



July 9, 2012

Science Advisory Board
EPA-ORD

Dear Members:

I appreciate the opportunity to submit a few comments to the Science Advisory Board on behalf of the Water Alliance. My comments are intended to identify a number of additional topics for your consideration, in particular with regard to the Save and Sustainable Water Resources plan and the Sustainable and Healthy Communities research program. These topics have emerged as indispensable parts of a transition to sustainable and affordable water management on Cape Cod, a place which I have concluded offers a significant opportunity as a national test-bed for reinvention of water and wastewater management in a systems frame.

Participants in a workshop series I have convened over the last year on Cape Cod have included a range of stakeholders, such as Nick Ashbolt and Ken Moraff from EPA, Beth Card from MA DEP, Glen Daigger from CH2MHill and the International Water Association, Nick Apostilides from GHD, Tracy Mehan from Cadmus, Paul Schwartz from Clean Water Action, Patrick Lucey from Aqua-Tex in British Columbia, Juli Beth Hinds from TetraTech, Bruce Douglas from Natural Systems Utilities, Jeff Chapin from IDEO, and others in the engineering and planning professions, as well as community activists, selectmen, and other local officials.

Cape Cod – The Nutrient Problem and Financial Crisis

Nutrients in groundwater have compromised water quality and habitat in the Cape's estuaries, salt marshes, and ponds, and recent lawsuits have forced the question of how these problems will be addressed in a timely manner. Traditionally, severe wastewater pollution problems have been addressed through construction of centralized sewer collection and treatment plants, but the costs of this approach have been rising dramatically. Cape Cod towns are therefore exploring more targeted and cheaper solutions, including use of inlet-widening, shellfish uptake, permeable barriers, cluster systems, composting and urine-diverting toilets, and others. Citizen groups have also stressed the importance of understanding better the sources, transport and impacts of nutrients, along with the impacts of various infrastructure strategies.

EPA-ORD Agenda – Helpful Research for Cape Cod

Efforts to identify options and implement a sustainable and affordable approach to nutrient pollution on the Cape can benefit from several of the systems-based ORD topics being proposed, for example:

- Development of Water Quality Simulation Modeling for Managing N and P Pollution
- Decision Support System for Sustainably Managing Nutrients
- Improved Assessment Approaches and Biological Indicators to Assess Responses to N&P and Compliance
- Sustainable nutrient removal technologies
- Develop novel infrastructure comparisons that address public health, societal/economic and ecological water needs
- Develop decision support tools, including economic considerations, that allow comparison between status quo and novel/alternative water service approaches

Suggested Additional Research Topics

While the above research projects can be very helpful to towns on Cape Cod, sustainable and innovative approaches will not be adopted without attention to a wide variety of interrelated institutional innovations as well. The workshop series over the last year has dealt with the following concerns, all of which deserve further study. Without research, pilot projects, and guidance documents on these issues, towns won't know how to manage these new technologies and designs, and state and federal governments won't have confidence that the right methods have been chosen. Specific needs are:

- Management of decentralized, integrated, and natural systems
If utility staff prefer not to install and oversee maintenance of these multiple, dispersed treatment approaches, is management provided by private companies and nonprofit conservation organizations and related agencies and how is this all coordinated?
- Financing
Can the Clean Water State Revolving Fund be adapted to support decentralized, integrated, and natural system approaches? What is the role of private financing by property owners? Can revenues be generated from resource recovery? Who finances pilot projects?
- Customer Preferences
Will Americans readily adjust to new methods, or should new technologies, such as composting toilets, be designed in different ways to accommodate yet-to-be-determined preferences?

- Governance
What are the roles and responsibilities of town, regional, state, and federal levels? Who funds and conducts various aspects of science, planning, pilot project, management, finance, and oversight functions? Are there partnership models for local control and enhanced technical assistance from EPA and the states? How are watershed-related analyses and perspectives incorporated into multiple scales of governance? How are citizens and non-profit organizations included in decision-making in a more serious way, since civil society is the most significant driver for reform and innovation?
- Regulations
How are the various decentralized, integrated and natural system installations (and pilot projects) permitted and what assessments, goals, and mitigations measures need to be included in approvable comprehensive wastewater management plans?
- Paradigm Shifting
Under discussion is a systems shift from siloed, engineered, and least-cost management of water or wastewater to integrated resource, hybrid engineered and natural treatment designs, and multiple-benefit management. Scattered examples exist of pulling all technologies, management, financing, customer preference, and regulatory innovations together. All aspects are interrelated and all must be accounted-for. Ultimately, there need to be ecosystem, infrastructure, and institutional models, tools, and guidelines developed that can be adopted by cities and towns. The attachment describes briefly an effort in Falmouth to develop a “bright green” paradigm.

