



Many Bikeway Abutters Forgo Trail Barriers

By Leah Brams and Vincent Stanton Jr.

City planners, economists, and sociologists have published many studies of the impact of recreational trails on home values, crime and other quantifiable events. But the true experts on recreational trails, it could be argued, are the people who live next to them. They have experienced the positive and negative aspects firsthand, in some cases for decades.

To learn what trail abutters think, one could conduct interviews—and that has been done—or one could study how they have behaved, on the theory that actions speak louder than words. Abutters are free to plant trees and shrubs or erect fences and walls to separate their house from the trail. Homeowners’ choices of landscaping elements can reveal their attitudes towards an adjacent path.

For example, it seems fair to assume that a history of trail-associated crime or vagrancy would eventually lead to more fences and walls, and that they would be built higher and stronger in proportion to the degree of perceived threat. Likewise, trail-associated noise and privacy concerns might be addressed by planting trees and shrubs, especially evergreens that provide year-round shielding.

To investigate abutters’ choices of natural and physical barriers we studied the Minuteman Bikeway in Arlington. We found that just over half of homes and businesses along the Bikeway are within 50 feet of the trail, yet few homeowners have put in fences, walls, or dense evergreen plantings. Apparently, abutters do not feel they need to make special efforts to protect their property from path users.

The Minuteman Bikeway

The Minuteman Bikeway runs for about nine miles through Arlington and Lexington and about one mile through Bedford. The trail opened in 1992, so abutters have had 21 years to adjust to the flow of bicyclists, walkers, and in-line skaters.

For this article we catalogued trees, bushes, fences, walls, and other landscaping features along the Minuteman Bikeway in Arlington, measuring their height, distance from the trail, and other properties to determine the degree of screening they provide to abutting properties. Careful inspection and photographic documentation of barriers viewed from the trail were complemented by analysis of overhead images from Google Earth, a program that allows precise

Barriers Along Minuteman Bikeway by Building Type

Type of Building	Number	No Barrier	Chain-Link Fence	Wood Fence	Wall
Single-Family Home	66	30%	46%	21%	6%
Two-Family Homes	99	23%	42%	34%	1%
All Buildings	238	31%	46%	23%	2%

Totals are greater than 100 percent due to buildings with multiple fence types. One house had two fences, another had a chain link fence anchored in a concrete wall. For complete data, see www.belmontcitizensforum.org.

measurements to be made on satellite photographs.

In Arlington, the Minuteman Bikeway passes through 12 types of zoning districts, including zones where only single-family houses are permitted, zones that allow high-density apartments, major business zones, and industrial zones. The trail is flanked by 238 abutting buildings, about 70 percent of which are single- or two-family homes.

The average distance from the edge of the paved trail to an abutting building is 51 feet. Not surprisingly, commercial buildings are closest

to the trail, with an average distance of 17.4 feet, very close to the property line. All other types of building average 50 to 59 feet from the trail (with the exception of three-family houses, which are closer, but only three abut the trail so the sample size is tiny). There is not much variation in building distances along the trail: 81 percent of the 238 abutting buildings are within 75 feet of the trail, including 86 percent of single-family houses and 72 percent of two-family houses.

Fences and Walls

No fence or wall separates 65 of 238 buildings from the trail, including 30 percent of single-family houses and 23 percent of two-family houses. Of the 165 buildings that do have a barrier, about two thirds are chain-link fences and one third wooden fences (over 90 percent picket fences). Solid concrete or stone walls are rare (2.1 percent). None of the 73 condominium, apartment, commercial, or municipal buildings have walls.

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In many trail segments, a single type of fencing—almost always chain link—runs continuously behind multiple houses. The location of fence posts suggests that property boundaries were not a consideration in fence construction. Twelve fence segments extend past at least four houses; the longest extends past 14 houses on Margaret Street. The fences in many of these areas appear old and are deteriorating. They may have been erected by the Boston & Maine Railroad Company, which ran trains along what is now the Minuteman Bikeway until 1981. Old land plans recorded with the Middlesex Registry of Deeds indicate fences along parts of the railroad right-of-way.

The average fence or wall height is 60 inches; 78 percent are between 45 and 70 inches high; only one is taller than 87 inches. Because nearly two thirds of barriers are chain-link fences, and

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Extensive foliage covers trail



Trail is visible through branches

VINCE STANTON JR. /GOOGLE EARTH

Vegetation along the Minuteman Bikeway and abutting houses just north of Lake Street, Arlington, on satellite photographs from June 18, 2010 (L) and April 17, 2008 (R). The white line in the right photograph illustrates how distances from houses to the Bikeway were measured.

because the average fence is five feet high, only 13 fences and one wall provided significant visual shielding, and only five fences blocked more than 20 percent of the building as viewed from the trail. In six cases, garages partially shielded views of houses; in four cases, a house was partially screened by its location above and set back from a steep slope.

