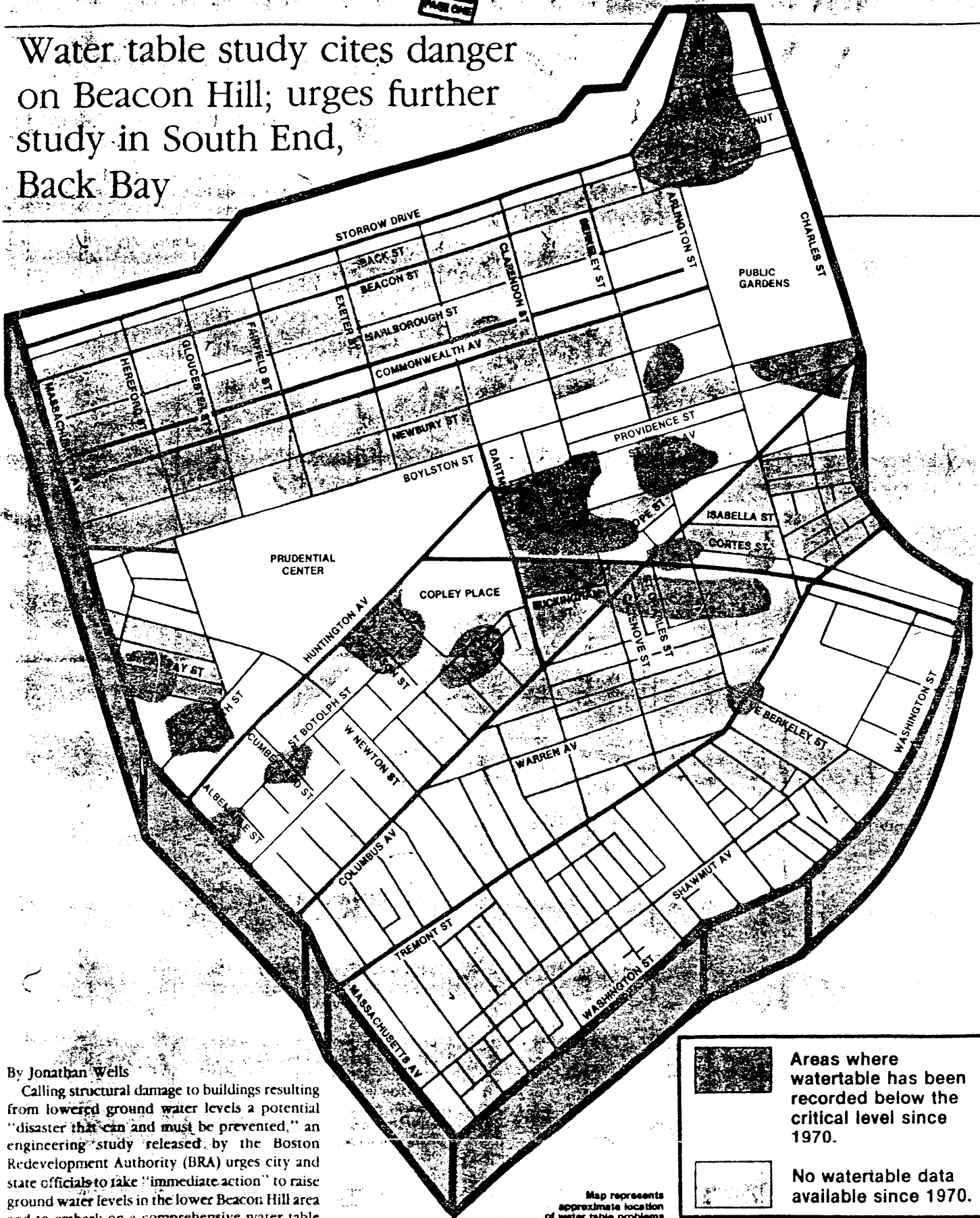




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Trouble Underground

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Water table study cites danger on Beacon Hill; urges further study in South End, Back Bay



	Areas where water table has been recorded below the critical level since 1970.
	No water table data available since 1970.

Map represents approximate location of water table problems

By Jonathan Wells

Calling structural damage to buildings resulting from lowered ground water levels a potential "disaster that can and must be prevented," an engineering study released by the Boston Redevelopment Authority (BRA) urges city and state officials to take "immediate action" to raise ground water levels in the lower Beacon Hill area and to embark on a comprehensive water table monitoring program in the Back Bay and South End.

The report, authored by the Cambridge engineering firm of Haley and Aldrich, says ground water levels beneath residential buildings on the flat of Beacon Hill have, in the last 10 years, fallen "significantly below normal," causing "significant deterioration" of the wood piles that support those buildings—particularly on Brimmer Street.

And while the report found very little available

data on ground water levels beneath most of residential Back Bay and the South End, Dr. Harl Aldrich of Haley and Aldrich, says there is a "possibility" that ground water conditions in those two neighborhoods are similar to those on lower Beacon Hill.

"I think the situation on the flat (of Beacon Hill) is very critical," says Aldrich. "The rotted piles exist and the cost (of repairing them) is significant. And every month that goes by with the water

table lowered results in additional rotting and deterioration."

Of the possibility that similar problems may exist in the Back Bay and the South End where many of the buildings were built on wood pilings during the nineteenth century, Aldrich says: "It is certainly possible, and in my view it should be investigated further. I believe the problem is very serious in the vicinity of Brimmer Street and near

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Storrow Drive. Elsewhere, I don't believe it is so serious that it warrants emergency action, but within the next year, a monitoring program should be established" in the Back Bay and South End "so that the uncertainty can be removed where there is no data."

