OPERATIONS

WATER SUPPLY GOALS

- **Supply high-quality drinking water.**
- **Protect New York City's watershed.**
- **Maintain robust, secure, and cost-effective water supply infrastructure and improve operational efficiency with new technology.**

Clean, abundant drinking water is essential. New York City's water supply and the infrastructure needed to carry it here has played a large part in the city's steady growth for more than 150 years. In 1840, two years prior to the activation of the Old Croton Aqueduct, the city had 313,000 residents. Three aqueducts and three city water tunnels later, our population is 8.4 million and growing.

With a capacity of 580 billion gallons in 19 upstate storage reservoirs and three controlled lakes, New York City's water supply is robust. The city's water travels from its home up to 125 miles away through 295 miles of aqueducts. These hallmarks of civil engineering use the driving force of gravity to deliver more than a billion gallons of water every day using little or no energy.

Thanks to a Filtration Avoidance Determination (FAD) issued by US Environmental Protection Agency (EPA), and a historic 1997 Memorandum of Agreement (MOA) between New York City, New York State, EPA, and other stakeholders, the city is not required to filter water from the Catskill and Delaware watersheds. Maintenance of the quality of this unfiltered water depends on continued protection of watershed lands by making sure that their use remains compatible with high water quality. DEP must vigilantly protect the Catskill and Delaware watersheds from activities—such as natural gas drilling—that threaten water quality. At the same time, we must work with upstate communities to promote economic development and recreational opportunities that are sustainable over the long term.

New York City's water is delivered from watersheds that extend more than 125 miles from the city and comprise 19 reservoirs and three controlled lakes. Our new water filtration and ultraviolet disinfection plants will ensure that NYC's supply of water meets stringent federal guidelines. Opposite: the Ashokan Reservoir.

STRATEGIES & INITIATIVES

Goal: Supply high-quality drinking water.

25 Maintain the city's Filtration Avoidance Determination (FAD).

We will protect our water supply by meeting all requirements of the FAD and Watershed Memorandum of Agreement (MOA), including the purchase of sensitive watershed lands, careful review of development activities, and the implementation of partnership programs that protect water quality in a way that facilitates environmentally sustainable economic development. Through these efforts, DEP will position itself to sustain our FAD through the 2012 review, renew it in 2017, and avoid filtration over the long term.

26 Purchase watershed lands that protect water quality.

Land acquisition is one of the most critical components of our source water protection program; without it, the city would almost certainly be required to filter water from the Catskill and Delaware watersheds. DEP has already purchased more than 115,000 acres of land in the watershed and will continue this successful program by contacting the owners of at least 50,000 acres of land every year in order to meet the requirements of our current filtration avoidance determination. The current land acquisition permit issued by the State Department of Environmental Conservation (DEC) is effective through 2025.

27 Complete and operate the Catskill/Delaware Ultraviolet (UV) Disinfection Facility to comply with the federal mandate for secondary disinfection of the Catskill and Delaware water supplies.

In 2012, DEP must complete and begin to operate the ultraviolet disinfection facility currently under construction at Eastview, just north of the city. The $1.6 billion plant is necessary to comply with a federal mandate that requires treatment of surface-level drinking water supplies with two forms of disinfection. Right now, DEP treats water from the Catskill and Delaware watersheds with chlorine. Once the new treatment plant is operational it will be the largest UV disinfection facility in the world.

28 Complete and operate the Croton Water Filtration Plant by 2013.

The Croton Watershed was first tapped to augment the city's water supply in 1840 when Westchester County was still a bucolic country neighbor. Today this watershed is highly developed, and although the water supply meets all health-based water quality standards, Croton water has seasonal variations in color, odor, and taste. Under the federal Safe Drinking Water Act, DEP is required to filter Croton water. The $3 billion Croton Water Filtration Plant is approximately two-thirds complete as of December 2010. Once operational, the Croton plant will enable DEP to supply 290 million gallons of water per day—approximately 30% of daily demand—from our oldest watershed.


Catskill/Delaware Watersheds
Croton Watershed
Schoharie Reservoir
Shandaken Tunnel
Pepacton Reservoir
Cannonsville Reservoir
Ashokan Reservoir
Esopus Creek
West Branch Delaware
East Branch Delaware
West Delaware Tunnel
East Delaware Tunnel
Neversink Reservoir
Rondout Reservoir
Neversink Tunnel
Delaware Aqueduct
Catskill Aqueduct
Hudson River
Delaware River
Neversink River
West Branch Reservoir
New Croton Reservoir
Kensico Reservoir
Croton Aqueduct
Jerome Park Reservoir
Hillview Reservoir
Boyds Corner Reservoir
Lake Gleneida
Middle Branch Reservoir
Lake Gilead
Bog Brook Reservoir
East Branch Reservoir
Kirk Lake
Croton Falls Reservoir
Diverting Reservoir
Amawalk Reservoir
Titicus Reservoir
Cross River Reservoir
Muscoot Reservoir
Delhi
Walton
Downsville
Deposit
Oneonta
Gilboa
Hunter
Phoenicia
Kingston
Poughkeepsie
Liberty
Ellenville
DELAWARE COUNTY
GREENE COUNTY
COLUMBIA COUNTY
DUTCHESS COUNTY
ULSTER COUNTY
SULLIVAN COUNTY
ORANGE COUNTY
PUTNAM COUNTY
ROCKLAND COUNTY
WESTCHESTER COUNTY
CHENANGO COUNTY
PENNSYLVANIA
NEW YORK
NEW JERSEY
CONNECTICUT
MASSACHUSETTS
125 Miles
100 Miles
75 Miles
50 Miles
25 Miles (from City Hall)
Bronx
Manhattan
Queens
Brooklyn
Staten Island
New York Bay
Long Island Sound
Atlantic Ocean
NASSAU COUNTY
White Plains
Environmental Protection
New York City's Water Supply System
Catskill / Delaware Watershed Area
Croton Watershed Area
Rivers and Reservoirs
Catskill Aqueduct and Tunnels
Croton Aqueduct
Delaware Aqueduct and Tunnels
County Borders
State Borders
www.nyc.gov/dep
NYCDEP/BCIA/AJ 2/10

Goal: Protect New York City's watershed.

29 Protect the water supply from hydrofracking for natural gas in the New York City watershed.

The need for clean domestic energy has accelerated interest in natural gas drilling in the Marcellus Shale in southeastern New York State, including New York City's watershed. DEP commissioned an independent scientific assessment that concluded that hydrofracking requires a level of industrialization that would threaten drinking water quality for nine million New Yorkers, and based on current science and technology cannot safely be conducted in the city's watershed. DEC took a step towards the same conclusion when it excluded unfiltered water supplies from the permitting program currently under consideration for New York State. We will continue to press DEC to prohibit hydrofracking in the watershed, a necessary step to maintain and protect the city's water quality over the long term.

