

MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the meeting of December 7, 2015
Date: December 14, 2015

PRESENT

N. Bartilucci
H. Bokuniewicz
S. Colabufo
P. Granger
C. Gurdon
T. Leung
W. Merklin
D. Paquette
J. Pilewski
R. Price
A. Rapiejko
M. Scorca
S. Terracciano

REGRETS

M. Alarcon
L. Koppelman
W. Spitz

1. There were not comments on the minutes of the last meeting (September 21, 2015).
2. Christine Gurdon has been working with the Town of Brookhaven on the design of a permeable reactive barrier (PRB, a.k.a. bioreactor) intended to be installed along Riviera Drive on the north shore of Wills Creek in the Forge River. Eutrophication has long been an issue in the Forge due to nutrient pollution and it has been estimated that 75% of the nitrogen entering the system comes *via* groundwater flowing under the shoreline. For this study, nine monitoring wells were set along the shoreline to depths of 4.5m. The highest nitrate concentrations were found at depth. Nitrate-nitrite levels were variable in both time and space ranging from 0.1 to 17.68 mg/L. The bioreactor is intended to be 47m long filled with a mixture of 30% wood chips and 70% native soil. The hydraulic conductivity of the medium of the PRB should not be lower than that of the ambient soil and ideally, should be much higher. However, because the native soil here already has a relatively high permeability (4m/day), the bioreactor medium would only be marginally higher in hydraulic conductivity. As a result, a thin (< 25 cm) but deep (4.5m) PRB is proposed. The width is chosen in order to reduce influent nitrate concentrations to less than 1 mg/L but to avoid eliminating nitrate all together because this would allow other metabolic processes which form undesirable products like hydrogen sulfide and methane. A control well should be placed when the reactor is built in light of the innate variability.

Salinity is not expected to be a problem although higher salinities are seen in the winter perhaps due to road salt. Sulfate which may lead to the production of H₂S tends to be elevated in sea water but in addition, sulfur is sometimes applied on land to control mold. Sulfate in the groundwater was not measured. Metals might also be monitored because of the potential of redox reactions producing changes in oxidation states. The presence of PCP's or similar compounds might also be used to indicate a sewage source.

Although trenching below the water table could be done using sheet-steel retaining wells, water will need to be pumped from the excavation and a DEC discharge permit will be needed. It may be difficult to keep the wood chips mixed in the PRB medium during placement because the wood would tend to float in the watery mixture. The medium might be encased in a geofabric, bags or geotube. It had also been suggested that perhaps a “picket fence” of well holes might work instead.

3. Bill Merklin joined the meeting to discuss the LICAP reports with Steve Colabufo. Bill chairs LICAP’s Water Resources Opportunity Subcommittee and Steve chairs the Water Resources and Infrastructure Subcommittee. LICAP intends to develop a Groundwater Management Plan for Nassau and Suffolk. There are about fifteen topics to be covered between these two subcommittees as individual chapters. Meetings have been held with the authors of each topic and working outlines have been prepared. Drafts are expected to be available for (internal) review in a few months.

Steve is also preparing a “State of the Aquifer” report. Although this could be a technical document, it was suggested that a broad, simplified treatment, intended for the general public, would be more appropriate. In order to change the public’s habits on water use they need a basic understanding of why they should bother to change their behavior. Reducing irrigation demand is one of the more pressing problems. Our current infrastructure is sized to meet the irrigation demand. Even though the population is stable more irrigation systems are being installed. Rain sensors are required but they do not appear to be functioning as well as intended. This situation means that more wells and more tanks need to be constructed; maintenance costs increase and the entire systems is stressed. “Fertigation” may help as one of the alternative methods explored by LICAP.

4. Roy Price discussed the University’s Center for Clean Water Technology. He is a hydrologist who had worked for the Southwest Florida Water Management District and is now an Adjunct Research Assistant Professor at SoMAS as well as the new Science Coordinator for the Center. The Center’s goal is to develop and commercialize the next generation of nitrogen-removal septic systems. The Center hopes to fill gaps in our understanding of the processes involved in septic waste processing and encourage novel technologies. It will provide authentication (not certification) of innovative processes. There are seven research themes: Engineering, Hydrology, Microbiology, N-cycling, Chemistry, Organics and Microsensors.

In this way, they hope to realize the economic opportunity and make Long Island a leader in the field. Hal Walker and Chris Gobler are co-directors and Jennifer Garvey is the Associate Director. There are two post-docs. Dr. Xinwei Mao and Dr. Stuart Waugh are two newly hired postdocs with the Center. Dr. Mao is a microbiologist with expertise in modeling the relevant microbial processes and Dr. Stuart Waugh will focus on detailed research on the nitrogen cycle in these new systems.

The Center will not only take advantage of instrumentation already available at Stony Brook but also has begun assembling new state-of-the-art equipment to develop further its core analytical capability. These include a Membrane Inlet Mass Spectrometer (MIMS) for the analyses of nitrogen gas, a new Metrohm ion chromatograph for major anions and organic acids, ICP OES for major cations, an ICP-MS, Atomic Fluorescent Spectrometer (AFS) and a graphite furnace atomic absorption spectrometer (GFAAS) for trace metals, and a time-of-flight mass spectrometer for pharmaceuticals and personal care products (PPCPs).

The Center is gearing up to take its first set of samples beginning with “Appendix A” systems, Cromaglas and BESST. They will also be looking into a recirculating gravel wetland in Shelter Island and, in conjunction with MASSTC in Massachusetts, innovative drainfield technology. The work in Massachusetts is done in collaboration with George Heufelder at MASSTC. It was pointed out that elements of the basic design are not new; D&B tried something similar 40 years ago, but new site-specific testing will include lysimeters and monitoring of (homogenized) influent and effluent. It is anticipated that nitrate levels can be reduced to less than 3 mg/L.

In these new systems, a septic tank would still be in line to remove grease and solids. The reduction technology may include ZVI, Anomox both in bioreactors and sequence batch reactors and Fe-anomox. Because the efficiency may be affected by metals, like Cu and Pb from pipes, metals will also be investigated.

5. Partially in response to Sandy damage, larger utility poles are being put in. These used to be treated with creosote, but now are treated with pentachlorophenol. It seems that the larger poles are not retaining the product as well and there have been inquiries about this compound possibly leaching into the groundwater or risks incurred by direct contact. The Suffolk County Department of Health Services had encountered this issue about a year ago in the Hamptons and it recently attracted attention in the newspaper in North Hempstead. Some limited groundwater sampling was done (without detects) but it would be more definitive to sample around pole storage areas.
6. Future meetings will be on:
 - January 25, 2016
 - March 21, 2016
 - May 16, 2016
 - June 20, 2016