

PLACE

Fall 2011

Brookline GreenSpace Alliance is a non-profit membership organization dedicated to the enhancement of open space in Brookline by supporting citizens in caring for their green spaces.



the Water issue

Greener Future for Stormwater3

Interview with Andrew Pappastergion, DPW Commissioner5

Brookline's Water History ..6

Keeping it Where it Falls ...7

GreenMatters8

The Value of Water in an Urban Landscape

by Marcus Quigley, P.E., D.WRE

The urban landscapes of our town and city centers have profound effects on water as it passes from rainfall on rooftops, roadways, treetops, and open areas, flows over impervious surfaces, through pipes and drainage ways, to streams and rivers; ultimately discharging into estuaries, bays, and the open ocean.

The moment a raindrop hits a surface its value is affected by circumstance. If it is lucky enough to land near the start of rainfall on a warm summer day on the leaf of a street tree, it may spread out to dampen the leaf and evaporate before ever having a chance to reach the ground. If it happens to fall onto a naturalized landscaped area it may have the opportunity to soak into the soil to sustain the vegetation growing there or infiltrate to join the groundwater table. In our urban landscapes it will more likely have a much less poetic fate.

We have built our cities largely assuming that water, when not of drinking quality and properly contained in pressurized pipes, was mostly a nuisance: something to be avoided on roadways, kept out of basements, or piped to the nearest conveyance that could carry it away as quickly as possible. As a society we are rethinking these assumptions and looking more closely at the choices we make and how the actions we take affect the value of water.

We are beginning to fully appreciate that the value of water as a resource varies greatly as a function of its location and quality in our urbanized areas. For example, clean runoff from roofs is typically much more valuable (i.e., for on-site irrigation) than more polluted runoff from pavements. Vegetated areas in the landscape can provide natural filtration, while over fertilization of those areas is one of the greatest potential sources of phosphorus load-

ing to receiving waters, potentially leading to negative effects such as harmful algal blooms. High quality potable water that we pay to have transported into our homes, in the fraction of a second it takes to come out of our faucets, touch our hands, and enter our sink drains, becomes a waste product we pay to have taken away from our homes.

More broadly, site planning, architectural and building mechanical system design, building materials, construction methods, landscape design, landscape maintenance practices, and pavement maintenance, can all greatly affect the value of water. Beyond our ability to control these big decisions we also have many other opportunities to become more aware and contemplate the many ways in which we affect the value of water. In doing this, it is helpful to think back to the raindrop as it travels through our urban landscape, what path it travels, what it comes in contact with, and where it is ultimately headed.

Marcus Quigley is the Vice Chair of the Brookline Conservation Commission and the Managing Principal for the Brookline branch of Geosyntec Consultants and is recognized as a national technical leader in urban water resources design, research and development, modeling, data analysis, and field data acquisition.

[See page 7 for an example of stormwater runoff reduction and reuse]



You can see these around town. What is it? See page 5

Upcoming BGSA Event

BGSA Watershed Walk - Friday, Nov. 11, 1-2:30PM. Brookline GreenSpace Alliance leads 1.5 mile free walk in Olmsted Park. The watershed and stormwater management is discussed within the context of Frederick Law Olmsted's dual purpose 'waterpark'. Meet at the parking lot opposite Brook House, 33 Pond Ave., Brookline Village.

Please RSVP to info@brooklinegreenspace.org

Board Members

Officers

Arlene Mattison, President
Anita Johnson, Vice President
Marian Lazar, V.P.-Publications
Rob Daves, Secretary
Ron Brown, Treasurer

Directors

Harry Bohrs
Frank Caro
Abby Coffin
Gina Crandell
Mary Dewart
Hugh Mattison
Merelice
Ryan Pace
Linda Pehlke
Fred Perry
Deborah Rivers
Lucy Robb
Jean Stringham
Bruce Wolff

