



Executive Summary

Introduction

Water is the single most significant resource for which Suffolk County bears responsibility. As the impact of Superstorm Sandy underscored, more than at any time in our history, we are obliged to come to terms, in every sense, with the water that surrounds us. Suffolk County's water quality is at a tipping point. We face an alarming trend in the quality of the water our families drink, compounded by impairment of many bodies of water in which our families play. Moreover, the source of these impairments has demonstrably degraded the wetlands that serve as our last line of natural defense against storm surge.

While today our drinking water generally meets quality standards, elevating levels of contaminants raise serious concern. Many of our rivers, estuaries and bays are impaired as result of eutrophication. Nitrogen, which primarily spews from residential septic and cesspools, as well as fertilizer, are the principal culprits that spur hypoxia, harmful algal blooms, diminution of sea and shellfisheries, and degradation of our protective natural infrastructure—wetlands and seagrass beds that act as wave and storm surge buffers^{1 2}. Sea level rise, which also contributes to marshland degradation, is projected to raise groundwater levels, increasing vulnerability to saltwater infiltration, and further compromising on-site wastewater treatment infrastructure largely composed of cesspools and septic tanks.

¹ Deegan LA, Johnson DS, Warren RS, Peterson BJ, Fleeger JW, Fagherazzi S, and Wollheim WM (18 Oct 2012) "Coastal Eutrophication: A Review of the Evidence for Hypoxia and Anoxia" *Estuaries and Coasts* 35:1212-1220.
² Anderson ME, McKee Smith J, Bryant DB, and McComas, RGW. (Sept 2013), "Laboratory Studies of Wave Attenuation through Artificial and Real Vegetation" USACE. "It is generally acknowledged that vegetated coastal features such as wetlands can reduce the effects of surge, waves, and tsunami propagation."

Executive Summary



Perhaps nowhere have we seen the impact of nitrogen pollution in more stark terms than the Great South Bay. At one time, this bay produced more than half the clams eaten in our country. However, over the past quarter-century, the clam harvest in the Great South Bay has fallen by 93 percent, destroying an entire industry which once accounted for 6,000 jobs. While clams were once over-harvested, they have largely failed to recover due to recurrent brown tides fed primarily from nitrogen from septic systems and cesspools. We must decide if this type of impaired surface water body will be our region's future or if we can restore our bays to health.

In advance of the release of the 2014 Suffolk County Comprehensive Water Resources Management Plan ("Comp Plan"), this Executive Summary Update is spotlighting the Comp Plan's critical findings, and relevant post-Superstorm Sandy considerations, in order to spur a critical public dialogue about the scope of the problem and begin to frame near-term solutions. While many environmental issues related to groundwater and surface waters have arisen since the previous Plan (1987), one elemental condition has remained constant: the vast majority of Suffolk residents rely on on-site wastewater disposal systems that discharge to groundwater. In addition, fertilizer use, industrial and commercial solvents, petroleum products, pesticides and a host of other manmade contaminants have had profound and long-lasting impacts on groundwater quality, as well as on fresh surface waters and coastal marine waters into which groundwater and stormwater runoff discharge.

In the face of sea-level rise and extreme weather events, Suffolk County is compelled to devise the means and methods to live and thrive with the water beneath, by and around us.



Critical Findings

*"We have a million and a half people, **approximately 70%**, or roughly a million people, who are **not sewered**. This is probably the only place in the world with that large a density in this tight a space where the waste is going into a sole source aquifer immediately beneath us that we're drinking, and this is **a big concern**."*³

Downward Trajectory in Groundwater Quality:

1. Nitrogen is public water enemy #1, as **nitrate contamination** from unsewered housing and fertilizer use poses a threat to both drinking water supplies and coastal marine habitat and resources. Nitrogen-induced nutrient loading and eutrophication can lead to many negative impacts on estuarine environments including harmful algal blooms, hypoxia [little or...], and even anoxia [no oxygen];
2. Volatile organic chemicals (VOCs), another **priority contaminant**, derives from commercial, industrial, and consumer use, impacting large portions of the aquifer, public water supply and private wells;
3. Pesticides pose **a threat**, especially to private wells in agricultural areas; and,
4. Pharmaceuticals and personal care products are an **emerging concern**.