30 Support economic development compatible with watershed protection.

At the core of the city's source water protection program is the belief that economic development can and must be compatible with water quality. Through our partnership with the Catskill Watershed Corporation (CWC), the City loaned $48 million to 203 watershed businesses over the last 12 years to support tourism, hospitality, manufacturing, and other industries. We have funded the extension of sewers, rehabilitated more than 3,500 septic systems, restored streams, and supported many other activities through CWC. Our partnership with the Watershed Agricultural Council (WAC) promotes farming and protects water quality, but we can do more. DEP will continue to support environmentally sustainable economic development in the watershed, including a re-examination of partnership opportunities for renewable energy production, the feasibility of bringing broadband coverage to rural areas, and ensuring that the Catskill Fund for the Future (CFF) continues to make loans to businesses in the watershed.

WATERSHED AGRICULTURAL COUNCIL

Since 1992, the Watershed Agricultural Council (WAC) has worked with nearly 1,000 farm and forest landowners in eight watershed counties to protect farmland and clean drinking water through land conservation approaches that support working landscapes. WAC has helped more than 400 farms to install stream buffers, cover manure, relocate feed lots, and construct stream crossings for livestock to keep bacteria and chemicals out of the city's reservoirs. The Council also works with forest landowners and professionals to manage woodlands, as trees provide the best natural water filtration and storage mechanisms. Thanks to strong outreach efforts, WAC now holds conservation easements on more than 20,700 acres of farm and forest land; these easements exist in perpetuity and protect watershed land from development while allowing farming to continue on the property. The Council also spearheads two "buy local" programs under the Pure Catskills branding campaigns for regional food and wood products. We will work with WAC to expand the conservation easement program and with in-city partners, such as GrowNYC, to promote regional agriculture from family farms and make the freshest, most nutritious food available to the city's residents.

Water Man at the Delaware County Fair represents the water that New Yorkers use every day. *Photo: WAC*

CATSKILL FUND FOR THE FUTURE

The Catskill Fund for the Future (CFF) supports tourism, hospitality, manufacturing, and other industries in the New York City watershed through small loans. Bread Alone started as a small bakery in Boiceville. In 2002, the CFF loaned Bread Alone $400,000 to support the growth of this environmentally friendly business. Today, it operates in two watershed locations, supplies 13 farmers markets, and has a wholesale business.

Once it is completed in 2012, the Catskill/Delaware Ultraviolet Disinfection Facility will keep NYC Water clean and healthy before it enters the city's distribution system. Portable Water-On-the-Go fountains increase accessibility to and awareness of New York City's healthy, delicious, and affordable drinking water.

31 Expand recreational opportunities in the city's watershed.

Over the last two years, thousands of local residents and visitors have enjoyed expanded recreational opportunities throughout the watershed. More than 117,000 people hold access permits to watershed lands, more than 11,300 people have boat tags for the city's reservoirs, and the watershed is a growing tourist destination. We will continue to expand the acreage of watershed lands open to the public for hunting, hiking, and fishing, and we will seek to expand recreational boating to include the Neversink and Pepacton reservoirs.

DEP opens as much watershed land as possible for recreational purposes.

Goal: Maintain robust, secure, and cost-effective water supply infrastructure and improve operational efficiency with new technology.

32 Develop and implement a plan to repair the Delaware Aqueduct.

The greatest water supply challenge DEP currently faces is the leak in the 45-mile Rondout-West Branch Tunnel of the Delaware Aqueduct that links New York City to half of its water supply. DEP has developed a comprehensive plan to build a three-mile bypass of the leaking section of the tunnel near Roseton, and repair parts of the concrete liner in other parts near Wawarsing. DEP has engaged in extensive preparations in anticipation of this project, including a geological survey of the area, a study of over 100,000 photographs of the interior of the tunnel, and the formation of a Public Advisory Committee to keep the community informed about our progress. We will break ground on the bypass before the end of 2013, and expect the project to be complete in 2019.

33 Pressurize the Catskill Aqueduct.

Once the Catskill/Delaware UV Disinfection Facility is operating, the Catskill Aqueduct will not be able to sustain the water pressures needed to convey water between Kensico Reservoir and the Catskill/Delaware UV facility, because the new facility will require us to reroute incoming water in a way that eliminates 40 feet of gravitational pressure. Pressurizing the Catskill Aqueduct will increase the volume of water available to the city and will re-establish DEP's ability to bypass Kensico Reservoir when necessary to access the highest quality water.

34 Connect the Delaware and Catskill aqueducts.

The Delaware and Catskill aqueducts cross within yards of each other in Ulster County. DEP is designing a connection between the two aqueducts that will allow water from the Delaware system to cross the Hudson River through the Catskill Aqueduct. Due to steep slopes and fine soils left from glacial lakes, runoff from the Catskill watershed can sometimes cause the waters in Ashokan Reservoir to become turbid, or less clear, from an increase in the amount of matter suspended in the water. The connection will move cleaner Delaware water into the Catskill Aqueduct, thereby increasing our conveyance capacity by up to 300 million gallons per day from four key reservoirs. We expect to start construction on the Catskill/Delaware connection in 2012.

35 Develop cost-effective groundwater and other supplemental water supply alternatives.

In connection with the repair of the Rondout-West Branch Tunnel, DEP must develop reliable alternative sources of supply for the period when the tunnel will be offline to make the bypass connection. One promising source of supply is the groundwater that used to supply the Jamaica Water Supply System in southeast Queens. DEP is investigating a number of other alternatives and will develop and implement a plan to ensure that the city has adequate supply during and after the repair of the Rondout-West Branch Tunnel.

36 Operate and maintain DEP's network of dams.

The city owns 32 "high hazard" dams based on the likelihood of serious economic damage, environmental harm, and loss of human life if they were to fail, including 29 upstate as well as the earthen dams that hold the Jerome Park Reservoir, Central Park Reservoir, and Silver Lake in the city. In addition, we have purchased 69 small dams through the Land Acquisition Program since 1997. Twelve dams have been upgraded over the last 25 years, and we will rehabilitate the Gilboa Dam over the next five years. In addition, we will continue to carry out programmatic dam maintenance and inspections and will complete engineering assessments required to meet the state's 2009 Dam Safety Regulations.

DEP's upstate operations carefully monitor reservoir conditions and weather forecasts to ensure an ample and flexible supply of clean water, while DEP Environmental Police Officers protect vital water infrastructure, including our 23 upstate dams.

