The Droplet

Florida Water Environment Association
Integrated Water Resources Committee

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Committee News & Information

As we begin the new fiscal year, the FWEA Integrated Water Resources Committee (IWRC) held its annual elections to determine the officers taking over the different chair roles for the next year.

The following is the list of our new chairs for 2012-13:

Past Chair: Leslie Turner
Chair: Leslie Gowdish
Vice Chair: Gabe Retana
Secretary: Saurabh Srivastava
Treasurer: Jason Christopherson
Website Chair: Beth Whikehart
Newsletter Co-Chairs: Alonso Griborio, Lee Smith

We would like to take the opportunity to thank our officers from 2011-12 for an outstanding year, which culminated with the hosting of a very successful one-day conference in January 2012, featuring some distinguished speakers discussing key issues for Florida water resources. Special thanks to Leslie Turner for her leadership and tremendous hard work as the Chair.

We are always looking for feedback from our readers regarding topics that are of interest to you, topics that you would like to be discussed in the newsletter in an upcoming issue or any general comment about the newsletter. Please email us your thoughts on the newsletter. To become an official sponsor of The Droplet or to consider becoming a member of the IWRC, please visit our website at http://www.fwea.org/ or email Saurabh Srivastava at Srivastava@pbworld.com.

USEPA Draft Framework Published for Integrated Municipal Stormwater and Wastewater Planning

In January of this year, EPA circulated a draft framework document [1] describing a proposed integrated approach to wastewater and stormwater infrastructure planning. The stated purpose of the framework is "...to provide further guidance for EPA, states and local governments in developing and implementing effective integrated plans. The framework identifies the operating principles and essential elements of an integrated plan." [2] This article attempts to summarize the context in which this initiative is emerging, the mechanics of the process as envisioned by EPA, and where we are currently on the implementation timeline.

Background

NPDES permit holders must often manage competing priorities and overlapping regulatory requirements associated with stormwater and wastewater infrastructure. The draft framework document provides guidance to assist states and communities in resolving these competing priorities and overlaps through a holistic, locally prioritized critical path approach to decision making for capital and O&M expenditures, considering both stormwater and wastewater infrastructures. The basic idea is to leverage existing flexibility within the Clean Water Act (CWA) and related regulations to assist communities in achieving the human health and water quality objectives of the CWA in an intelligent and cost effective manner.

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Modeling for Integrated Urban Water Management

Integrated urban water management presents big challenges but also great opportunities to minimize both the impact on the receiving water and the costs associated to that. Options like impact-based real-time control (RTC), construction of retention volumes and treatment facilities, can all be better designed and evaluated by using models that include all units. The problem becomes more complex, but the larger number of degrees of freedom allows for finding better solutions.

An example of integrated management was implemented for the Dommel watershed by Waterboard De Dommel (a public company), which in 2010 launched the project KALLISTO. The Dommel is a relatively small and sensitive river flowing through the city of Eindhoven (The Netherlands), receiving discharges from a 750,000 population equivalent WWTP and over 200 CSOs from 10 municipalities. Waterboard De Dommel launched this project in order to find the most cost-effective set of measures for meeting the regulatory requirements for the river Dommel. The main focus is on protection of the aquatic environment from oxygen dips and ammonia peaks caused by the discharges. Based on a monitoring campaign in the urban wastewater system (WWTP and sewers) and in the river, detailed models were calibrated then simplified and integrated in a single model which was subsequently validated against the fully detailed models. This approach allows overcoming:

• The communication problems between different software platforms, which reduces the possible scenarios to be run that require true integration (e.g. RTC);

• The simulation speed problem of the detailed models, allowing to reduce the time needed to run each (long term) scenario by several orders of magnitude.

The objectives of integrated modeling are: (1) the determination of the potential for impact-based RTC in order to minimize investments and to develop an impact-based RTC strategy to be applied in the Eindhoven cluster, and (2) the identification of integrated solutions that include RTC and capital-intensive measures.

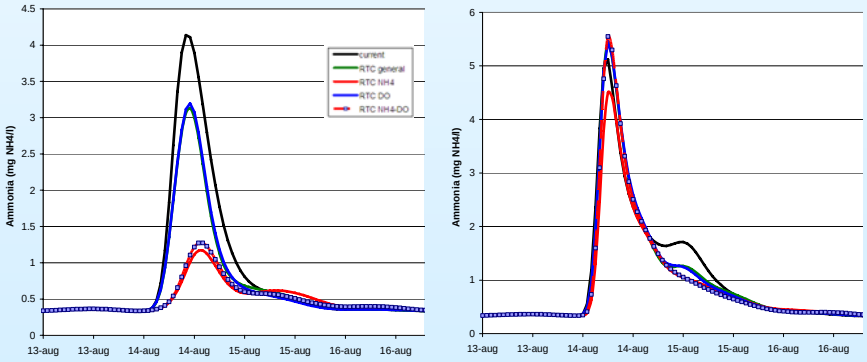

Figure 1. Impact of applying RTC strategies on ammonia concentration in the Dommel downstream of Eindhoven for a small storm event (left) and for a large storm event (right)

