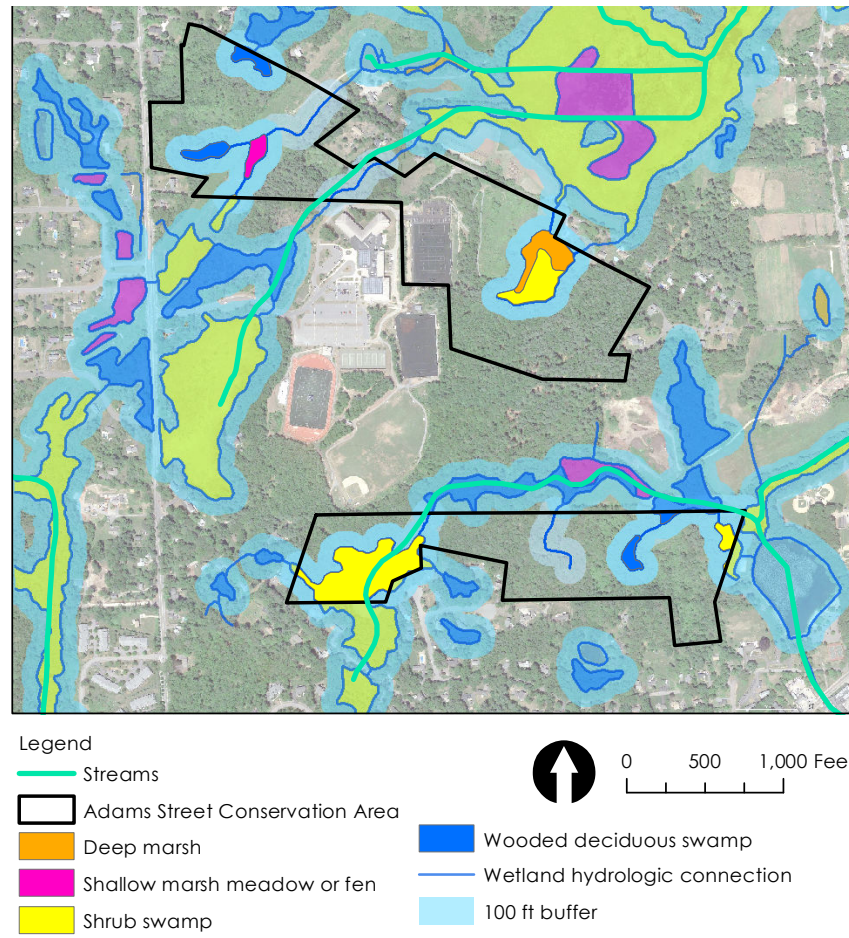
HABITAT

Many species of birds and mammals rely on streams and wetlands for food, water, and shelter, especially during migration and breeding. More than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half require wetlands at some point in their lives.

VULNERABILITY

Streams and wetlands are subject to degradation by the many contaminants in stormwater runoff from surrounding impervious and cultivated lands. Runoff and discharge from stormwater outfalls can include harmful pathogens/bacteria, nutrients, sediments (total suspended solids), road salts, biological and chemical oxygen-demanding substances, thermal pollution, metals, and synthetic chemicals.

In addition, surrounding residential areas can cause degradation with lawn fertilizer and chemical applications as well as yard waste disposal. Non-native invasive species can out-compete natives resulting in a decrease in biodiversity and available food sources for insects and wildlife.



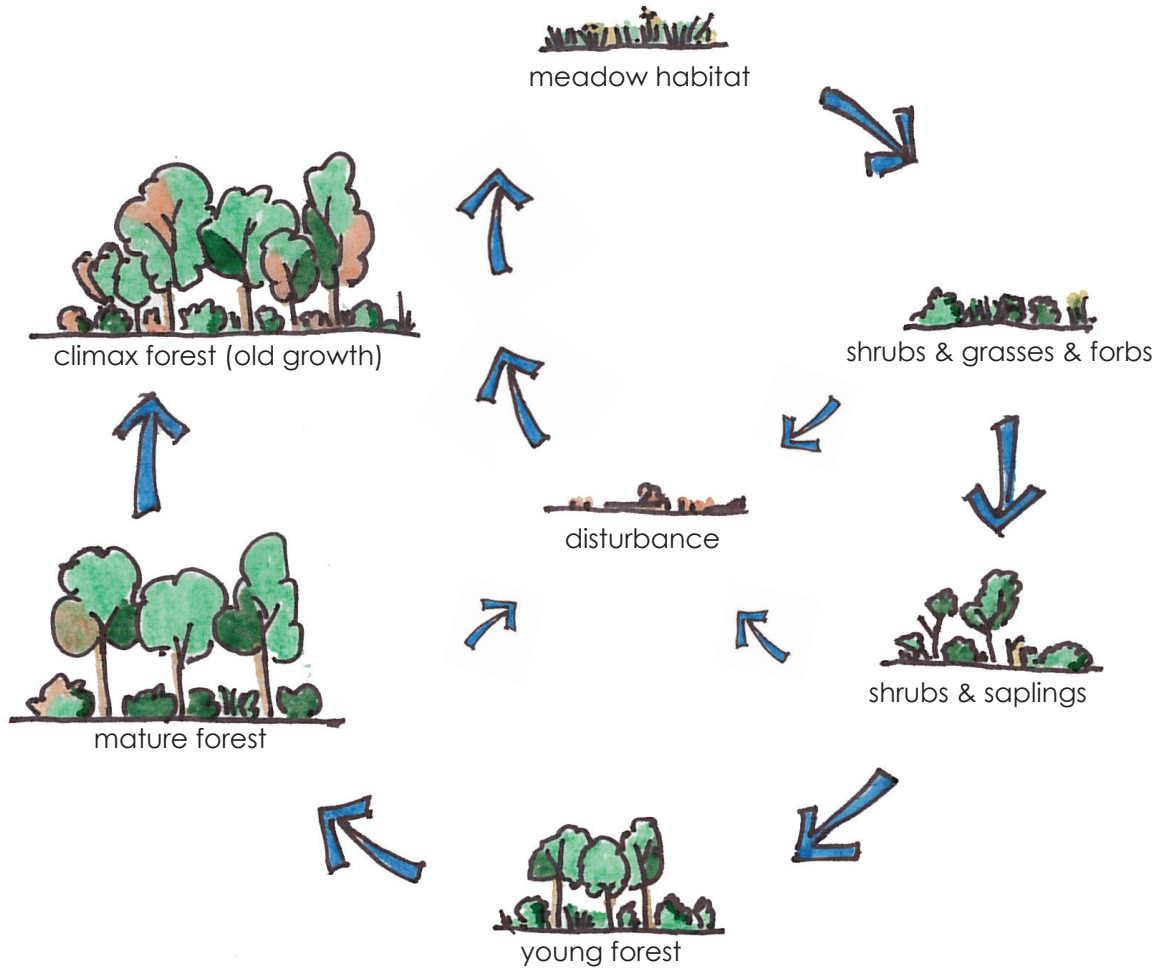
BUFFERS

Buffers protect streams and wetlands from upland development and other nutrient producing activities such as farming and agriculture. They supply habitat for semi-aquatic species providing additional biodiversity. The WPA gives the Conservation Commission authority to review activities within a 100-foot buffer of wetlands. One hundred foot buffers to all wetlands, hydrological connections and streams are shown in the map above. In the Conservation Area, these buffers cover about 25 acres. Although a 100-foot buffer was used for illustration purposes, some of the hydrological connections may not warrant a buffer and the streams may include a 200-foot buffer per the Rivers Protection Act. A wetlands professional should be consulted to confirm extent of buffers.

Deep marshes such as the one off of Adams Street are characterized as "one of the most productive ecosystems on earth." ("Massachusetts Wetlands.")

VEGETATIVE COVER AND SUCCESSION

THE PROCESS OF FOREST SUCCESSION



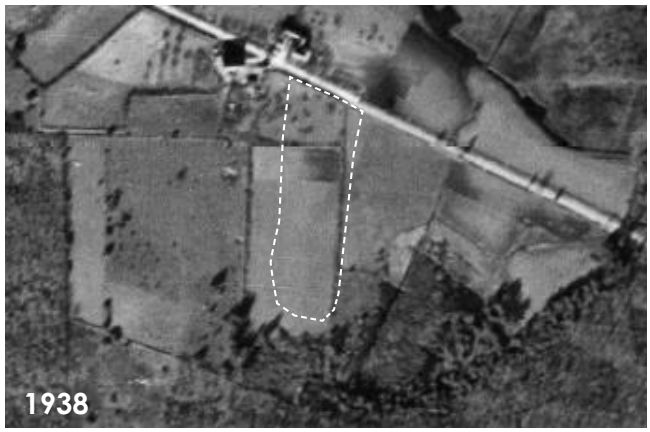
Topography, soils, wetlands, and streams are the building blocks on which vegetative communities form.

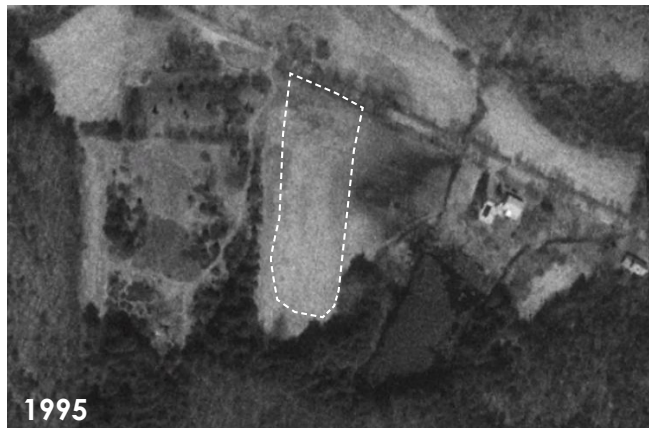
In the New England coastal plain, forests are the dominant plant community, though they represent only one of a range of diverse plant communities. Historically, natural and human-induced disturbances have led to the creation of meadow and other early successional habitats. More commonly today, abandoned farmland undergoing succession and lands subject to development have dramatically reduced available grasslands and early successional habitat. Research highlights that over the past 60 years, open habitats (grasslands, savannah, shrublands, and barren lands) have decreased by 98% throughout eastern North America ("*Managing Grasslands*").

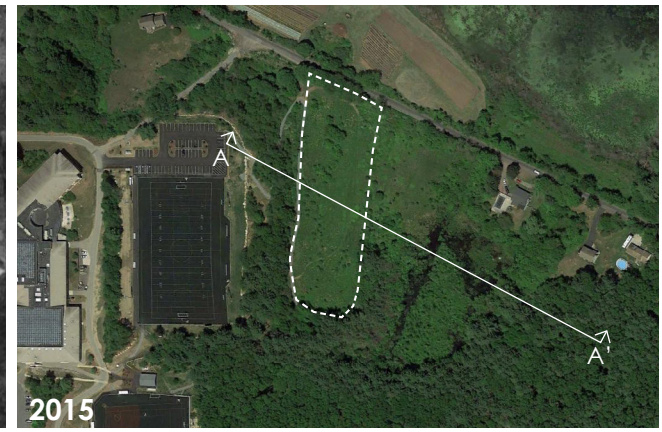
Compounding this dramatic reduction is habitat degradation from fragmentation and the influence of non-native, invasive species on remaining lands undergoing succession. Each stage of succession provides unique habitat to a different suite of plant and animal species. As these different habitats continue to decline in quantity and quality, many species that rely on them exhibit signs of decline.

Active management of the Adams Street Conservation Area should strive to build connectivity and improve successional habitats including grasslands, shrub and saplings, and young forests through the removal of invasive species. Exploring opportunities to connect this conservation area with other open spaces will enhance habitat connectivity. The following pages explore successional habitat observed within the Conservation Area.

SUCCESSION OVER 78 YEARS







Assessing aerial photographs from 1938 to 2015 on land along Adams Street reveals that much of the land was actively farmed, likely as hay pasture, until farming practices ended in the past ten years.

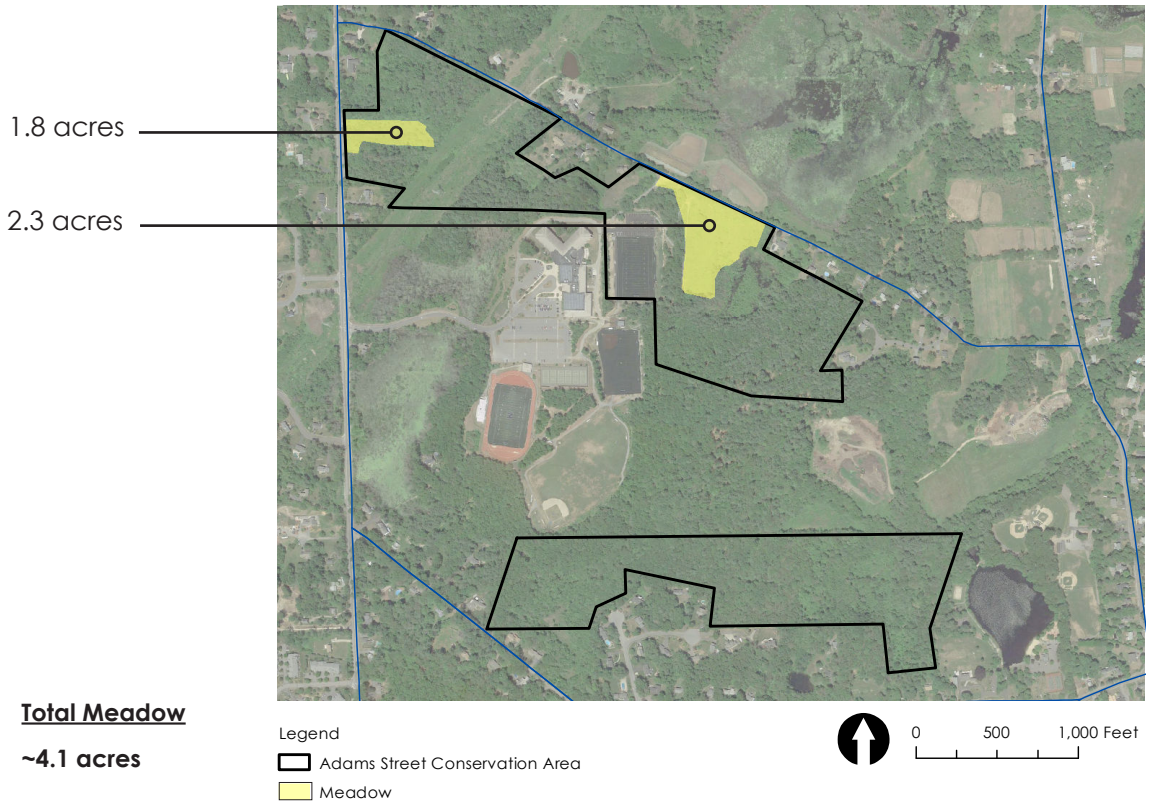
Pasture was gradually replaced by a variety of native, non-native, and invasive plant species. Prevalent native species include common milkweed (*Asclepias syriaca*) and goldenrod (*Solidago spp.*). Cool season, non-native grasses are likely prevalent from the former hay pasture activities. Several invasive species are of particular concern, including glossy buckthorn (*Frangula alnus*), multiflora rose (*Rosa multiflora*), and oriental bittersweet (*Celastrus orbiculatus*).

These photos reveal how quickly succession can occur once farming activities end. One common farming activity evident here is the practice of ditching and draining wetlands. There are two ditches present here, one draining the wetland adjacent to the Adams Street Meadow. Without active maintenance, the ditch likely filled in, allowing the wetlands to return.

The strip of forest vegetation along the western edge of the meadow has been undergoing succession from 1995 to 2015. This young forest is heavily infested with invasive vegetation that without attention, will soon encroach into the meadow. The meadow area, shown in the dashed white line, was cleared in December 2015.

EXISTING MEADOW

MEADOW HABITAT



Total Meadow

~4.1 acres

Meadow habitats are early successional plant communities consisting of grasses and forbs. The loss of these types of grassland habitats has led to the dramatic reduction in birds that depend on them, such as the vesper and Savannah sparrows and upland sandpipers.

From 1971 to 1999, meadow habitat in Medway decreased from 246 acres to 30 acres, a distressing statistic for a town which used to be known for its "broad meadows."

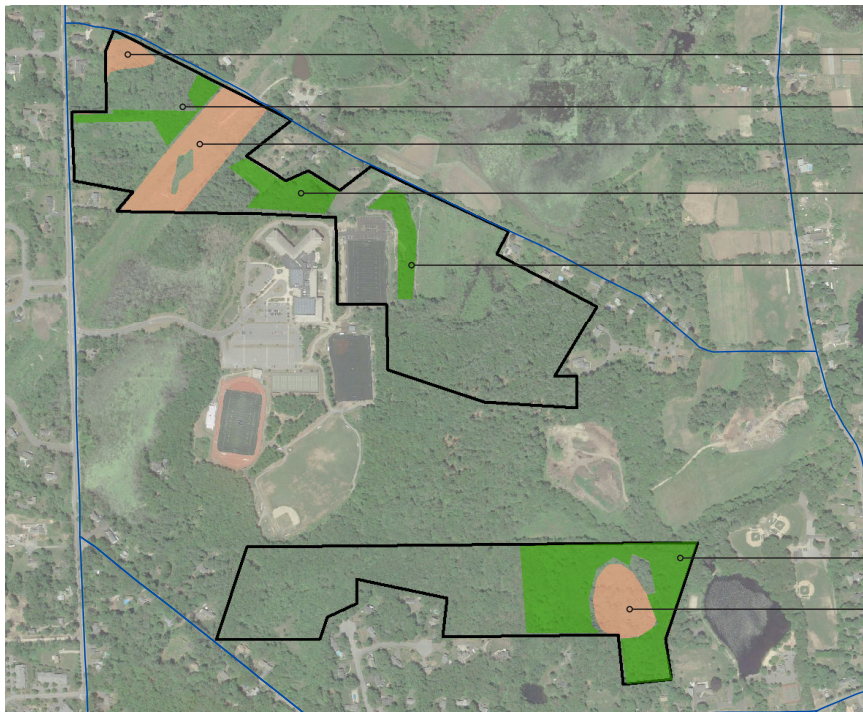
The Adams Street Conservation Area contains 4.1 acres of meadow habitat. The 1.8 acre meadow along Summer Street includes a sewer line easement. The larger, 2.3 acre meadow along Adams Street is adjacent to a small, returning wetland. Both areas of meadow are gently sloping toward neighboring wetlands. Each meadow is adjacent to a different type of successional community (the utility corridor and the farmland north of Adams Street) which enhances its value as early successional habitat.