37 Optimize water delivery by integrating next-generation forecasting models into daily operations.

DEP is developing next-generation forecasting technology to ensure optimal use of the entire reservoir system for New Yorkers and, to the maximum extent possible, for downstream stakeholders and habitats. The Operations Support Tool (OST) will enable DEP to more precisely anticipate storms, forecast weather events and hydrologic conditions and their impacts on water quantity and water quality, and supply the highest quality water to the city. OST will also allow us to increase the volumes we can safely release to our partners or the Delaware River Basin Commission without any additional risk to our ability to supply high-quality water to our nine million customers.

38 Continue to protect the NYC watershed and water infrastructure.

To ensure that New York City's watershed and related infrastructure is protected from terrorism, crime, and pollution, DEP Police will increase security patrols, develop new access controls at key facilities, and use video surveillance and other technology to maximize its effectiveness. In addition, we will continue to participate in programs, including the Contaminant Warning System Demonstration Pilot, that test new security techniques and systems that could better protect the water system. The Contaminant Warning System is piloting new sensors and procedures to detect potentially contaminated water in the distribution system as early as possible so that it can be isolated and kept out of in-city distribution.

WATER DISTRIBUTION GOALS

- **Complete key infrastructure projects to improve delivery of water to New Yorkers.**
- **Build out sewer and stormwater infrastructure to improve water quality in New York Harbor, reduce flooding, and support economic growth.**
- **Increase the efficiency of field crews to optimize the maintenance and performance of the water and sewer networks.**
- **Protect public health and water and sewer infrastructure by promoting and enforcing the installation of backflow preventers, grease traps, and other critical equipment.**

Deep below the five boroughs, City Water Tunnels Nos. 1, 2, and portions of City Water Tunnel No. 3 distribute one billion gallons of water through 6,600 miles of water mains. Thousands of regulators, pumps, and valves calibrate the pressure to keep this system safe. About 7,400 miles of sewers carry 1.3 billion gallons of wastewater and stormwater from homes and businesses to a 148-mile network of interceptor sewers that are the primary veins that feed the city's 14 wastewater treatment plants; green components such as the Staten Island Bluebelt absorb additional stormwater runoff that never enters the sewer system. Maintaining these massive networks is a 24/7 responsibility: DEP field crews respond to thousands of calls—from three-alarm fires to clogged catch basins—every year. This complex undertaking protects the water quality of New York Harbor and its tributaries.

Investment in the maintenance and construction of water mains—and the fire safety, basic sanitation, and clean drinking water they provide—is critical to the city's residential, commercial, and industrial growth. Since 2002, Mayor Bloomberg and the City Council have rezoned nearly one fifth of the city in over 100 areas to set the stage for new development in formerly industrial waterfront areas such as Williamsburg, western Queens, and Hunts Point. Partnering with the City's Department of Design & Construction (DDC), DEP replaces an average of 80 miles of water mains and sewers annually and continues to build out sanitary and stormwater sewers in neighborhoods where residential and commercial development have outstripped the capacity of existing infrastructure, or where new land uses have required upgrades to existing capacity. DEP plans the construction of these networks to be as cost-effective and sustainable as possible.

Public health depends on our maintenance of the system and on the reliability of the connections to private homes and businesses. We strive to provide customers with clear direction and fast, efficient service while ensuring that private developers and homeowners meet design, construction, and public health and safety standards.

STRATEGIES & INITIATIVES

Goal: Complete key infrastructure projects to improve delivery of water to New Yorkers.

39 Activate Stage 2 of City Water Tunnel No. 3.

City Water Tunnel No. 3 is one of the longest running civil works projects in the city's history. When complete, it will improve the reliability of the city's water supply and enable DEP to inspect City Water Tunnel No. 1 for the first time since it came on-line in 1917. Before we can activate the Manhattan portion of the tunnel by the end of 2013, we must integrate the tunnel into the city's existing distribution network. New York State recently granted the City permission to allow cooperative bids from private construction firms to expedite the network connections needed to activate Stage 2 of City Water Tunnel No. 3 as soon as possible.

Mayor Bloomberg has made finishing City Water Tunnel No. 3 a top priority, investing more funds for the tunnel than the previous five administrations combined.

40 Build the Staten Island Siphon.

The Richmond Tunnel, completed in 1972, is Staten Island's primary connection to the water supply system. Two older mains provide backup supply in the event that the Richmond Tunnel has to be taken offline. To spur economic development in the region, the Port Authority of New York and New Jersey is deepening the harbor channel for container ships to dock in New York Harbor. Dredging for this project requires DEP to replace Staten Island's back-up water supply lines. In partnership with the Port Authority, the Army Corps of Engineers, and New York City Economic Development Corporation, DEP will construct a new 72-inch water tunnel that can deliver more than 150 million gallons to the island per day. DEP will break ground on the siphon by 2011 and expects to complete construction by 2014.

41 Build out and replace critical water supply infrastructure to support residential, commercial, and industrial growth throughout the city.

To ensure the vibrancy of the Manhattan central business district, support the growth of Coney Island's amusement district, and make the thousands of housing units and offices at Atlantic Yards possible, DEP will construct trunk water mains up to 72 inches in size to accommodate increased water use in these areas. We will also replace distribution mains in Jamaica Estates and Pelham Parkway, and complete the trunk main network in the Rockaways.

Goal: Build out sewer and stormwater infrastructure to improve water quality in New York Harbor, reduce flooding, and support economic growth.

42 Build out and upgrade the sewer network in southeast Queens, Staten Island, and other neighborhoods that need additional capacity.

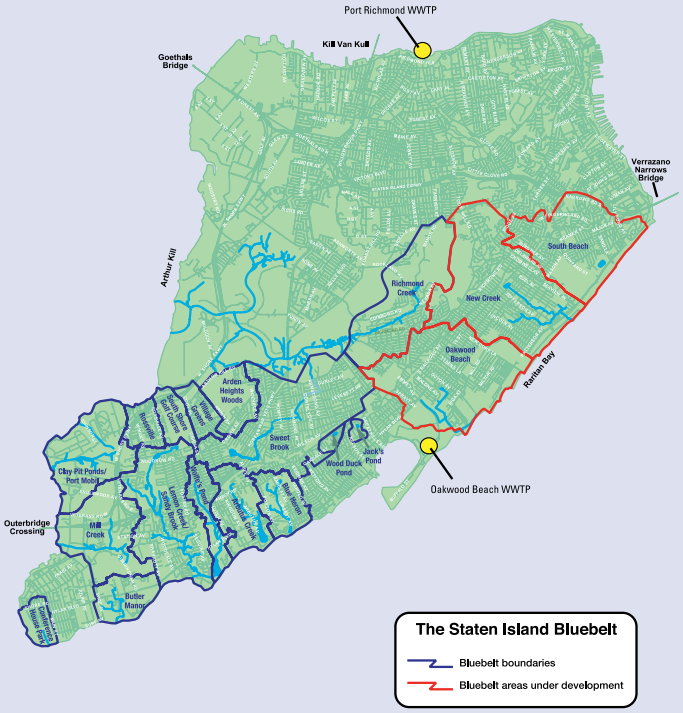
A robust sewer expansion and replacement program is essential to protecting public health and improving the ecology of New York Harbor. DEP will prioritize the extension of sanitary and storm sewers to neighborhoods throughout the five boroughs that need additional capacity to support current residents and future growth. Over the next four years, DEP will start or finish key projects on the South Shore and Mid-Island of Staten Island and in the Springfield Gardens, Laurelton, and Maspeth-Middle Village sections of Queens.

