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QUEEN ANNE'S CONSERVATION ASSOCIATION ISSUES WORKING PAPER, CONVENES WORKSHOP ON SOUTHERN KENT ISLAND SEPTICS

Background: On April 18, 2014, Queen Anne's Conservation Association (QACA) released a statement (available at www.qaca.org) saying that the southern Kent Island (SKI) failing septics problem had not been adequately defined and that the full range of alternative solutions had not been adequately considered. Accordingly, it was QACA's position that no basis had been established for committing to a "pipeline solution" that would bring additional major residential development to SKI.

Since that time, QACA has worked to define the problem and to assess alternative solutions to it. To that end, QACA has convened an ***SKI Septics Workshop****, co-sponsored by the Kent Island Defense League (KIDL) and Concerned Citizens of Southern Kent Island (CCSKI), that will bring interested citizens together with persons having expertise in wastewater treatment options. The Workshop is scheduled for Monday, June 9, 2014, at 6:00 p.m. in the Christ Church Parish Hall, 830 Romancoke Rd. Stevensville, MD.*

As background for the Workshop presentations and discussions, this Working Paper summarizes, under four separate Issue headings, what QACA has been able to do so far, with the help of other interested citizens, to clarify the SKI failing septics problem. We expect that, as a next step, the Workshop will lead both to revision and refinement of what we have done and to the development of needed additional information for citizens and for State and local officials. QACA will continue to assist in this process.

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SKI SEPTICS: A QACA WORKING PAPER June 4, 2014

Executive Summary: The principal health risk posed by failing SKI septic systems is direct discharge to, and resultant contamination of, surface waters with which humans can come in contact. Of the 1,518 systems on SKI, it is estimated that 10-15% of them present this health risk; nearly all of these are in two communities, Romancoke and Kent Island Estates. The June 9 Workshop will explore onsite wastewater treatment options to eliminate this health risk, at a lower cost and without the adverse impacts of a sewer connection to KNSG. Onsite systems providing advanced treatment can also remove far higher percentages of nitrogen from wastewater than the existing SKI systems, and evidently do it more cost-effectively than a sewer connection to KNSG.

ISSUE #1: DEFINING THE PROBLEM (Does the sewer connection proposal rest on an accurate characterization of the SKI failing septics problem? What exactly is, or should be, meant by saying that a septic system is "failing"?)

Here are some frequently used terms: **Surface water** is water present on the earth's surface. **Groundwater** is water below the earth's surface, filling porous spaces in soil, sediment, and rocks. An **aquifer** is a permeable subsurface zone through which groundwater flows. **Well water** is pumped from an aquifer for household usages including drinking water. The **water table** is the upper "surface" of a subsurface area that is saturated with groundwater (typically shallow, "unconfined" groundwater).

And we have one unique acronym for convenience: **EHSD** -- the County's Environmental Health Services Director**.** (A second unique acronym, **SFS**, is introduced under Issue #2 below.)

So, then, what's the problem?

In an extensive presentation to the Planning Commission on February 14, 2013, beginning at QACTV 91:50, the EHSD stated that the principal risk to human health from a failing septic system is contamination of drinking

water with pathogens (disease-causing microorganisms). The EHSD further stated that this risk does not exist on SKI, because the wells there draw from deep aquifers containing groundwater protected by massive clay barriers from any possible contamination from septic systems (*e.g.* the Aquia aquifer, evidently 200 feet below SKI). That is why, as he says, there is no need to bring public water to SKI.

The EHSD says that the health risk that does exist from SKI septics, although no actual cases of disease have been traced to them, arises from the possibility of direct contact with contaminated surface water. This possibility exists because SKI drainfields can become flooded due to the seasonally high groundwater levels or because the drainfields are old and clogged and rainwater ponds on them. Accordingly, if the drainfield is filled to the point that water fills back into the septic tank, sending wastewater from a home into the system under these circumstances can result in contaminated surface water, either on the home property or in nearby swales or streams, with which humans can come into direct contact.

