What are we doing?

Under the leadership of Mayor Menino, the City revived the Boston Groundwater Trust (BGwT). The BGwT's jurisdiction was expanded to all neighborhoods of Boston, and a new board of volunteer trustees was appointed. The BGwT's mission is to monitor groundwater levels and make recommendations to raise, restore, and protect these levels.

In 2005, Mayor Menino convened City and State agency leaders to sign a Memorandum of Understanding creating a City/State Groundwater Working Group comprised of public agencies that own and maintain underground infrastructure. The Working Group holds quarterly public meetings, works to identify causes of groundwater drawdowns, and develops solutions to overcome them. In addition, the City established the Groundwater Conservation Overlay District in the Boston Zoning Code (See BZC Article 32). This section of the code stipulates that new construction or substantial renovations in the identified areas will not cause any reduction in groundwater levels and, in certain neighborhoods, will provide recharge systems to direct rainwater into the ground instead of the sewer system. This has resulted in the installation of more than 134 new recharge systems.

The City of Boston and the BGwT established a Recharge Coordination Program. Located at the BGwT, the Recharge Coordinator provides technical assistance to property owners. Available technical assistance includes reviewing a property and providing options on recharge structures and pervious materials that will allow more rainwater to infiltrate the ground. While the Recharge Coordinator cannot design a system for a property owner, this initial technical assistance can help owners develop a project concept based on best practices. For information, contact the Boston Groundwater Trust at 617.859.8439 or visit the BGwT web page at www.bostongroundwater.org.

As a property owner, what can I do to help?

Repair basement leaks. Waterproof your basement. Do not pump away water. Even a small sump pump can cause a significant decrease of local groundwater levels for you and your neighbors, and may expose pilings.

Install a recharge system that will capture and redirect rainwater from your roof and infiltrate it into the ground. Drywells must be designed and installed in consultation with the Boston Water and Sewer Commission (BWSC) so that they will properly infiltrate water into the ground. If your downspouts discharge into the sanitary sewer, BWSC may disconnect them to create recharge on your property.

A leaking lateral sewer pipe can also draw away groundwater. BWSC will reimburse up to $3,000 to repair a blocked or collapsed sewer lateral where the blockage is under the public way. For water service pipe leaks, BWSC's Leak Up To Owner program will assist eligible homeowners to obtain repairs at a reasonable cost with the option to spread payment over 12 months. See www.bwsc.org for details.

How are failed pilings repaired?

Using a procedure called underpinning, contractors dig under the building, cut away the rotted section of piling to below the lowest expected future groundwater level, replace it with steel and encase the steel in concrete. This is a labor intensive process, and the cost to underpin a typical three or four-story rowhouse can be expensive.

The good news is that if groundwater levels rise again to cover the pilings, the rotting process can cease when the air in the wood dissipates. If there has been no settlement of the building, there is a high likelihood that the pilings are still strong enough to support it.

How do I know if my building is on wood pilings or is at risk?

First, check the maps available on the BGwT's website to determine if your property is within the historic "made land" area of Boston. If it is, check the groundwater levels in that area to see if they are high or low. Next, check the building permit history for your property at the City's Inspectional Services Department (some are on the BGwT website) to determine if your property was built on wood pilings and the pile cut-off levels (please note that not all property files contain complete records; some are on the BGwT website). The only sure way to know if the wood pilings remain in good condition is to have a properly trained professional dig a "test-pit" below the building and examine the pilings.

How can I tell if pilings are failing?

Often times, the building will start to settle and a few cracks will appear. Windows and doors may become inoperable and floors no longer level. If this happens, you should consult a structural engineer to ensure the safety of the building.

What's the future?

Because we have many old buildings built on "made land," Boston will always be vulnerable to groundwater related problems. The good news is that groundwater levels have risen in areas where infrastructure has been repaired and water recharged. Working with city and state agencies, and the BGwT, we continue to research better ways to address decreased groundwater and more cost effective ways to repair foundation damage. By fixing leaks, installing recharge systems, and continuing our monitoring and coordinated response efforts, we can proactively address the groundwater issue.