43 Complete a comprehensive drainage investment strategy for the city.

By 2013 DEP will develop a comprehensive drainage investment strategy that will highlight the integration of the NYC Green Infrastructure Plan with traditional methods of stormwater management to support Mayor Bloomberg's sustainability and development goals over the long term. This plan will build on existing drainage plans and will expand the Bluebelt in the Mid-Island section of Staten Island, integrate high-level storm sewers into Laurelton and Park Slope, and meet the needs of the major rezoning of Jamaica that allows for the construction of hotels and office towers. A comprehensive drainage strategy will ensure that DEP meets all responsibilities outlined in the City Charter to eliminate flooding so that these communities can develop and thrive.

STATEN ISLAND BLUEBELT

Many communities in Staten Island benefit from the Bluebelt, DEP's innovative stormwater management system. Comprised of streams, ponds, and other wetland areas, the Bluebelt preserves the ability of wetland systems to convey, store, and filter stormwater before it reaches the sewers, thus saving tens of millions of dollars in infrastructure costs over conventional storm sewers while providing comparable results. The Bluebelt also provides open space and important wildlife habitats and demonstrates that wetland preservation can be economically prudent and environmentally responsible. DEP will continue to build out the Staten Island Bluebelt and will create new Bluebelts in other areas of the city, including Twin Ponds and Springfield Lake in Queens. For areas in which leveraging green technology is not a viable solution to managing stormwater, DEP will invest in targeted improvements to the sewer system, such as high-level storm sewers to reduce the impacts of CSOs.



DEP operates an extensive 7,400-mile sewer system in all five boroughs that transports wastewater from homes and businesses to 14 wastewater treatment plants.

ROCKAWAY PENINSULA

On the Rockaway peninsula, DEP has spent $54.75 million since 2002 to build separate storm sewers; this improvement has eliminated combined sewer overflows and reduced sewer backup and flooding complaints in the drainage area—a substantial accomplishment that improves water quality for the 140,000 residents living in Rockaway and the thousands of annual visitors to the area's beaches.

Goal: Increase the efficiency of field crews to optimize the maintenance and performance of the water and sewer networks.

44 Decrease water main breaks and sewer backups and improve response time.

Water and sewer main breaks disrupt residential life, suspend business, hamper transportation networks, damage property, and endanger public health and safety. DEP has 24/7 response teams and a leak detection unit that use cutting edge technology to locate and repair leaking valves and pipes. Water and sewer main breaks declined in 2010, but we can do better. With enhanced pressure-boundary management, more preventive maintenance, and expanded sewer cleaning, we will reduce the number of water main breaks, respond to water and sewer emergencies within one hour, and reduce our targeted resolution time for sewer backups by at least 10%.

45 Expand catch basin cleanings and rehabilitation to prevent flooding and protect water quality.

During heavy rain, street litter can wash into our sewers and end up in the harbor and on the city's beaches. The city's 144,000 catch basins keep garbage and debris out of the sewer system and the water bodies we protect. DEP will inspect all catch basins by 2014 and institute a three-year year inspection cycle. More than 2,350 catch basins are also in need of repair. DEP will establish a system to prioritize repairs by risk, set targets for catch basin repair time, and seek to substantially eliminate the repair backlog by 2014.

Vactor trucks proactively clean out the city's largest sewers, called interceptors, with a powerful vacuum system that removes debris and increases the sewer system's ability to convey wastewater flow to DEP's 14 wastewater treatment plants.

46 Expand the preventive maintenance program for critical water infrastructure.

The shafts, valves, and pressure regulators that deliver high-quality water at a safe pressure to 8.4 million residents of New York City every day are the workhorses of our water system. While maintaining adequate pressure is critical for firefighting and residential use, excessive pressure increases the likelihood of water main breaks, costly emergency repairs, leaks, and disruptions to residents and businesses. To better maintain our system and ensure reliable distribution, DEP will expand its preventive maintenance program to target pressure reducing valves, exercise more than 200 tunnel valves annually to keep them in good working order, and conduct 200 monthly inspections of our 500 pressure regulators.

47 Improve hydrant repair response time.

The first fire hydrant was installed in 1808 at the corner of Williams and Liberty streets. The Great Fire of 1835 and the loss of nearly 700 buildings in Lower Manhattan prompted both the creation of the Fire Department and the construction of the Old Croton Aqueduct. Today, more than 109,000 fire hydrants deliver more than 750 gallons of water per minute and are key to public safety. DEP repairs approximately 20,000 fire hydrants annually. Because of the critical nature of fire protection, DEP is committed to repairing high-priority fire hydrants—those near schools and hospitals—within 10 days.

48 Increase field crew productivity to improve system performance.

DEP will undertake a number of initiatives to increase field crew productivity and the overall performance of the water and sewer networks:

- **Pilot GPS technology:** GPS technology will improve the efficiency of DEP's fleet of over 2,000 vehicles by reducing fuel and maintenance costs. It will also allow managers to more effectively deploy field personnel.
- **Enhanced GIS mapping:** DEP invested in GIS mapping of the distribution and collection system to consolidate decades of paper maps into a modeling tool that can predict system performance under many different conditions. This tool will enable us to identify problems faster, and will improve the overall management of agency assets.
- **Onboard computers:** Time is of the essence at water main breaks and other emergencies. DEP is outfitting its field crews with onboard computers so that they can access mapping and construction documents in the field that will allow them to reduce repair time and more quickly restore service to customers.

DEP works with FDNY to make sure that sprinkler caps are available at all firehouses during the summer so that communities can open hydrants safely for relief from the heat.

Goal: Protect public health and water and sewer infrastructure by promoting and enforcing the installation of backflow preventers, grease traps, and other critical equipment.