Several bird species have been observed using smaller grasslands as habitat including horned lark (<2.5 acres) and bobolink (4 acres), though most grassland bird species require larger contiguous areas of habitat. Vesper and Savannah sparrows require a minimum of 12 acres; eastern meadowlarks need at least 60 acres; and upland sandpipers need at least 64 acres ("*Managing Grasslands*").

Few larger contiguous patches of meadow habitat exist today and the related bird species' populations are in decline throughout the northeast as a result. While providing a patch of meadow habitat has localized benefits, connecting parcels of similar habitat type together improves habitat availability for a greater number of species.

The Adams Street meadow was cleared of woody vegetation in December 2015.

SHRUB AND YOUNG FOREST: EARLY SUCCESSION



Total Shrub	Total Young Forest
~9.6 acres	~15.5 acres

Shrubland and young forest occupies about 25 acres within the Conservation Area and adjacent to wetland and riparian corridors. Shrublands consist of woody species under 15 feet and underlying grasses and forbs. Young tree saplings may be present in some shrubland systems. Over time, as trees become the dominant canopy, young forest develops. This process of succession is currently underway within these shrubland areas.

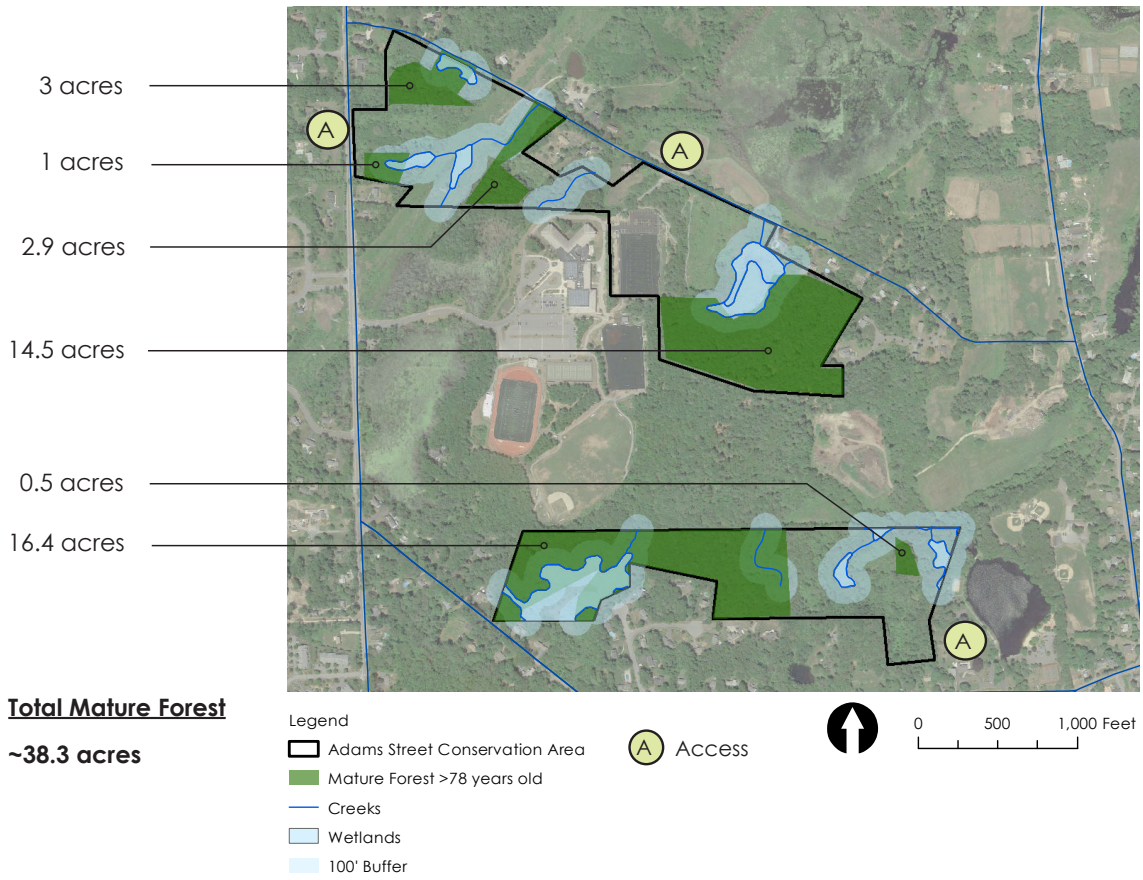
Small shrubland areas such as the one acre area along Adams Street can support species with small home ranges, including butterflies, dragonflies, and the chestnut-sided warbler. The larger area by Choate Pond and within the utility corridor can support species with larger ranges, such as white-tailed deer and turkeys.

There are more than 15 acres of young forest throughout the study area that range from 20 to 70 years of age. They include a mix of upland and lowland hardwoods, such as shagbark hickory, American beech, red and white oaks, and red maples, among others. These areas also include a mix of native understory species including witch hazel, arrowwood, and low-bush blueberry, as well as a mix of non-native, invasive species including Japanese barberry, glossy buckthorn, and oriental bittersweet.

The native flora of shrublands and young forest are not able to withstand the spreading pressure of invasive species. Invasives often leaf out earlier, shading natives, and disperse more prolifically, out-competing native vegetation for space and resources. Shrublands within the Adams Street Conservation Area should be managed for invasive plants as they undergo succession to support a healthy transition into forest habitat.

Of the 40 species of birds that prefer shrub habitat in the northeast, 22 species are in decline. Furthermore, of the 3,500 butterflies and moths native to the northeast, 56 species depend on shrub habitat for their survival ("*Managing Grasslands*"). At the Adams Street Conservation Area the utility corridor provides important perpetual shrubland habitat to support these species.

MATURE FOREST



Mature forests mapped above include all wooded areas in a 1938 aerial photograph which still exist today. These older forest patches cover over 38 acres, nearly 43% of the study area. Forested lands are a mix of conifer and deciduous hardwood species. Mature stands show signs of regeneration with young saplings present. They have sparse understory and little infestation of invasive species.

The two larger stands in each parcel are adjacent to wetland and riparian habitat and are inaccessible by vehicle from existing roads. Both have undulating topography with occasional steep slopes above 8%. All other smaller areas range from just under three acres to a half acre and also abut wetland, riparian, and buffer habitat.

According to Lazarus and Schaible:

> [V]arious studies... suggest that most [forest] parcels smaller than 80 acres tend not to benefit from economies of scale, and parcels smaller than 20 acres are unlikely to yield any financial return.

These forest parcels, though not large enough for harvesting, offer greater benefits, such as carbon sequestration, stormwater interception, wildlife habitat, nutrient cycling, and air quality as well as providing human recreational enjoyment.

Mature forest along Choate Trail.

UTILITY CORRIDOR

Adams Street Conservation Area

0 125 250 500 Feet

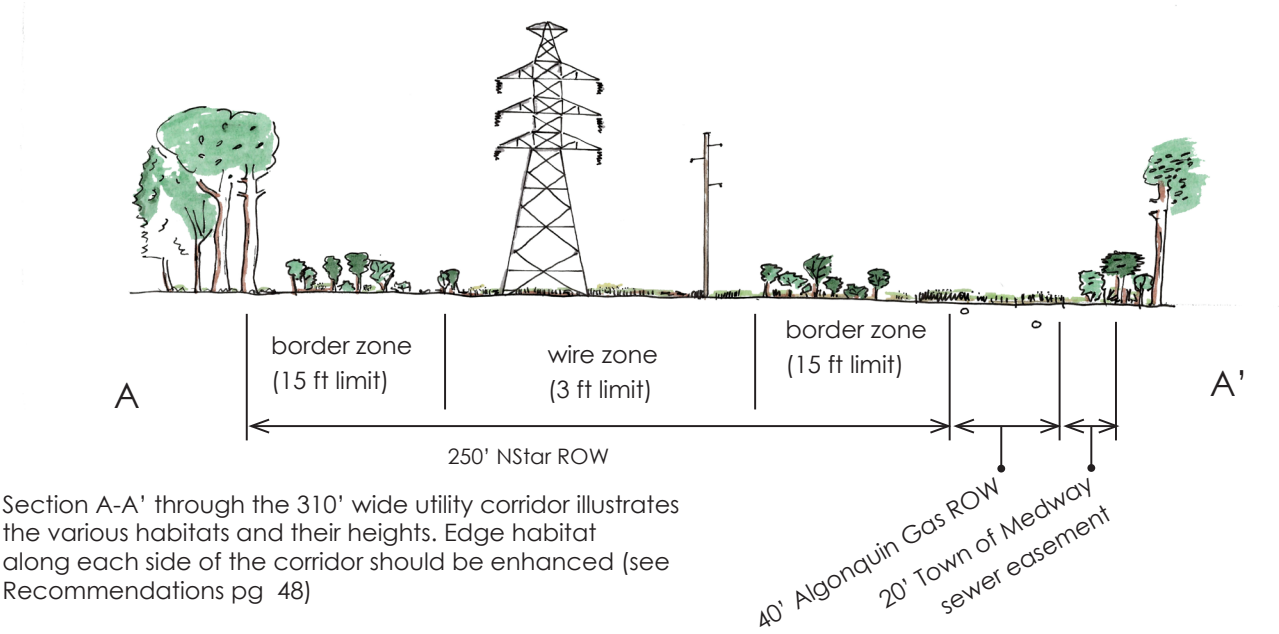
NSTAR and Algonquin Gas own and maintain right of ways (ROWs) through the Adams Street Conservation Area which total about 5.8 acres.

Algonquin Gas mows or "brush hogs" its ROW every three years. The NSTAR ROW is maintained with maximum height constraints of three feet under wires and 15 feet in border zones. Both utilities have published maintenance plans and access their right of ways from Adams or Summer Streets.

The maintenance regimes of the utilities result in permanent early successional shrub habitat within the right of way. To preserve and enhance diverse habitats, the two utilities should work to balance and coordinate their maintenance schedules and strategies.

The habitat available within utility right of ways is unique and valuable for its biodiversity.

The right of way within the Adams Street Conservation area includes a recently mowed gas line corridor.



Section A-A' through the 310' wide utility corridor illustrates the various habitats and their heights. Edge habitat along each side of the corridor should be enhanced (see Recommendations pg 48)

> Transmission line corridors in forested landscapes provide important early successional habitats for a taxonomically rich array of native plant and animal life, including populations of rare species. (Wagner et al. 231)

Thus these utility corridors contribute to the biodiversity of the Conservation Area.

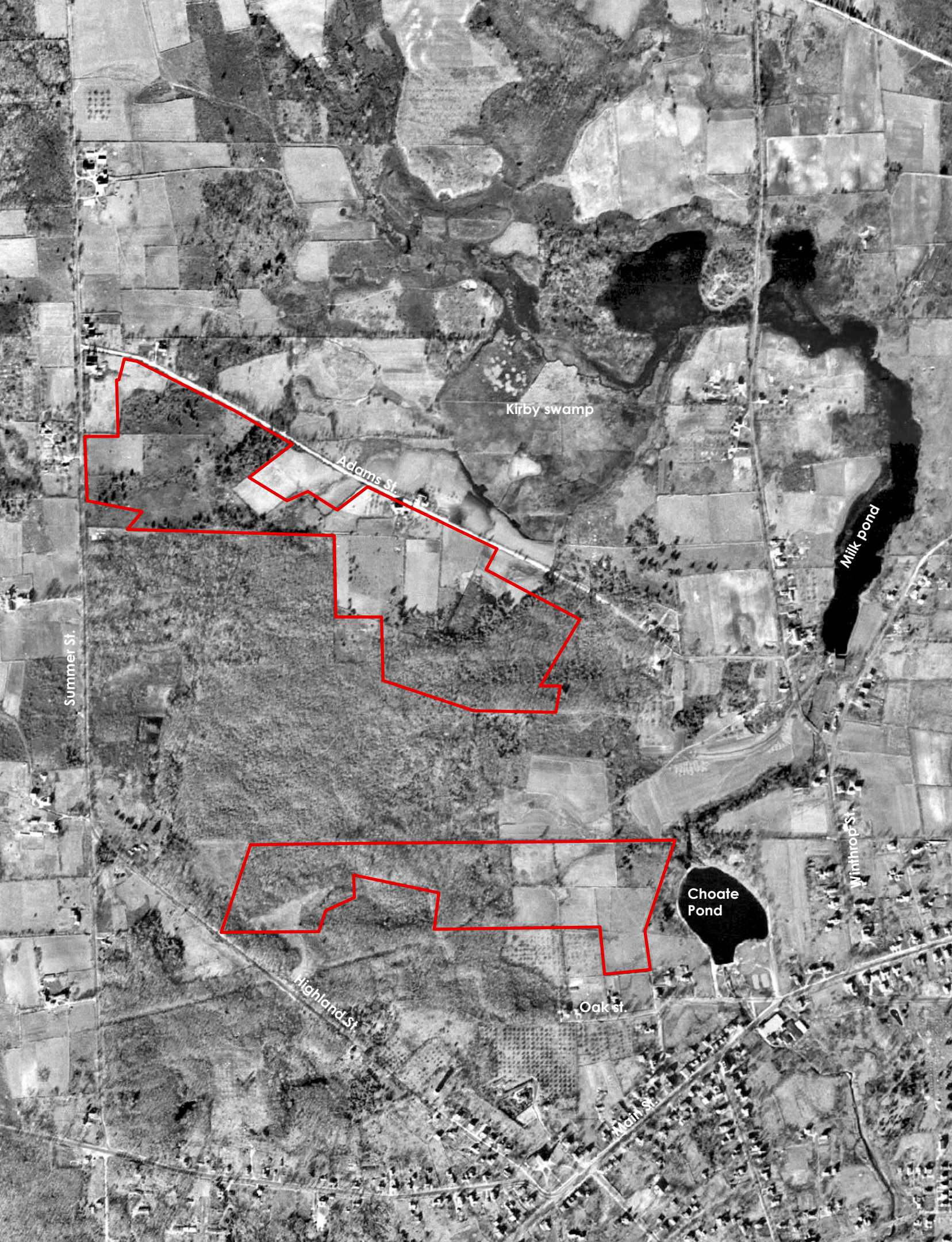
Wild indigo,
Baptisia tinctoria

Photo by Mason Brock

Shrub habitat within the NStar corridor provides important habitat and enriches the biodiversity of the Conservation Area.

Wild indigo dusky wing
Erynnis baptisiae

Photo by Tom Peterson


Kirby swamp
Adams St.
Milk pond
Summer St.
Winthrop St.
Choate Pond
Highland St
Oak st.
Main St.

HUMAN PATTERNS

Patterns on the ground today reflect current and past human uses including residential development, recreation, and agriculture.

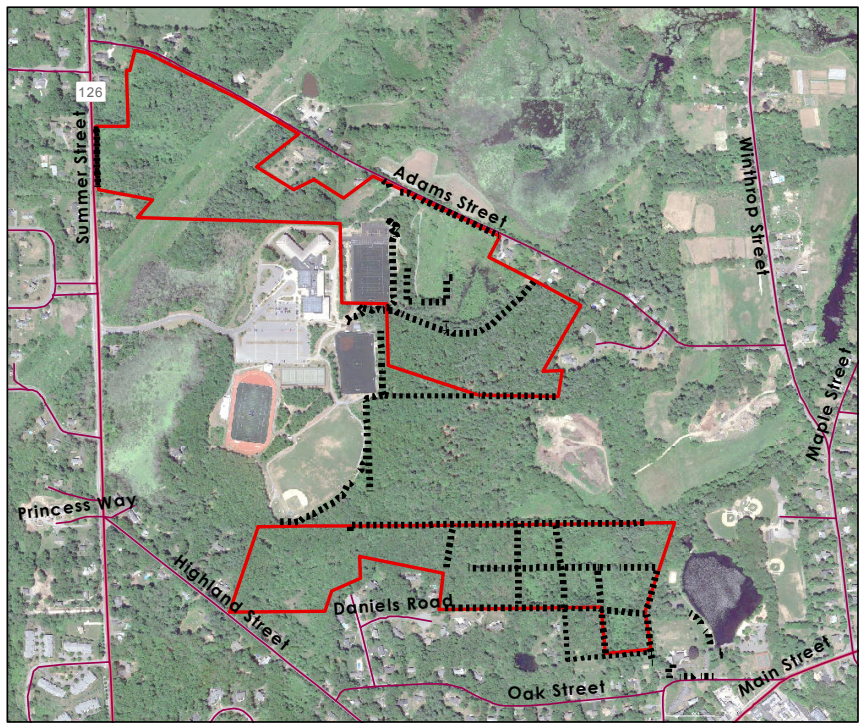
As shown in light gray on the 1938 aerial on the opposite page, agriculture was prevalent in the Chicken Brook corridor and along Winthrop and Summer Streets. Large farms took advantage of the rich, gently sloping and moist lands along the Chicken Brook. The topographically higher area between the Adams Street Conservation parcels was forested at the time and some of these forests still persist today. To the south of the Conservation Area, houses line the streets in the Village of West Medway.