Gates

Fences built before the Minuteman Bikeway opened in 1992 almost certainly did not include gates; there is no reason to access a live train line from private property. It seems reasonable to conclude that the gates that exist today were built after 1992. Gates are only possible if there is a fence or wall, of course—31 percent of buildings abutting the trail have no fence or wall—and only if the slope of the land adjacent to the trail is compatible with a path from the house to the trail. At 11 houses, the slope is so steep that a path from the back yard to the trail would be impassable.

Taking account of those constraints, 33 of 152 buildings (22 percent) that could have gates do have gates, including 24 percent of single-family houses and 20 percent of two-family houses. (See table on page 4.) Some houses have elaborate gates with landscaping around the entrance.

A gate suggests engagement with the trail; having no barrier may suggest either engagement or indifference. Altogether 45 percent of buildings abutting the trail had either no barrier or a barrier with a gate, including 51 percent of single-family houses and 40 percent of two-family houses.

Trees and Shrubs

The average single-family house is 47 percent hidden by vegetation, and the average two-family house is 46 percent hidden based on observations made in July and August 2013.

One way to estimate the degree to which property owners have sought to increase visual shielding provided by trees and bushes is to measure the fraction of coniferous plants.

Gates Along the Minuteman Bikeway by Building Type

Building Type	Number	With Fence	Gate Possible	With Gate
Single-Family Home	66	46	37	24%
Two-Family Home	99	76	74	20%
All Buildings	238	163	152	22%

“Gate Possible” indicates properties where the slope is not too steep for a gate to the Bikeway. The “With Gate” percentage is calculated based on the “Gate Possible” totals.

Surprisingly, 96 percent of trees and bushes along the Minuteman Bikeway are deciduous and therefore provide little shielding from mid-November till mid-May. This is evident in from satellite photographs which show that the trail is completely blocked by the leaf canopy in June, but easy to see in April.

Apartment and multi-unit condo buildings have the highest fraction of coniferous trees and bushes, but still they still only account for 11 to 12 percent of vegetation.

A second way to estimate a property owner’s interest in visual shielding is to count how often trees or shrubs are planted in an arrangement designed to block the view of the adjacent building. For example, a row of closely planted yews can block any view of what is behind them. Only 8 percent of single-family homeowners and 14 percent of two-family homeowners have planted anything—even low bushes—in an organized pattern. On the other hand, 40 percent of apartment buildings and 45 percent of multi-unit condo buildings have organized plantings, including coniferous plants.

Conclusions

Buildings of all types, including homes, are quite close to the Minuteman Bikeway. Just over 50 percent of all abutting buildings are within 50 feet of the edge of the 12-foot-wide trail.

Despite their proximity to the trail, most homeowners have not erected physical barriers or planted coniferous trees to improve shielding since the Minuteman Bikeway opened in 1992.

These observations suggest that abutters have low levels of concern about vagrants, intruders, or even noise. That inference would be weakened if homes along the Minuteman Bikeway turned over quickly, or were predominantly inhabited

by renters, but, as will be explored in a subsequent article, it turns out that is not the case.

To see detailed and complete tables and graphs of the survey data, see www.belmontcitizensforum.org

Vincent Stanton Jr. is a director of the Belmont Citizens Forum. Leah Brams is a sophomore at Belmont High School. She was an intern for the Belmont Citizens Forum in the summer of 2013.

Bike Path Barrier Sources

A good summary of studies of abutter attitudes to recreational trails can be found in a 2008 masters thesis from the University of Cincinnati (see pages 17-18). www.americantrails.org/resources/economics/littlemiamipropvalue.html

Arlington GIS map: www.mapsonline.net/arlingtonma/index.html

Arlington zoning map: www.arlingtonma.gov/public_documents/ArlingtonMA_Maps/ZoningMap_11x17.pdf

Google Earth is available as a free download from: www.google.com/earth/download/ge/agree.html

More tables and data from this study are available at www.belmontcitizensforum.org. An Excel spreadsheet with all recorded observations is available from the authors on request. Contact info@belmontcitizensforum.org.

Community Path Committee to Rank Routes

By Price Armstrong

The Belmont Community Path Advisory Committee (CPAC) has come a long way since its first meeting over a year ago in August of 2012, and it is on the verge of releasing route recommendations. The purpose of the committee is to establish next steps for a multiuse path through Belmont, connecting the Fitchburg Cutoff Path in Cambridge with a yet-to-be constructed path in Waltham. While such a facility has been proposed for many years in Belmont, this committee is a major step forward in its construction.