49 Increase backflow prevention inspections.

DEP requires large buildings and certain businesses in New York City to install and maintain backflow preventers to prevent contaminated water from entering the city's distribution system. For example, car washes with strong pumping capacities could inadvertently pump contaminated water into distribution if they did not have backflow preventers. In 2010, DEP notified more than 16,000 property owners of the need to install a backflow preventer. Over the next four years, we plan to inspect more than 20,000 buildings based on the potential risk that the building or business poses to the water supply.

50 Update grease trap regulations, increase inspections, and educate the business and development communities about compliance.

Restaurants, nursing homes, and other businesses with commercial kitchens must install grease traps to prevent fats, oils, and greases from entering the sewer system where they clog service lines and backup sewers. Currently, both the Department of Buildings (DOB) and DEP are responsible for regulating grease interceptors; this can cause confusion for business owners since DOB and DEP have not standardized the regulations. DEP will work with DOB to standardize and streamline the regulations and DEP's grease team will inspect at least 8% of food service facilities within two years to determine if they are being implemented properly. DEP will also continue to develop print and online educational materials and will conduct outreach to stakeholders to help the public understand proper disposal methods for grease and the importance of backflow preventers.

51 Promote and incentivize yellow grease recycling for use as biodiesel fuel.

Mayor Bloomberg recently signed legislation requiring all heating oil to contain at least 2% biodiesel by October 1, 2012. Yellow kitchen grease from fryers and other cooking equipment can be recycled for use in biodiesel, which will decrease the amount of grease that could otherwise end up in the sewer system. DEP will work with the Business Integrity Commission (BIC) and the NYC Department of Health and Mental Hygiene to encourage the collection of yellow grease by licensed haulers through new incentives, write educational materials for business owners, and create enforcement mechanisms to increase yellow grease recycling.

WASTEWATER TREATMENT GOALS

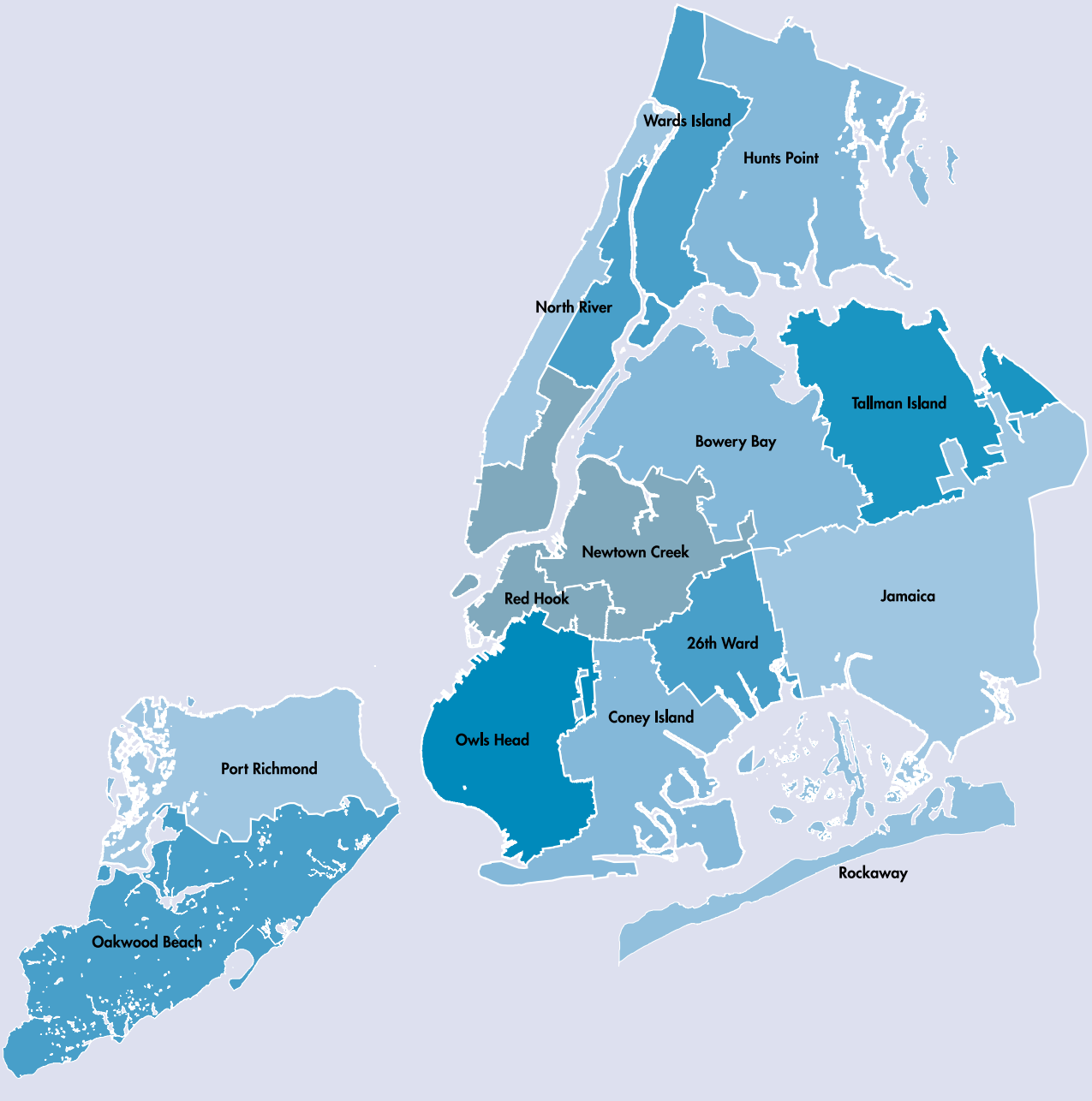
- **Certify citywide compliance with Clean Water Act standards for secondary wastewater treatment.**
- **Continue to improve water quality in New York Harbor to facilitate new development and increased waterfront access for all New Yorkers.**
- **Optimize the efficiency and reliability of wastewater treatment operations.**
- **Evaluate the economic, ecological, and social effects of DEP's capital investments and wastewater treatment operations.**

Improving water quality in New York City's harbor is essential to continuing Mayor Bloomberg's historic transformation of the city's waterfront from a relic to a vibrant area with residential, commercial, and modern industrial uses. DEP is investing billions of dollars to implement cutting-edge technologies and restore natural treatments—like oysters, wetlands, and eelgrass—to meet state and federal water quality standards and continue to restore the harbor's ecological health. Our investments are paying off: water quality in New York Harbor is better now than at any time in the last 100 years, but we have more work to do.