Today, many of the farms have been replaced with single family homes. Where Oak Street once ended with orchards, it now connects back into Highland Street and a network of residential dead-end roads. The high school and ball fields replaced much of the previously wooded areas and the power line corridor cuts diagonally through the landscape.

A look at current uses of the Conservation Area shows how existing trails often parallel the historic stone walls. Opportunities to create a cohesive trail system throughout the site's diverse communities are explored.

Opposite: 1938 aerial photo of study area and surroundings shows the prominence of agriculture.

STONE WALLS



Legend

Adams Street Conservation Area

Stone Walls

0 500 1,000 Feet

The Open Space Committee mapped existing stone walls in the area to highlight them for preservation.

The many stone walls found in the conservation area are reminders of the past agricultural uses.

Stone walls function as both a cultural resource and habitat for a wide variety of animals and plants. Small mammals, reptiles, birds, amphibians, insects and spiders as well as lichens and mosses make stone walls their homes. Through this habitat creation, conservation of stone walls contributes to biodiversity.

Dry stone walls are also thought to have a corridor function and therefore can contribute to connectivity in the landscape.

As plans move forward on this conservation area and others throughout Medway, care should be taken to map these features and ensure their conservation.

The stone wall south of the wetland separates a hardwood conifer forest from a predominantly hardwood forest. This vegetation pattern tells a story of previous land uses.

Legend

Adams Street Conservation Area

Existing stone walls

0 125 250 500 Feet

Remnant stone walls frame historic fields such as this area near Choate Pond. Stone wall patterns within the conservation area reveal past agricultural use.

The stone wall along Adams Street is flanked by large trees, a common occurrence adjacent to agricultural fields in New England.

Eastern chipmunks often use stone walls for shelter. *Photo by Gilles Gonthier*

Stone walls provide habitat for mosses. *Photo by P Smith*

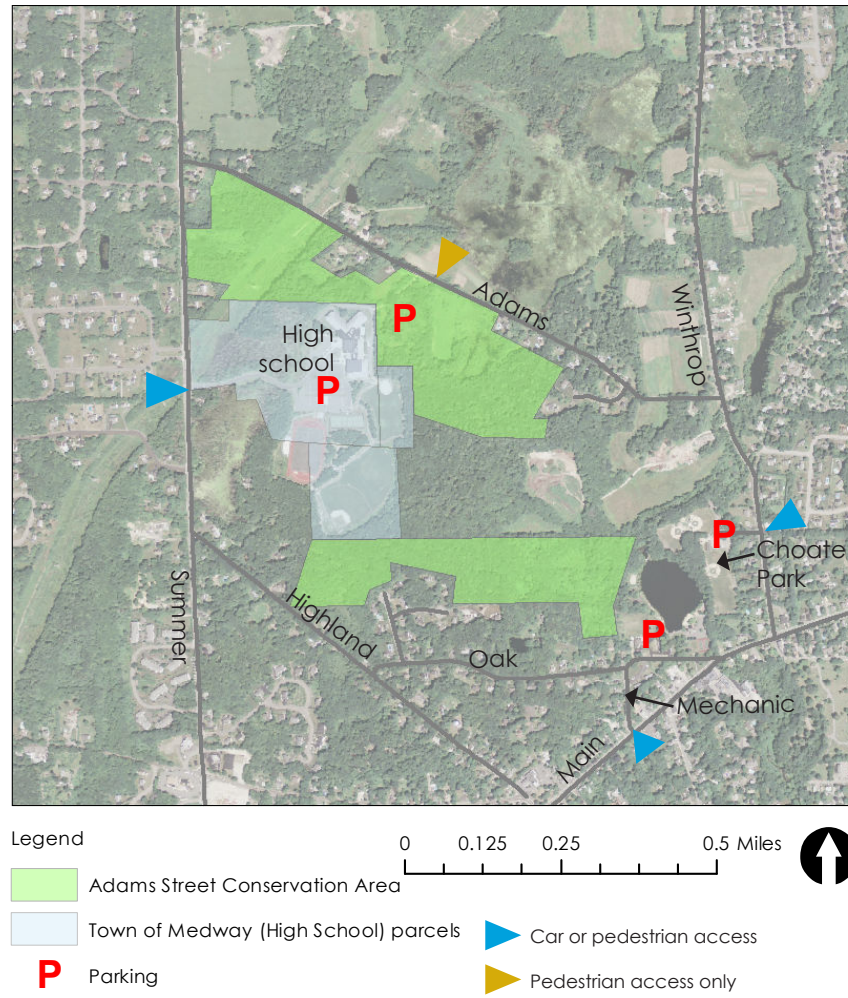
PARKING AND PEDESTRIAN ACCESS

CIRCULATION

Visitors access the Conservation Area on foot or by car. Two parking areas off Winthrop and Mechanic Streets serve Choate Park. The high school has a large parking area and an additional parking area has been built behind the high school next to the artificial turf field, both of which are within the Conservation Area.

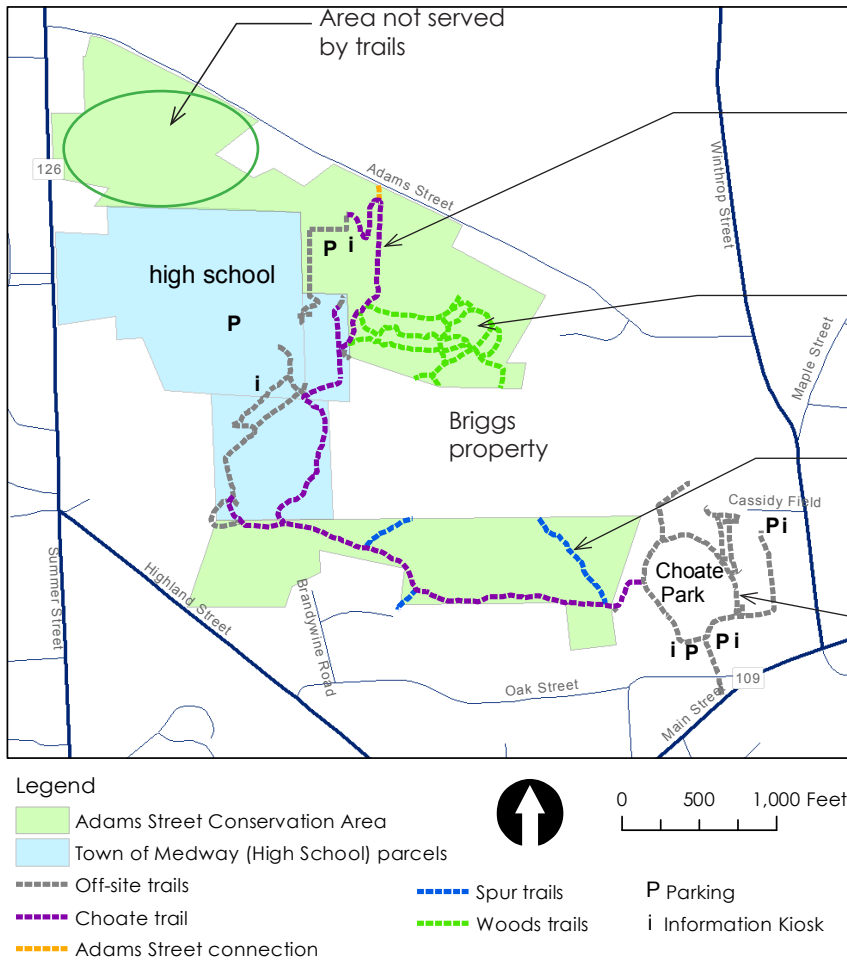
Nearby residents can also access the Conservation Area on foot, from Choate Park, via the high school driveway or directly off of Adams Street. Residents in abutting homes can access the area directly from their backyards.

Additional direct access points, such as a trail connection beginning at Summer Street might provide pedestrians with options other than the high school driveway or walking on Adams Street where there are no sidewalks.



The parking lot behind the high school has recently been constructed and can hold 66 cars.

EXISTING TRAIL NETWORK



CHOATE TRAIL:
- Total length approx. 1 mile
- 5 feet wide
- Gravel/stone dust surface/ well-delineated path.

WOODS TRAILS:
- Total length approx. 0.9 miles
- Width varies, <3 feet
- Unimproved surface

SPUR TRAILS:
- Total length approx. 0.25 miles
- Width varies, <3 feet
- Unimproved surface

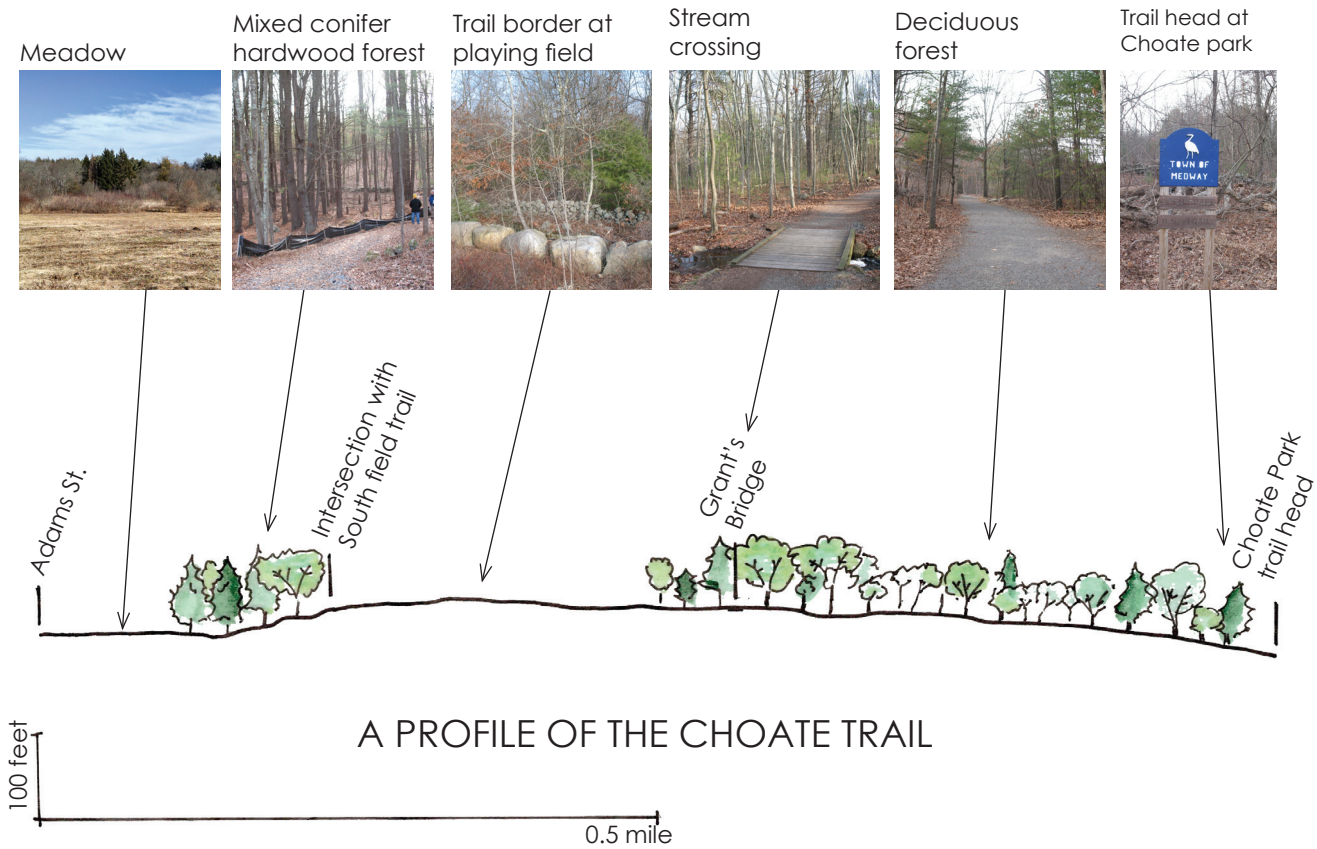
TRAILS OUTSIDE STUDY AREA

The Choate Trail is a popular walking trail between Adams Street and Choate Park. Unlike the other trails within the Conservation Area, it is well defined with a wide compacted stone dust surface. It can be accessed on foot from many points along its length.

The Woods Trails criss-cross through the wooded area without a clear destination. The trails are not marked making them difficult to navigate when covered with leaves or snow. The Spur Trails suggest connections through the Briggs property. These trails are also unmarked and difficult to navigate.

The northwest portion of the Conservation Area has no trails which makes it less accessible to visitors. Extending the Choate Trail from Adams Street through this area to Summer Street would provide additional recreational opportunities.

The Choate Trail is a pleasant walk through a mixed conifer hardwood forest.



Walking on the Choate Trail provides variation in terrain and scenery as the path borders along the meadow and winds through the woods. The trail crosses through the mature forest found in the study area but the user also experiences meadow and young forest. The trail is about one mile long and the change in elevation is about 60 feet.

The trail is well used for many purposes, such as dog walking, fitness, nature watching and bicycling. At the community meeting residents expressed concerns about users walking dogs off leash, dog waste, and exposure to poison ivy and ticks. Improved signs that explain rules for dogs on the trails, installation of dog waste stations, and removal of poison ivy near the trail edge could help alleviate these concerns.

FOREST SERVICE TRAIL ACCESSIBILITY GUIDELINES (See next page)

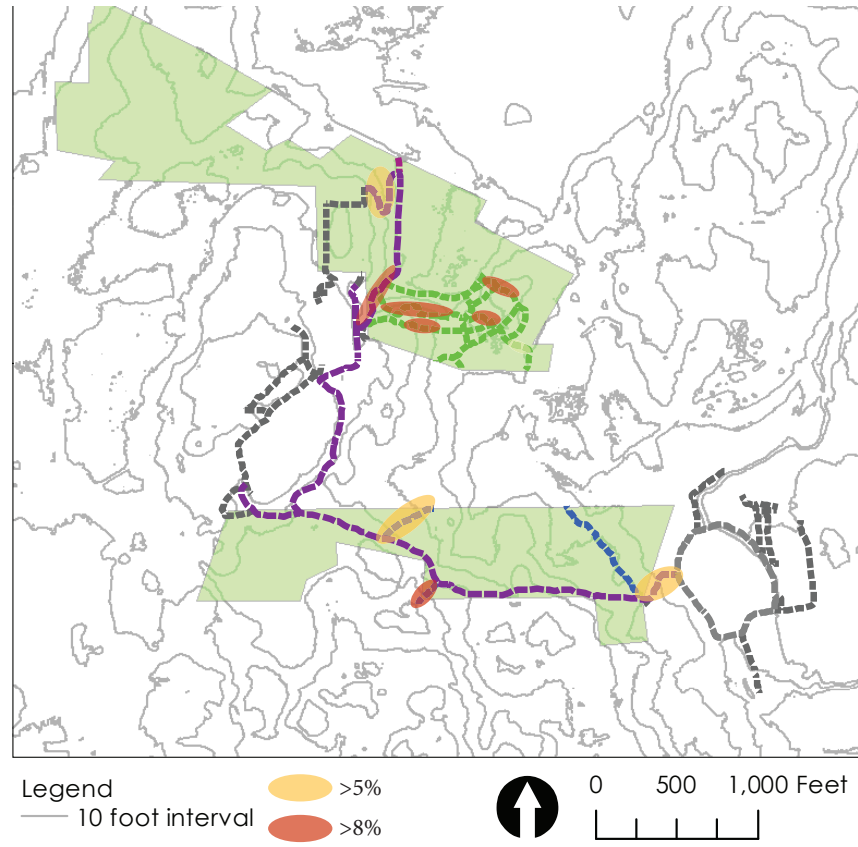
The following 12 components of trail design are covered in the guidelines:

1. *Trail tread surface*
2. *Clear tread width*
3. *Running slope and cross slope*
4. *Resting intervals*
5. *Passing spaces*
6. *Tread obstacles*
7. *Openings*
8. *Protruding objects*
9. *Trail facilities*
10. *Trailheads*
11. *Trailhead signs*
12. *Gates and barriers.*

("Forest Service Trail Accessibility Guidelines")

TRAIL SLOPE

ACCESSIBLE TRAIL GUIDELINES
The Forest Service Trail Accessibility Guidelines (FSTAG) provides standards for building outdoor recreation trails that are ideal for use by people with a wide range of abilities. Provisions within FSTAG include guidelines on 12 criteria ("Forest Service Trail Accessibility Guidelines"- see box on previous page). The existing trails were analyzed for running slope, the most difficult criterion because it is dependent on natural topography.



CHOATE TRAIL
The main trail generally meets the FSTAG criteria with the exception of the beginning and end and a steep section through the woods. The beginning and end may just exceed the 5% criterion. This should be verified with actual surveyed elevation or grade measurements. If the slope exceeds 5%, then resting intervals should be added every 200 feet. The section near the Woods Trails appears to exceed 8%. Resting intervals should be added to this section every 30 feet. The information in kiosks at each end of the trail can be improved to include trail network details including distances to intersections and trail heads.