Last February, CPAC held a public forum to receive input from the community. This forum was held in conjunction with an online survey which received over 1,200 responses, mostly from Belmont residents. The survey and the forum both indicated a great deal of support for the path, both as a recreational and a transportation facility. The biggest concerns, unsurprisingly, centered on two issues: funding and costs, and abutter privacy and security. The CPAC has been working to address these concerns, and others, to the fullest extent possible at this early stage.

Currently, the CPAC is focused on evaluating the potential routes for the path. Most of the proposed routes can be found in a recent Metropolitan Area Planning Council report done for the town. (See www.belmontcitizensforum.org/maps/#Bicycling.)

In general, the route sections can be boiled down to three main areas:

- between the Waltham line and Belmont Center
- crossing through Belmont Center
- between Belmont Center and the Cambridge line

Each section has its own opportunities and challenges, and the committee is acting in as deliberate and transparent a manner as possible when evaluating the routes.

Waltham to Belmont

For the western-most section between the Waltham line and Belmont Center, there are two main possibilities. The path can either travel

north of Pleasant Street along the McLean reservation and down through Beaver Brook, or south of the railroad tracks and on low-traffic streets. A third possibility is to create a viaduct for the path under Trapelo and Lexington Streets, but the feasibility of that route is currently unclear.

Crossing Belmont Center

At Belmont Center, the Leonard Street/Concord Avenue/Channing Road intersection presents a major challenge. One possibility is to build the path on town open space north of Royal Road, and then to cross Leonard Street. Another possibility is to run the path on the railroad bridge above Leonard Street, completely avoiding the streets below. Finally, the entire stretch could be done through bicycle and pedestrian improvements of the existing roadway, though the survey and forum indicated a strong preference for separation from traffic.

Belmont Center to Cambridge

The section of path continuing on to the Cambridge line has three major alternatives. The first is to use the MBTA right of way next to the commuter rail line to build a path, which currently appears feasible. However, abutters express significant concerns about this alternative. Another possibility is to install on-road bicycle facilities on Channing Road and use signage to connect bicyclists and pedestrians up to the railroad right-of-way. Finally, it would be possible to route users along Concord Avenue and perhaps build a separated path on Belmont High School property most of the way back to the Cambridge line, though there would also have to be a short stretch on Brighton Street.

In order to evaluate these potential routes, the CPAC is scoring them based on a number of criteria and using the final score to rank them. Based on this ranking, along input from the February forum and the survey, the CPAC will establish a final recommendation for the preferred route. The discussion surrounding these rankings should conclude at the CPAC's November 6 meeting, and will be presented at a public forum yet to be scheduled.

I work for the Massachusetts Bicycle Coalition, and work in many communities around the state. As a statewide bicycle advocate, I must say that this is one of the most transparent, inclusive processes I have seen. The process has been very deliberate and open to the public, and I foresee that because of careful planning, the CPAC will be able to produce a solid recommendation for the Board of Selectmen.

In the end, however, what the CPAC produces is only a recommendation. More discussion will be needed by the Selectmen and likely also by Town Meeting. It is unclear whether this committee will continue after submitting its final report and recommendations. Regardless, the coalition of community members serving on the CPAC is impressive, and reflects well on our town and its citizenry.

Price Armstrong is a member of the Belmont Community Path Advisory Committee.



SUSAN JONES

Letter to the Editor

I thank Belmont Citizens Forum for its coverage of traffic issues resulting from new residential developments under construction in North Cambridge. I'm a bicyclist and motorist, bicycling advocate and persistent critic of Cambridge's treatment on Concord Avenue (see summary of my comments at cambridgecivic.com/?p=2285).

I'll add an issue to those the article raised. The recent reconstruction of Concord Avenue between Blanchard Road and the Alewife Brook Parkway rotary could hardly have made conflicts between bicyclists and motorists any worse, or done more to generate delays and danger.

The new traffic signal immediately west of the Concord Avenue/Alewife Brook Parkway rotary backs up traffic in the rotary whenever a bicyclist or pedestrian actuates the signal to cross. The westbound sidewalk bikeway on the north side of Concord Avenue crosses a driveway or street every 100 feet on average, into an industrial area. Heavy commuter traffic and trucks turn across the bikeway. Right-turning motorists must stop

in the travel lane, blocking traffic behind them, to yield to bicyclists overtaking in their right rear blindspot, and posing the threat of "right hook" collisions as well as "left" cross collisions between eastbound left-turning motorists and bicyclists. Buses traveling both ways on Concord Avenue must stop in the travel lane, where they discharge passengers directly onto the bikeway—very hazardous.

