

Southern Kent Island
Sewer and Water Subcommittee
Options Group Report

November 14, 2007

INTRODUCTION

It has been difficult to think in terms of options, i.e. a competing collection and/or treatment system to the "standard" regional system, which has been initiated by the County and various consultants over the last decade and a half. This difficulty arises because the state-of-the-art plant is up and running at Stevensville and needs customers to retire the debt service. This is the same dilemma encountered by Centreville, Queenstown and others when confronted with out-of-date systems exacerbated by deferred maintenance and shrinking Federal funding and the promise of external capitalization provided by new residential development.

Nevertheless, the Public Works Advisory Board, after several sessions with senior staff of DPW and Health, have agreed that the County cannot, in the dual interest of the health and welfare of the local public and that of the Chesapeake Bay, adopt a passive do-nothing strategy. Consequently, the Subcommittee was reorganized to clarify the original tasking by the Commissioners to address the difficult questions of the moment. All on the Board seem genuinely interested in being part of a solution. This look at options is part of a 3-part effort, in addition to construction and finance, to define the issues in an understandable manner.

NO BUILD OPTION

Assuming our goal is to minimize nutrient discharges from existing residences in the 3 southern Kent Island communities initially in Phase 1 (Kent Island Estates and Romancoke), and to minimize the possibility of adverse health effects to the local population, the "no-build" alternative does not satisfy at all. It has one main positive in that, if current building permit requirements are enforced, the population of Southern Kent Island will not explode in the near future with its attendant costs on transportation, education and emergency services. Similarly, the cost of doing nothing will be reflected in lessened quality of life and environment, but the examination of all these costs are beyond the scope of the Subcommittee. However, as stated below in the analysis of Home Systems, the installation of an approved aerobic system should be made available to the existing homeowner who wishes to pursue modifications to facilitate property transfer or to satisfy a social conscience.

BUILD OPTIONS

The entire system to dispose of sewage means having to examine alternatives in both the collection and treatment arenas. Sometimes, collection alternative A may be combined with one or more treatment alternatives, for example. Consequently, an obvious alternative may have been omitted and certainly some have been ignored due to the writers' prejudices or knowledge gleaned from professional staff briefings.

The systems, in general, may be grouped into the following areas:

A. NON- TRADITIONAL OPTIONS Home Systems

The Home Systems employ a septic tank(s) or septic tank with aerobic features and some sort of effluent treatment and disposal- either shallow trench or sand mound. Add-ons such as other media filters consisting of urethane foam, patented coconut media, and others are sometimes used. Other in- home options might include composting or incinerating toilets.

Analysis- there are currently 10 approved aerobic systems approved by the State which the local Health Departments may permit. Some fit into most of the existing tanks, some require installation of a second tank, some cannot be left in vacation mode without special procedures, and all have varying degrees of nutrient reduction. Due to the nature of our local problem, high groundwater, the effluent will still adversely impact public health and any public financing of such systems which fail BA Technology should not be endorsed. However, an existing failed system should be permitted to employ approved technologies and some sort of revolving loan program should be considered. The feeling here is that these enhanced aerobic systems do provide a net reduction in pollutant discharges.

The composting systems also should be allowed on a case-by-case basis, but have at least 4 shortcomings: the tanks will tend to require anti-flotation additions, hard to install retroactively within the existing home footprint, some may require homeowner attention to turning the pile, and require re-plumbing. Some gray water may be added, but some problems have been reported by DNR at event type uses in public recreational areas.

The incinerating toilets only treat "black" waste and require homeowner action with each use. The effluent issues with the remainder of the domestic discharge are the same as the other Home Systems mentioned above.

We visited an aerobic system in Talbot County on August 13, 2007. This is a 2 tank septic system with a re-circulating aerobic media filter inserted ahead of the trench drain. The 12 months of treatment data were impressive as was the apparent consumption of the

flow by evaporation to the point that the grass over the trench laterals was "starved" of moisture. The current drawback is that this is a homemade system which has not yet been submitted for evaluation and approval to Maryland Department of the Environment. However, one or more of the 10 approved systems, we believe, includes a re-circulating sprayed media. The published treatment results are unknown at this time. For comparison to our locale, it should be noted that Talbot County had required the twin 1000 gallon two compartment tanks, and the owner/designer stated that our single 1000 or 1500 gallon tank custom would not provide enough detention time for the anaerobic process in the tank prior to the aerobic filter.