WOODS TRAILS
The Woods Trail network has many steep sections. To make all these trails compliant with FSTAG standards would entail adding many switchbacks. Because of the redundancy of the trails, it is reasonable to eliminate some of the steeper trails or to build a new accessible trail and allow the forest to regenerate along the old alignments. There is no wayfinding currently on these trails making them difficult to navigate.

SPUR TRAILS
Two out of three of the spur trails exceed running slope criteria. These trails should either be eliminated or improved.

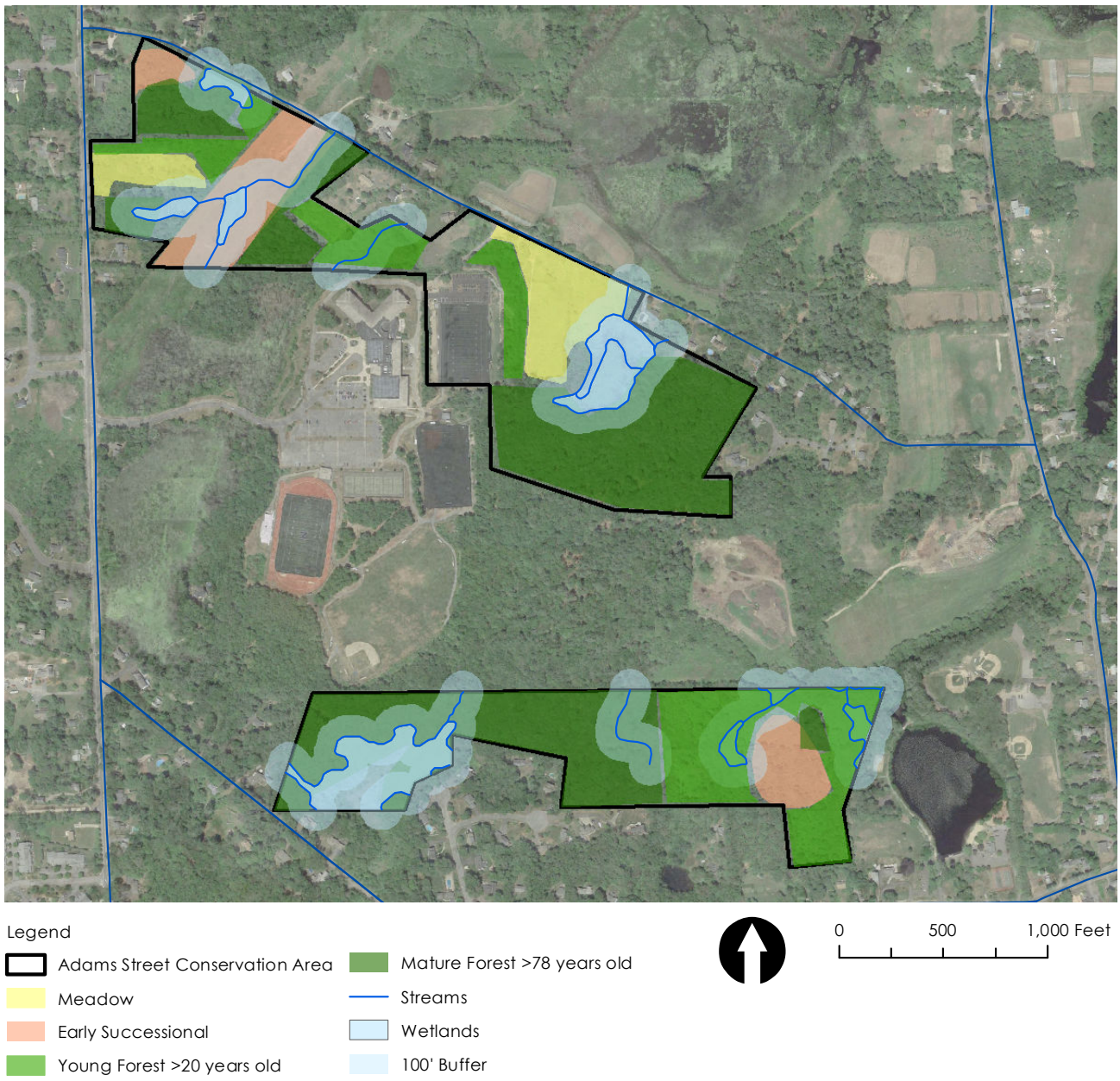
FSTAG compliance is not a requirement for all trails. However, given the central location of the Conservation Area, making the trails accessible to most Medway citizens has a lot of merit. In addition, too many trails, such as the Woods Trails network, result in compaction where vegetation will not regenerate as easily as other parts of the forest. Reducing the number of trails in this area should be a priority.

FSTAG GUIDELINES ON RUNNING SLOPE

Running Slope	Maximum length between resting intervals
<5%	Not required
5 to 8.33%	200 feet
8.33 to 10%	30 feet
10 to 12%	10 feet

("Forest Service Trail Accessibility Guidelines")

RECOMMENDATIONS: ECOLOGICAL MANAGEMENT



The following recommendations provide a strategy to address ecological issues from a systems approach. Measures taken in one habitat type can influence other parts of the system. The recommendations begin with wetland and stream resources, and continue through all successional habitats. Particular emphasis is placed on the meadow because its installation is imminent. Invasive plant management is addressed for all habitat types.

Recommendations on public use follow with proposed trails and access.

Opposite: Approaching the meadow from the woods along the Choate Trail.

ECOLOGICAL MANAGEMENT: WETLAND AND RIPARIAN HABITAT

Degradation of wetlands through runoff, siltation, and invasive species reduces available quality habitat and biodiversity. Medway can reduce degradation by modifying land practices within and around wetlands, increasing public education, managing invasive species, and ensuring proper management of stormwater.

PREVENT WETLAND DEGRADATION FROM RUNOFF

- Conduct formal wetland delineation.
- Conduct wetland monitoring and identify areas of concern using local drainage area delineations.
- Review town-wide practices for road maintenance with wetlands in mind.
- Minimize impervious surfaces to increase infiltration of runoff.
- Educate homeowners on the importance of the wetlands in their vicinity and the impacts of lawn applications.

Establishing the areas that drain into the site's wetlands can provide valuable information on sources of degradation. The map to the right shows drainage areas from StreamStats, a web-based stream mapping and analysis program of U.S.G.S.

The wetlands and streams within area A on the map are within a 168-acre watershed which includes Summer Street, a portion of the high school, and a large area of single family residential development. Drainage to the deep marsh and shrub swamp off of Adams Street (area B) is a small area of about 30 acres. It includes portions of the high school parking and turf fields as well as areas within the Conservation Area including the Choate Trail. The drainage area to the large shrub swamp in the southern study area, about 64 acres, is comprised of single family development on larger lots.

Activities within these areas, such as spreading winter sand and salt on the public streets and summer lawn fertilizer and pesticide programs within the residential areas, will affect the health of the wetlands. Pet waste within drainage areas also contributes to wetland degradation.

Results of wetland monitoring could lead to the identification of potential problem locations within drainage areas; activities which are resulting in pollution could then be mitigated.

EDUCATE ABUTTERS

- Conduct public education to provide information and guidelines on how the general public and adjacent property owners can protect wetland resources.
- Develop general information regarding best management practices for those living next to wetlands and their buffers, including basic lawn care management and practices for reducing nitrogen and phosphorous levels from reaching adjacent wetland resources, as well as incorporating native vegetation (see page 60).

MANAGE INVASIVE SPECIES

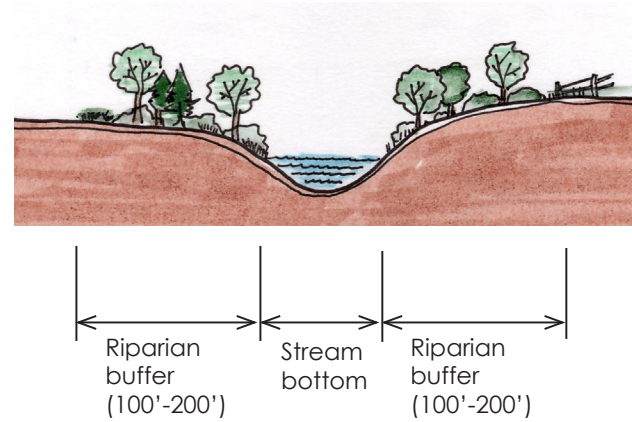
- Prevent the introduction and establishment of invasive plants through public education and monitoring.
- Manage existing invasive species through approved methods which consider the wetland and stream environments.

Invasive species identified in the Adams Street wetlands include:

- Oriental bittersweet *(Celastrus orbiculatus)*
- Gray willow *(Salix cinerea)*
- Purple loosestrife *(Lythrum salicaria)*
- Yellow Iris *(Iris pseudacorus)*

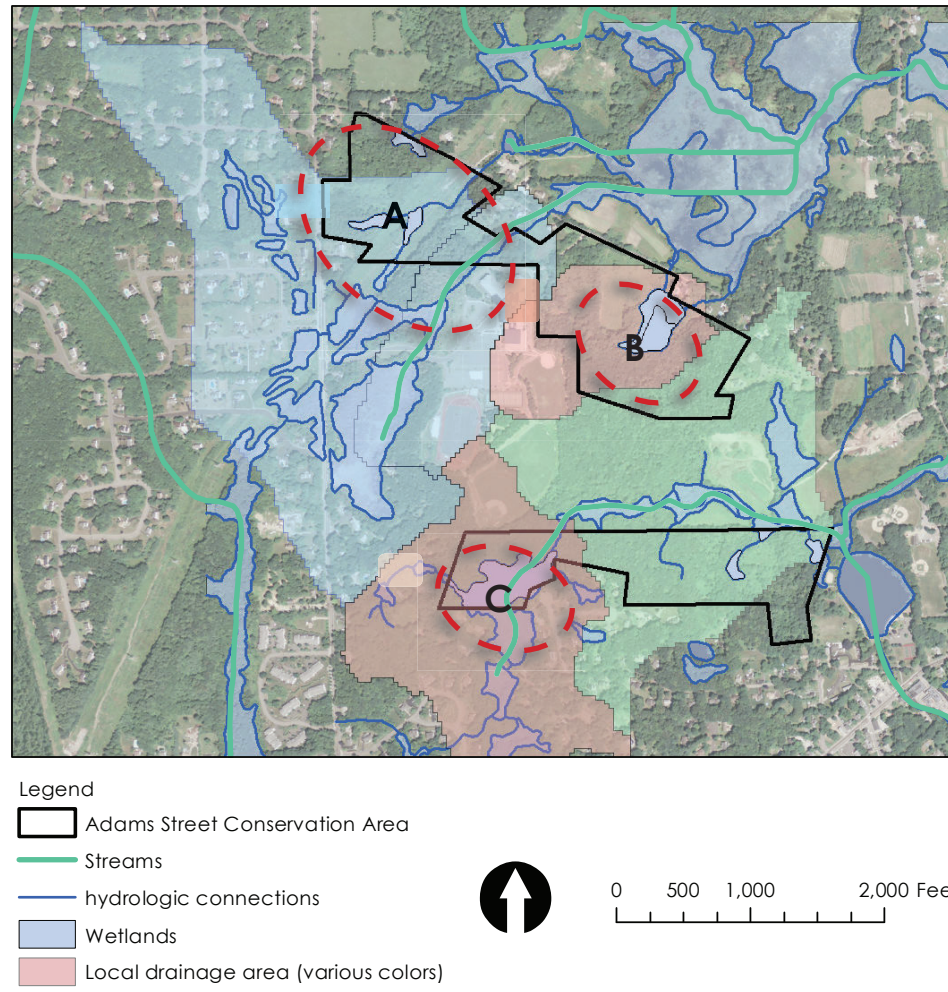
STRENGTHEN STORMWATER TREATMENT REQUIREMENTS

- Strengthen Town stormwater treatment requirements for new construction or redevelopment that require infiltration of stormwater runoff outside of wetland jurisdiction.



Protecting the buffer around wetlands and streams helps to prevent their degradation.

Delineating and mapping the local drainage areas provides information on potential sources of pollution and degradation to water quality in receiving streams and wetlands. (StreamStats)



WESTBOROUGH PURPLE LOOSESTRIFE BIOCONTROL PROJECT

Students in Westborough are engaged in a multi-year environmental and educational project to manage purple loosestrife (*Lythrum salicaria*) by raising and releasing purple loosestrife beetles *(Galerucella)* at selected sites in town. This project is a joint effort of the Westborough Community Land Trust (WCLT) and the Westborough High School (WHS).

Purple loosestrife (*Lythrum salicaria*) is a non-native, invasive plant that spreads rapidly and takes over wetlands, changing their ecology. Purple loosestrife outcompetes native species, reducing nesting material, food, and shelter for wildlife. Purple loosestrife is well established and widespread in Westborough. The beetle does not eliminate purple loosestrife, but reduces its density by up to 90% according to some studies.

WHS environmental science classes and environmental club are involved in the effort during the school year, and volunteers from WCLT and the wider community continue the work during the summer. ("Purple Loosestrife Biocontrol Project.")

ECOLOGICAL MANAGEMENT: PERPETUAL MEADOW HABITAT

PREPARE THE SITE
Preparing the site is a critical first step to successfully establish a wildflower-grassland meadow.

- Conduct a thorough vegetation assessment to inventory grasses currently present on site.
- Spend the first year controlling and removing invasive species.

MANAGE INVASIVE SPECIES
Removing non-native invasive vegetation is the most challenging process in establishing a successful meadow. If the site is left fallow, invasive species are bound to arrive before the natives become established. There are several common treatment methods that could be used singly or in combination:

1. REPEATED TILLING:
This technique involves dragging a shallow tiller across the site on a regular basis to uproot young seedlings and germinants. It tends to stir a seed bank, and can potentially increase germination of unwanted vegetation.

2. HERBICIDE:
Application of broad spectrum systemic herbicide can reduce cool-season grasses that may currently be the dominant grass because of former agricultural activities. Broad spectrum herbicides may have negative effects on desired native species and some should not be applied near wetlands. Application should be done by a licensed pesticide applicator. Consult an invasive plant specialist to decide appropriate chemical methods.

3. PRESCRIBED BURNING:
Prescribed burning is the most effective method to maintain health and vigor of native grasslands, and improve soils. Burning should be conducted between March 1-April 15, before nesting season begins. Unlike other land management practices, burning removes the thatch layer that prevents from birds from nesting or foraging.

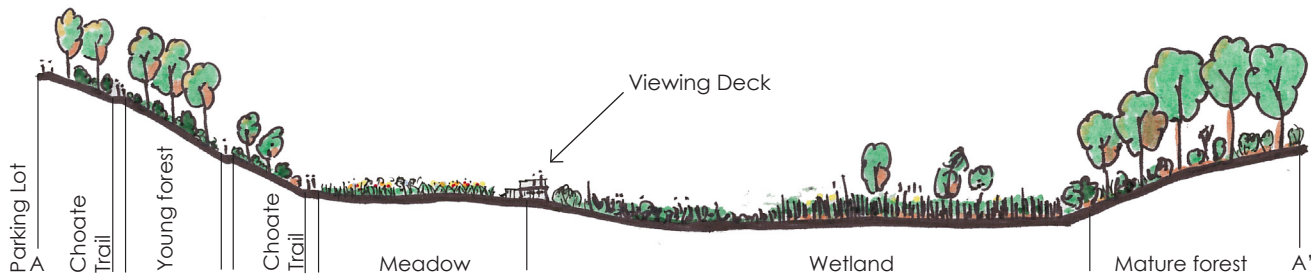
PLANT AND ESTABLISH MEADOW

- Sow seed in the fall. New England native plants have adapted strategies to survive the winter months. Many seeds will not germinate unless they've gone through a period of cold that helps "trigger" germination. Sowing seed in the fall provides conditions necessary for good germination rates in the spring.
- Mow in the spring of the first year to reduce the ability of cool-season grasses to outcompete new native seedlings.
- Plant 50-75% cover using warm-season grasses (e.g. little bluestem, big bluestem, Indian-grass, broomsedge, switch grass) and the remainder in native forbs (e.g. black-eyed susan, purple cone-flower, tall ironweed, bee balm, butterfly milkweed)
- Plant forbs in mass plantings to prevent takeover from taller warm-season grasses.

MAINTAIN MEADOW HABITAT
Regularly manage weeds throughout establishment.

- Mow every 3-4 years to prevent woody plant establishment. Do not mow too frequently, i.e. annually, as this practice will favor cool-season grasses over warm-season grasses.
- Mow late in the season after bird nesting (August 15th) and fall flowering species complete seed production.
- Mow Area A year 2, and mow Area B year four. Mowing partial areas on alternative years to provide continuous habitat.