Surface Water Impairments:

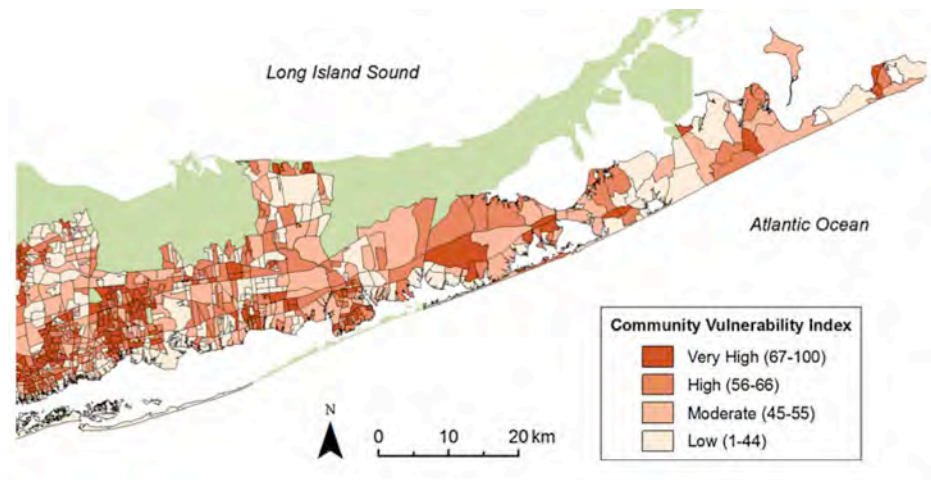
5. Long Island's entire 60-miles long South Shore Estuary Reserve was declared impaired by the New York State Department of Environmental Conservation (NYSDEC) in 2008.
6. Brown tide algae invasions have been plaguing Long Island estuaries for nearly a quarter of a century, according to Dr. Chris Gobler of Stony Brook's School of Marine & Atmospheric Sciences (SoMAS) obliterating a shellfish habitat that once provided one half of all hard clams for the nation.
7. There was an 18-36% loss of tidal wetlands between 1974-2001 according to NYSDEC.
8. The NYS Seagrass Taskforce estimates that the 200,000 acres of seagrass in Long Island's bays and harbors in 1930 have shrunk by nearly 90% to 22,000 acres.
9. The Forge River in Moriches is "the worst case of anoxia (absence of oxygen) I have seen," states Dr. Larry Swanson, Associate Dean of SoMAS.

³ Dawydiak, Walter, Acting Director Environmental Quality, Suffolk County Department of Health Services. Testimony to Health Committee of SC Legislature, March 6, 2012

Executive Summary



*The costs of redressing water-related issues are significant; the economic consequences of not doing so are **potentially devastating in property values alone**. Then there is Long Island tourism, producing revenues of \$4.7B/yr, with approximately 28% of visitors – 5.1M/yr – visiting parks and beaches.⁴ “Coastal habitats shield people and property from sea-level rise and storms,” reducing their exposure by half, according to marine ecologists at Stanford Woods Institute for the Environment.^{5 6}*