Conclusion- due to the high water table and the small lot sizes and the less than state-of-the art effluent treatment, the above mentioned Home Systems should not be further examined as to costs.

B. TRADITIONAL

1. County- Sponsored Community System
2. County- Sponsored Regional System

Some types are described in a Michigan fact sheet for Alternative On-Site and Community Collection and Treatment Technologies:

"Small Diameter Effluent Sewers: Effluent from each home septic tank is conveyed via small diameter plastic pipes to a central treatment center...Pipe installation requires only shallow narrow trenches and the system can be built quickly. For homes in very flat or low lying areas, a small pump (Septic Tank Effluent Pumping- STEP- System) may be needed. Septic tanks must be pumped out regularly and STEP systems must be maintained and serviced."

"Grinder Pump Systems: instead of a septic tank, each home has an electrical grinder pump which grinds up the solids and pump the sewage through small diameter pipes to a central treatment center..."

In a Community System for our locale, we are thinking of a vacuum or pumped collection to a local treatment and discharge point for all 3 communities with or without septic tanks. This is 4 options:

- 1a. vacuum from an added tank so that existing tank periodic haulage is required.
- 1b. abandonment of existing tank and vacuum system (as in new development)
- 1c. in-tank pumping to treatment and discharge so that periodic haulage is required.
- 1d. abandonment of existing tank and grinder pump to treatment and discharge.

Variants of these could be considered for each of the 3 communities or subsets thereof and we call these cluster systems, and require much more analysis which has begun by the construction group in their mapping effort. Also, schemes which can eliminate contiguous vacant lots via gerrymandering piping layout, or vacant lots within FEMA Flood Hazard Zones could be proposed for "no service."

Options 1a and 1c require periodic pumping and transfer by licensed hauler for treatment. If on a biennial basis, this would represent about a \$10 monthly cost to the homeowner and should not differ from the present, except we all know that we're not nice to our septic systems and there seems to be no enforcement mechanism or regulation. Note that in New York State there is a table of tank size and house population which dictates pumping frequency. These options should result in a lesser treatment cost due to on-lot solids retention. These options may result on greater flows due to the retention of the house piping and tanks due to infiltration. Consideration should be given to house sewer material type and tank seaming at a particular house prior to deciding on the collection system for a block.

Options 1b and 1d have the advantage in that Inflow and Infiltration is minimized due to all new construction, so that the ratio of peak to average daily flow will be significantly less than older municipal gravity systems.

All of the above options should be cost evaluated. To the extent feasible, if a vacuum system is evaluated or a house or group of houses pumping system is evaluated, examine each house for the condition of its tank and piping.

As to the **Community** treatment part, a large 50 acre parcel which has recently been logged looks desirable as a site for some type of plant and wetland treatment. According to the Soil Survey of Queen Anne's County, USDA, 1966, the predominant soil type is Elkton with small areas of Mattapex and Othello. The soil association is associated with poorly drained silty soils having a firm silty clay loam to plastic clay subsoil. These soils are good for timbering and as a source of topsoil, but are unsuitable as a source for sand and gravel, are susceptible to frost action and have severe limitations for non-farm uses such as homesites. This site may be a potentially viable site for a constructed wetland treatment. In fact, our neighboring County to the west, Anne Arundel, has had more than 20 years experience with either system 1c or 1d and a sand filter and polishing wetland for Mayo near the South River. It should be noted that this system includes the septic tank as a part of the County utility. We talked with the head of Lombardo Associates, Mr. Pio Lombardo, who indicated it was chosen over a conventional collection system (abandonment of septic tank) and a 2 mile pump to an existing treatment plant. The economics prevailed in comparing only a 2 mile pump as opposed to our proposed 7 mile pump in the **REGIONAL** system, below. Another consideration considered by the Mayo community was the minimization of infill build-out. Accordingly, the County passed legislation which addressed lot aggregation. Mr. Lombardo offered his assistance addressing some of our issues, which are obviously not unique.