A final workshop to be held on July 20th concerns perhaps the most fundamental questions:

- Managing Uncertainty
Knowing that much is not understood about ecosystems on the Cape and about the effectiveness of various interventions (sewers, wetlands, composting toilets, etc.), that the suite of innovative technologies will improve and expand significantly over time, and that climate and other ecosystem, economic, and social systems are increasingly unstable and unpredictable, how should towns optimally manage their investments over the long-term?
- Regulating Uncertainty
Permits and consent decrees are written to provide “reasonable assurances that progress will be made” in addressing water quality violations. When a town proposes a 25-year plan, which includes science and monitoring, pilot projects, and other elements that phase in mitigation measures over time and

that introduce uncertainty, what agreements and timelines need to be made to satisfy the concerns of permit-writers that serious investments will be made?

I am looking forward to continued engagement with EPA on these matters on Cape Cod, in particular, the Office of Water, Region 1, and ORD. A particular opportunity in the near-term is the inclusion of these institutional and governance topics into the Southern New England estuaries project.

Thanks for your attention to these suggestions.

Valerie I. Nelson
Director
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ATTACHMENT – LETTER TO FALMOUTH WQMC

February 1, 2012

Water Quality Management Committee
Falmouth, Massachusetts

Dear Members:

As the convener of last Tuesday and Wednesday’s workshop on “Restoring Falmouth Coastal Ponds and Estuaries in New Ways”, I would like to summarize briefly the initial scoping of a possible “Bright Green” approach to wastewater management in Falmouth and the recommended next steps for the Town if it were to decide to assess and develop further this approach. Win Munro, Matt Patrick, Eric Turkington, and Steve Leighton attended various segments of the workshop and Win and Matt have access to the detailed background materials and the presentations from Tuesday. They may have slightly different interpretations of some of the conclusions of the workshop or their usefulness to Falmouth. I would like to offer to you all my own understanding of the discussions and recommendations, in particular to summarize the “outside expert” perspective, as I heard it.

The major recommendation that I take away from Wednesday’s workshop discussion was that “Bright Green” is doable, but that elements in the already-approved demonstration projects must be tied together in a master plan or strategy exercise, if they are to be substantive and credible to regulatory agencies and the public. This plan or strategy would also include consideration of the conventional infrastructure options already on the table and it is possible that a “hybrid” solution would emerge as the best. From the perspective of participants in the workshop,

this plan should not and need not wait for the results of the demonstration projects and might be completed within a period of a few months. Tom Cambareri from the Cape Cod Commission did not attend the session on Wednesday, but he did make a similar point on Tuesday about the importance, from the Commission point of view, of a comprehensive strategy that tied together the different demonstration projects going forward in Falmouth.

Break-Out Group Discussions

The charge to workshop participants on Wednesday morning was to scope out what a “Bright Green” approach could look like in Falmouth. Bright Green was defined for the purposes of the exercise as including the Falmouth demonstration project concepts (inlet widening, oyster uptake, permeable barriers, composting and urine-diverting toilets) and other nontraditional technologies, and excluding any use of central sewerage. The scoping was not intended to constitute a recommendation for the Town of Falmouth, nor were direct comparisons to be made with pre-existing sewer and treatment plant options that have already been studied.

The three break-out groups on Wednesday morning were asked to summarize and describe a “bright green” path forward. Each group was asked to articulate broad purposes and objectives, critical drivers, elements of technology, management and financing, key factors, unknowns, and sequencing of decisions and alternative paths. Background for the development of the scenarios included the extensive case studies and work of experts in other areas of water management and in other countries, along with highlights of the problems described by Matt, Win and others from Falmouth on Tuesday morning, and on a driving tour of Falmouth during the lunch break.

It was interesting to see that the three scoping scenarios included common principles and practices, while also accentuating or focusing on different parts of a model Bright Green master plan or strategy for Falmouth.

Common elements of a Bright Green approach highlighted in all of the break-out groups were:

Purpose and objectives:

- restoration of water quality and habitat in ponds and estuaries
- attention to nitrogen, phosphorus, emerging contaminants, carbon and other alterations and stressors (biological metrics for a healthy aquatic environment)
- affordability
- resilience to climate change, aging population
- achievement of multiple benefits to the community, including public health, jobs, tourism economy, ecology
- compliance with regulations – TMDLs as a “floor”

Elements of Strategy

- maximize resource recovery and minimize non-renewable resource use – water, nutrients, energy
- utilize natural systems approaches – inlet widening, shellfish uptake, permeable barriers, others
- integrate water, wastewater and stormwater planning
- sequence decisions to incorporate pilot projects and adaptive management
- communicate with public and engage stakeholders
- create new financing, utility, and business institutions and by-laws

In addition, however, each of the groups ended up focusing on a particular part or perspective in a comprehensive Bright Green strategy. This differentiation greatly enhanced the overall understanding of how a Bright Green path forward would work and why it holds such great promise for Falmouth.

Bright Green Technology and Management Strategies

This group included Nick Ashbolt and Rob Adler from EPA, Nick Apostolidis from GHD, and Hilde Maingay and Win Munro from Falmouth.