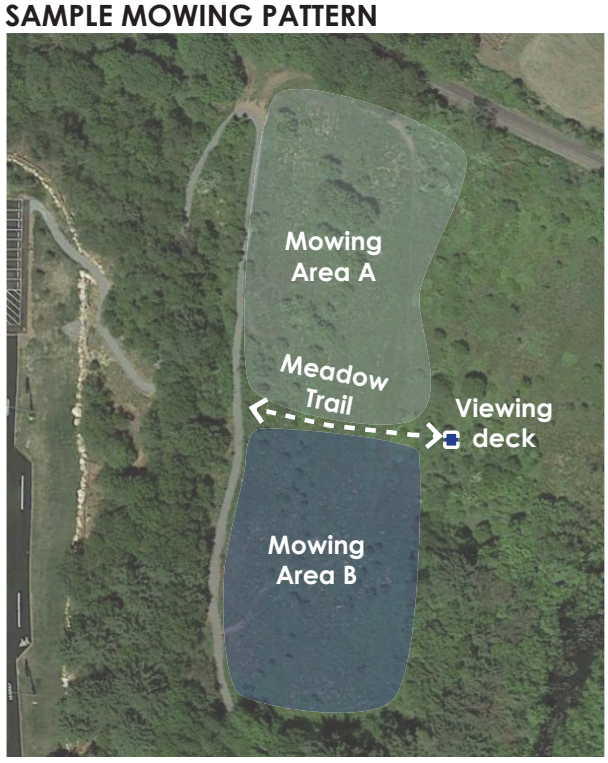
PROPOSED MEADOW

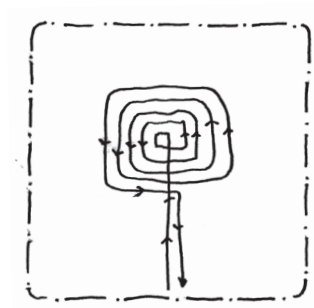


MEADOW IMPLEMENTATION AND MAINTENANCE TIMELINE

ACTIVITY	YEAR 0	YEAR 1	YEAR 2	YEAR 3
SITE PREPARATION	Inventory existing grass species			
	Treat cool-season grasses with herbicide			
	construct walking trail to wildlife platform			
	construct wildlife viewing platform			
PLANTING AND ESTABLISHMENT	Seed warm-season grasses and forbs in late fall before first frost.		Sow additional seed for species not meeting cover goals	
		Water planted areas during establishment as needed		
MOWING		Mow 2 times at 8"-12" to diminish growth of cool-season grasses	Mow late in season, after nesting and fall flowering; half of meadow 8"-12"; once every 2-3 years	Mow second half of meadow 8"-12"; once every 2-3 years
SITE MAINTENANCE		Spot treat cool-season grasses with herbicide	Spot treat cool-season grasses with herbicide	
	Manage invasive species on site and surrounding edge	Manage invasive species on site and surrounding edge	Manage invasive species on site and surrounding edge	Manage invasive species on site and surrounding edge
MONITORING	Establish photo-monitoring points	Take photographs at photo-monitoring points	Take photographs at photo-monitoring points	Take photographs at photo-monitoring points
	Establish transect for vegetation assessment	Conduct transect monitoring; evaluate	Conduct transect monitoring; evaluate	Conduct transect monitoring; evaluate

SAMPLE MOWING PATTERN



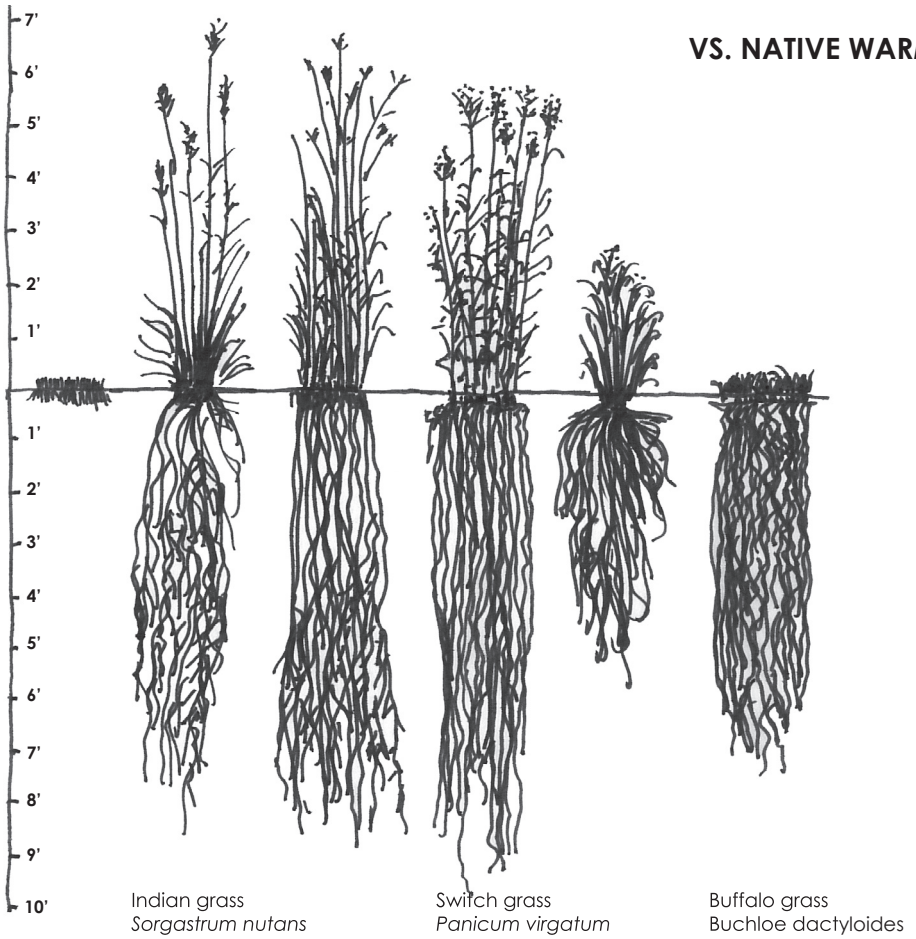


Mowing pattern to help animals disperse safely.

Black capped chickadee with caterpillar.

ECOLOGICAL MANAGEMENT: MEADOW

TRADITIONAL LAWN GRASS
VS. NATIVE WARM-SEASON BUNCHGRASSES

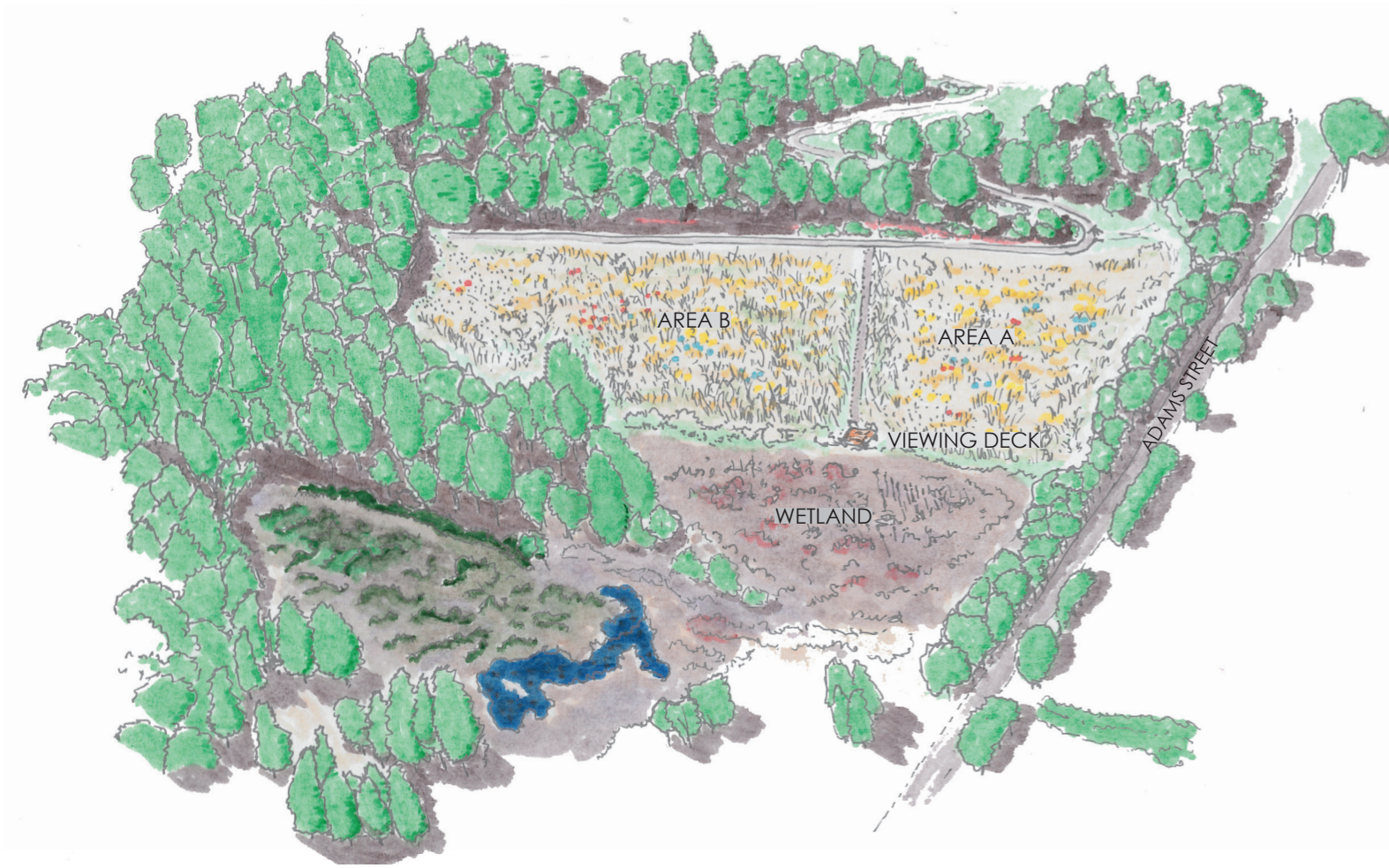


WARM SEASON VS. COOL SEASON GRASSES

Grasses used for hay production are mainly non-native cool-season grasses that will compete with native warm-season grasses during establishment of the meadow. Specific management activities need to reduce populations of cool-season grasses from their remnant seedbank.

WARM-SEASON GRASSES	COOL-SEASON GRASSES
Growing starts above 60-65F	Growing starts above 40-42F
Majority of species are native to mid-western prairie and northeast meadow habitat	Majority of species found in northeast are non-native; introduced for crop and pasture
Most productive growth in summer when cool-season grasses are less active	Longer growing season; green in spring and fall
Stems provide winter nesting cover	Plant stems lay flat sooner, become thatch in winter
Lower cost to maintain, thrive in nutrient-poor soils; drought tolerant	Higher cost to maintain stand vigor (fertilizer, lime, re-seeding, herbicide)
Deeper root systems; 5'-15'	Shallower root systems
Grows primarily as bunch grass; space between grasses creates opportunity for forbs to grow; shelter and forage opportunities for birds, small mammals	Grows more densely, annual and perennial seed and rhizome
Common species: Switch grass, little bluestem, big bluestem, eastern gama grass, deer tongue, Indian grass	Timothy grass, Kentucky bluegrass, orchard grass

PROPOSED ADAMS STREET MEADOW



A bird's-eye view looking west: a path bisects the meadow and leads to a viewing deck where visitors can enjoy bird watching throughout the wetland and nearby meadow habitats.

ECOLOGICAL MANAGEMENT: SHRUB TO FOREST HABITAT

Shrub and young forest habitats will naturally become mature forest through the process of succession. Management intervention is necessary to support a healthy transition. The presence of non-native, invasive species results in a compromised forest ecosystem. Certain practices will slow or prevent succession including the utility corridor regime, maintained meadow habitat, and developed features such as trails and sports fields. Edge habitat exists between different habitat types, also referred to as transition zone habitat, and typically displays greater biological diversity than within each adjacent habitat. Forest edges are places where invasive species thrive due to increased light, disturbance, and niche use by seed-dispersing animals, i.e., birds and deer, and require specific management actions.

MANAGE INVASIVE SPECIES POPULATIONS

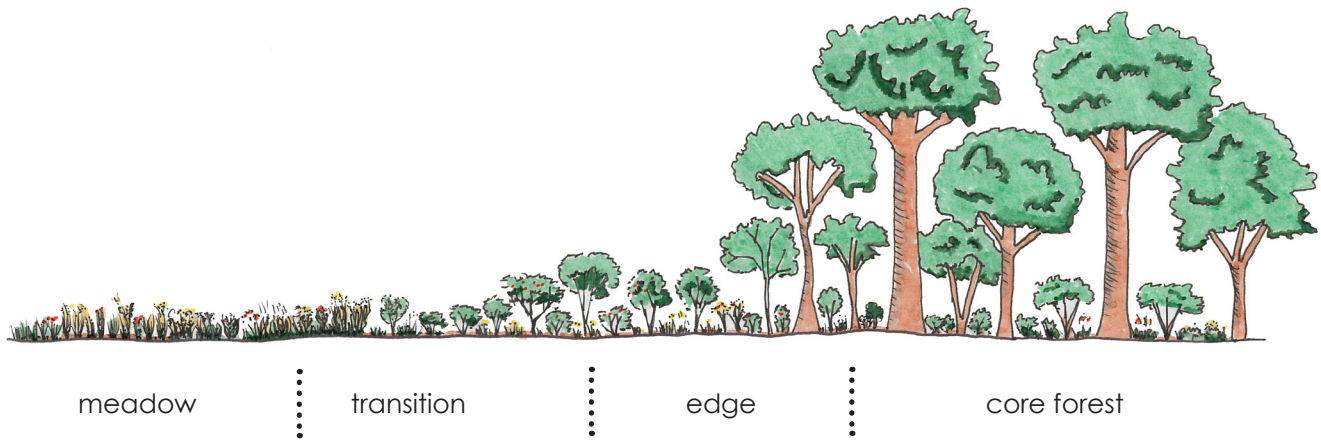
- Invasive species are considered the second largest cause for loss of biodiversity, outside of urban development (Park 1). Species should be mapped and inventoried on a regional level to appropriately prioritize management efforts.
- Within the Adams Street Conservation Area, invasive species within heavily used and disturbed areas, including the meadow and along trail edges, should be prioritized for removal to prevent their further spread.
- Prioritize removal in recently disturbed areas, and removal of new invaders over well-established species.

MANAGE THE EDGE

- Strengthen forest edges by planting native shrubs to increase structural diversity and resilience against invasive species that prefer
- Eversource to alternate mowing schedules to maximize available habitat within the Adams Street Conservation Area and throughout the Town of Medway. Mowing should be done outside of bird nesting season (after August 15).
- Partner with utility companies to manage invasive species populations that develop on the edge of and within the corridor.
- Close Summer Street trail during herbicide application and mowing by utility companies.

MANAGE FOREST HEALTH

- Forests within the study area are currently too small for economically beneficial harvesting; preserve for habitat and human recreational values, carbon sequestration, air quality, and stormwater interception.
- Develop a Forest Management Plan with a licensed forester to assess stand health and further management needs. Prioritize wildlife habitat over timber harvesting.
- Research possibility of acquiring enough forest land in partnership with other municipalities and private landowners to sell carbon credits.
- Partner with surrounding landowners to maximize forest habitat productivity and possible timber harvesting or educational harvesting opportunities.
- Consider enrolling in the Department of Conservation and Recreation Forest Stewardship Program, an educational program designed to help landowners protect the inherent ecosystem value of their forest (Forest Stewardship Program).

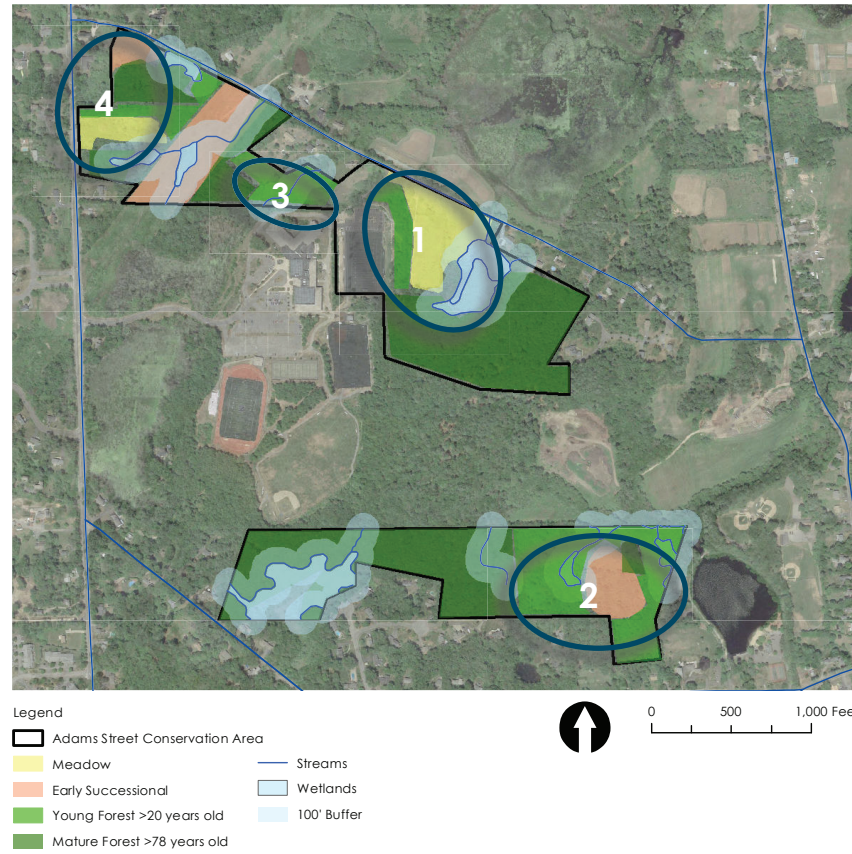


ECOLOGICAL MANAGEMENT: INVASIVE SPECIES

Invasive species have been identified at the Adams Street Conservation Area primarily in meadow, shrub, and young forest areas, and in particular along forested edges. The following zones prioritize a site-specific approach to manage invasive species within and around the site.