To improve harbor water quality we must improve the way we treat the 1.3 billion gallons of wastewater New Yorkers generate every day. We can achieve this by increasing the capacity of our wastewater treatment plants and controlling the sources of wastewater before it reaches the sewer system. Because treating 1.3 billion gallons of wastewater a day is so resource intensive—requiring energy, chemicals and hundreds of highly-skilled workers—more treatment is not good enough. We have to be smarter too. That means making our treatment plants more efficient and partnering with the private sector to help us convert the natural byproducts of the sewage treatment process, such as methane gas, from waste to energy. Working smarter also means tapping into the talent and skills of our workforce—the sewage treatment workers, electricians, oilers, and superintendents—who know the plants best and can help DEP identify cost-effective ways to improve operations. Finally, DEP needs to continue to work closely with community partners in the neighborhoods where our wastewater facilities are located.

New York Harbor is at its cleanest in a century thanks to extensive upgrades at our wastewater treatment plants. The Newtown Creek Wastewater Treatment Plant is undergoing a $5 billion upgrade, including improved treatment systems and a new microbiology lab that conducts rigorous tests to make sure New York Harbor remains clean and accessible.

New York City's Wastewater Drainage Areas



As of December 2010

New York City's wastewater drains to 14 treatment plants in all five boroughs, mainly through the force of gravity.

STRATEGIES & INITIATIVES

Goal: Certify citywide compliance with Clean Water Act standards for secondary wastewater treatment.

52 Certify that the Newtown Creek Wastewater Treatment Plant meets secondary treatment standards by June 2011.

In June 2010 DEP began meeting monthly Clean Water Act secondary treatment standards harborwide that dictate that we must remove 85% of pollutants from wastewater. In 2011 DEP will certify that the Newtown Creek Wastewater Treatment Plant meets the effluent discharge requirements of the Clean Water Act; this will mean that all 14 of the city's wastewater treatment plants will be meeting monthly secondary treatment standards for the first time since the standards were established in 1972.

53 Complete $2.6 billion in upgrades underway at six wastewater treatment plants.

DEP has been aggressively modernizing its wastewater treatment plants to ensure high levels of treatment well into the future. The pumps and tanks at these plants take a beating from the rags, debris, and grit that flow in with sewage and must be constantly rehabilitated. In addition to Newtown Creek, several other city treatment plants are currently undergoing major capital upgrades that will total $2.6 billion by 2014. The upgrade at the Hunts Point Wastewater Treatment Plant in the Bronx, which includes new systems to remove nitrogen from wastewater, will exceed $500 million when completed in 2013.

Goal: Continue to improve water quality in New York Harbor to facilitate new development and increased waterfront access for all New Yorkers.

54 Implement the NYC Green Infrastructure Plan.

In September 2010, Mayor Bloomberg launched the NYC Green Infrastructure Plan, a comprehensive, 20-year effort to reduce combined sewer overflows and meet water quality standards through a combination of green installations and cost-effective grey infrastructure. This includes leveraging cost-effective grey infrastructure and maximizing existing capacity. DEP will increase wastewater storage capacity by regularly cleaning the dirt and debris that clogs the large interceptor sewers that feed wastewater treatment plants and will pilot an increase in the cycle time of bar screens that protect motors and pumps from large debris. We will also install new devices—including gates, inflatable dams, bending weirs, and mechanical throttling gates—to store wastewater until peak flow subsides. We will keep seawater out of the interceptor sewers by inspecting and repairing 25 tide gates per month until all 500 gates are in a state of good repair.

55 Activate the SHARON and ARP treatment technologies to remove oxygen-depleting nitrogen from wastewater.

In February 2010 DEP committed $115 million in an agreement with the State Department of Environmental Conservation, the National Resources Defense Council, and other environmental stakeholders to protect, preserve, and restore marshlands by reducing nitrogen discharges that accelerate algae growth and degrade the harbor's natural ecosystem. This commitment is part of more than $1 billion in investments in advanced treatment systems at eight treatment plants to remove oxygen-depleting nitrogen from wastewater. As part of this effort we will install cutting-edge

technologies at two plants: SHARON (single reactor system for high activity ammonium removal over nitrite) and ARP (ammonia removal process). Both nutrient removal systems use patented processes with smaller footprints, lower energy consumption, and fewer chemicals than conventional biological nitrogen removal processes. We project that these investments will reduce nitrogen amounts by at least 50% by 2020.

JAMAICA BAY AGREEMENT AND EDUCATION RESOURCE DIRECTORY

Jamaica Bay is a 31-square-mile waterbody with a broader watershed of approximately 142 square miles, including portions of Brooklyn, Queens, and Nassau County. It supports multiple habitats—including open water, salt marshes, grasslands, coastal woodlands, maritime shrublands, and brackish and freshwater wetlands—as well as 91 species of fish and 325 species of birds. The February 2010 Jamaica Bay agreement with DEC and NRDC to improve the overall water quality included $100 million in nitrogen control upgrades at the 26th Ward, Coney Island, and Rockaway wastewater treatment plants and $15 million to restore marshlands, with the possibility of an additional $30 million in federal matching funds. DEP also recently published the Jamaica Bay Education Resource Directory as part of the 2005 Jamaica Bay Protection Plan.

Goal: Optimize the efficiency and reliability of wastewater treatment operations.

56 Pilot contracting competition between city workers and private contractors.

DEP currently uses a combination of in-house labor and private contractors to perform equipment maintenance at treatment plants and pumping stations. Private contractors and DEP employees are each assigned to specific tasks that do not overlap. To provide opportunities to our skilled workforce and achieve savings, DEP will pilot a program to offer municipal labor unions the opportunity to bid on maintenance contracts. If DEP employees provide the lowest responsible bid, they will win the job. This allows employees to earn extra pay and allows us to complete the work at a lower cost.

57 Improve inventory management and planning.

DEP is rolling out the Computerized Maintenance Management System (CMMS) at our 14 wastewater treatment plants to keep a real-time inventory of materials. The system includes wireless barcode scanners to track parts so that plant operators can locate common, shareable parts at any DEP location instead of ordering new stock. CMMS will also develop predictive maintenance schedules and estimate the full cost of repairs. These improvements will reduce operating costs and increase the efficiency of wastewater operation. Cooperation and planning will help DEP budget for wastewater treatment in the long run.

58 Use new technology to constantly monitor pump stations and other infrastructure and maximize the storage capacity of the sewer system.

DEP is installing telemetry systems at its remote facilities that provide instant performance information to a single system operator. These systems, coupled with the expanded use of computerized supervisory control systems, have already eliminated the frequency of in-person inspections of many of our pump stations and regulators. As the system becomes operational, it will enable DEP to manage wet weather storage in the sewers and interceptors, which will reduce CSOs and improve harbor water quality.

Goal: Evaluate the economic, ecological, and social effects of DEP's capital investments and wastewater treatment operations.

