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In coming issues . . .

Practical Asset Management for Public Agencies

Dealing with Changing Stormwater Regulations in Construction

The Dilemma Facing MS4 Permit Holders in the East of Hudson Watershed

Is stormwater pollution mitigation an impossible task in the East of Hudson Watershed?

Faced with a consent decree due March 2008 from the New York State Department of Environmental Conservation (NYSDEC) via the federal Environmental Protection Agency (EPA), each East-of-Hudson MS4 permit holder is required to create a stormwater management program specifically intended to address stormwater pollution mitigation. Beyond Best Management Practices (BMPs), planning, outreach, and inter-municipal cooperation, the capital cost implications to remediate stormwater pollution are staggering; the area already shoulders some of the heaviest tax burdens in the country. Since the MS4 program is practically an unfunded mandate, it is not surprising that municipal leaders have taken a "sky is falling" approach to the program. Does this mean that stormwater pollution mitigation is an impossible task in the East of Hudson Watershed? Will local and New York City water quality (the East of Hudson Watershed provides 10% of the city's drinking water) continue to be compromised as a result?

What drives the regulations? DEC has determined that the Total Daily Maximum Loads (TMDLs) remain at unacceptable levels for the water supply. Phosphorus content is the primary villain. Phosphorus is a nutrient in water that leads to eutrophication (excess plant growth) of water bodies, which in turn leads to reduced oxygen and thus the downward spiraling health of aquatic environments.

As of this writing, all the agencies and individual permit holders involved are in disarray. To find a solution with tangible results, we need to level the playing field. We need to look at the entire East of Hudson Watershed, identify priorities and sequentially address the worst conditions first.

To date, no East-of-Hudson MS4's have completed mapping of stormwater inflows and outfalls. Some have not even budgeted for it, much less for the capital costs of the remediation. However, the point-source mapping of both inflows and outflows represents a milestone towards leveling the playing field. The rub, as long as each permit holder turns to their professional consultants to get the work done, is that even the cost of mapping will be a dramatic event for the taxpayers. Sharing the mandate, however, would reduce costs and effort. In addition, by mapping and prioritizing sources of pollution on a regional basis, the resulting data would allow funding to be applied to where remediation is needed most.

Stormwater mapping requires looking at inflows, such as stormwater catch basins that may illicitly discharge pollutants into stormwater systems; point source outfalls, such as pipes that discharge pollutants directly into water bodies; and drainage systems. In the Village of Brewster, which covers only half a square mile, the mapping of inflows has been relatively easy to perform, but the mapping of point source outfalls has yet to be completed. Mapping point source outflows typically requires teams to walk every water body in a designated area (wetlands, river, ponds, lakes and reservoirs) using topographic maps and a GPS handheld device to locate the points of discharge. On a regional basis, mapping stormwater in the East of Hudson portion of the New York City Watershed would require walking some 90,000 acres.

What is the solution? In most cases, the task is too costly to be performed by the municipality's professional consultants. NYSDEC can and has levied fines on MS4's for failure to comply with Phase II Stormwater regulations, but the fines have not made much of an impression.

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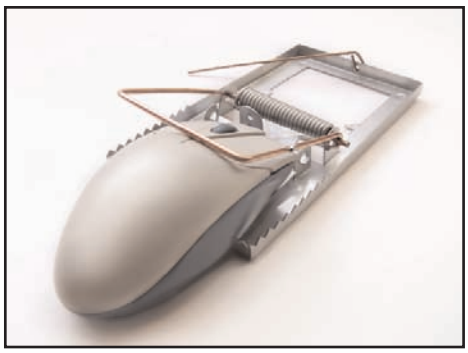
Protecting Against Terrorism at Water Utilities



Water sectors and operators are advised to continue to maintain awareness of incidents, such as breaches or intrusion.

