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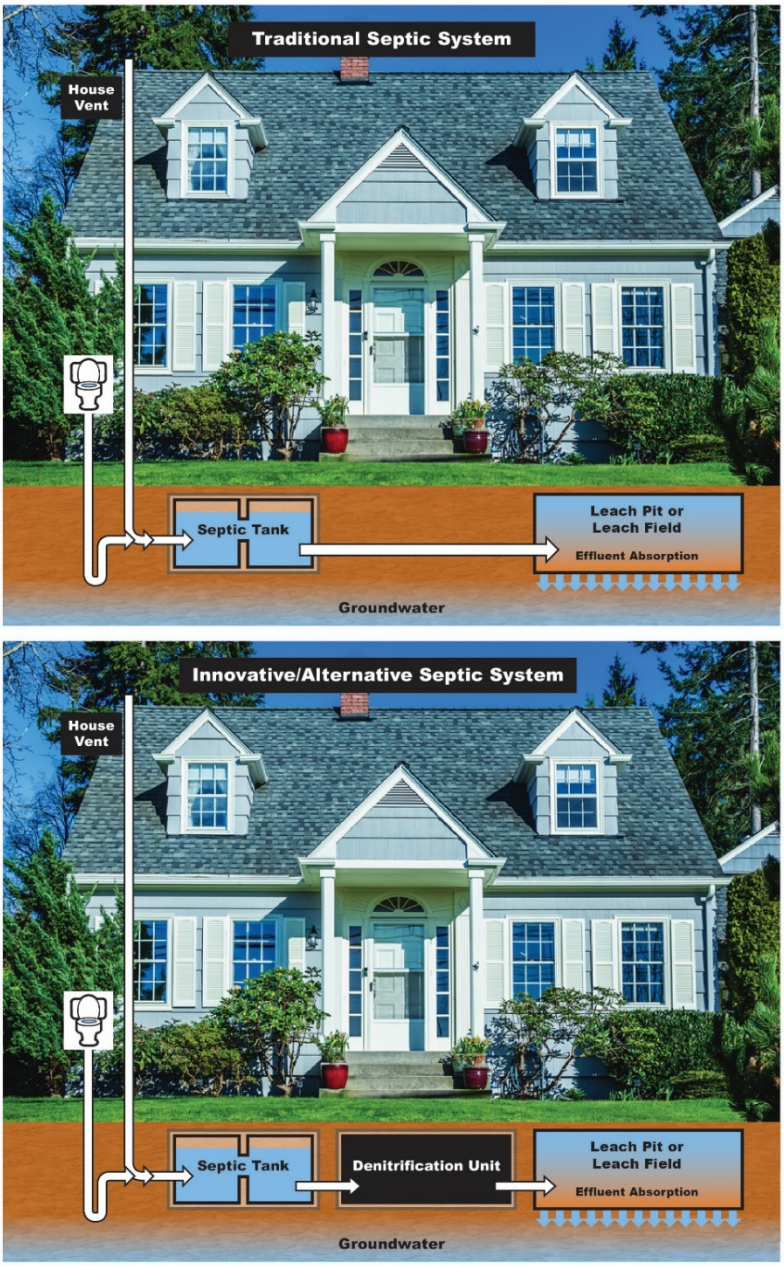
A Neighborhood-Scale Demonstration of Enhanced Innovative/ Alternative Septic Systems in the Cape Cod Region

EPA is partnering with the U.S. Geological Survey (USGS), Barnstable Clean Water Coalition (BCWC) and others to implement a neighborhood-scale demonstration of enhanced innovative/alternative (IA) septic systems in Barnstable, Massachusetts.

BCWC is leading the conversion and replacement of existing septic systems for up to 20 homes with new, enhanced technologies capable of high removal of nitrogen from wastewater. EPA advised on locations for septic replacement and coordinates monitoring of system performance. The new enhanced IA septic systems are designed to prevent excess nutrients from entering estuaries and freshwater ponds in the Cape Cod region. Excess nitrogen from septic systems and other human activities can threaten estuaries, wetlands, drinking water sources, and freshwater ponds as they contribute to algae blooms, low dissolved oxygen, degradation of seagrass, impaired freshwater and estuarine ecosystems, and in extreme cases, fish kills.

Additional partners on the project include the Town of Barnstable, Massachusetts Department of Environmental Protection, Massachusetts Alternative Septic System Test Center, and The Nature Conservancy.



Upgrades from traditional septic systems (top image) to enhanced innovative/alternative septic systems (bottom image) have been offered by BCWC to homeowners in a Barnstable, MA neighborhood.

Issue

The Three Bays watershed in Barnstable (Cape Cod region) contains more than 5,000 onsite wastewater treatment systems. Many are traditional septic systems that do little to remove nitrogen from wastewater, which has resulted in excess nitrogen in the surrounding environment. This excess nitrogen has impacted groundwater, estuaries, and freshwater ponds in the watershed and across the Cape Cod region.

Enhanced IA septic system designs can remove much of the nitrogen before it enters surrounding groundwater, estuaries and ponds. As new designs are developed, system installations and monitoring are needed to evaluate real-world performance before they are considered for broader use.

Acceptance of these systems by homeowners can depend on social factors, cost, aesthetics, perceived risks, and local ordinances.

Demonstration Project Research Approach

After examining groundwater quality in four candidate Barnstable neighborhoods with elevated nitrogen levels, EPA and partners identified one with high housing density on approximately one quarter-acre, regularly spaced lots for the IA septic systems demonstration project.

The enhanced IA septic system upgrades were offered by BCWC to neighborhood homeowners. Each system is being monitored for nitrogen removal performance for approximately three years following installation. Groundwater monitoring wells located up- and downgradient from participating homes are being monitored to determine the impact of the new, enhanced IA septic systems on nitrogen in groundwater.

Goal and Expected Outcomes

This study is part of a larger research effort at EPA that focuses on evaluating interventions to reduce excess nitrogen in the Cape Cod region.

It is expected that this demonstration project will provide 1) performance measures and cost effectiveness information for the enhanced IA septic systems; 2) an evaluation of the systems' impact on nitrogen in groundwater; and 3) lessons that local, state, regional, and federal partners can use in watersheds similarly compromised by traditional septic systems.

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