59 Develop and implement a long-term, sustainable citywide sludge management program.

The volume of sludge that our wastewater treatment plants produce is increasing as we improve our system to remove nutrients like nitrogen and treat additional wet weather flows. Managing sludge, including conveyance by vessel or pipeline, dewatering, and off-site removal, is one of DEP's most expensive operations. We will develop a long-term sludge management plan through a transparent public process that will consider upgrades to the dewatering process and that pursues a cost-effective sustainable reuse for the 1,200 tons of sludge per day we currently produce.

DEP's fleet of three sludge boats convey sludge from the eight wastewater treatment plants without dewatering facilities to the six plants with this capability. Sludge boats have been a part of the city's sludge transportation and disposal system since the late 1930s and each vessel makes 14 round trips a week.

60 Expand and strengthen DEP community partnerships throughout the five boroughs.

Wastewater treatment facilities are a necessary burden. In New York City's space-constrained, densely-packed neighborhoods, communication and partnerships with local community groups are critical to maintaining and upgrading the infrastructure the city needs to continue to thrive. DEP will continue its partnerships with the Croton Facility, Newtown Creek, Hunts Point, and Brookfield monitoring committees, as well as the Jamaica Bay Advisory Committee, the North Community Environmental Review Board, and other groups who help us to ensure that DEP is a good neighbor throughout the city.

NEWTOWN CREEK MONITORING COMMITTEE

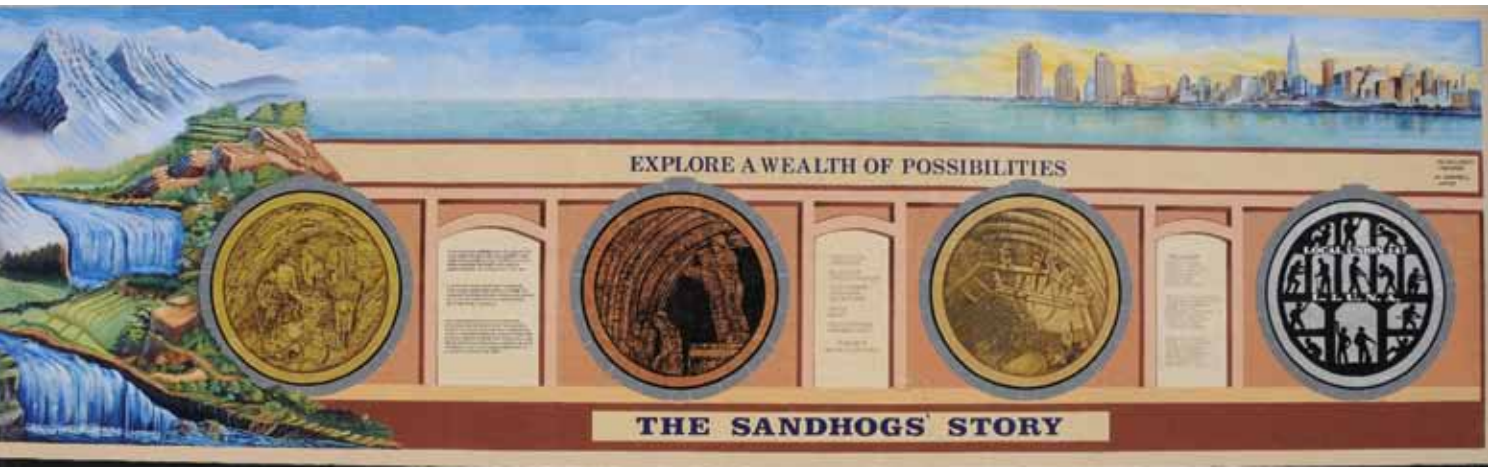
Since 1996, the Newtown Creek Monitoring Committee (NCMC) has worked with DEP to identify and design community amenities such as the Nature Walk at the wastewater treatment plant and provide recommendations to mitigate potential impacts to the Greenpoint community associated with the plant upgrades. A committee of volunteers and one of the longest standing citizen oversight committees in New York City, NCMC is an excellent example of a strong partnership between government and community that has exceeded expectations. We look forward to our continued work with NCMC and community partners throughout the city.

CAPITAL GOALS

- **Implement strong capital project controls to deliver projects on time and on budget.**
- **Achieve $100 million in savings through value engineering and by deferring projects.**
- **Strengthen technical expertise in design and construction management.**
- **Become the owner of choice in the regional and national design and construction community.**

DEP has the largest capital program of any city agency and one of the largest of any public utility in the country. We have more than $13 billion in projects in some phase of design and construction, and approximately $14 billion of work in our 10-year capital plan. Many of the projects we are building have been described in the preceding sections, including the $3 billion Croton Water Filtration Plant, the $5 billion City Water Tunnel No. 3, and the $5 billion upgrade of the Newtown Creek Wastewater Treatment Plant. The unprecedented level of investment we are making in the water system now is preparing it to serve the nine million New Yorkers who rely on DEP today and the generations that will follow.

But financing these megaprojects—many of which are required by unfunded federal and state mandates—has necessitated four consecutive years of double-digit water rate increases and the ability of our 835,000 bill-paying customers to absorb these increases is strained. Moving forward, we must reduce the cost of our capital program by making tough decisions about what we build and how and when we build it. That means justifying each project on its merits, and engaging with federal and state authorities about the necessity and timing of satisfying unfunded mandates in the future. Where less expensive alternatives like the NYC Green Infrastructure Plan are viable, we must build consensus and pursue them vigorously.



DEP builds and manages multi-billion dollar construction projects to support its mission of supplying, distributing, and treating water for nine million New Yorkers. The Sandhogs, or Local 147 of the Laborer's International Union of North America, build the majority of New York City's tunnels, including City Water Tunnel No. 3.

STRATEGIES & INITIATIVES

Goal: Implement strong capital project controls to deliver projects on time and on budget.

61 Implement new project controls business processes.

DEP is implementing new business processes to achieve consistency in the way we manage the scope, schedule, and budget of every capital project. A new, flatter organizational structure will help us better use our limited resources, drive decision making down within the organization, and create single-point accountability for all projects.

62 Create a Project Controls Division.

In fall 2010 DEP formed a new Project Controls Division comprised of experts in the field of construction-cost estimating and schedule management to help project managers deliver jobs on time and on budget. The Project Controls Division oversees the development of a sound cost estimate and delivery schedule for each capital project. Project managers, design consultants, and contractors will be held accountable for missed milestones and cost overruns.