From the Company's website:

<http://www.lombardoassociates.com/decentralized.shtml>

"7. Integrated Decentralized Wastewater Management Planning – Application Mayo, Maryland

Lombardo Associates prepared an extensive integrated wastewater decentralized wastewater management Master Plan for the Mayo Peninsula area of Anne Arundel County, MD. The Plan served a 9 square mile area

adjacent to Annapolis, MD with a population of approximately 8,000, where integration of growth management was a key issue.

The Plan consisted of:

- Centralized collection (40 miles of septic tank effluent system – 50% gravity), treatment (recirculating sand filters, constructed bulrush wetland, constructed peat wetland, UV disinfection – build out capacity of 0.9 MGD) and disposal facilities (discharge to Chesapeake Bay) for approximately 2,200 connections;
- A cluster septic tank effluent collection to leachfield system serving 78 connections;
- On-site septic district for the remainder 80 properties– repair of existing problems and ongoing maintenance

The Plan was:

- Overwhelmingly approved by the local residents through an extensive public participation program – 11 sub areas with representatives from each area
- Integrated with the Planning Department's approval process, with numerous County Council actions taken to address implementation issues
- Implemented at a capital cost of approximately \$ 60 million.
- Received American Consulting Engineers Council Engineering Excellence Awards from local and National chapters
- Basis for Tom Neel, Director of Anne Arundel County Dept. of Utilities and Pio Lombardo, P.E., Engineer-of-Record, being selected by Engineering News Record as Construction Man of the Year candidates.
- Basis for subsequent Lombardo prepared Master Plan for Anne Arundel County Wide (approximately 25,000 systems) On-Site Wastewater Management Utility.

Reference: Mr. Thomas Neel, Former Director, Anne Arundel Dept. of Utilities
CEO, ADS Environmental Systems
800-633-7246"¹

¹ As Mr. Neel is no longer with the County, updated contacts are as follows:

Douglas Burkhardt, Project Engineer, AACo DPW 410 222-4481

Ron Bowen, Director, AACo DPW 410 222-7042

Note that the project won national recognition and that it creatively addressed vacants.

In the **REGIONAL SYSTEM**, the primary advantages are:

- a. The collection is via vacuum collection with which the County has extensive experience. This advantage accrues to option 1a and 1b above, also.
- b. The treatment plant is a Best Available Technology and has the capacity in place.
- c. Customers become available to pay down the debt service.

Some disadvantages are:

- a. The life cycle costs of the lengthy pump (about 7 miles) may be burdensome, and, in reality, the forecasting is a moving target due to energy costs.
- b. Vacant lot exclusion will be difficult, we believe, within the 3 existing communities.
- c. Notwithstanding the Attorney General's Opinion, the long route between Southern Kent Island and the Stevensville plant will eventually cause contiguous properties to be served.

SUMMARY and RECOMMENDATIONS

1. On-lot treatment methods should not be further considered due to poor soils, high water table and small lots. Cluster systems, however, may be feasible for some sub areas of the 3 communities.
2. Develop costs for the following 4 systems
 - a. add new tank, install vacuum/lift to community treatment
 - b. remove tank, install vacuum/lift to community treatment
 - c. install in-tank pump to community treatment
 - d. remove tank, install grinder pump to community treatment
3. In conjunction with the unit costs for the 4 collection systems in 2., develop a facility conceptual plan for a plant local to the 3 Phase 1 communities. Compare the life cycle costs versus the pump to KNSG plant.
4. Perform study in 3. for the other communities in Phase 2(QA Colony & Kentmorr) and phase 3(Ches Estates, Sunny Isle, Batts Neck & Mattapeake).

Jeff Smith – Chairman

Reggie Jones

Mike Warring, Vice Chairman, DPW Advisory Board