The Massachusetts Invasive Plant Advisory Group (MIPAG) provides an ecosystem-based, integrated approach to prevent and manage invasive plant populations. This approach includes biological control, habitat manipulation, manual control, mechanical removal, chemical control, and cultural practices. The list of invasive species (pages 48-49) was compiled by the Town of Medway Open Space Committee and site observations. These species were ranked using MIPAG's ranking classification: invasive, potentially invasive, or likely invasive ("Guidance for the Effective Management of Invasive Plants").

INVASIVE SPECIES MANAGEMENT PRIORITY ZONES



The following zones were prioritized based on ease of access, degree of present disturbance, and presence of riparian corridors that act as dispersal agents.

1. ADAMS STREET MEADOW, WETLAND, AND FOREST EDGE

The meadow area has been severely disturbed in preparation for future meadow establishment. Efforts to reduce cool-season grass cover and invasive species within and around the meadow should be the top priority to ensure successful establishment of new plantings.

2. SHRUB AND YOUNG FOREST AT CHOATE PARK TRAIL AND LOOP TRAIL ENTRANCE

Successional habitat along Choate Trail is accessible to volunteers and includes the entrance to the new loop trail. Prioritize invasive species removal here and coordinate with trail construction efforts. Post sign at trailheads that identify target species.

3. YOUNG FOREST RIPARIAN CORRIDOR INTERSECTING FUTURE SUMMER STREET TRAIL

The riparian corridor has a heavy infestation of multiflora rose and Japanese barberry. Berries from both species may be dispersed by the creek and should be removed from the creek edge and beyond. Accessibility is limited and removal should be coordinated with construction of the Summer Street trail.

4. MEADOW, SHRUB, AND YOUNG FOREST ALONG SUMMER STREET

The meadow area along Summer Street may be regularly disturbed to access the existing sewer line and should be maintained as meadow habitat. The shrub area at the corner of Summer and Adams Streets is accessible and visible to passersby. Coordinate removal efforts in conjunction with Summer Street trail construction efforts.

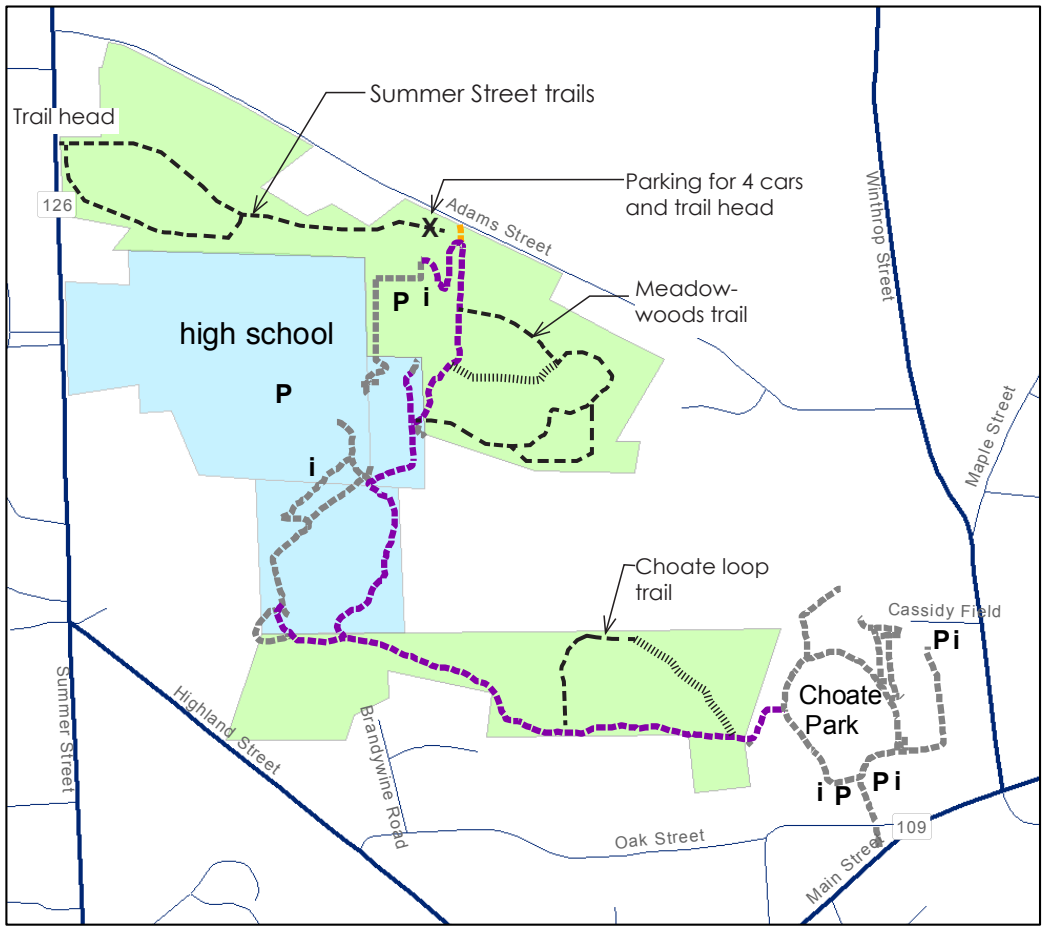
ECOLOGICAL MANAGEMENT: INVASIVE SPECIES

THE ECOLOGY OF INVASIVE SPECIES FOUND AT THE ADAMS STREET CONSERVATION AREA

SPECIES IDENTIFIED	MIPAG RANKING	HABIT	PREFERRED HABITAT	SPREADING MECHANISMS
Norway maple *Acer platanoides*	Invasive	Large deciduous tree	varied, from forest wetland to mature forests	samara seedpods wind dispersed
Japanese barberry *Berberis thunbergii*	Invasive	woody shrub	open and wooded uplands and wetlands	seed dispersed by birds
oriental bittersweet *Celastrus orbiculatus*	Invasive	vine	varied	bird and human dispersed
greater celandine *Chelidonium majus*	Not listed	herbaceous biennial	most often found in disturbed areas	dispersed by ants; attracted to seed elaiosome
autumn olive *Elaeagnus umbellata*	Invasive	deciduous shrub	Old fields, early succession forest; forest edges	fruit is dispersed by birds and small mammals
burning bush *Euonymus alatus*	Invasive	deciduous shrub	varied but not in wet areas	bird dispersed
glossy buckthorn *Frangula alnus*	Invasive	small deciduous tree or coarse shrub	upland, wetland, coastal habitats	bird dispersed
creeping charlie *Glechoma hederacea*		herbaceous perennial groundcover	upland and wetland habitat	spread by seed and vegetatively through stolons and ramets
yellow iris *Iris pseudacorus*	Invasive	herbaceous perennial	wetlands, primarily in floodplains	spreads from rhizomes and seeds
Morrow's honeysuckle *Lonicera morrowii*	Invasive	deciduous shrub	upland, wetland, coastal habitats; often along forest edges	seed dispersed by birds and possibly small mammals
purple loosestrife *Lythrum salicaria*	Invasive	herbaceous perennial	marshes, sedge meadows, bogs, river banks, lake shores	dispersed by root fragmentation or seed
common buckthorn *Rhamnus cathartica*	Invasive	shrub or small tree	upland, wetland, coastal habitats	seed is dispersed by birds
multiflora rose *Rosa multiflora*	Invasive	perennial vine or shrub	woodlands, forest edges, successional fields	seed is dispersed by birds
gray willow *Salix cinerea*	Invasive	shrub or small spreading tree	waterways, riparian vegetation, lake edges	seeds are easily dispersed by wind and water; twigs dispersed by water

POTENTIAL ECOLOGICAL IMPACTS	FLOWERING AND FRUITING	RECOMMENDED ACTION AT ADAMS STREET
can reduce native species diversity and change the structure of forest habitats; creates dense shade	flowering in spring before foliage; fruiting in late summer	seedlings pulled by hand; trees cut to ground
displaces natives through dense growth in shaded woodlands and open lands; early leaf out	flowering mid-spring to early summer; bright red fruits late summer to fall	remove small seedlings by hand; cut and stump treat larger, mature shrubs
damages natives by girdling and load; vigorous growth shades other species	flowering in spring; red berries ripen in the fall.	vines can be pulled out by the roots, cut repeatedly or treated with systemic herbicides
can become abundant in unmanaged situations; can out-compete other native herbaceous plants	flowering May-June; produces seed pods mid to late summer	hand removal; herbicide treatments
very effective spreader, suppresses growth of other plants by shading, good competitor because of ability to fix nitrogen	flowering April-May; produces red-pink drupe-like fruits	hand pulling; cutting & mowing; propane torch; herbicides; grazing
develops dense root mat; threatens natives by crowding and shading	greenish flowers in spring; red-purple flowers in summer	hand pulling; cutting and stump treatments with herbicides
great threat to wetlands where it can form dense stands	yellow-green flowers in summer; black fruit that persists into winter	manually remove seedlings; cutting and cut stump herbicide treatment; under-plant woodlands with native shrubs
can become weedy or invasive in some areas; plants can form dense mats	flowers early to late season depending on geography	difficult to remove by hand unless all stolons are removed; chemical treatments are effective
outcompetes native communities	flowers in late spring; seeds produced in July-November	manual removal effective if all rhizomes are removed; chemical treatments with systemic herbicides are effective
contributes to reduction in species richness and native plant cover in early to mid successional forests	white to pale yellow flowers in May-June; fruit in July-August	potential for control is low in large, unmanaged areas; moderate for managed areas; high in small populations
outcompetes and reduces diversity of native vegetation; develops into monoculture stand	magenta, white-light pink flowers July-September	hand pull young plants; biological control with leaf-eating beetles and herbicide treatment for older populations; control is difficult of large established populations
great threat to wetlands where it can form dense stands	yellow-green flowers in summer; black fruit that persists into winter	manually remove seedlings; cut and cut stump herbicide treatment; under-plant woodlands with native shrubs
extremely prolific; creates dense thickets	white-pink flowers May-June; red fruits, rose hips, throughout the summer	cut individual plants and apply systemic herbicides to cut stumps
outcompetes native vegetation for space and nutrients	flowers in early spring, seed produced about one month later	cut individual plants and apply herbicides to cut stumps

RECOMMENDATIONS: PUBLIC USE



Legend

- Adams Street Conservation Area
- Town of Medway (High School) parcels
- Choate pond loop
- Choate trail
- Adams Street connection
- Other trails

0 495 990 Feet

P Parking

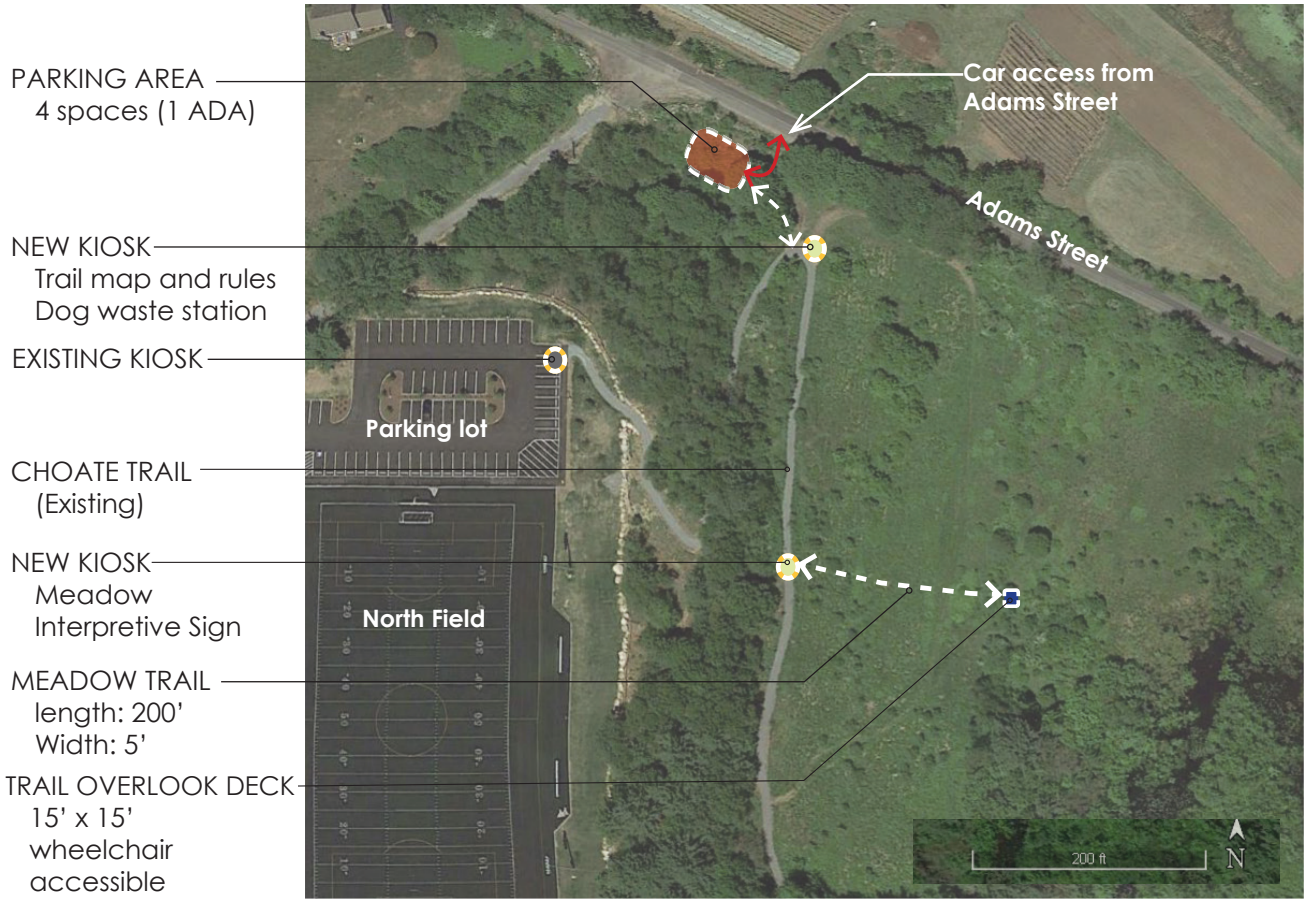
i Information Kiosk

Proposed trail

Existing trail to be improved

The proposed trail system is a three-mile network of new and existing trails which draws visitors through the diverse woodlands, wetlands and meadows of the Adams Street Conservation Area. And it provides a continuous connection from Choate Park to Summer Street. New trails include a meadow trail and a loop trail in the wooded area above the meadow and wetland, a trail extension in the southern wooded area to create another loop, and the Summer Street trail which connects Summer Street to the Choate Trail. A small parking lot is proposed off of Adams Street, a visible invitation to use the trail system. The trails are aligned so that they can meet trail accessibility standards (pg 35-36).

PUBLIC USE:
ACCESS AND WAYFINDING



The Conservation Commission and Open Space Committee requested a small parking area be located off Adams Street for easy access to the Conservation Area's trail system. This parking would supplement the parking lot adjacent to North Field which is accessed from Summer Street and the high school. Additional kiosks, one at the new parking lot and one at the beginning of the meadow trail provide interpretive information about the meadow, and wayfinding information. A viewing deck is proposed at the end of the meadow trail overlooking the deep marsh and swamp.

PARKING

- Build a 4-car parking area with access off of Adams Street. This parking could include handicap parking for access to the Choate Trail and the meadow trail.

WAYFINDING

- Provide signs or kiosks with trail information including distances and trail rules at each trail intersection.