Better would have been a two-way bikeway on the south side of Concord Avenue next to Fresh Pond Park, where there is only one signalized intersection, maintenance of the previous roadway width and bike lanes, and bus turnouts.

The 2005 Concord-Alewife Plan contains no mention of the Concord Avenue bikeway. See the recommendations for Concord Avenue on page 80 of the report [available at www.cambridgema.gov/CDD/Projects/Planning/concordalewife.aspx]. The plan therefore does not account for the congestion caused by the bikeway, on which construction began only four years later.

John S. Allen
Waltham, MA

Work to Start on More Bike Path Segments

By Meg Muckenhoupt

The state Department of Conservation and Recreation (DCR) has mapped out the route for a 23-mile portion of the Mass Central Rail Trail between Waltham and Berlin. The 104-mile bicycle and pedestrian rail trail is intended to stretch through Belmont from Boston to Northampton. Though many sections in central and western Massachusetts are complete, eastern segments have been more of a challenge.

“DCR has identified a ‘path development corridor’ where we believe a path can be developed along the MBTA right-of-way that DCR has leased from Coburn Road in Berlin to Linden Street in Waltham,” wrote Paul Jahnige, DCR’s Greenways and Trails program director, in an e-mail. DCR obtained a 99-year lease on the MBTA’s right-of-way in December 2010.

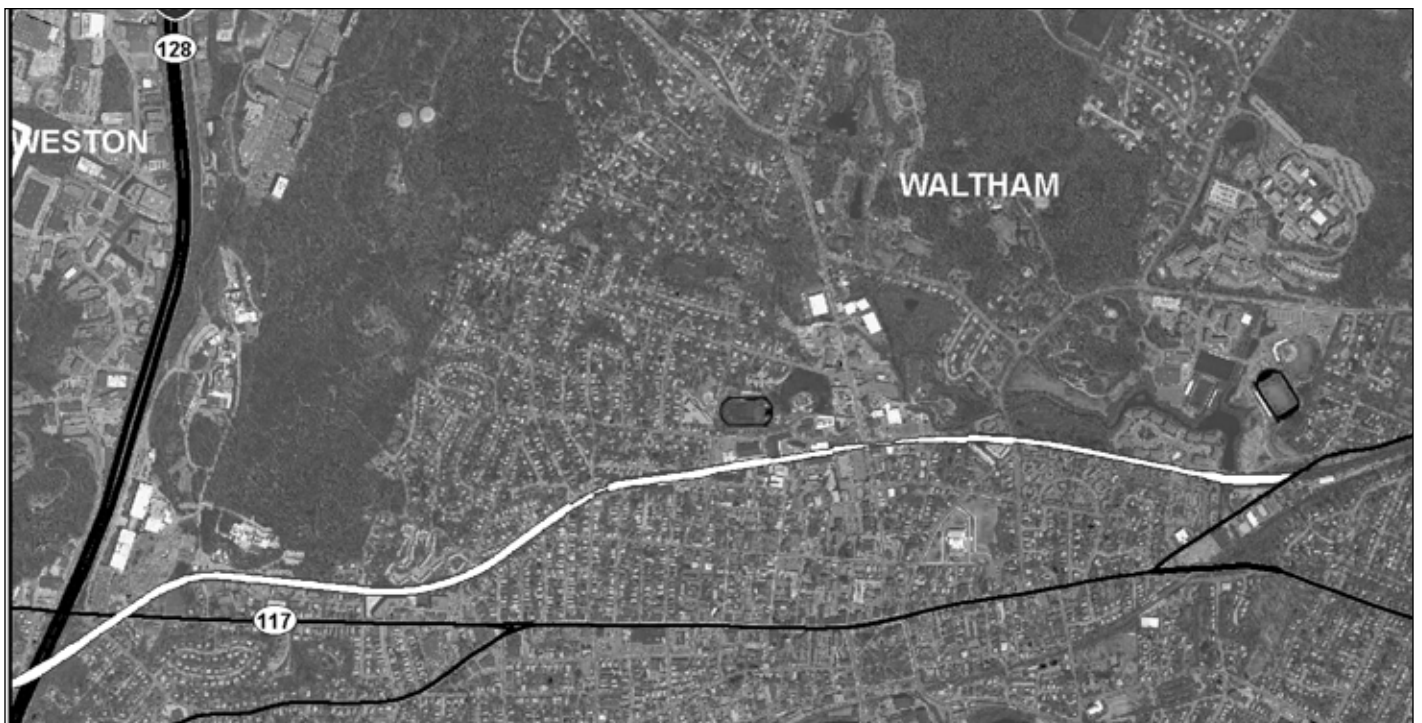
Having an official route for the trail will help local towns start to plan, pave, and complete their trail sections, said Dan Driscoll, DCR director of Recreational Facilities Planning. “They can move forward,” Driscoll said.