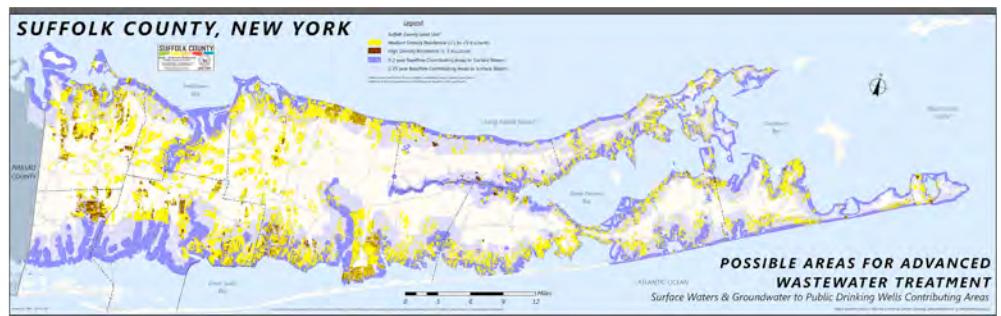


⁴ Trust for Public Land, “The Economic Benefits and Fiscal Impact of Parks and Open Space in Nassau and Suffolk Counties, New York,” 2010 accessed at <http://cloud.tpl.org/pubs/ccpe--nassau-county-park-benefits.pdf>
⁵ Arkema, K, “Coastal habitats shield people and property from sea-level rise and storms,” Nature Climate Change, July 2013
⁶ Shepard, C, et al, “Assessing future risk: quantifying the effects of sea level rise on storm surge risk for the southern shores of Long Island, New York,” Nat Hazard 2011: 727-745.



Nitrogen from Unsewered Areas

Suffolk County, with a population larger than 11 states and a region that derives its drinking water from the ground, must pay particular attention to the 350,000 sub and non-performing septic/cesspools in Suffolk, accounting for well over 75% of the homes. They are particularly problematic in areas with high water tables and in close proximity to surface waters. When flooded or submerged in groundwater, septic systems do not function as designed and they fail to adequately treat pathogens. Excess nitrogen from this sewage threatens our valuable natural resources, coastal defenses, and human health.



Map of 0-25 Year Baseflow Contributing Areas to Surface Waters

Characteristics of Unsewered Areas in Suffolk County, N.Y.			
	Unsewered Residential Parcels		
	Total	Medium Density (> 1 to < 5 d.u./acre)	High Density (≥ 5 d.u./acre)
0-25 Year Baseflow Contributing Areas to Surface Waters	155,939	121,843	34,096
0-50 Year Estimated Groundwater Travel Time to Public Water Supply Wells	55,169	43,967	11,202
Minus Overlap	1,414	1,199	215
Total	209,694	164,611	45,083

Suffolk County has identified priority high density (greater than 5 homes per acre) and medium density (1 to 5 homes per acre) residential subregions within the contributing areas with the following characteristics:

1. with a depth to groundwater of 10 feet or less; and/or
2. contribute to an area that is listed as a 303(d) impaired water body.