Boston Complete Streets Initiative

In 2009, the City of Boston embarked on an effort to reconsider the way streets are designed. Working with community groups and local advocacy organizations, the City launched the Boston Complete Streets initiative, with the goal of creating streets that are:

1. Multimodal: Safe, comfortable and accessible to all users
2. Green: Energy efficient, sustainable, and low maintenance
3. Smart: Innovatively designed, making use of appropriate new technologies

In the "green" category, the City has been piloting the use of stormwater management approaches that allow runoff from streets and sidewalks to filter directly into the ground instead of being channeled into pipes. Design features such as permeable pavements, structural cells that collect stormwater under pavements, and stormwater tree pits that receive runoff from the street can help replenish groundwater, support a healthy tree canopy, and reduce pollutant discharges to our rivers and harbor.

Opportunities for green stormwater management will be considered in all street redesign projects. Areas in the GCOD are prime locations for piloting green stormwater management approaches.

Peabody Square, Dorchester

The Groundwater Problem

Beginning in the early 1700's, sand and gravel were deposited on top of the original mud flats to expand Boston's Shawmut Peninsula and created new, buildable land. This new "made land" was not strong enough to support heavy, multi-story brick structures. Wood pilings were driven through the made land and underlying mud into hard clay typically located 30 to 40 feet below ground surface. Nearly all buildings constructed on made land through the early part of the 20th century are supported on wood pilings, which will last for centuries if they remain submerged in groundwater. However, if groundwater levels fall, the tops of the wood pilings are exposed to air and attacked by microbes. After prolonged air exposure, the wood pilings eventually rot causing building foundation problems.

Much of the surface in the affected neighborhoods has been covered by buildings and impervious blacktop and concrete, preventing rainwater from being absorbed into the ground. In addition, infrastructure upgrades such as sewers, subway lines, highway tunnels, deep garages and basements, have been built beneath the surface of made land. When these structures leak, the water that enters is often drained or pumped away. This loss of water causes surrounding groundwater levels to drop toward the level of the leak, a phenomenon called "drawdown". If groundwater levels are drawn down below the tops of the pilings, they may be exposed which allows the wood to rot.

The affected neighborhoods include "made land" areas of the Fenway, Back Bay, South End, Bay Village, flat of Beacon Hill, Chinatown, Leather District, Bulfinch Triangle, North End and Downtown waterfronts, Fort Point Channel area, and areas of East Boston.

Dear Resident:

Addressing low groundwater levels continues to be a priority for my administration and we have made substantial progress in recent years. Groundwater is important not only for our environment, but in many areas of Boston, groundwater protects properties with foundations that are supported by wood pilings.

With our partners at the Boston Groundwater Trust, and with state and federal support, a network of 800 groundwater monitoring wells has been installed in Boston providing updated groundwater data to local residents and policymakers. Working with community-based organizations, the City established the Groundwater Conservation Overlay Districts to further protect local properties.

Thomas M. Menino
Mayor of Boston

Check out these web sites for more information:

CITY OF BOSTON
OFFICE OF ENVIRONMENTAL AND ENERGY SERVICES
www.cityofboston.gov/environmentalandenergy

BOSTON GROUNDWATER TRUST
www.bostongroundwater.org

BOSTON WATER AND SEWER COMMISSION
www.bwsc.org

BOSTON REDEVELOPMENT AUTHORITY
www.cityofboston.gov/bra

INSPECTIONAL SERVICES DEPARTMENT
www.cityofboston.gov/isd

BOSTON COMPLETE STREETS
www.bostoncompletestreets.org

We appreciate the continued support of our partners at the U.S. Environmental Protection Agency and the State Executive Office of Energy and Environmental Affairs.

Boston Groundwater

CITY OF BOSTON
Thomas M. Menino
MAYOR

The Importance of Groundwater Level

Mayor's Office of Environmental and Energy Services
Boston City Hall, Room 603
Boston, MA 02201