Some towns are poised to complete their paths. “Wayland’s ready to go,” Driscoll said.

Wayland rail trail advocates are hoping to get their portion of the trail completed by the end of the town’s 375th anniversary year in June 2014. Wayland may work with the Iron Horse Preservation Society, which builds rail trails at no cost to towns in exchange for removing and selling the old tracks.

However, most towns need to go through a number of steps before they can start improving their trails, according to Jahnige—including planning the trail’s construction and finding funding.

In Waltham, the DCR’s lease ends at Linden Street, which “is not an appropriate end/access point,” Jahnige wrote. At that spot, the trail would be high over the roadway on an old railroad bridge. Jahnige said DCR hoped to extend the trail a short distance along Waverley Oaks Road to Beaver Street, the currently anticipated end point. Although the right-of-way extends beyond Linden Street to Waverley Square, the trail cannot. The MBTA sold the right-of-way to a private owner years ago, and a building was erected on the route between Beaver Street and Trapelo Road.



The bicycle path route set by the DCR from the Weston town line to Linden Street, Waltham.

The DCR received notification on August 7 that the MBTA had granted permission for the DCR to remove the tracks along the Berlin-to-Waltham corridor, which is also known as the Wayside Rail Trail. The route delineation was completed in September, and official maps of the corridor are being finalized.

The DCR also expects to file Environmental Notification Forms (ENFs) for the entire 23-mile segment with the Massachusetts Environmental Policy Act in November. That filing “will provide an opportunity for the public to comment,” on the routes, Jahnige wrote.

The 104-mile Mass Central Rail Trail corridor, formerly a branch of the Boston & Maine Railroad, was gradually abandoned in sections starting in 1939, when the Hurricane of 1938 made tracks in Barre unusable. Apart from a short section of track still used for freight in Palmer, no trains have run on the Mass Central Rail Trail corridor since 1971.

The group Wachusett Greenways has posted a series of detailed trail maps for the central

Massachusetts portion of the Mass Central Rail Trail between Sterling and Barre at www.wachusettgreenways.org.

Meg Muckenhoupt is editor of the Belmont Citizens Forum *Newsletter*.

Snow Removal Bylaw

On November 4, Belmont Special Town Meeting passed a residential snow removal bylaw. Homeowners are now responsible for removing snow from sidewalks next to residential properties.

If you would like assistance with snow removal, contact Marie Poore, Volunteer Coordinator, at the Belmont Council on Aging at (617) 993-2979. Please call to register in advance of winter storms.

Volunteers Restore Lone Tree Hill’s Old Coal Road Trail



RADHA IYENGAR

Volunteers joined Belmont’s Land Management Committee on November 2 at on the Lone Tree Hill Conservation land. They group worked on the Old Coal Road, a main trail into the property off Pleasant Street, to channel water runoff and reduce erosion.

Uplands Geology Makes Development Difficult

By Lucia Lovison-Golob

For centuries, the Alewife Brook Reservation and adjacent Belmont Uplands were protected from urban development by their special wetland hydrology and geology. Entrepreneurial farmers planted silver maples there in the last century in hopes of draining the area. The silver maple, *Acer saccharinum*, is able to tolerate short-term flooding; its shallow fibrous root system holds the soil together and its leaves transpire moisture, making the soil more absorbent of rainwater. However, thanks to natural springs, a very shallow water table, and a soil made up mainly of clay deposits, the Uplands experiences frequent, extensive floods, so that even these tough farmers failed to conquer the wetland.

The Silver Maple Forest abutting the Alewife Brook Reservation along Acorn Park Drive and otherwise known as the Belmont Uplands, remains an undeveloped 15.6-acre site straddling Belmont and Cambridge. These same hydrological processes will affect the Silver Maple Forest if AP Cambridge Partners builds its planned 299-unit apartment complex there.

Uplands Lies in Boston Basin

Geologically, the Alewife Brook Reservation is a rare place. Most of Alewife Brook Reservation and the low-lying Boston Basin to the east were formed from remnants of the African plate when it joined the North American continent millions of years ago. The Boston Basin is an almost flat area with elevation ranging between only 10 and 40 feet above mean sea level. It was dated to about 600 million years ago by means of tiny fossils found in the rocks during Red Line excavations.