Advisors

Michael Berger
Michael Dukakis
Frances Shedd Fisher
Betsy Shure Gross
Chobee Hoy

Member Organizations

Brookline Farmers' Market
Brookline Soccer Club
Brookline Village Coalition
Brookline Youth Baseball
Bountiful Brookline
Campaign to Preserve St. Aidan's
Chestnut Hill Garden Club
Chestnut Hill Village Alliance
Climate Change Action Brookline
Fisher Hill Association
Friends of Billy Ward Playground
Friends of Boylston Playground Assoc.
Friends of Brookline Reservoir
Friends of Carlton Street Footbridge
Friends of Corey Hill Park
Friends of Cypress Field
Friends of Dane Park
Friends of Emerson Garden
Friends of Fairsted
Friends of Griggs Park
Friends of Hall's Pond
Friends of Harry Downes Field
Friends of Hoar Sanctuary
Friends of Larz Anderson Park
Friends of Lawrence Park
Friends of Leverett Pond
Friends of Linden Park
Friends of Littlefield Park
Friends of Lost Pond
Friends of Minot Rose Garden
Friends of Monmouth Park
Friends of the Muddy River
Friends of the Old Burying Ground
Friends of the Paths and Park
on Aspinwall Hill
Friends of Sargent Pond
Friends of Waldstein Park
Garden Club of Brookline
High Street Hill Association
Larz Anderson Auto Museum
Lincoln School PTO Landscape Committee
Linden Parks Association
Putterham Garden Club
Salisbury Road-Corey Farms
Neighborhood Association

Editor

Marian Lazar

BGSA is a non-profit, tax-exempt organization under section 501(c)(3) of the Internal Revenue Code. Donations are tax deductible.

President's Message

Clean drinking water and water for our many regular uses are provided by complex systems that enable us to live together as an urban community while also affecting us in other ways. For example, reservoirs and sanctuaries are significant open spaces which provide opportunities for passive recreation. Both are important components in water management. In Brookline, sanctuaries incorporate wetlands which help control flooding, filter out contaminants from storm water runoff before it reaches the Muddy and Charles Rivers, and provide wildlife habitat.

Over the last two centuries, the water systems of both Boston and Brookline have evolved to serve larger populations. Early reservoirs, such as the two on Fisher Hill are now being redeveloped

for new purposes. The old Town covered reservoir is being turned into a new housing community, including affordable housing. The open reservoir, formerly part of the Boston water system, has been purchased for a new Brookline park which is protected by a conservation restriction held by the Brookline GreenSpace Alliance. This park's design review process, which is an inclusive community planning process, is on-going; and in tribute to the reservoir's history is looking into incorporating a water feature into the new parkland which will also include a soccer field and walking trails through a woodland.

Learning about where our water comes from, and what happens to it when we are done with it, gives us an appreciation of a precious resource and our responsibility to handle it well.



The Brookline Reservoir, formerly part of Boston's water supply system, also provides opportunities for passive recreation.

A Greener Future for Stormwater

by Kate Bowditch



Like many towns, Brookline was developed in ways that we now know in hindsight are pretty bad for rivers. But it's easy to understand how it happened. First, we paved our roads to reduce dust and mud and to support more traffic. Then we built ditches and drains to collect rain from those roads – stormwater runoff – and let it flow down to the nearest stream or wetland. As the town grew, we built more roads and buildings and parking lots, filling in more and more open space and developing land closer and closer to those streams and wetlands. Eventually, to increase buildable space, we filled in wetlands and buried streams in pipes, building right on top of them.

The natural “green infrastructure” of the town, its swales and gullies and marshy pools where water once collected when it couldn't soak into the ground, all disappeared. But the water didn't disappear. Rain still falls, and it has to go somewhere. Since the built environment prevents rainwater from soaking into the ground, we built “gray infrastructure” – gutters, drains, catch basins, storm drain pipes – to carry off the rain water. Worst of all, in some places, we actually put sanitary sewage and stormwater runoff into the same pipe – a “combined” sewer – which worked well until a heavy rainfall, when the pipes overflowed, pouring a mix of untreated sewage and stormwater runoff directly into nearby rivers.

Unfortunately, while the gray infrastructure solved some problems like street ponding and flooded parking lots, it created new problems: sedimentation and water pollution in our ponds, wetlands and streams; rapid peak flows into rivers during storms; and reduced flows in rivers during dry summer months when groundwater drops because of lost recharge. Inadvertently, the infrastructure we've built to manage water actually makes pollution and flooding problems worse.