According to the Department of Homeland Security's Infrastructure Threat and Risk Analysis Center (HITRAC), the Water Information Sharing and Analysis Center (ISAC) and National Infrastructure Coordinating Center (NICC) reported 24 suspicious incidents at water utilities during August and September, up from an average of 6 incidents a month from March through July.

Despite the increase, the Department of Homeland Security (DHS) has no intelligence indicating a link to domestic or international terrorist planning or an imminent operation to attack the U.S. drinking water and wastewater sector, although some of the incidents involved criminal activity such as vandalism or theft. In addition, DHS states that increased reporting may be the result of improvement communication among the Department, the WaterISAC, the Environmental Protection Agency (EPA), and owners and operators in the water sector, as well as overall heightened security awareness in the private sector.

HITRAC will continue to review and analyze suspicious activity to establish a baseline for reporting that can enhance DHS's ability to detect genuine threats. To that end, water sectors and operators are advised to continue to maintain awareness of incidents such as breaches or intrusion, elicitation of information, and surveillance of facilities and systems, that could be innocuous but often resemble and may actually constitute preoperational terrorist activity. DHS asks that all suspicious incidents be reported immediately and fully to the Water ISAC and the DHS NICC.

Over the past four years, the WaterISAC has had four reports of cyber intrusion. The most recent was from the EPA regarding a cyber incident affecting the SCADA (Supervisory Control & Data Acquisition) system of a Pennsylvania water facility, which may have occurred over the Columbus Day holiday. The possible cyber intrusion was discovered due to the excessive amount of windows open on the plant's computer. Anti-virus software detected a virus in addition to spy ware on the system, including a program installed to discover system passwords. Of three operators with remote home access to the computer, one reported having similar issues with his personal computer at home. Home access has since been discontinued and the Pennsylvania State Police called to investigate the computer hard drive. To date, there does not seem to have been any tampering with the water system's plant operating systems, and the water system has not experienced operating problems. Individual passwords to access the operating systems will be changed.

Leading an investigation of this incident is the FBI office in Harrisburg, Pennsylvania, with assistance from the Pennsylvania State Police computer crimes staff and the FBI office in Williamsport. The originator of the cyber intrusion is believed to be a computer hacker from a foreign country, who did not intend to disrupt the SCADA system at a water treatment plant in the U.S., but to install a malicious software package on a computer anywhere to pirate movies, games, music, etc. and run operations off the victim's computer. The software installed, "1.exe," contained "VNC (Virtual Network Computing) Scanner," which can steal passwords, allow remote keyboard and mouse control and draw other resources from a computer. Undetected in many cases by virus scans, in this case the software could have affected water treatment plant operations if the hacker was able to connect to VNC and manipulate the controls. The point of compromise was through the single home computer through the Internet to the plant computer with the SCADA system. Once a computer is found with this or other malicious software, it must be expertly cleaned or have its hard drive replaced, which is what happened in the Pennsylvania facility.

The WaterISAC notes that a lot of spy ware hosting takes place overseas, and international law is still unclear on how to detain and prosecute cyber criminals. Only a few have been arrested, and most serve very little time. The difficult of enforcement has given rise to a black market of malicious cyber activities.

As immediate preventative measures, the WaterISAC recommends that water utilities:

- Enforce utility network security standards on remote login users' home systems. This includes offering free antivirus and spy ware software for employee use, information about malicious site and safe browsing, and user training in updating and patching systems and web browsers on a regular basis.
- Consider giving employees who login remotely a utility-owned and locked down laptop for that purpose.
- Update antivirus definitions at least daily.
- Consider a central software distribution server.
- Activate "active scan" features on all malicious code detection software, allowing the system cache and web cache to be scanned during use, preventing the installation of spy ware.

As future preventative measures, water utilities can:

- Consider terminating the remote login policy, if the potential result of remote SCADA manipulation does not warrant the cost of implementing 24/7 physical coverage.
- Enforce a strict password content policy (using sentences over 20 characters long, mixing in special characters).
- Have emergency backup computers to take over mission-critical systems that must be taken offline due to infection.