West of Belmont, the Boston Basin ends at the Boston escarpment, where an outcrop along Route 2 near the Lexington/Arlington line, originally part of the North American continent, rises to elevations ranging from 100 to 400 feet. Every driver can view the Boston Basin from Route 2 as it crosses the Lexington/Arlington line (between mile 132 and 133).

Millennia of glacial activity, ending with the Laurentide Glaciers about 15,000 years ago, have

eroded the original Boston Basin Group rocks. Marine clay sediments were covered by glacial outwash, and topped off by deposits of soft sediments of peat. The Alewife Brook Reservation area is rich in organic matter or peat, sometimes directly on top of clay sediments. In the past century this area was excavated for clay, and quarries such as the Clay Pit Pond brick works in Belmont scarred the landscape.

The soft deposits that characterize the Alewife Brook Reservation are up to about 180 feet (60 meters) thick and made mostly of a type of marine clay called Boston Blue Clay (BBC). BBC is also called “expansive” or “sensitive” clay, because its mechanical behavior changes if it is touched or its pressure or water content changes. In general, BBC shows a high degree of plasticity.

The soft deposits that characterize the Alewife Brook Reservation are made mostly of a type of marine clay called Boston Blue Clay (BBC). BBC is also called “expansive” or “sensitive” clay, because its mechanical behavior changes if it is touched or its pressure or water content changes.

Disturbances reduce the load it can stand without shifting. Its water and salt content can also affect the allowed load and behavior of the foundations of buildings built on BBC.

Why is it so important to discuss the BBC and the geology of the Alewife Brook Reservation? Because, based on studies carried out, most of the Silver Maple Forest is characterized by BBC-type of soft sediments.

Back as far as 1909, a study by the Pierce engineering firm, based on a cross-section of borings, showed a depth of about 46 feet of clay beneath the zone between Little Pond and Little River. More recently, in 2010, AP Cambridge Partners contracted the engineering firm Northeast Geotechnical Inc. to create a report

Boston Blue Clay at Alewife

In 1991, geologist George Ehrenfried recalled his experience observing construction of the Alewife MBTA Station. He wrote, "When the Perini Construction Company was building the Alewife subway station, they ran into the same problem. When I visited the construction job site, I saw one of their bulldozers sinking into the quicksand-like clay in the bottom of the excavation. Most of the undercarriage had already disappeared.

"They weren't really worried about it. They knew they had enough heavy-duty equipment so they could hoist it up out again before it went down too far. This stuff is called 'sensitive clay.' This means that it looks stiff enough to start with, but as soon as it is disturbed it turns into something like pea soup.

"The digging problems are horrendous. They never could have got the job done unless someone had invented a brand new digging procedure involving the placement of 'slurry walls.' After they finished the two concrete sidewalls, the pressure from the outside was so great that they had to put in hundreds of big heavy iron struts to prevent these walls from collapsing inward . . .

"Even then, when they measured the force on the struts with strain gauges, they found that the loads were very close to the safe limit of what the struts could stand. There are many other engineering options for creating stable foundations in soft sediment like BBC, such as concrete piles, but those approaches cost more and take longer than building floor slabs."

Ehrenfried's complete lecture on Cambridge-area geology is available at rwinters.com/history/ehrenfried.htm.

on the site and collect borings and samples at the Silver Maple Forest, including samples from the monitoring well. These samples and borings seem to show mainly BBC between depths from 20 and 60 feet.

From a geotechnical perspective, two aspects of Northeast Geotechnical's report stand out: a proposal to excavate part of the BBC, and a plan for gravel foundations—called floor slabs—larger than the proposed buildings' footprints. While those floor slabs are intended to increase the strength of the building foundation, the plan contains the caveat that the builder may change the design of the foundations "as the situation needed."

We already know that at the location of one of the buildings, about 25 feet of BBC starts near the surface. Even during construction, constant dewatering will probably be needed at the site. It will also be a challenge to use heavy equipment there, as it was for the construction of Alewife MBTA (see sidebar).

Cambridge forbids the use of continuous pumping and dewatering. It won't be an option once construction ends. However, we know that the water table ranges from 2 feet to 20 feet under the surface in the Silver Maple Forest area.

What would dewatering during construction do to the foundations in BBC? It would assure that the layer of gravel in the floor slab will support the foundation. Unfortunately it would also assure that the soft clay layers beneath the foundation would settle differently from other layers as soon as dewatering ceases at the end of construction and the "sensitive" clay sediments are exposed to a sudden increase





COALITION TO PRESERVE THE BELMONT UPLANDS

A map of the Alewife area showing the location of the Belmont Uplands, or the Silver Maple Forest.

in water content. That change could cause the clay sediments to expand tremendously, absorbing the naturally accumulating water. The foundation could potentially lose its bearing capacity in some areas, and expose parts of the foundation to corrosion.