Brookline has been working for many years to improve our infrastructure and reduce the impacts of urbanization on our waterbodies. The town has removed nearly all the combined sewers in town, with the huge construction project cur-

rently underway on Beacon Street removing the last section. Brookline sweeps its streets regularly, and inspects and cleans its catch basins, keeping thousands of pounds of sediments out of the river every year. And Brookline is a partner in the Muddy River Restoration Project, which will dredge polluted sediments out of the river and allow flood flows to pass out to the Charles River more quickly.

Still, we haven't changed the fundamental “hardscape” that causes so many water problems; almost 40% of the land in Brookline is “impenetrable,” meaning built on or paved. Our underground drainage systems are extensive: virtually every street in Brookline has a storm drain pipe buried beneath the pavement to carry away runoff. And while no one expects us to rip up all our streets or tear down all our buildings, it is clear that the way we manage rainwater is gradually shifting. Recently, both regulations and technology have begun to evolve, and real changes for how cities and towns manage stormwater runoff are ahead.

Stormwater Regulations

Recognizing the impacts that urban stormwater runoff has on rivers and harbors, the US Environmental Protection Agency (EPA) developed regulations and permit requirements that went into effect in the 1990's for most cities and towns in Massachusetts, requiring significant data collection, infrastructure mapping and “good housekeeping” practices like regular street sweeping and cleaning out catch basins where sediments and trash accumulate. Massachusetts also regulates stormwater runoff through the Wetlands Protection Act, so projects that are under the jurisdiction of the Brookline Conservation Commission must meet state stormwater management requirements. Brookline has passed a stormwater bylaw of its own, requiring new development projects to be designed so that at least some water is recharged into the ground rather than flowing out into the street.

These current regulatory programs are a step in right direction, and have made a real difference

“Rain still falls, and it has to go somewhere.”

“Inadvertently, the infrastructure we've built to manage water actually makes pollution and flooding problems worse.”

(continued on page 4)

“New regulations have been proposed by EPA that are likely to require Brookline to do much more to protect water.”

Stormwater (continued from page 3)

in water quality throughout Massachusetts and across Brookline. But water quality still doesn't meet the required standards, and flooding is still a major problem, causing tremendous problems in Brookline and Boston.

New regulations have been proposed by EPA that are likely to require Brookline to do much more to protect water resources and reduce stormwater problems. The new permit, which will apply to all cities and towns in the North Coastal portion of Massachusetts, including Brookline, has been issued in draft form. It would require, among other things, far more water quality monitoring, more street sweeping, and, for cities and towns in the Charles River watershed, the construction of new types of infrastructure to capture and treat stormwater runoff, reducing the amount of runoff that flows off in pipes. The current draft regulations focus on public property – streets and public buildings – but regulation of large, private properties with acres of impervious cover seems likely over time.

The new regulations are unlikely to require dramatic, immediate change. EPA is looking at timetables for new requirements that may extend ten or even twenty years. It took our nation over twenty years to build wastewater treatment systems that could collect and clean our sewage, and it may take that long to build new systems to manage stormwater differently. But over time, Brookline residents should expect to pay more for our stormwater infrastructure, and to have a much better system as a result.

Technology

To reduce flooding and improve the water quality in our rivers and streams, we actually need to turn our old approach to infrastructure upside down: instead of trying to get water away from our buildings and off our streets as fast as possible, we need redesign our driveways and

parking lots and roads to hold water longer, to allow it to filter into the ground wherever it can, and to let plants take up water through their roots and evaporate it back into the air. Water can't be recharged everywhere – you don't want it to flow back into your basement, or into contaminated soils, and you can't squeeze it into ledge or dense clay soils. But Brookline is full of areas where we can and should be collecting rainwater and using it to water plants, recharge groundwater, or even be stored for reuse to water our lawns and parks.

Some solutions to these problems may actually be found by reintroducing green into our “gray” infrastructure. If we build small stormwater planters and filter beds along our streets, as has been done extensively in the cities of Portland, Oregon and Seattle, Washington, and is now being done in New York and Philadelphia, we can improve water quality and reduce flooding, while protecting the pipes underground and extending their useful life. If we plant more street trees to collect rain, use porous paving materials, and try to keep the rain that lands on our roof in our own yard, we can gradually restore the natural hydrology that we paved over and buried so many years ago.

