Wastewater/Water Distribution Infrastructure

By Gab Belfit, Cape Cod Commission and
Scott Michaud, Cape Cod Commission

GIS map provided by Gary Prahm, Cape Cod Commission and
Ben Smith, Cape Cod Commission

The sustainability of Cape Cod's water resources is pivotal to the sustainability of the Cape's population, economy and business climate and their future growth. A measure of sustainability can be directly linked to the availability of water-resource planning, technology and infrastructure capable of adequately protecting water quality in a manner that achieves community goals. While Cape Cod continues to identify sustainability goals, the region has already taken significant steps in this process and has begun to identify additional infrastructure needs.

Water Quality Protection

One such sustainability goal may be, for example, adequate support for Cape Cod's tourism-based economy, an economy that is dependent upon the quality of the Cape's fresh and marine waters – natural assets that attract commerce to the Cape. This goal depends upon the region's ability to provide clean drinking water to support transient populations and to support the year-round population required to provide the necessary services. While drinking-water and ecology protection have their own respective issues, the protection of both is dependent upon appropriate planning, technology and infrastructure adequate for achieving community sustainability goals.

Cod Cod's drinking water is derived from the Cape Cod aquifer, a sole-source aquifer afforded certain protections through a special Federal designation in recognition of the unavailability of alternative water supplies. Most of Cape Cod communities obtain their water supplies from municipal water supplies. The remaining communities obtain their water supplies from small-volume wells and individual private wells. With the exception of a limited number of areas on the Upper and Lower Cape where private wells are still used to obtain drinking water, most water supplies provided by individual private wells are located on the Outer Cape where only Provincetown and limited areas of Wellfleet are served by municipal water supplies. Therefore, the Cape Cod Aquifer serves as the sole source of drinking water throughout the Cape making aquifer protection an imperative to sustainability.

Water Supply

(http://www.capecodedc.org/documents/WastewaterWaterInfrastructureMap.pdf)

Upper and Lower Cape communities have been successful in the delivery of clean, untreated drinking water through the development of municipal water supplies and their required protections and setbacks through the State's Water Management program, and land use planning and the procurement of open-space with Land Bank and Community Preservation funds. Low-density development typical of the Outer Cape has allowed these communities to obtain clean drinking water on individual sites using private and small-volume wells. Outer Cape communities such as Eastham have begun to evaluate sites for municipal water supplies because of increasing development pressures on

water quality. Provincetown, which has historically obtained its water supply from neighboring Truro and the adjacent Air Force Base, recently concluded a water-supply audit followed by corrective measures to eliminate leaking water mains and has more recently entered into an inter-municipal agreement with Truro to supplement its existing water supply. Provincetown has enacted regulation that links new development to the availability of water.

Wastewater
(http://www.capecodedc.org/documents/WastewaterWaterInfrastructureMap.pdf)
Appropriate management of wastewater and stormwater is critical to protecting drinking-water supplies because the Cape Cod Aquifer is the repository for wastewater and stormwater runoff. Wastewater and stormwater management are also important to the ecological and aesthetic quality of the Cape's freshwater ponds, estuaries and marine embayments because the aquifer discharges to these coastal systems, contributing nutrients derived from these non-point sources.

Cape Cod has historically relied upon on-site wastewater treatment and disposal, with limited areas in Buzzards Bay, Falmouth, Barnstable, Chatham and Provincetown connected to sewer with advanced wastewater treatment. Most of the on-site wastewater systems supply nutrients such as nitrogen and phosphorus to Cape Cod's estuaries, marine embayments and freshwater ponds because most of Cape Cod are watershed areas that discharge to these resources. On-site wastewater systems located on Cape Cod treat wastewater to various levels depending on their size and whether they're permitted under the State's Ground Water Discharge program. However, the vast majority of the Cape's on-site systems are standard Title-5 septic systems that are not designed to remove nutrients.

Algal blooms and fish kills throughout the 1990s has made it apparent to Cape Cod communities that development is impacting water quality, thereby stimulating community involvement in evaluating water-quality impacts and enacting regulatory limits on development in sensitive watersheds. In accordance with its obligation to implement Federal requirements under the Clean Water Act, the State in partnership with Barnstable County, embarked on the Estuaries Project to assess the ability of estuaries and marine embayments to assimilate nitrogen additions and allow for the development of maximum allowable nutrient loads (TMDL) for these systems. The target loads, which have not yet been finalized for Cape Cod estuaries and embayments, will drive community decisions regarding Cape's wastewater-management needs.

Stormwater
Cape Cod has special needs when it comes to the issue of stormwater. As with wastewater, the Cape Cod Aquifer is the repository for stormwater runoff. As stormwater travels over the land, it picks up chemical contaminants and materials that are not naturally found in our waterways. Some contaminants are toxic, even in small amounts. Other contaminants are not necessarily poisonous but can cause undesirable effects. For example, excess nutrients such as nitrogen in bird droppings entrained in stormwater runoff from impervious pavement and the lack of vegetation that would

otherwise takes up the excess nutrients fertilizes surface waters and causes algal blooms and fish kills. This pollution of waterways can result in unpleasant and even unsafe boating, swimming and fishing. Cape Cod waterways are especially important to fisheries and tourism, making it important to minimize stormwater pollution. It is increasingly important for stormwater pollution to be controlled as the population on Cape Cod grows and development increases.

Employing the techniques of Low Impact Development, (LID) in stormwater design is a goal for future development and redevelopment on Cape Cod. Unlike traditional stormwater control techniques, LID strategies prioritize resource conservation and increasing green space, while simultaneously controlling runoff discharge volume and quality to reach levels of preconstruction stormwater control. One of the primary goals of LID design is to dampen peak flow and find beneficial uses for water such as reduce recharging groundwater and evaporating rain water to the atmosphere rather than exporting it as a waste product down storm sewers. Integrated Management Practices, or IMPs, is one such LID technique that uses small-scale stormwater management controls to strategically distribute stormwater throughout a site. The job of IMPs is to maintain natural flow patterns, filter pollutants and recreate or maintain a site's hydrology. Development and redevelopment should strive to break up stormwater discharge to several smaller systems, utilize integrated landscaped bioretention practices and plan landscape designs with efficient irrigation that can retain water that does not need to use fertilizers or pesticides. The use of these types of controls in combination with conservation practices, minimizing development impacts and maintaining site runoff rates, creates a customized stormwater management design that helps maintain overall watershed integrity and functions.

Conclusion/Summary

Protection of drinking water and Cape Cod's surface waters important to sustaining Cape Cod's economy and ecologic vitality will require concerted regional, inter-municipal efforts that combine smart-growth planning, and development of appropriate technologies and infrastructure necessary to meet water-quality goals determined by Cape Cod communities. Progress continues to be made by both town and regional government, in cooperation with the private sector, to engage in community outreach; assess water-resource needs; evaluate technologies and local, regional and state regulatory and legal frameworks; and engage in smart-growth planning important to the protection of water resources.

<u>Selected Bibliography</u>:

"*Cape Cod Comprehensive Regional Wastewater Management Strategy Development Project*." (Cape Cod Commission, 2003).

"*Enhancing Wastewater Management on Cape Cod: Planning, Administrative, and Legal Tools*." (Barnstable County, 2004).