Will the installation of drains and basement waterproofing be sufficient to prevent groundwater and surface water infiltration at the Silver Maple Forest site?

Given the geology and hydrology of the Alewife Brook Reservation, anyone who builds or grants permits to build there must take into consideration the exorbitant cost of intensive, constant, and ever-increasing maintenance. Who will pay for these costs? Are those worth destroying the Silver Maple Forest?

Lucia Lovison-Golob is a former Harvard University GIS instructor, an engineering geologist, and a geotechnical, GIS, and remote-sensing expert. She can be reached at lucia.lovison@gmail.com.

Stormwater Group Seeks Members

The Belmont Citizens Forum and Sustainable Belmont are working together to form a Belmont Stormwater Working Group. Our goal is to improve water quality and reduce flooding in our waterways. Our first initiative will be to identify candidate sites where “green” rainwater treatments such as rain gardens, pervious pavement, or green roofs might be cost-effective.

Citizen involvement will allow the town to take best advantage of a recent state grant to fund design studies for Best Management Practice sites (BMPs) in Belmont and Arlington. The meeting will be facilitated by Fred Paulsen (Sustainable Belmont) and Anne-Marie Lambert (BCF).

If you are interested in the group, please email bcfprogramdirector@gmail.com.

Constructed Wetland Opens at Alewife

By Sumner Brown and Lucy Brown

Cambridge has just finished building a spectacular 3.4-acre water garden—officially, a constructed stormwater wetland—less than a mile east of Belmont. It cost \$6.3 million to build, and it is open to the public for free. But this garden is not just for our enjoyment. This garden was built because Cambridge started building sewers before the germ theory of communicable diseases. These old sewers have a fundamental design problem; during heavy storms, they wash raw sewage into waterways. The Environmental Protection Agency (EPA) has ordered Cambridge to separate its sanitary sewers from its stormwater drainage. The wetlands will soak up stormwater without worsening flooding in Cambridge's Alewife Brook.

In much of Cambridge, both the sewage and water going into storm drains gets placed in the same sewer lines, called combined sewers. Two hundred years ago the combined sewers would

go to the nearest waterway and their work was finished. Now the combined sewers go to the sewage treatment plant at Deer Island. This works fine until it rains. A small rain gives Deer Island extra water to process. Heavy rains cause sewer lines to reach capacity, and a mixture of sewage and stormwater spills into waterways. The EPA has given Cambridge until December 2015 to stop it.

Cambridge is digging up streets in 335 acres of the city and installing new pipes to carry sewage to Deer Island and stormwater to the constructed wetland. The rain garden costs only about three percent of the total project cost. (Belmont also sends stormwater to Deer Island, but Belmont's problems stem from inflow and infiltration from sewer abuse and leaking pipes, not from a design problem.)

The constructed wetland's function is to mimic the Great Swamp that two hundred years ago covered much of Cambridge, Belmont,



SUSAN JONES

The newly constructed stormwater wetland in the Alewife Reservation.

and Arlington. This natural wetland cleaned and held rainwater before slowly releasing it. However, before wetlands' role in controlling flooding was recognized, the Great Swamp was channelized, creating the Alewife Brook, and most of the Great Swamp was developed. The destruction of this natural wetland has left the land around Alewife Brook vulnerable to flooding.

Having inherited this situation, Cambridge has an obligation not to contribute to Alewife Brook's flooding. If the separated stormwater from 335 acres of Cambridge were placed directly into Alewife Brook it would make flooding worse. The manufactured wetland will slow the stormwater's flow into Alewife Brook.

How the Constructed Wetland Works

When you visit the constructed wetlands, there are explanations and interpretative signage of how the engineered wetland functions. Broadly, dirty stormwater will be filtered through the wetland before draining into Little River, a tributary of Alewife Brook. First, the water enters a "fore bay" where sediment will settle out. This bay will be dredged as needed. Then the water goes through a swale of native plants that will capture nutrients in the water. These nutrients, such as phosphorous from lawn fertilizers, are food for the plants, but without the wetland, they could pollute Little River, possibly causing algal blooms. Then the water will accumulate in what looks like a pond, the main basin, where time and plants will be able to further clean the water.

There is a question of how much this constructed wetland will help prevent more flooding. The constructed wetland has an area of about one hundredth of the area whose rainwater it services. Not all the rain that falls will go quickly to the manufactured wetland, and not all of the 3.4 acres of the wetland stores much water. But ignoring details, one inch of rain may increase the height of water in the wetland by eight feet. (If all of one inch of rain that fell on 335 acres was placed in a tank with an area of 3.35 acres, the tank would fill to a height of 100 inches.) However, the wetland would start spilling water over its rim when the water rises about five feet higher than it was on



SUSAN JONES

Swans enjoy the newly constructed stormwater wetland.