The Green Future

We spend a tremendous amount of money building and maintaining infrastructure every year. Over time, at least some of these investments can and should be devoted to new, greener technologies. Protecting and improving rivers is well worth the investment: a cleaner environment benefits public health, improves property values and is far more resilient to a changing climate. The millions of dollars that have been spent to clean up Boston Harbor and the Charles River have yielded far more in economic and environmental returns, and citizens and politicians are rightly proud of the turnaround.

Regulations are clearly pushing us in the green direction; the technology is evolving rapidly. The trends in Brookline of less green and more gray with every new development are shifting; Brookline's future is likely to be greener.

Kate Bowditch is the Chair of the Brookline Conservation Commission, and Director of Projects at Charles River Watershed Association. CWRA is the 2011 winner of the International River Prize for Environmental Excellence, awarded for excellence in river management.



The Beacon Street Project

An Interview With DPW Commissioner Andrew Pappastergion

Marian Lazar recently spoke with Andrew Pappastergion, Commissioner, Public Works; Philip M. Trainor, Jr., Director of Water and Sewer; and Bill Smith, Construction Coordinator for the Sewer Separation Project on lower Beacon Street

ML: Can you tell me about the Beacon Street Sewer Separation Project? What is happening and why?

AP: Brookline has 120 miles of sanitary sewers and 120 miles of stormwater pipes. When they were first built, the two systems were not totally separate. Sometimes the same pipe was used for both sewage and stormwater.

The Town has been separating stormwater and sanitary drains since the 1960's. Before this project started, there were eight miles of pipe left to separate. Because of the density of this area, and the depth of the pipes, this is the most difficult and expensive section to deal with. The cost to separate the pipes was much greater for Brookline than the savings from reduced sewage flow.

To meet the requirements of the Federal Clean Water Act, the MWRA is under an EPA order to prevent overflows from their Combined Sewer Overflow (CSO) facilities at Union Park (Boston), Cottage Farm and Prison Point (Cambridge), that store and pump CSO flows. Screened and chlorinated wastewater is stored there and pumped to the Deer Island treatment plant. Any wastewater that exceeds a facility's storage capacity is discharged through CSO outfalls; in the case of Cottage Farm, into the Charles River. To reduce the overflow from its Cottage Farm facility, which receives flows from Brookline, MWRA is giving grants to cover the cost of work like the Beacon Street Separation Project. The project involves creating a new sewer line, which will connect to the MWRA facility in Cambridge, and then connecting all buildings to the new line. The old line will carry stormwater to the Charles.

ML: Why wasn't this project undertaken before the rehabilitation of Beacon Street?

AP: We tried to do the separation before the Beacon Street Restoration. Because of the funding process, it was not possible. To minimize distur-

bance on the surface, we are using a process called microtunneling. A boring machine is cutting the new sewer line underground. The total cost of the project is \$22million.

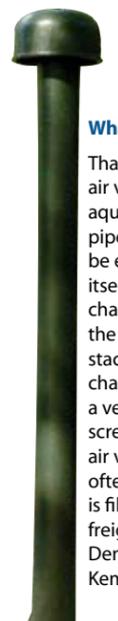
ML: What benefits will Brookline see from this work?

AP: In a heavy rain storm, the combined pipes cause flooding for properties and businesses on Beacon Street. When stormwater and sewage in this section are finally separated in 2013 this should no longer happen. In addition, wastewater in the sanitary sewer is metered as it leaves the Town, and we are charged for it by the MWRA. By separating out the stormwater the volume (and the cost of wastewater removal) is reduced.

ML: What else would you like to tell me about water in Brookline?

AP: The Town has 150 miles of water lines, many are 130 years old, and all are made of cast iron. In the 1960's a study showed that the pipes were tuberculating; forming internal protrusions that reduced the carrying capacity of the lines. We started a forty year pipe relining process; lining the pipes with cement and replacing the control valves. It was finished in 2000, and resulted in a system that is like new. As a result there only rare water main breaks. The lines are flushed in rotation every three years.

The Town's sewers are made of clay pipe. Using smoke tests, cross connections where stormwater runs into the sewer lines have been eliminated. However, the clay pipes have become porous over time, allowing ground water to seep in, increasing the sewerage costs. To prevent seepage, a fiber glass liner “slip line” is inserted into the old pipes, making them water tight. A robotic device is then fed through the line to open the connections to buildings. Any remaining illegal connections can be detected and removed at this point.



What is it?