The Bright Green scenario that emerged from this group emphasized resource recovery and minimization of nonrenewable resources through a wide range of nontraditional technologies and management structures, including composting toilets, urine separating toilets, RME packaging toilets, greywater non-potable reuse, STEP or vacuum systems for greywater or blackwater collection, rain gardens for stormwater infiltration, fertilizer/source controls, along with estuary management approaches.

The group highlighted a variety of new management tools to support these nontraditional technologies, including revisions in plumbing codes and by-laws, incentives for conservation and reuse, creation of a responsible management entity or utility for management of individual home systems, establishment of businesses for installation and/or rental of onsite technologies, subsidies for low-income homeowners, creation of a unified Town entity combining DPW, conservation, and others.

Adaptive Management

This group included Ken Moraff from EPA, Glen Daigger from CH2MHill, Vic D'Amato from TetraTech, Earle Barnhart and Christina Rawley from Falmouth, and Erin ... from the Cape Cod Commission.

The Bright Green scenario emerging from this group highlighted the sequencing and management of decisions over time. In particular, the group recommended the selection of one or more ponds (salt and/or fresh water) to be used as demonstration sites for a comprehensive solution that would include oyster farms,

permeable barriers, inlet widening, and source separation technologies and recovery in adjacent homes. A monitoring program would be created. An Environmental Eco-Education Center could be built at this site. Uncertainties of oyster farm reliability, ecotoilet adoption rates, inlet widening and sea level rise could be studied. Phase 1 would anticipate, address and monitor areas of concern in these sites, while a Phase 2 in the Town would address wider issues and adapt to lessons learned. Start with the strategy, not with the alternatives. Assess costs, opportunities, and risks. Manage a portfolio of solutions, both known and emerging.

Healthy Functioning Landscapes and Community

This group included Patrick Lucey from Aqua-Tex, Bruce Douglas from Natural Systems Utilities, David DeLorenzo from MA DEP, Jeffrey Eagles from Orleans Water Alliance, Valerie Nelson from Water Alliance, and Ron Zweig from Falmouth.

This group recommended that the Town step back to articulate broader landscape and socio-economic community conditions and concerns, with the understanding that development in Falmouth has exceeded in multiple ways the capacity of natural systems to manage pollutants and alterations in landscape. Analytic steps recommended included: characterization of how hydraulic and nutrient flows have been altered over time, modeling of how watersheds and estuaries function (landscape and water systems) and assessment of their current health, establishment of the potential of restoring functioning conditions, modeling of energy, stormwater, and other resources flows in the community, assessment of resource values and flows throughout the community (water, energy, food, etc.), development of business cases for provision of services and capture/minimization of resources. It was recommended that natural and bio-mimicry solutions in the estuaries and ponds be utilized as least cost methods, followed by groundwater management, nitrogen reduction (supply management) and restoration of landscapes more generally. The existing Massachusetts Estuaries Project models can run to estimate the effectiveness of a number of different intervention strategies.

Next Steps

In a final discussion period on Wednesday, Eric Turkington asked the question: “What should Falmouth be doing now?” Answers fell into three categories:

1. A master plan or strategy is needed now to develop further “Bright Green” approaches, to link the Falmouth demonstration projects, and to assess both nontraditional and conventional infrastructure approaches, including those already considered for Falmouth. This master plan or study could be done in a six-month timeframe potentially for \$250,000, could be done without any results from the demonstration projects, and will convince regulatory agencies and the public of the seriousness and credibility of Town efforts.
2. A collaborative, multi-stakeholder deliberation is important going forward, so as to enrich and hasten a consensus development and understanding of an

- optimal path forward. An advisory group should include Committee members, Town staff, experts, regulators, and members of the public.
3. Communication, outreach, and education of the public is essential, both in designing solutions for Falmouth and in mobilizing the support of citizens for the paths chosen.

A few additional themes or reflections that I heard from the outside experts included:

- importance of incorporating resilience (modularity and incremental investments) to climate change and hurricanes. Participants in the workshop from outside of Falmouth were impressed with the vulnerability of beaches and ponds to potential sea level rise and storm surges;
- challenges of the Falmouth economy, including diversity of incomes, tourism-based economy, aging population, and patterns of resource inflows and monetary outflows. Potential solutions could include more closed-loop resource systems locally;
- need to understand the problem. Focus now is on nitrogen reduction, but other ecosystem disruptions might turn out to be the problem. For example, eutrophication may also be occurring because of less carbon in the water, so it is best to consider multiple stressors and integrated solutions;
- high value in bridging the existing gaps in conversation and communication between advocates, Town staff, experts, and the public more generally;
- the willingness of federal, state, and county regulatory and planning authorities to engage in and contribute to Falmouth master planning and strategy development is a positive development and should be capitalized upon going forward.

I look forward to staying in touch with you and am available to answer any questions or provide any materials, as you may request.

Thanks for your review of this summary.

Sincerely,

Valerie I. Nelson
Water Alliance