October 27—during an exceptionally dry fall. We expect that the plan is to open the outlet valve before water escapes over the rim. Once the wetland is full, water will pour into Little River as fast as it comes to the constructed wetland. We believe the wetland has been designed to handle "10-year" storms. We may not know how well the wetland works for several years. The pipes that will bring stormwater from 335 acres in Cambridge are not ready; full sewer separation is scheduled for December, 2015.

Compare the efforts in Cambridge to do the right thing with stormwater with what we have done in Belmont this summer with the high school parking lot. We repaved it. Water that falls on the parking lot goes directly to Clay Pit Pond, which is part of Wellington Brook, which flows into Little River.

The constructed wetland's function is to mimic the Great Swamp that two hundred years ago covered much of Cambridge, Belmont, and Arlington. This natural wetland cleaned and held rainwater before slowly releasing it.

The path of water between Clay Pit Pond and the Cambridge constructed wetland is less than a mile long. Belmont has done nothing so far to keep parking lot dirt out of Clay Pit Pond. An attempt to get \$160,000 in of Community Preservation Act funding to build a cleanup swale.

Wetland Built on "Wild Land?"

The Cambridge constructed wetland has been criticized for taking undeveloped, wild land and building on it. This is true. However, those of us who remember what was on the constructed wetland site before are not impressed with this argument. This "wild land" was a low-quality wildlife habitat where the dominant species of wildlife was human. Trash was abundant. If you would like to see what this sort of problem looks like, you can find an obvious path going north into the woods off of the bike path which goes between the wetlands and Brighton Street, about a sixth of a mile east of Brighton Street. This path goes to Wellington Brook and then follows the brook for a short distance to Perch Pond. You can not miss the trash of an abandoned camp site.

If you wish to visit the artificial wetlands, you can walk, run, or bicycle along the newly constructed community path that starts on Brighton Street beside the train tracks and runs to Alewife Station. You will find the walk along

the rail trail to be pleasant and safe because the trail is free of cars and populated by friendly walkers, runners, and cyclists. The wetland begins less than half a mile from the Brighton Street end of the bike path. Enjoy the fabulous water garden with trails, boardwalks and scenic overlooks. Read the interpretive signage. Enjoy over 100,000 plantings. And appreciate a working wetland.

Sumner Brown is a Director of the Belmont Citizens Forum. Lucy Brown is a geologist.

Environmental Events

Western Greenway 5K Hike

Saturday, November 16, 1-3 p.m.

Join the Waltham Land Trust on a 3.1 mile hike through Beaver Brook North Reservation and Rock Meadow, past marshes, through open meadows, and along the Met-Fern Cemetery. Wear sturdy shoes and be prepared for up and down climbs on a narrow, bumpy path. walthamlandtrust.org, swadman@walthamlandtrust.org, (781) 893-3355. Meet at Elsie Turner Field, 421 Trapelo Road, Waltham.

Ecological Impact of Climate Change in New England

Sunday, November 17, 1:30-3:30pm

Speaker Ailene Kane Ettinger, PhD, botanist and ecologist, will discuss topics what scientists know about climate change and what we can expect for the future for New England's flora, fauna, and unique habitats. Co-sponsored by the Arnold Arboretum, the New England Wild Flower Society, and Mass Audubon. Fee: \$26 member, \$32 non-member. my.arboretum.harvard.edu. *New England Wild Flower Society's Garden in the Woods, 180 Hemenway Road, Framingham.*

Fresh Pond Virtual Walkabout

Monday, November 18, 6-7:30 p.m.

Join Chip Norton, Cambridge watershed manager, for a slide show featuring restoration work at Fresh Pond. Free. Advance registration required. friendsoffreshpond.org, fpr@cambridgema.gov or (617) 349-6489. *Water Purification Facility front door 250 Fresh Pond Parkway, Cambridge.*

Volunteer Service Days: Autumn Clean Up

Saturday, November 23, 10 a.m.-noon

Come volunteer for stimulating work keeping Mass Audubon's Habitat Wildlife Sanctuary beautiful. All ages welcome. Children under 9th grade must be accompanied by an adult. Community service credits are given. Tools and gloves provided. Registration required. www.massaudubon.org, habitat@massaudubon.org, (617) 489-5050. *Habitat Education Center and Wildlife Sanctuary, 10 Juniper Road, Belmont.*



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November/December 2013



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