Executive Summary



Contaminant	Manmade Sources
<p data-bbox="82 455 1182 489">Nitrogen pollution is increasing in our groundwater</p> <ul data-bbox="142 520 1182 1890" style="list-style-type: none"><li data-bbox="142 520 1182 651">• While 87% of all community supply wells had nitrogen concentrations less than or equal to 6 mg/L, between 1987 and 2005 there were large changes in nitrogen levels in all of Suffolk County's groundwater aquifers. Nitrogen concentrations in the Upper Glacier aquifer rose by 40% while levels in the Magothy aquifer, a deeper aquifer, rose by 70%.<li data-bbox="142 682 1182 812">• Parts of Suffolk County's groundwater exceeds maximum containment levels caused by unsewered, subsized lots, especially in Huntington, Smithtown and northern Brookhaven, with nitrate levels ranging from 8 mg/L to 12 mg/L in Magothy wells in Northport and East Northport.<li data-bbox="142 844 1182 940">• All 3 major estuaries in Suffolk County are suffering from dissolved oxygen impairments as well as recurring Harmful Algal Blooms, some toxic to humans, diminishing the County's wetlands, which act as a second line of defense for storms.<li data-bbox="142 972 1182 1068">• Wetlands have been scientifically proven to reduce vulnerability from storm surge, reducing wave height by 80% over short distances. Waves lose energy as they travel through vegetation.<li data-bbox="142 1100 1182 1398">• Losses of healthy salt marsh have accelerated in recent decades. NYSDEC estimates that there was an 18-36% loss in tidal wetlands in the Great South Bay between 1974 and 2001. In 2008, NYSDEC declared Long Island's entire South Shore Estuary Reserve system, stretching more than 60 miles, an "impaired water body" (under section 303(d) of the Clean Water Act). NYSDEC identifies nitrogen from wastewater as a reason for this unfortunate designation and states that cesspools, septic systems, and sewage treatment plants cause eutrophication, resulting in lower water oxygen levels and persistent algal blooms. According to researchers Kinney and Valiela¹, 69% of the total nitrogen load for the Great South Bay is from septic systems and cesspools.<li data-bbox="142 1430 1182 1623">• Excessive nitrogen has been shown to have a direct effect on seagrass by promoting growth of microalgae which shade it and macroalgae which out-compete it. Thousands of acres have died off in Long Island's Eastern and South Shore estuaries. According to the NYS Seagrass Taskforce, historic photography and records indicate that there may have been as much as 200,000 acres of seagrass in 1930 in Long Island bays and harbors; only about 22,000 acres remain.<li data-bbox="142 1654 1182 1890">• A few decades ago, half the clams eaten in this country came from Great South Bay. However, in the past 25 years, the hard clam harvest in Great South Bay has fallen by more than 93% to record lows, resulting in a loss of more than 6,000 jobs.¹ In the 1970s, bay-scallop fishery on Eastern Long Island and hard-clam fishery in the South Shore bays were the two largest in the U.S. The bay-scallop collapse was almost entirely due to the nitrogen-caused algal blooms. While hard clams were over-harvested in the 1970s and 1980s, they have failed to recover largely due to recurrent brown tides.	<p data-bbox="1187 455 1515 520">350,000 septic and cesspools</p> <p data-bbox="1187 552 1515 812">30,250 homes with septic systems or cesspools are within the 0-25 year contributing area to surface water and have less than 10 feet separating their systems from the water table</p> <p data-bbox="1187 877 1515 1014">80% of all fertilizer purchased in Suffolk is for non-farm, residential uses</p> <p data-bbox="1187 1066 1515 1260">25,905 tons of fertilizer were purchased as non-farm uses in 2012, representing 16% of all fertilizer purchased statewide¹</p>

Executive Summary



Contaminant	Manmade Sources
<p>Volatile Organic Chemicals (PCE, TCE, TCA, and MBTE)</p> <ul style="list-style-type: none"> 20% of public water supply wells are treated to remove low-level VOCs prior to delivery to customers The gasoline additive MTBE, banned in 2004, is detected on a widespread basis but manifests itself in small concentrations of 2-3 parts per billion Concentrations of dry cleaning and metal finishing solvents doubled in a 20-year period, impacting four times the number of wells. 70% of community supply wells are rated as high or very high for VOC contamination, due to the widespread use of VOCs 	<p>Illegal discharges & spills, leaking underground storage tanks, septic systems, household cleaners, and banned chemicals traveling through the aquifer</p>
<p>Pesticides</p> <ul style="list-style-type: none"> Past agricultural practices have significantly impacted private wells on the East End, with 6.5% exceeding pesticide maximum contaminant levels Over 100 pesticide-related compounds in Suffolk’s groundwater have been detected 	<p>Agricultural sector and homeowners</p>
<p>Pharmaceuticals and Personal Care Products</p> <ul style="list-style-type: none"> Detection of pharmaceuticals and personal care products, like ibuprofen, phthalates, and caffeine, have been found in 0.5% of community public supply well samples, and 4% of (shallower) non-community public supply and private well samples. The presence of 1,4-dioxane, a chemical in detergents, in over 100 SC Water Authority wells and in a large percentage of its water distribution system is expensive to treat. 	<p>Industry and homeowners</p>