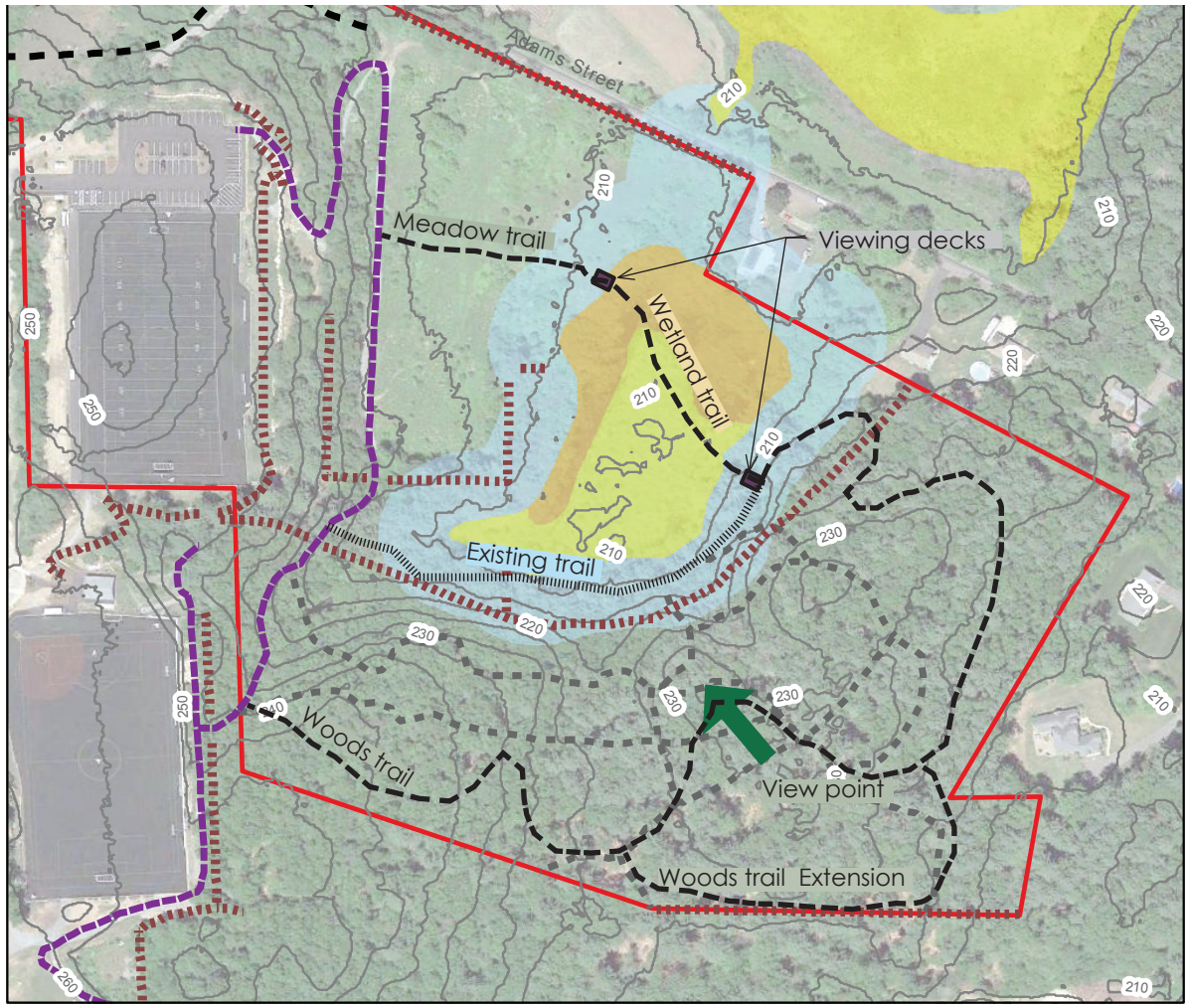
DOG WASTE

- Provide dog waste stations at parking areas including the main lot near the high school and the proposed lot off of Adams Street and at Choate Park.
- Make arrangements within Town departments to have the dog waste removed on a regular basis and bags refilled.

An existing kiosk at the parking lot behind the high school displays a trail map.

A dog waste station in Northampton is well used and helps to keep the trail clean.

PUBLIC USE: WOODS - MEADOW TRAIL



Legend

- Adams Street Conservation Area
- 5 foot contours
- Stone Walls
- Trails to be removed
- Existing Choate Trail
- Deep marsh
- Shrub swamp
- 100' buffer
- Existing trail (to be improved)
- Proposed trails

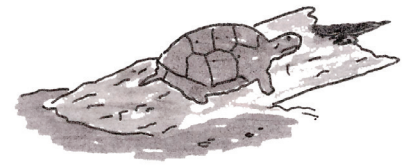
0 125 250 500 Feet

PASSIVE RECREATION

- Build two viewing decks with seating to allow for passive recreation such as bird watching from both sides of the marsh and swamp.
- For maximum accessibility, design the viewing decks with wheelchairs in mind.

BUILD A TRAIL ACROSS THE MEADOW

- Build a 300-foot long trail across the meadow with a viewing deck at the edge of the deep marsh.
- The trail location delineates mowing extent on alternate years. See page 44 for meadow mowing details.



REPLACE THE EXISTING WOODS TRAIL NETWORK WITH A LOOP TRAIL

The new accessible trail is a loop of about two-thirds of a mile with a view point overlooking the swamp and marsh. It joins the existing lower trail to border a stone wall on one side and the shrub swamp on the other before reconnecting with the Choate Trail.

- Close existing trails to allow soils to decompact and forest to regenerate (see BMPs below).
- Build an additional loop (Woods Trail extension) to border the stone wall at the south edge of the property.

MA DCR BEST MANAGEMENT PRACTICES

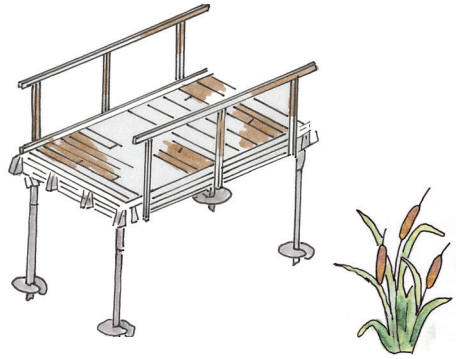
General Guidelines:

- *Provide a better option (build another trail).*
- *Educate users (explain trail closure).*
- *Halt ongoing erosion (add check dams and slash).*
- *Close sight lines (transplant natives into paths).*
- *Consider breaking up the tread and re-contouring the land.*
- *Block the corridor (use a fence and signs).*
- *Don't introduce or spread invasive species (use local soils and native plants).*

("Closing and Restoring Trails.")

BUILD A TRAIL ABOVE THE WETLAND USING HELICAL PIERS

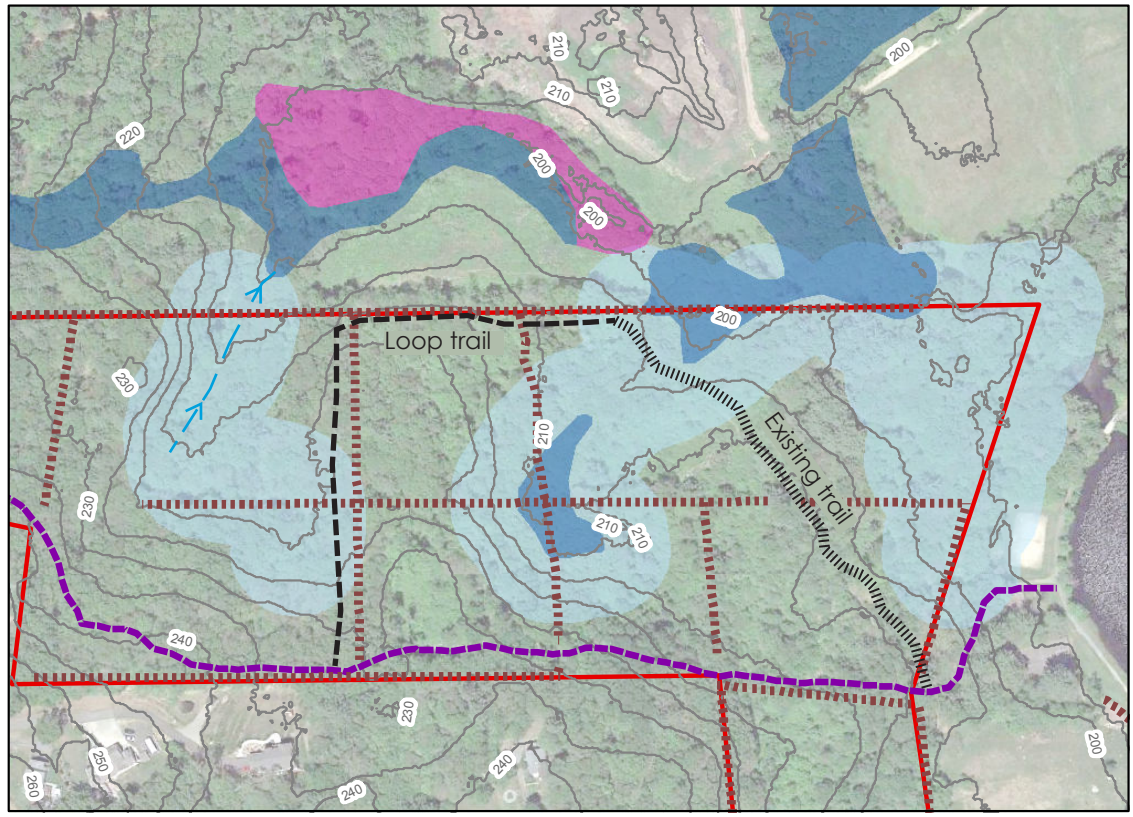
- Build a 350-foot long accessible trail above the deep marsh and shrub swamp to connect to the woods trail network.
- Helical piers are ideal for wetland crossings because their disturbance is negligible.



Existing trails are compacted and act as drainage ways potentially resulting in erosion. The recommendations suggest closing these trails and building a loop trail.

Glimpse of the deep marsh from the proposed Woods Trail viewpoint.

PUBLIC USE: CHOATE PARK LOOP TRAIL



Legend

- Adams Street Conservation Area
- 5 foot contours
- Stone Walls
- Adams to Choate Trail
- 100' Buffer
- Shallow marsh
- Wooded swamp
- Hydrologic connection
- Proposed trail
- Existing trail (to be improved)

0 125 250 500 Feet

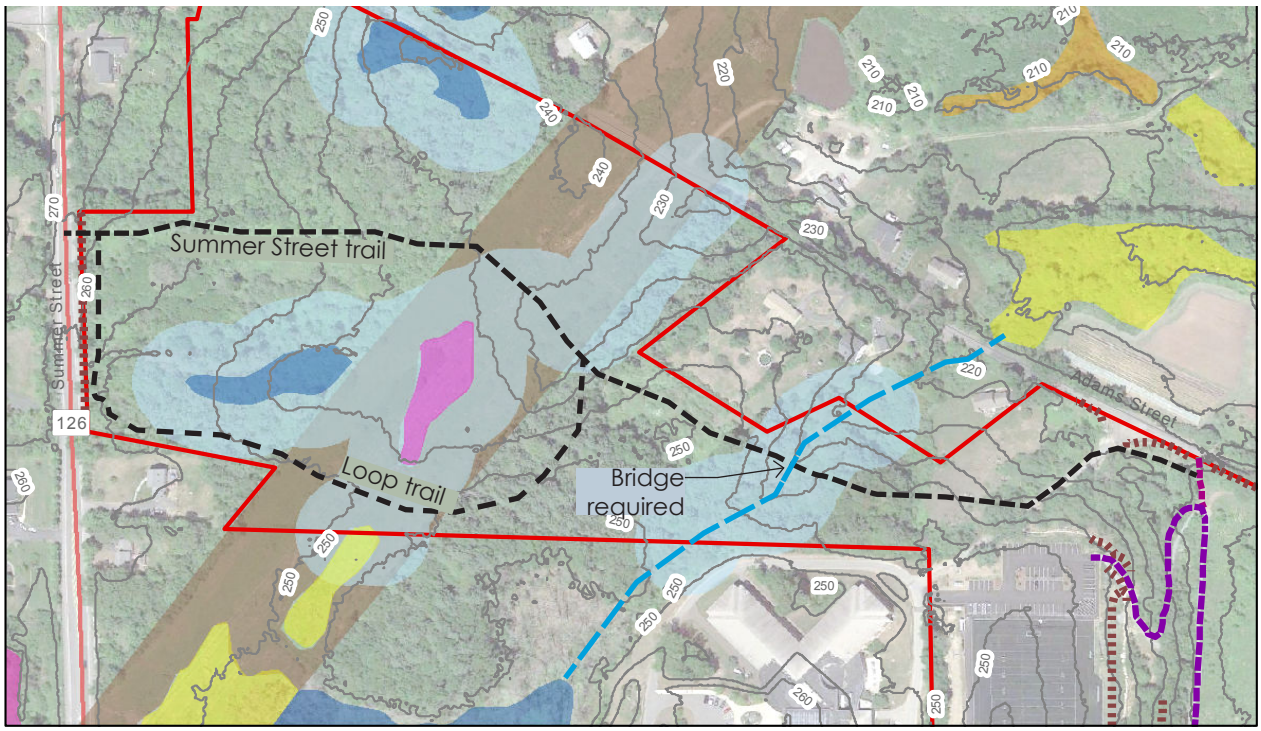
EXTEND THE CHOATE TRAIL IN A LOOP

- Connect existing spur trail to a new trail segment to form a loop back to the main trail.
- Align new trail with stone wall and showcase the site history with an interpretive sign.
- Avoid the steep terrain associated with the ephemeral stream and the 100' buffer area.

The new portion of the trail is about 1000 feet, and combined with the spur trail it provides a .33 mile loop.

The new trail with cut through an old stone wall.

PUBLIC USE: SUMMER STREET TRAIL



BUILD A TRAIL FROM SUMMER STREET TO ADAMS STREET

This trail explores a part of the conservation area which is currently inaccessible. Many different habitats are traversed including meadow, shrub, and young forest. The trail also provides pedestrian access from Summer Street to the Choate Trail without requiring people to walk along Adams Street. Since Adams Street is narrow and winding and does not have sidewalks, this provides safer access to the rest of the conservation area for pedestrians. The loop trail provides a quarter mile walk within this part of the Conservation Area.

- Provide a kiosk or sign at Summer Street announcing that it is one half mile to the Choate Trail intersection.
- Obtain permission to cross utility corridor
- Provide a bridge crossing at the stream

The trail is about one-half mile long and drops 40 feet in elevation from Summer Street to the junction with the Choate Trail.

FOLLOW REGULATIONS WITHIN RIPARIAN CORRIDORS AND BUFFER

- Minimize impact of stream crossing by using a bridge or bottomless culverts.
- Practice erosion control to prevent degradation to shallow marsh and forested swamp.
- Obtain all necessary permitting.

PARTNER WITH NSTAR/EVERSOURCE AND ALGONQUIN GAS TO BUILD TRAIL ACROSS RIGHT OF WAY

- Assess optimal vegetation management options through utility corridor.
- Maximize protection of wetland habitat by aligning trail around the wetland buffers when possible.

RECREATION WITHIN UTILITY ROWs:

NStar became part of Eversource Energy in 2015. Eversource has a land management policy which includes use of their right of ways for recreation. The Ridgefield rail trail (below) is an example of a recreational trail within the Eversource right of way. The trail is a 2.4-mile crushed cinder walking trail and can be used for walking, jogging, and cross-country skiing. It is open from dawn to dusk every day. It is managed by the utility though local residents have volunteered in coordination with the utility. There are discussions underway to upgrade the trail for bicycling ("Ridgefield Rail Trail").

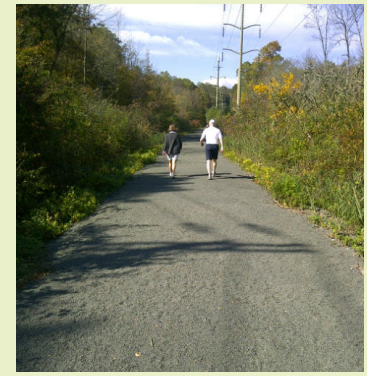
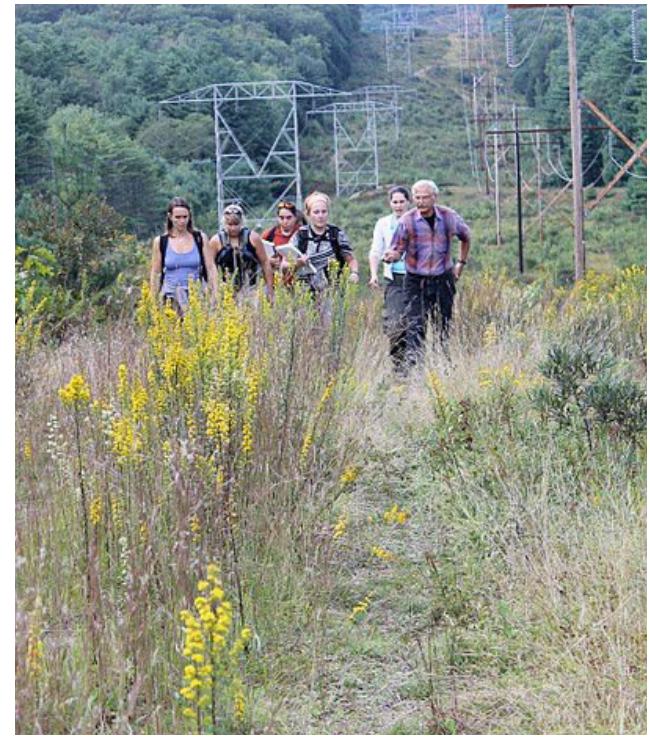


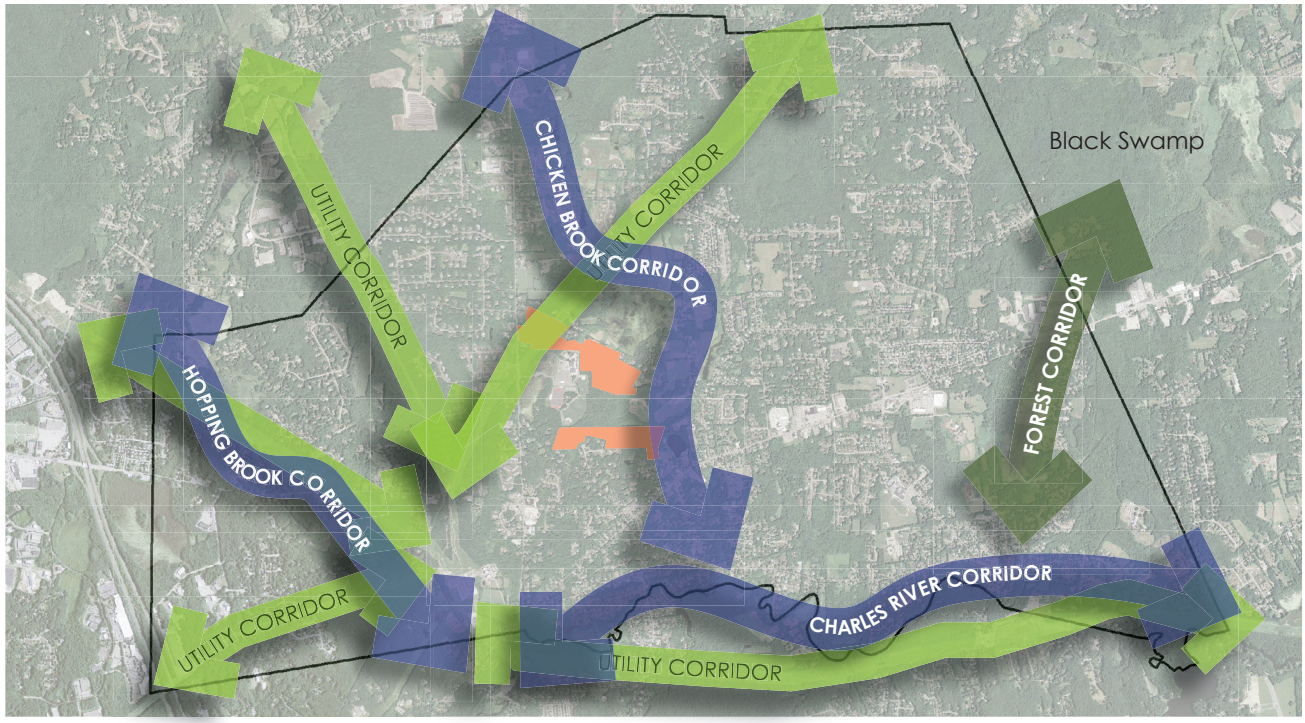
Photo by Laxworld123

The stream just north of the high school will require a bridge for the trail crossing.