Both for ammonia (see Figure 1) and oxygen, RTC has a significant potential for smaller storms and a less for major storm events. Then, scenarios have been formulated based on a combination of RTC and more capital-intensive measures in the sewer, WWTP and receiving waters. Those scenarios have been evaluated on the basis of 10-year simulations with hourly inputs and outputs (see Tables 1 and 2).

The model gives a good description of the dynamics of the whole urban wastewater system. The results of the analysis showed that:
• Impact-based RTC could improve system performance, however not to the required extent;

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Calendar of Events

Date	Description
June 5, 2012	IWRC Meeting Teleconference
July 3, 2012	IWRC Meeting Teleconference
August 7, 2012	IWRC Meeting Teleconference

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		NH4 [mg/l]			DO critical [mg/l]			DO basic [mg/l]		
Duration		1 - 5 h	6 - 24 h	> 24 h	1 - 5 h	6 - 24 h	> 24 h	1 - 5 h	6 - 24 h	> 24 h
Tolerated	**12**	1.5	0.7	0.3	5.5	6	7	3	3.5	4
frequency	**4**	2	1.2	0.5	4	5.5	6	2.5	3	3.5
per year	**1**	2.5	1.5	0.7	3	4.5	5.5	2	2.5	3
	0.2	4.5	3	1.5	1.5	2	3	1	1.5	2

Table 1 – Quality evaluation framework, defined in terms of exceedance frequencies of critical concentrations for given durations

	current						A						B						C						D					
NH4 critical	0	1	1	8.1	60.8	47.7	0	1	1	4.6	20.6	40.3	0	0	1	0.7	5.6	36.8	0	0	1	0.5	6.8	17.6	0	0	0	0.4	3.0	10.6
	1	1	1	12.9	55.9	26.5	0	1	1	2.3	9.1	13.0	0	0	1	0.2	2.1	7.8	0	0	1	0.0	2.4	7.8	0	0	0	0.0	0.9	3.7
	1	1	1	13.6	50.6	14.6	0	1	1	0.3	4.8	3.4	0	1	1	0.0	1.1	1.7	0	0	1	0.0	0.3	2.4	0	0	1	0.0	0.2	1.7
	1	1	1	4.0	10.7	0.7	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.2	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.1
DO critical	0	1	1	3.9	23.2	25.8	0	1	1	2.1	12.1	24.9	0	1	1	1.8	15.3	23.9	0	0	0	0.8	4.7	8.0	0	0	0	0.3	1.2	3.7
	0	1	1	2.8	19.9	10.4	0	1	1	1.2	9.4	7.8	0	1	1	0.7	8.6	6.0	0	0	0	0.3	1.8	2.1	0	0	0	0.0	1.4	1.3
	0	1	1	1.0	12.4	7.6	0	1	1	0.5	5.4	4.1	0	1	1	0.2	3.0	3.3	0	1	1	0.3	1.4	1.4	0	0	0	0.1	0.4	0.5
	0	1	1	0.2	0.7	0.3	0	1	0	0.0	0.5	0.1	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.1
DO base	0	0	0	1.0	4.9	1.2	0	0	0	0.5	2.3	0.5	0	0	0	0.2	1.1	0.6	0	0	0	0.3	0.7	0.1	0	0	0	0.1	0.1	0.1
	0	0	0	0.6	3.3	0.9	0	0	0	0.6	1.7	0.2	0	0	0	0.0	0.9	0.4	0	0	0	0.1	0.1	0.1	0	0	0	0.0	0.0	0.1
	0	1	0	0.7	1.8	0.3	0	0	0	0.3	0.9	0.1	0	0	0	1.0	0.6	0.1	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.1
	0	0	0	0.0	0.2	0.1	0	0	0	0.0	0.1	0.1	0	0	0	0.0	0.0	0.1	0	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0

Table 2 – Evaluation of selected preliminary scenarios (not final results of the project); based on Table 1; for each scenario, the 12 criteria with their numerical value, at the left side 0 in white cells means frequency not exceeded, 1 in gray cells frequency exceeded; A = RTC NH4 + increased MLSS + increased aeration capacity + dry buffer, B = additional dry buffer volume, C = A + effluent wetland, lower NH4 control set-point + effluent aeration + no dry buffer, D = C + increased sewer pumping capacity + increased sewer retention volume

• For DO in the river, the WWTP effluent shows a larger than expected impact for small and medium storms, while the effect of CSOs is dominant for large storms;
• For NH4 in the river, additional measures will be necessary in the sewer, at the WWTP and in the river in order to be able to comply with the WFD.