Consider acquiring less targeted software to reduce their threat profile and, thus, risk.

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Landscaping and Lakescaping to Protect Water Quality

Proper landscape design and management play a critical role in protecting water quality, especially for communities that include a lakefront. In such communities, creating a sustainable shoreland landscape, or lakescaping, is beneficial not only to water quality and wildlife but to property owners, whose property value can increase. Sustainable shorelines protect water quality by slowing runoff, reducing erosion, and filtering nutrients that can cause algal blooms. They provide habitat for wildlife and can deter nuisance species like Canada geese. They add beauty and color to property, increase privacy, and can reduce the amount of time needed for lawn care.

Sustainable shorelines provide habitat for wildlife and can deter nuisance species like Canada geese.

A vegetative buffer zone of native plants, which generally have extensive root systems, is often a key element of successful lakescaping. To be effective, buffer zones should be planted along at least 75% of a property's water frontage, extend 25 to 50 feet into the water, and continue 25 to 100 feet or more from the water's edge onto the land. The wider the zone, the better it will function.

Buffer zones can use existing and/or new plantings and include aquatic plants in shallow water, moisture-loving plants along the shore, and upland plants in dry soils. As well as aquatics, native plants can comprise trees, shrubs, wildflowers, sedges, and grasses. Plant selection will depend on a variety of factors, including water depth, whether plants will be exposed to waves, the degree of moisture in the soil at different elevations, and whether water levels and soil levels fluctuate during the year. Local nurseries and landscape architects can be consulted as to the exact species that should be used.

Native plant buffer zones require minimal maintenance. Fertilizer should not be used as it will give an advantage to unwanted weed species and alter the natural growth habits of the natives. Plants should be watered during their first season of growth and, thereafter, only in periods of drought. Mulch will help to retain soil moisture and prevent weed competition. After establishment, plantings should be checked once a year for unwanted tree seedlings and other woody species. If invasive exotics such as purple loosestrife were previously present, they may reappear but can be kept in check with an appropriate herbicide.

A well-designed buffer zone will keep impervious surfaces, such as solid paving for walks and parking areas, to a minimum. Instead, porous surfaces such as wood chips or pea gravel can be used to let water infiltrate the soil. In addition, vegetated areas such as grass swales can be placed at the base of downspouts and adjacent to paved surfaces to capture water and allow it to infiltrate the soil. Curved paths and drives add visual appeal and prevent runoff water from being directed toward the lake. Vegetation can be used to frame or restrict views. With careful plant selection and a little pruning, views can easily be maintained between the shrub layer and the tree canopy.

For all communities, paying attention to lawns and, in the fall, leaf removal, can also go a long way toward protecting water quality. A healthy lawn filters and purifies water as it enters the soil en route to groundwater or bodies of water such as a lake. Compared to paved surfaces or bare soil, lawns also reduce surface runoff. When caring for lawns, communities and/or property owners must decide which species of plants are acceptable and which need to be controlled (a weed is a plant growing in the wrong place). It should be borne in mind that annual weeds die off, leaving bare soil that is prone to increased runoff, while perennial weeds, if dense, can help to minimize runoff. Weed control options include mowing at the proper height for the species of grass being used in a lawn, reducing soil compaction around areas of heavy wear and adjacent to paved areas, and weeding by hand.

If pesticides are used, they should be those that are the least water soluble, with the lowest potential for leaching into groundwater. Extreme caution should be exercised when applying pesticides near wells and impervious surfaces where runoff may enter storm sewers, and they should not be applied when heavy rains are expected or the ground is already saturated or frozen. (Studies show that 80% of lawn runoff occurs when soil is frozen.)

Fertilizers are helpful in establishing a new lawn and jumpstarting a lawn in the spring. Fertilizers should have a 0 value for P (phosphorus), the pollutant that causes the most trouble in lakes. Once grass is established, most soils do not require additional phosphorus applications to maintain a healthy lawn.