That's a vent stack for an air valve on an MWRA aqueduct. Filling a large pipe requires the air to be expelled. The air valve itself is in an underground chamber mounted on the pipeline. The vent stack is connected to the chamber and it is simply a vertical pipe with a screened cap on it. The air valves aren't used that often but when the pipe is filling it sounds like a freight train. Thanks to Dennis DeWitt and Marcis Kempe for their help.



Stormwater Planters collect runoff from the street in Portland, Oregon.

Photos courtesy of the City of Portland Environmental Services.





Brookline's Water History

thanks to Greer Hardwicke, Brookline Preservation Division, for the research for this article

Inside the covered reservoir on Fisher Hill.
Photo by Linda Rosenthal

In 1871, a Committee was appointed to investigate a means of supplying Brookline with pure water. Until then, drinking water came from private wells and cisterns. As a result of the study, Water Commissioners were appointed in 1873 to oversee the development of a water supply system, using water from the Charles River. The final plan consisted of filtering galleries on a property on the west side of Cow Island Pond, now in Dedham. Filtered water from the Charles was pumped to an open reservoir on Fisher Hill for distribution throughout the Town. The system was finished in 1874 with seventeen miles of cast iron pipe. (Brookline has 150 miles of water supply lines today.) This low pressure system only provided water to houses at lower elevations.

In 1879, because of increasing pollution in the water, the filtering galleries were enlarged and the pumping station was moved to another location on Cow Island Pond. A fence was erected around the waterworks property in Dedham to prevent animals from straying over the galleries.

To satisfy citizen demands for a high pressure system, able to deliver water to more properties, a new pumping station was built at the corner of Grove and Newton Streets and started pumping 1885. In 1902 Town Meeting authorized the building of a new covered reservoir with a capacity of 6,500,000 gallons, on the site of the original open storage basin on Fisher Hill. It was built using as much of the pre-existing open basin as possible. The idea of covering the existing reservoir was investigated, but the sides were too irregular and the paving too rough for an adequate foundation. The new sides were made of three walls, one above the other. The roof, a span

of elliptical concrete arches, sprang from the third wall. The cement roof was supported at the sides and ends by masonry walls and across the span by brick and concrete piers. The floor, 12 inches thick, was of solid concrete and sloped toward the central drain which traversed the entire length.

The facility remained in service until 1954 when Brookline became part of the Metropolitan District Commission (MDC) water service. Today the Town's water no longer comes from the Charles River. It flows by gravity from the Quabbin Reservoir in Central Massachusetts.

A new high service pumping station was built at 321 Newton Street and is still used today by the MWRA which succeeded the MDC as water supplier. A low service pump on Reservoir Road is also operated by the MWRA.

Last year the covered reservoir was dismantled to make way for construction of Olmsted Hill, a new mixed income housing community.



Pumping Station at Cow Island Pond, Charles River. Photo courtesy of Brookline Preservation Division

Stormwater: Keeping it Where it Falls

by Deborah Rivers, AIA LEED AP

(What individuals can do)

Climate change has seemingly resulted in a warmer and wetter weather pattern here in the Northeast. The most recent instances of wetter than usual weather associated with Irene, Lee, and the overnight storm that brought close to 6" of rain in two hours to nearby Peabody underscore the issue. What can residential property owners do that might mitigate the effects of heavier and more persistent rain?