The report recommends that owners of buildings on wood pilings in lower Beacon Hill, the Back Bay and the South End who suspect their pilings may be decaying should have a qualified engineer examine their property. According to the city's inspectional services department (ISD), such an engineering study costs between \$5,000 and \$8,000. The cost of replacing rotted pilings varies according to the size of the building and the extent of the damage. According to ISD senior engineer Paul Folkins, the cost of recent structural on lower Beacon Hill buildings ranged from \$92,000 to \$300,000 per building.

When underground water levels fall below the tops of wood pilings used to support many older buildings, those supports can rot, causing the structures to settle unevenly and the foundations and bearing walls to buckle and crack, according to the report. The Haley and Aldrich report also concluded that the lowering of the water table can be caused by water draining into leaky sewer pipes, blockage of the flow of ground water into an area or the pumping out of ground water during major construction projects. The water table can be raised by pumping water directly into the ground—which is known as recharging—or by repairing sewer leaks.

In the case of lower Beacon Hill, the Haley and Aldrich report recommends that a temporary recharging system be installed "without delay" to raise the water table in that area until the source of the problem can be identified and corrected permanently.

The report also recommends that the appropriate government agencies install a network of observation wells throughout lower Beacon Hill, the Back Bay and the South End and provide "qualified personnel" to monitor them; strengthen the Massachusetts Building Code to restrict the lowering of the water table during and after new construction; monitor both the Prudential Center and the Southwest Corridor project area; and embark on the "very costly" task of repairing or replacing all leaky sewer lines in the study area.

Last week, city officials said BRA director Stephen Coyle is in the process of forming a inter-agency committee to study the water table problem. The committee will include top-level representatives from the BRA, the city's inspectional services and public works departments, the Boston Water and Sewer Commission and the Metropolitan District Commission (MDC).

"Nothing in the report is shocking," says BRA official Linda Bourque. "We knew the problems existed, but we needed to know where they existed and where immediate action is needed. At this point, we need to find out who will do the long-term monitoring (of the water table), how much it will cost, who pays for it, how many observation wells we need to drill and what the cost of the drilling is . . . But we won't wait for the completion of a long process to respond."

According to John Sullivan, senior engineer for the Boston Water and Sewer Commission, that agency has already installed observation wells in the lower Beacon Hill area and has begun to examine water and sewer lines in that area for possible leaks that could be draining ground water from that area. The MDC is also studying the Boston marginal conduit, which runs beneath the length of Storrow Drive from Beacon Hill to the Back Bay, as a possible cause of the lowered water table.

John Vetere, the MDC's assistant director of collection systems, says his agency has been working since February of last year to find the best way to raise the water table in lower Beacon Hill. To date, he says ground water

levels have been raised one foot, but are still well below the wood pilings.

Trouble spots

The \$40,000 Haley and Aldrich water table study was undertaken last May at the urging of the citizen advisory committee reviewing the 25-story, twin-tower New England Life building proposed for 500 Boylston Street. The Haley and Aldrich study, which was funded by both the BRA and New England Life, compiled all existing information on the water table in an area roughly bounded by Storrow Drive, Massachusetts Avenue, Washington Street and Charles Street.

Very little information on the water table was available for the bulk of the study area, particularly in sections of the Back Bay and South End where most of the nineteenth century residential buildings built on wood pilings are located.

Areas where water table levels had been monitored since 1970 and where the ground water levels were found to be below the critical level of the wood pilings include: the flat of Beacon Hill; a portion of the block bounded by Boylston, Arlington, Newbury and Berkeley Streets; a section across from the Public Gardens that includes Hadassah Way and parts of Boylston Street, Providence Street and Charles Street South; around the John Hancock buildings on Clarendon and Berkeley Streets, Copley Square; an area bounded by Clarendon, Stanhope and Berkeley Streets and the Massachusetts Turnpike; and Isabella and Cortes Streets in Bay Village.

In the South End, identified trouble spots include: an area abutting the Massachusetts Turnpike that includes Buckingham, Cazenove and St. Charles Streets and portions of Berkeley, Clarendon and Dartmouth Streets; three areas along St. Botolph Street near Garrison, Cumberland and Albemarle Streets; portions of the Christian Science Center area between Massachusetts Avenue and Falmouth Street; a section of Carleton Street between Holyoke and Yarmouth Streets; and the intersection of Tremont Street, Warren Avenue and East Berkeley Street.

Causes of the problem

The Haley and Aldrich report identifies several conditions that may be lowering the water table in the study area. In the Back Bay and on lower Beacon Hill, the Boston marginal conduit—which was constructed in 1910 at the behest of Back Bay homeowners bothered by odors emanating from the Charles River—could be drawing ground water from the area through cracks in its walls and also serving as a dam that obstructs the flow of water from the Charles River back into the Back Bay and lower Beacon Hill. The report also indicates that ground water may be leaking into the Storrow Drive underpass at Arlington Street.

In the Boylston Street area, the report says subway tunnels beneath Boylston Street and Huntington Avenue may be restricting the flow of ground water. In addition, Haley and Aldrich indicates the water table in the Copley Square area has been lowered by ground water leaking into the St. James Avenue sewer.

According to the report, the pumping out of ground water during major construction projects can temporarily lower the water table in surrounding areas, but it states that "by their presence alone," buildings and other projects in the Back Bay over the last 40 years have not "caused permanently lowered or significantly changed ground water levels."

The report also states that future development in the Back Bay, specifically the proposed New England Life project, "is not expected to cause permanent ground water lowering."

Aldrich adds that construction and excavation done for the MBTA's Southwest Corridor project did not cause water table problems in the South End adjacent to the turnpike. Several homeowners on St. Charles and Cazenove Streets have been claiming recently that MBTA construction has lowered the water table and caused structural damage to their properties.