Phosphorus is found in tree leaves, making autumn a critical time to protect water quality. If leaves on the ground are not properly managed, the result can be high concentrations of phosphorus in lakes, streams and ponds, leading to algal blooms and eutrophication, a process in which lower levels of dissolved oxygen that occur from plant dieback are fatal to fish and other aquatic organisms. For proper management, a mulching mower can shred fallen leaves into small enough pieces to be mulched into the turf to decompose. Grass clippings and leaves can be collected for composting away from roads, and mixed in a ratio of one part clippings to three parts leaves.

In general, protecting the watershed requires keeping all leaves, grass clippings, and fertilizers out of gutters where they will be washed into storm sewer systems. And whether in rural, urban, or lakeshore settings, low-impact lawn care methods are beneficial.

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Q & A with John Folchetti

Q: ***What are the main obstacles facing East of Hudson MS4's in developing and implementing Phase II stormwater management plans?***

A: To date, the obstacles remain the same as for MS4's throughout the state. As reported in our April issue, NYSDEC has proposed enhanced requirements for East of Hudson MS4's that would affect five of the six minimum control measures required under a stormwater management plan. One requirement would be for East of Hudson MS4's to develop and maintain maps showing their entire stormwater conveyance systems, with all information provided in digital format suitable for use in GIS software. Public comments on the proposed requirements were sought and due back in August, but, as of this writing, NYSDEC has not posted a decision.

Q: ***If East of Hudson MS4's were required to map their entire stormwater systems, how feasible would it be to use volunteers to accomplish the task?***

A: With the proper training, so that volunteers are comfortable with reading topographical maps and operating a GPS, it would be very feasible. Programs already exist which provide volunteers for this kind of work. The Village of Brewster successfully sought and used volunteers for a clean-up of the East Branch of the Croton River a few weeks ago.

Q: ***What funding possibilities are there for East of Hudson MS4's?***

A: A regional Authority or organization that was funded would clearly lift the financial burden of implementing stormwater management programs. Currently, grants are available from New York State in the East of Hudson Region. The Village of Brewster has gotten two of them, both for GIS mapping programs for existing stormwater systems and outfalls. Another possibility is to establish stormwater districts and levy a district user fee, which no one is doing and which is not a very palatable solution.

Please give us your suggestions for future Q & A topics and future articles, by emailing them to john.folchetti@jrfa.com.

MS-4 Dilemma *continued from page 1*

One approach might be to create an Authority, which would have the legal power to raise money to identify stormwater issues, or a public corporation, such as the Catskill Watershed Corporation. A public corporation for the East of Hudson region, which is characterized by suburban sprawl and development, would, however, be facing very different needs than those of the Catskill Watershed, which provides the other 90% of New York City's drinking water from lands that are fairly well protected and pristine.

Another solution might be to take a bottom-up approach to stormwater mapping, in which a not-for-profit organization, backed by the expertise of a major academic institution, would take on the job. Such an organization would provide the leadership and training to mobilize a small army to walk and map the water bodies of the East of Hudson region. Using state-of-the-art aerial topographical maps, teams of people from sources including City and Hudson River Valley colleges, military bases and non-government organizations such as the Scouts and Trout Unlimited, would move from one MS4 to another. The data they compiled would be managed and overlaid onto their maps, to provide a complete picture of stormwater remediation needs in the Croton (East-of-Hudson) Watershed. Funding for the project, and the resulting remediation, might be up to NYSDEC, NYCDEP (New York City Department of Environmental Protection), or a combination of state, federal, New York City and local municipal sources.

With the proper leadership, performing stormwater mapping East of the Hudson could be transformed from a huge dilemma to a surmountable problem. With a beginning and end clearly in sight, the problem could be resolved with dramatic savings for taxpayers, and quickly enough to meet the March 2008 deadline for implementing stormwater management programs.