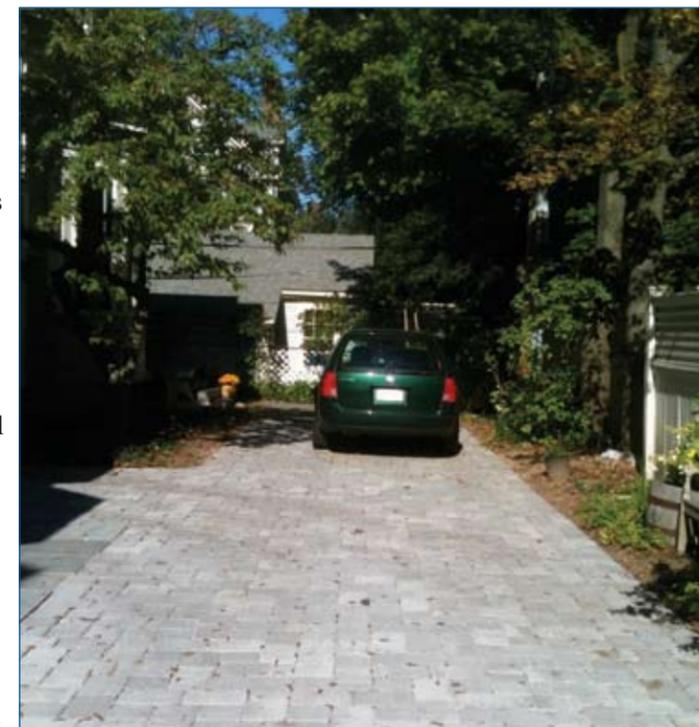
Several years ago our next-door neighbor, my husband, and I started planning to redo our common driveway. After researching various materials and looking at examples in our neighborhood, we decided that concrete pavers would be a more attractive alternative to the existing bituminous. Concrete pavers also have the advantage of being lighter in color, thus reducing heat island effect, and more pervious through the joints than monolithic paving. My husband and I, both registered architects, prepared detailed drawings to describe the paving pattern and the general grading concept. We found a very reliable contractor and the construction process began.

This was not a one-day do-over. When we started the project, we didn't realize that driveway work of this type required a building permit and that the Town has regulations governing storm-water run-off. Our project was classified as "minor" and it covered less than the area requiring a drainage plan prepared and stamped by a civil engineer. Permit in hand, the existing bituminous paving was removed and the subsurface dug out to a depth of 8". The preparation of the base is key to the long-term performance of a paver driveway. Grading, installation of filter fabric, gravel and stone dust sub-base, and sand setting bed took more than a week. Setting the pavers in the sand bed, filling the joints with sand and final compaction were the final steps. The driveway was graded so that much of the runoff drains to the planted area beside the driveway reducing the amount of storm-

water running to the street and storm sewer. The whole process, including permitting with the Town, took three weeks.

A related project done in conjunction with the driveway work was re-grading and resetting our bluestone terrace to eliminate the small pond that formed every time we had heavy rains. The terrace now drains to the surrounding planted areas. In the process, we decided to use an abandoned septic structure, which we had previously uncovered, to serve as a drywell for one of the downspouts from the roof. This lets the rain recharge the groundwater as the water is held and slowly absorbed into the ground. Another downspout feeds a rain barrel, a very easy way to collect water coming off the roof for use watering plants during a dry spell.

Although we think of public streets and commercial parking areas as constituting the major part of paved areas, private residential property also contains a considerable amount of paved area. If property owners would make informed choices about materials and grading when making improvements to driveways and parking areas, the collective positive impact of reducing heat island effect, reducing storm-water run-off, and making the environment more visually attractive would benefit the Town as a whole.



The new driveway using pervious pavers.

Stay Connected

Visit www.brooklinegreenspace.org to learn about open space issues and upcoming events. Sign up for e-mail updates at info@brooklinegreenspace.org

GreenMatters



On a Tree Identification Walk October 9, Tree Planting Committee chairman explained how to identify some of the 20 species of trees found in Olmsted Park.



At a recent BGSAs "Friends Coffee" representatives from park friends groups compared strategies and shared successes and wish lists for future projects.



BGSA receiving an award from Climate Change Action Brookline for its role in founding the organization. Photo by Jean Stringham



Above: Parks Budget sub-committee meeting with Brookline Town Administrator, Mel Kleckner, to discuss the value of open space and trees to our quality of life. BGSA has consistently made the argument that well-maintained green spaces make for healthier people, a healthier environment and a healthier community. Below: The subcommittee meets with DPW Commissioner Andrew Pappastergion to discuss the need for a Town arborist position.

THE BROOKLINE HISTORICAL SOCIETY - FALL PROGRAM
 Water for Brookline: Cow Island Pond, Quabbin and the Metropolitan System
 Marcis Kempe, Deputy Director of Operations
 Massachusetts Water Resources Authority

Sunday, November 20, 2011, at 2 PM 2450 Beacon Street
 The Waterworks Museum Chestnut Hill, MA 02467



BROOKLINE
GreenSpace
 ALLIANCE

PO Box 470514
 Brookline MA 02447

Non-Profit Org.
 U.S. Postage Paid
 Boston MA
 Permit #53810