

Charles River Watershed Association (CRWA) has spent the past seven years investigating environmental impacts on the Charles River. Our understanding of Eastern Massachusetts's water issues lead us to make two striking, yet interrelated conclusions. First, many urbanized areas in the United States are running out of potable (drinkable) water, and rivers are drying up. Second, improvements in water quality are becoming increasingly difficult and expensive to attain.

Most of these environmental problems are related to the proliferation of impervious (paved) surfaces. Imperviousness has a double-edged effect

that disconnects rainfall from groundwater thus reducing groundwater recharge and baseflows while augment-



ing flooding problems, instream erosion, stormwater runoff, and increasing the frequency of Combined Sewer Over-

flow (CSO) discharges. Imperviousness is generally associated with growth, and growth also leads to greater water demand. The consequence is that there is less water stored while more water is demanded. Additionally, each summer demand for potable water doubles in virtually every community as residents seek to irrigate their lawns. Finally, particularly in urbanized regions, our preferred method of treating wastewater is through large regional systems that move water out of local watersheds. The issues affecting groundwater supply are relatively straightforward: reduced recharge, greater human demand, regional wastewater treatment facilities, and lack of conservation.

## Introducing SMARTSTORM™

The urban United States is losing water at increasing rates, and the consequences over the next 20 years are alarming. To meet both environmental and human demands in the Charles River watershed, CRWA has been looking at small-scale engineered systems that conserve and enhance groundwater storage. Our concern for this problem led us to design the **SmartStorm™ Rainwater Recovery System**. The system is designed to capture clean rooftop runoff in order to store some of the water for irrigation purposes and nonpotable uses like car washing, recharge any excess to a drywell for infiltration into groundwater supplies, and reduce stormwater runoff.

SmartStorm™ will reduce demand on potable water supplies for irrigation, reduce polluted stormwater runoff dramatically, and enhance aquifer storage, par-

ticularly during the summer months, helping sustain public drinking water supplies and increase Charles River flow and groundwater recharge. SmartStorm™ will go a long way toward restoring the environmental balance between land and rainwater that would have existed prior to the construction of our homes and apartments. CRWA's first pilot project is scheduled for the town of Bellingham in early August, using funding from the American National Power fund negotiated 5 years ago. As part of the pilot project, thirty to forty Bellingham homeowners will be eligible to receive free SmartStorm™ installation at their homes. SmartStorm™ was available commercially in limited quantities this summer to homeowners outside Bellingham and is expected to be on the market by spring of 2003.

### Why SmartStorm™?

#### Environmental Benefits

- Increases groundwater recharge
- Decreases runoff volume and peak flows to storm drains
- Decreases potential for flooding
- Improves stormwater quality
- Reduces potable water demand for irrigation during the stressed summer period
- Provides strategic emergency supply
- Potential to offset effect of local well withdrawals by recharging groundwater supply

#### Homeowner Benefits

- Provides supply of nonpotable water for lawn care, car washing, plantings, etc.
- Saves homeowners money by reducing the dependency on municipal water supplies
- Supplies a source of water during town watering bans and restrictions
- Locked lids for safety
- Knowledge that you are helping to restore our natural environment



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# How Does SmartStorm™ Work?

SmartStorm™ is designed to change the way water works in municipalities. Each system will store or recharge up to 2400 gallons per day depending on soils, or the equivalent of one hundred percent of the runoff from a 2000-ft<sup>2</sup> roof in a 2-inch rainstorm.

A homeowner places at least two partially-buried, 400-gallon plastic storage tanks near roof drains to collect water before it hits pavement and picks up oil and other contaminants. The water is then stored in the tanks for the homeowner's use, sending all excess into a drywell for groundwater recharge.

The system includes the following components: one or two roof washers; two or more 400-gallon, 44 x 66 inches, plastic tanks (the tanks can be "daisy-chained" together to create additional storage depending on irrigation and other water needs); 600-gallon drywell for 2000-ft<sup>2</sup> roof; internal sump pump for irrigation; and pipes and connections.

The SmartStorm™ tanks are connected to roof gutters and downspouts and store rainwater runoff for nonpotable uses. All of the roof area can be linked to the tanks with aboveground or belowground piping. The tanks are located in one

central area or distributed around the house. Gravity feed or a pump supplies water to a drip or sprinkler irrigation system. The excess water is directed to the drywell and infiltrates into the ground to provide recharge to the groundwater. The small amount of overflow from the drywell is directed away from the house.

SmartStorm™ is equipped to deal with many possible forms of contamination from the rooftop. The first level of protection will be in the form of a removable, cleanable screen to catch leaves and large solids. A flow diverter minimizes potential chemical contamination by diverting the first-flush runoff away from the system. The third level of protection is in the tanks themselves. They serve as a settling basin for any suspended solids that enter the tanks and have a removable lid to

allow removal of solids. Finally, the drywell has a maintenance port for periodic cleanout.

The 400-gallon tanks are designed to be used either without any excavation, or placed in a two or three foot deep hole, easily dug by a homeowner, to lower their

overall profile. They are designed to be linked together easily, increasing storage capacity to irrigate larger lawns or gardens. They can be remotely connected, for example, by placing a barrel at each corner of a home, still hooking all four tanks together using inexpensive PVC pipe, or located away



Rendering of a SmartStorm™ Tank

from a home altogether, and yet still harvest and store roof rainwater runoff through underground piping. The tanks are designed to handle overflows by linking them to drywells. The drywell construction requires excavation of about 85 ft<sup>3</sup>.

The system is designed to recharge twice its volume in a day. In eastern Massachusetts, this design will recharge the volume of a one-inch rainfall from a 2000-ft<sup>2</sup> rooftop.

## For More Information

If you are interested in learning more about SmartStorm™ or how to obtain a system, please contact us at 781-788-0007 or email [crwa@charlesriver.org](mailto:crwa@charlesriver.org). Additional information including photos of a system installation can also be obtained from our website: <http://www.charlesriver.org>.

## About Charles River Watershed Association

One of the country's first watershed organizations, Charles River Watershed Association (CRWA) was formed in 1965 in response to public concern about the declining condition of the Charles. Since its earliest days of advocacy, CRWA has figured prominently in major clean-up and watershed protection efforts, working with government officials and citizen groups from 35 watershed towns from Hopkinton to Boston. Initiatives over the last three decades have dramatically improved the quality of water in the watershed and approaches to water resource management. CRWA is dedicated to protecting the health, beauty, and accessibility of the Charles River.



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