63 Create a new capital Project Management Information System.

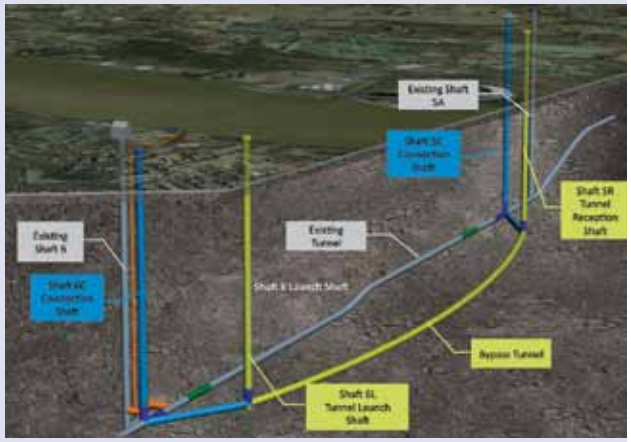
DEP will develop and implement a new Project Management Information System (PMIS) to provide complete transparency into the project scope, budget, and schedule of every project, and to automate the project management workflow of every project in DEP's capital program.

64 Provide public transparency into DEP capital projects.

We will provide public, web-based access to basic information about all DEP capital projects through nyc.gov. The website will allow the public to identify projects either planned or under construction in their neighborhood, including project descriptions, the latest design and construction updates, and whether the project is on schedule and on budget.

RONDOUT-WEST BRANCH TUNNEL REPAIR PROJECT

In 1990 DEP identified leaks in the Delaware Aqueduct, one of New York City's primary drinking water supply tunnels. Based on a 10-year investigation and more than $200 million of preparatory construction work, DEP is currently designing a bypass for a section of the Delaware Aqueduct in Roseton and internal repairs for a tunnel section in Wawarsing. Since we must shut down the Aqueduct when we are ready to connect the bypass tunnel, DEP is working on projects that will supplement the city's drinking supply during the shutdown. We expect to break ground on the bypass in 2013 and complete the work in 2019.



Goal: Achieve $100 million in savings through value engineering and by deferring projects.

65 Implement an Asset Management Program to make the right capital investments at the right time.

The high cost of maintaining aging water and sewer infrastructure is not unique to New York City. Municipalities and public utilities across the country are grappling with massive infrastructure needs at a time of nearly unprecedented fiscal constraints, stringent federal and state regulatory mandates imposed without financial support, and intense competing demands for government services. Many DEP facilities are more than 30 years old, and some assets were built more than a century ago. The failure of a critical piece of equipment—such as a sewage force main or a water supply shaft—could have major impacts on water quality in New York Harbor or DEP's ability to maintain water pressure for critical facilities.

Making the right decisions about capital investments at the right time can save the city and our nine million customers—particularly the 835,000 who pay the water bills—millions of dollars every year. DEP will implement an Asset Management Program to support decision making about asset renewal and investment. The program will be supported with powerful analytic tools to help us efficiently manage thousands of capital assets, including centralized tracking of asset age, condition, performance, maintenance records, replacement costs, and consequences of failure.

66 Develop a 10-year capital plan that prioritizes funding for critical assets and minimizes the need for future water rate increases.

In January 2011 DEP proposed its 10-year capital investment plan for 2012 through 2021. Since 2003, DEP has committed $18.8 billion in capital work, including $13.4 billion (69%) for projects mandated but not funded by the New York State and Federal governments. As a result, debt service during this period has increased nearly 1.5 times, from $496.7 million to $1,231.2 million, and water rates have increased 104.5%, from $399 for the average single-family home in 2003, to an estimated $816 in fiscal year 2011. The key challenges for the next 10-year plan are to meet DEP's critical capital needs and strategic objectives, while minimizing the need for future water rate increases. The 10-year plan is an opportunity to look beyond the immediate horizon to improve the stewardship of our capital asset base and fund innovative projects to harness clean energy and develop green infrastructure. The asset management program will help us to identify the most cost-effective ways to maintain our infrastructure and select projects that have multiple benefits, such as lower operating costs and cleaner emissions.



DEP conducts outreach events to attract the best and brightest companies, including minority- and women-owned business enterprises, to work on our construction projects. DEP has one of the largest construction programs in the region, including $11 billion currently in construction and $3 billion in design and planning. DEP's capital work will generate approximately 5,000 jobs for each of the next four years.

Goal: Strengthen technical expertise in design and construction management.

67 Enhance expertise through balanced dependence on consultant support.

New York City has a rich history of designing and building its own water infrastructure, including City Water Tunnel No. 1 at the turn of last century and the Olivebridge Dam in 1915. Over the past few decades, DEP's reliance on outside consultants to design and build the majority of our capital projects has depleted internal expertise in management and design necessary to manage the multi-million dollar projects in our capital portfolio. Over the next four years, we will strengthen in-house design and construction management of our capital program by standardizing project management, implementing stronger project controls, and increasing our capacity to manage projects in-house.

68 Recruit top engineering talent to pave the way for future success.

DEP will target and recruit architects, engineers, designers, and other skilled professionals from the best regional and national professional schools. Our goal is to recruit the "best and brightest" to build a sustainable organization dedicated to engineering excellence. The opportunity to work on some of the most innovative and challenging infrastructure projects in the world will be a valuable recruitment tool that will encourage young engineers to start or make their careers in public service.

69 Implement a workforce development program.

DEP strives to create a culture of highly motivated staff by providing challenging opportunities in an environment of teamwork and mentoring. To help us achieve that, we will implement a new workforce development program to identify job skills and expectations for all levels within the capital program and help promote growth opportunities for our employees.

Goal: Become the owner of choice in the regional and national design and construction community.

70 Improve DEP's standard construction contract language and processes.

In order to make the procurement process more efficient for our vendors and increase the number of quality contractors that bid on DEP capital projects, we will implement fair and balanced contract terms and broadly implement Damages for Delay provisions to encourage more contractors to bid on DEP's work where appropriate. We will also streamline our business processes and improve performance in the critical areas that affect contractor cash flow, including procurement duration, change order processing times, payment review and approval, and project closeouts where we release all funds previously held as collateral.

71 Strengthen outreach to design and construction industry partners and expand minority- and women-owned business participation.

DEP will hold quarterly meetings with key construction industry stakeholders to solicit feedback on areas of improvement, and will partner with them to implement solutions, such as formal partnering sessions that build trust and expedite projects. To encourage more diversity in our capital program, we will reach out and market our quality-based selection process to more minority- and women-owned businesses (MWBEs) and regional and national engineering firms that do not currently do significant work with DEP.

DEP holds community events to discuss upcoming projects with minority- and women-owned businesses. Opposite: Newtown Creek Wastewater Treatment Plant digester eggs. *Photo: © 2008 Walter Dufresne, Photographer / walterdufresne.com*