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THE FUNDING CALENDAR

Grant Name	Funding Agency	Eligible	Deadline	Goals
Public Library Construction Grant Program	New York State Education Department	Public libraries in New York State	December 29, 2006	Construction, renovation, and rehabilitation, particularly those projects that will improve access for New Yorkers with disabilities.
New York State Conservation Partnership Program	New York State Department of Environmental Protection	Land trusts in New York and a Land Trust Alliance member	January 24, 2007	A) Conservation Capacity & Excellence B) Conservation Catalyst C) Land Conservation Transactions D) Professional Development
Agricultural Fairground Infrastructure Improvements	New York State Department of Agriculture and Markets	Agricultural or Horticultural Corporations and County Extension Service Associations	March 30, 2007	Costs of construction, renovation, alteration, rehabilitation, improvements or repair of fairground buildings or facilities used to house and promote agriculture.
Greenway communities grant program	The Hudson River Valley Greenway Communities Council	Approved Greenway Communities	Open	Community planning grants to help communities develop a vision for their future and tools to achieve it by balancing economic development and resource protection objectives.
Small cities - economic development program	New York State Governor's Office for Small Cities	Municipalities with populations under 50,000 excluding metropolitan cities, urban counties and Indian tribes	Open	General economic development activities that create and/or retain permanent, private sector job opportunities principally for low and moderate-income persons, through the expansion and retention of business and industry in New York State.

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Engineering News-Record Cost Indexes

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CONSTRUCTION COST INDEX			
20 City: 1913=100	**October 2006 Index Value**	**% Chg. Month**	**% Chg. Year**
Construction Cost	7882.53	+1.5	+4.2
Common Labor	16488.68	+2.0	+4.2
Wage$/Hr.	31.33	+2.0	+4.2

BUILDING COST INDEX			
20 City: 1913=100	**October 2006 Index Value**	**% Chg. Month**	**% Chg. Year**
Building Cost	4431.26	+1.3	+3.9
Skilled Labor	7415.98	+2.1	+3.5
Wage $/Hr.	41.16	+2.1	+3.5

MATERIALS COST INDEX			
20 City: 1913=100	**October 2006 Index Value**	**% Chg. Month**	**% Chg. Year**
Materials	2607.79	0.0	+4.5
Cement $/Ton	94.28	+1.5	+5.6
Steel $/CWT	39.41	+1.8	+12.6
Lumber $/MBF	482.75	-3.6	-8.0

October construction costs, for the convenience of readers undertaking capital construction projects.

October 2, 2006
Asphalt - Cement - Aggregate - Concrete - Brick - Block - Lime

Item	Unit	20 – City Average	% Chg. Year	New York
Asphalt				
Paving, PG 58	Ton	282.11	+36.0	325.00
Cutback, MC800	Ton	300.69	+5.3	482.00
Emulsion, Rapid Set	Ton	258.37	+10.0	433.80
Emulsion, Slow Set	Ton	257.98	+8.9	433.80
Portland Cement	Ton			
Type one	Ton	94.42	+5.3	81.00
Masonry Cement				
70-lb bag	Bag	6.40	+8.9	7.00
Gravel				
1 ½" down to ¾"	Ton	10.73	+0.8	12.50
¾" down to 3/8"	Ton	10.42	0.0	12.50
Crushed Stone				
Base course	Ton	8.15	-1.1	9.00
Concrete course	Ton	8.63	+1.6	8.00
Asphalt course	Ton	9.06	+0.1	7.20
Sand				
Concrete	Ton	7.98	+0.5	9.50
Masonry	Ton	8.85	+2.8	6.25
Concrete Ready Mix				
3,000 psi	Cy	85.70	+5.6	94.00
4,000 psi	Cy	89.83	+5.6	102.00
5,000 psi	Cy	94.16	+5.6	108.00
Std. Modular Block	M	350.72	+2.6	490.00
Concrete Block				
Normal weight 8x8x16	C	127.86	+3.6	110.00
Lightweight 8x8x16	C	151.70	+9.7	118.00
Lightweight 12x8x16	C	173.29	+3.5	168.00
Masons Lime	C	198.85	+1.6	190.00

This table shows cost indexes for building materials.