Conway School students walk along a trail within a utility corridor in Montague, Massachusetts enjoying the diverse flora.

BEYOND ADAMS STREET:
CONNECTIVITY AND CONSERVATION LANDSCAPING



The Adams Street Conservation Area's central location in Medway along Chicken Brook offers opportunities to foster connectivity between other open space parcels and private lands throughout the town. These opportunities can build upon existing interconnected corridors established by utility corridors and waterways. In addition, conservation landscaping of developed lands can improve connectivity by reducing fragmentation and creating new habitat for native species.

CONNECTIVITY AND BIODIVERSITY

Medway's biodiversity is enhanced by its 12 miles of utility corridors*. Both their early successional habitat and their range are important to biodiversity. Their range improves connectivity which supports healthy ecosystems.

Development and agriculture have fragmented habitats throughout Medway. Although the town has many acres of various habitat types, most are reduced to many small parcels. For example, the 612 acres of forested wetlands within the town are located in 189 separate parcels, many of which are under one-half acre in size. Preserving connected parcels should be a priority for the town, as a means of reducing habitat fragmentation.

* includes east-west corridor partially in the Town of Franklin.

CONSERVATION LANDSCAPING

National Land Cover Data from 2011 identifies 1,152 acres (15% of land in Medway) as "developed open space." This is defined as land that is currently managed as residential and commercial landscaping. This significant area of land could be enhanced to provide more habitat for wildlife, and also provide ecosystem services such as improving water quality through catchment and infiltration.

Conservation landscaping on private lands can improve connectivity within Medway through ecological management of the over 1000 acres of developed land in the town. The Chesapeake Conservation Landscaping Council identified eight elements to be considered in conservation landscaping (see next page.)

USE NATIVE PLANTS:
Native plants have evolved with the ecology, climate and soils of the region. When planted in the appropriate location, they require little to

no maintenance or additional resources such as irrigation or fertilizers. Because they have evolved with other plants and wildlife, they are better equipped to defend against pests and diseases, and are a critical food source for animals, specifically insects, that depend on them for habitat.

HEALTHY PLANT COMMUNITIES CONTAIN FIVE LAYERS OF VEGETATION:

1. Tree canopy
2. Understory tree layer
3. Shrub layer
4. Herbaceous layer
5. Groundcover layer

Developing landscapes that integrate these layers will enhance habitat value and aesthetic qualities of the land.

PLANT IN LAYERS: SHRUBS, UNDERSTORY AND GROUNDCOVERS:
Early successional habitat is in decline all throughout the northeast, including within the Town of Medway. Promoting the planting of native shrubs and understory species on public and private lands outside the conservation area will improve this declining habitat. The majority of managed landscapes have a "park-like" appearance with lawn and tree canopy. Understory layers are mostly absent from this environment. Adding layers of vegetation to increase connectivity between the groundcover and tree canopy will increase habitat opportunities for wildlife.

PROMOTE DROUGHT-TOLERANT GARDENS FOR WATER CONSERVATION:
Traditional lawns are planted with cool-season grasses such as Kentucky blue grass. These grasses grow well in cooler seasons such as spring and fall, though not as well during hot summer months. Watering necessary to promote summer growth results in intense municipal water use. Planting warm-season grasses will promote water conservation and reduce water use in the landscape.

REDUCE LAWN WHERE POSSIBLE:
Initiate incentives to replace lawn areas with native vegetation that will conserve water, improve habitat connectivity, and protect water quality, particularly when properties are adjacent to wetlands, riparian corridors, or buffer areas.

USE GARDEN FEATURES TO SLOW SURFACE WATER RUNOFF:
Rain gardens and bioswales are slight depressions in the landscape that are designed to catch, temporarily detain, and filter runoff from impervious surfaces. These features can help reduce sediments and pollutants in runoff generated by impervious surfaces. This runoff generally flows directly into storm drains and local waterways. By encouraging water to sink into the landscape, these features help to clean the water prior to discharge or infiltration into local and regional aquifers.

The ecological recommendations within this plan provide a management framework for Medway's open space and all of the land within the town. Through implementation of these recommendations, Medway will benefit from enhanced ecosystem services, most particularly, from enhanced drinking water quantity and quality, both of which are essential to Medway's current and future residents.

EIGHT ELEMENTS OF CONSERVATION LANDSCAPING

A CONSERVATION LANDSCAPE:

1. *Is designed to benefit the environment and function efficiently and aesthetically for human use and well-being;*
2. *Uses locally native plants that are appropriate for site conditions;*
3. *Institutes a management plan for the removal of existing invasive plants and the prevention of future nonnative plant invasions;*
4. *Provides habitat for wildlife;*
5. *Promotes healthy air quality and minimizes air pollution;*
6. *Conserves and cleans water;*
7. *Promotes healthy soils;*
8. *Is managed to conserve energy, reduce waste, and eliminate or minimize the use of pesticides and fertilizers.*

"Conservation Landscaping Guidelines"
Chesapeake Conservation Landscaping Council

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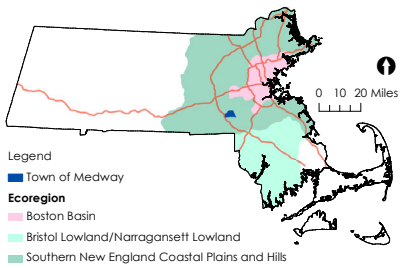
MAP DATA SOURCES



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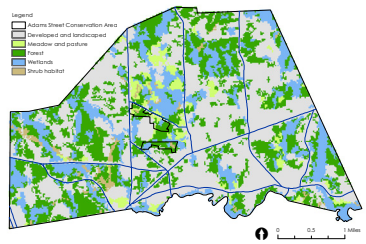

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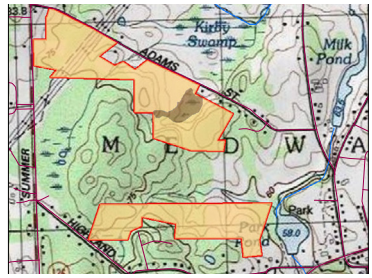

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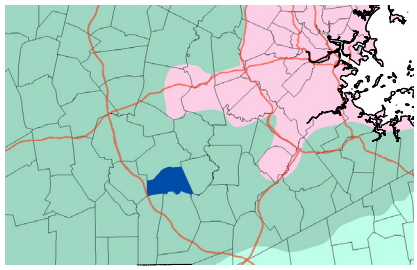

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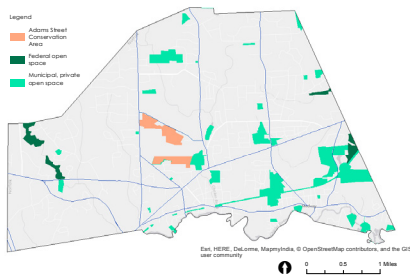

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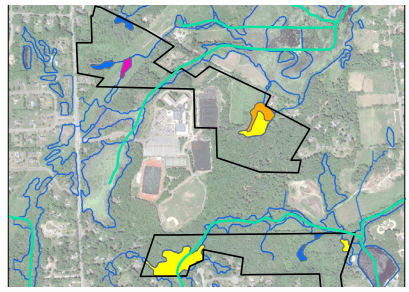

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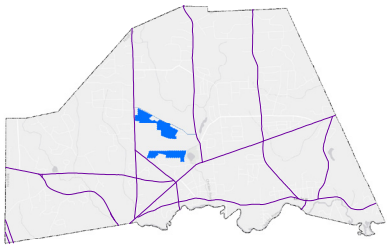

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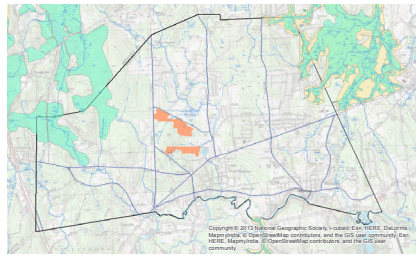

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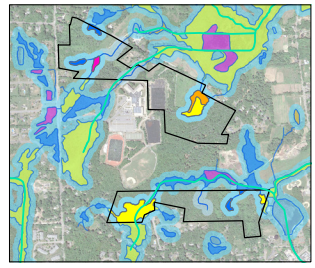

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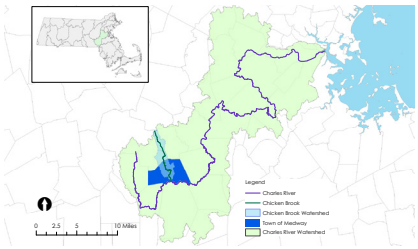

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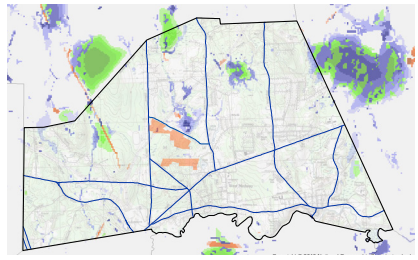

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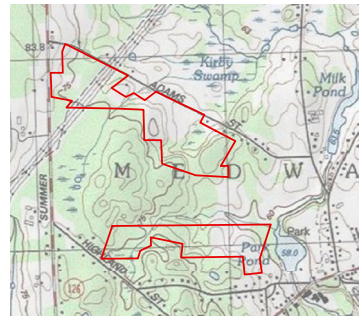

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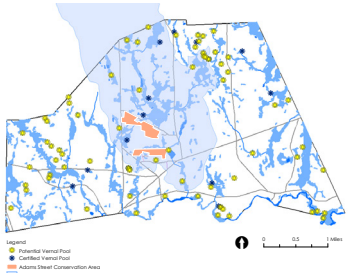

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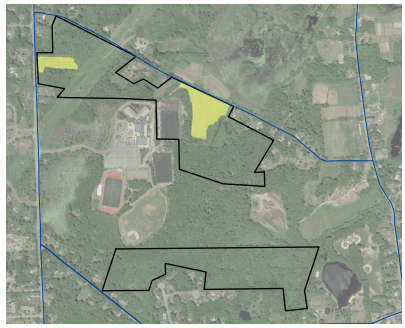

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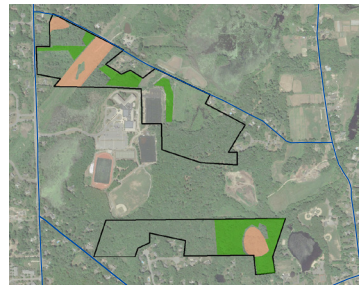

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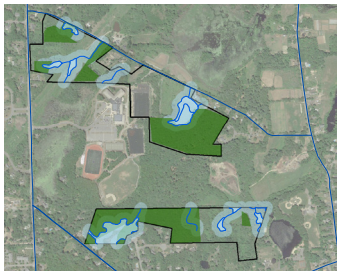

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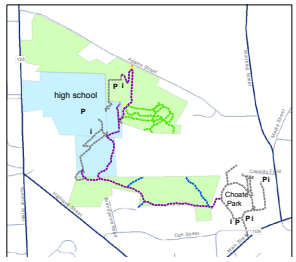

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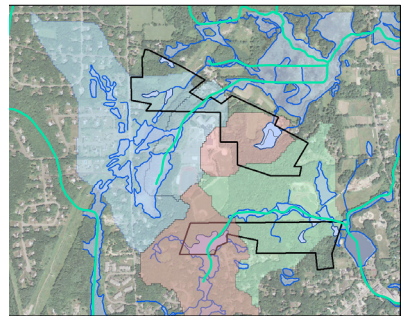
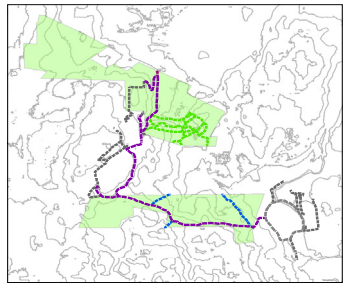


LOCAL WATERSHEDS

ECOLOGICAL PATTERNS: UTILITY CORRIDOR



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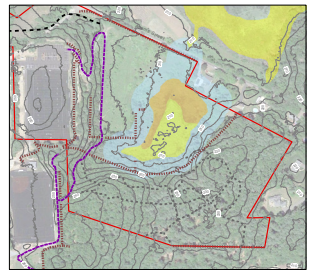
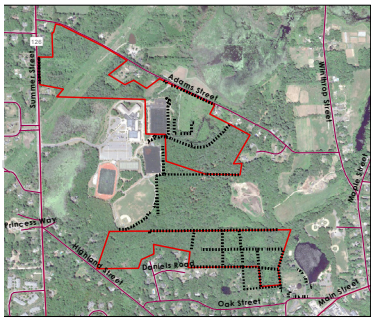
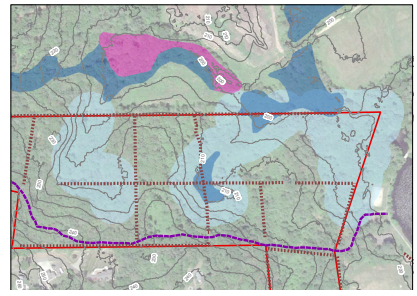


MEADOW-WOODS TRAIL



HUMAN PATTERNS: STONE WALL

HUMAN PATTERNS: 1938 PHOTO WITH STONE WALL



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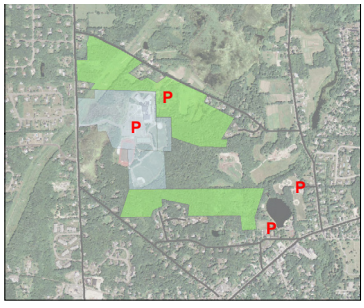

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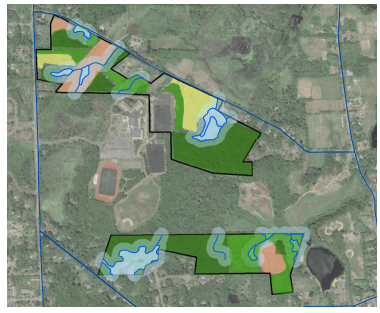
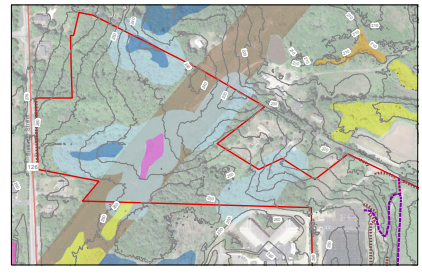
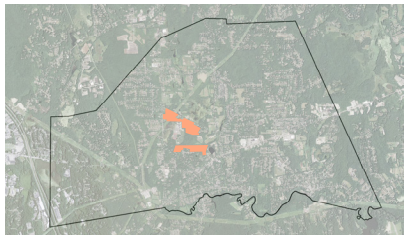


ECOLOGICAL SUMMARY



SUMMER STREET TRAIL



BEYOND ADAMS STREET: CONNECTIVITY

See next page for map data sources.

MAP DATA SOURCES

Data used in the production of the maps in this report comes from several sources as outlined below. In several instances, certain layers have been processed and combined in various ways through the analysis process.

DATA SOURCES:

Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division:
Mass DOT Roads, EOT Roads (177), Tax Parcels (M177), DEP Wetlands, Watersheds: major and subbasin, Massachusetts Towns, BioMap2, Certified Vernal Pools, Potential Vernal Pools, Ecoregions, USGS Hydrology_25K, National Land Use Cover 2011, Land Use 2005, Open Space, Network Hydrology Center Lines, NRCS SSURGO-Certified Soils

Geospatial Data Gateway: LiDAR Elevation Dataset - Bare Earth DEM - 1 meter, 42071b4 holliston_MA; National Land Cover Data by state - 2519 Massachusetts (2011); 2014 National Ag. Imagery Program Mosaic - 25021_1n2014_1 Norfolk

USGS StreamStats: Drainage basin shape files

Town of Medway: Stone wall and trail shape files

Google Earth: Aerial photography 2015

UMass Amherst: Conservation Assessment and Prioritization System - Five color integrated IEI Geo TIFF

NETR Online, Historic Aerials: 1938 Aerial Photograph