The integrated model proved to be a very powerful tool to quickly investigate interactions, synergies and conflicts in the whole urban wastewater system, allowing for the identification of effective solutions to achieve the defined receiving water quality objectives. Some preliminary economic evaluation in the project indicate large savings (30 to 70%) obtained by implementing solutions identified with the integrated approach, compared to the initial budget calculated by adopting "business as usual" solutions.

References:

Benedetti, L., Langeveld, J., de Klein, J.J.M., Nopens, I., van Nieuwenhuijzen, A., Flameling, T., van Zanten, O. and Weijers, S. (2012) Sewer-WWTP-river integrated modeling for improvement of the Dommel River water quality. In: *Proceedings of WEFTEC2012*, New Orleans, LA, USA, Sep-Oct 2012.

Langeveld, J., Benedetti, L., de Klein, J.J.M., Nopens, I., van Nieuwenhuijzen, A., Flameling, T., van Zanten, O. and Weijers, S. (2012) Impact based RTC for improvement of the Dommel River water quality. In: *Proceedings of WEFTEC2012*, New Orleans, LA, USA, Sep-Oct 2012.

Benedetti, L., de Jonge, J., de Klein, J., Flameling, T., Langeveld, J., Nopens, I., van Nieuwenhuijzen, A.F., van Zanten, O. and Weijers, S. (2012) KALLISTO: Cost Effective and Integrated Optimization of the Urban Wastewater System in Eindhoven. In: *Proceedings of the 3rd IWA/WEF Wastewater Treatment Modelling Seminar*, Mont-Sainte-Anne QC, Canada, Feb 2012.

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Proposed Approach

The draft framework document lays out "overarching principles" for regulators with oversight responsibility, either at the State or federal (EPA) level, relating to (paraphrasing): 1) maintaining existing regulatory standards; 2) balancing CWA requirements in a prioritized fashion; and 3) responsibility for developing and implementing requirements. That last part is particularly significant to permit holders because it includes the possibility of new EPA enforcement tools. Specifically, "Where a municipality has developed an initial plan, EPA and/or the State will determine appropriate actions, which may include developing requirements and schedules in enforceable documents."[3]

The framework document also includes "guiding principles" for communities involved in planning. These principles include, among other things: reflecting State requirements and providing for State input to the planning process; a cost effectiveness evaluation of alternatives for selection and sequencing; stakeholder input and consideration of community impacts; permittee financial capacity assurance; and preservation of existing compliance timelines.

The scope and proposed elements of an integrated plan are described, and would include the following:

1. Water quality, human health and regulatory issues to be addressed;
2. Existing wastewater and stormwater systems under consideration, and current performance;
3. Process for community stakeholder involvement;
4. Process for developing and selecting alternatives, and for proposing implementation schedules;
5. Criteria and process to be used in measuring success.

Finally, the document outlines EPA's expectations concerning implementation of integrated plans, including federal and state agency roles, and mechanisms such as integrating plan requirements into NPDES permits, enforcement actions, or both. That last part may be significant to permit holders who are considering the potential attractiveness of entering into a "framework" integrated planning process.

What Has Happened So Far?

A memorandum outlining the purpose of the initiative was sent from EPA's Washington headquarters to the Regional Administrators on October 27, 2011. The agency then held public listening sessions on the draft framework between late January and mid February, 2012, in five regional offices.

What's Next?

Subsequent to the five listening sessions, EPA has been working to revise the January 13, 2012 draft framework document. A revised draft should be available in the near future on the EPA site (http://cfpub.epa.gov/npdes/integratedplans.cfm). Additionally, the agency is currently seeking to identify "leader municipalities" that are already developing or have successfully developed and implemented integrated plans, to serve as models for other communities.

Think you've got a "leader municipality"? Share your story with the Integrated Water Resources Committee by sending an email to lsmith@ectinc.com (please be sure to mention "leader municipality" in the subject line). Watch future issues of the Droplet for updates on this subject, and hopefully a case study or two from some leader municipalities in Florida.

Reference:

[1] Available for download at http://cfpub.epa.gov/npdes/integratedplans.cfm.
[2] USEPA, Draft Integrated Planning Approach Framework, Jan 13, 2012, pg. 1.
[3] USEPA, Draft Integrated Planning Approach Framework, Jan 13, 2012, pg. 2.

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