Item	Unit	20-City Average	% Change Year	New York
PIPE & TUBING				
Reinforced Concrete Pipe (RCP)				
12"	ft	11.35	+3.1	14.37
24"	ft	24.41	+3.6	32.82
36"	ft	36.32	+3.3	49.23
48"	ft	51.34	+3.1	77.83
Corrugated Steel Pipe				
12"	ft	8.24	+11.4	8.33
36"	ft	23.97	+12.9	32.36
96"	ft	54.63	+3.7	90.26
Polyethylene Pipe (PE)				
Underdrain 4"	ft	0.84	+7.7	0.97
Polyvinylchloride Pipe (PVC)				
Sewer 4"	ft	1.31	+0.8	1.36
Sewer 8"	ft	3.60	+13.2	3.36
Water 4"	ft	3.38	+16.1	5.36
Water 8"	ft	8.49	+3.7	11.46
Water 12"	ft	17.37	+4.8	24.76
Ductile Iron Pipe (DIP)				
6"	ft	12.51	+7.2	21.13
8"	ft	13.47	+8.7	23.73
12"	ft	20.36	+5.3	41.47
Copper Water Tubing				
Type L ¾"	ft	1.90	-0.5	1.92
Type L 1 ½"	ft	3.36	+8.3	4.63
FERROUS METALS				
Reinforcing Bars				
Grade 60, #4	cwt	31.34	-0.7	43.66
Epoxy-coated	cwt	33.13	+1.4	34.66
Hot-Rolled Carbon Steel Plate				
12 gauge, 48" x 10'	cwt	30.88	+16.7	38.66
Expanded Metal Lath				
3.4 lb/sq yd mesh, 3.4 LBS Y	cwt	203.46	+8.1	204.23
Flat-ribbed, 3.4 LBS Y	cwt	211.36	+1.1	204.23
Building Sheet & Plate				
Aluminum sheet 36" x 96"	cwt	177.47	+16.4	133.66
Stainless Steel Sheet				
14 gauge	cwt	179.91	+21.3	132.66
16 gauge	cwt	169.73	+22.7	134.66
20 gauge	cwt	171.63	+20.4	137.66
Stainless Steel Plate				
304, ¼", 72"x240"	cwt	172.01	+12.3	122.66
316, ¼", 96"x240"	cwt	233.41	+8.4	132.66
Steel Piling				
HP14 x 42	cwt	28.80	+0.8	21.13
LUMBER				
2" x 4": SYP				
Pine	mbf	434.77	-9.6	-
Fir	mbf	312.83	-7.7	316.66
Common	mbf	441.17	-12.1	336.66
2" x 6": SYP				
Common	mbf	413.17	-3.6	313.66
2" x 8": SYP				
Common	mbf	476.64	-7.3	373.66
2" x 10": SYP				
Common	mbf	369.33	-7.3	433.66
4" x 6": SYP				
Common	mbf	809.33	-1.5	1366.66
4" x 12": SYP	mbf	1637.49	-6.2	1373.66
Plywood: 5/8" Thick	msf	566.10	-3.4	576.66
Plywood: 3/4" Thick	msf	979.13	-6.3	1623.66
Roofing Insulation				
Unfaced	sf	1.23	+4.4	1.36
Wall Insulation:				
Unfaced	sf	1.31	+3.6	1.66
Pipe Insulation:				
Fiberglass	sf	1.23	+4.8	1.33

This combined table shows cost indexes for sewer, steel and lumber.

Engineering News-Record Cost Indexes
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