Here it is important to avoid the misunderstanding about health risk that is too easily perpetrated by describing as "failing" any septic system that "discharges directly into the groundwater" (to use the phrase repeatedly used by the EHSD). Groundwater is, by definition, subsurface water – particularly water in a saturated zone where there is no air in the spaces between the soil particles. When the EHSD laments the "direct discharge to groundwater", he refers to the fact that the soil layer below the drainfield, being saturated by subsurface water, is unable to adequately reduce pathogens by exposing them to oxygen (*i.e.* the system fails to achieve what is called "secondary treatment" of the wastewater). "Direct discharge to the groundwater" does not necessarily mean that pathogen-contaminated wastewater will mix with either the deeper groundwater in the confined aquifers that is being drawn on for drinking water, or with the surface waters that humans can come into contact with.

While there is nothing inherently wrong with saying that a septic system is "failing" when it discharges directly to ground water (*i.e.* that there is so-called "hydraulic failure"), one should not give the impression, as the

EHSD repeatedly does, that all such systems present a health risk. Given that well contamination is not a problem on SKI (for the reasons stated above), the health risk from a "failing" septic is present only when that system, because of a flooded drainfield, discharges effluent to surface waters with which humans can come into contact, not when it discharges into groundwater that they cannot contact.

Additional confusion is introduced when the EHSD describes as "failing" a system that, on a seasonal basis, does not have the State-prescribed 2-4 feet of (dry) soil (for secondary treatment) between the drainfield and the water table. Using this concept of "regulatory failure" allows the EHSD to expand the category of "failing septics" beyond those systems that pose health risks and to claim that over 80% of the SKI septic systems are "failing" – which, indeed, they may well be (see next section), but without the great majority of them posing any threat to human health.

Using "failing" in all possible senses of term, whether or not health risks are present, opens the door for arbitrary and inconsistent characterizations of individual systems by the EHSD. Thus, inside the nine SKI communities homes on large lots without any visible surface water during the wet season can be characterized as having "failing" septics, while properties outside the nine communities with seasonally-visible surface water are not being so characterized. Similarly, in Kent Point or Marling Farms, homes on small lots without room for replacement drainfields are not characterized as having "failing" systems, while lots of the same size in the nine SKI communities are being so characterized. And, with varying definitions of a "failing" septic system to choose from, the danger exists that approvals to build new homes or sell existing homes can be granted or withheld for reasons that are largely subjective.

ISSUE #2: SCOPING THE PROBLEM (Which SKI septic systems are "failing" in the sense that the systems create a potential health risk from surface water contamination, and how many of these are there?)

The Rubin Report (on the County website) examined permit files for over 2,500 septic systems on Kent Island. This examination showed that the predominant form of septic system (over 2,000 systems) is an 8-foot deep trench or pit "which placed sewage into shallow groundwater". The Report noted that "[t]he soil's hydraulic limitations also occasion soil surface breakthroughs in the worst cases leading to the County's concern for public health" (p. 2). But, crucially, the Report made no attempt to identify the systems where such breakthroughs occur – and where, therefore, a risk to health is present.

Instead, the Rubin Report adopted the direct-discharge-to-groundwater standard for identifying a failing system: "Seasonal groundwater penetrating systems meet the definition of a failed septic system" (p. 1). The Report then (in Table 1, p. 10) went on to make a permit assessment of 2,186 septic systems in 12 Kent Island communities to estimate how many were "failing" under the definition adopted. The result was somewhat ambiguous: there was "inadequate information" to assess any of the 795 permits issued in Kent Island Estates, in the other 11 communities another 355 were "unknown", 484 were "possible compliant", and 565 were "groundwater penetration". These numbers fall rather short of the 80% failure rate commonly cited, but if Rubin is correct in saying that 2,000 of the 2,500 systems examined were 8-foot deep cess pits, then it is unremarkable that 80% of the SKI systems are "failing" *in the sense of seasonally discharging to ground water*.

What is remarkable is that citizens (and County Commissioners) still do not know how many SKI septic systems are failing *in the relevant public health sense of contaminating surface waters seasonally or after major rain events*. This is the most important question of all, and it remains unanswered to this day.

QACA cannot provide a definitive answer to the question. We do not have either the resources or the inspection powers available to the EHSD and the County. But we do have the ability to consult with knowledgeable long-time residents, to go out with the people who live there and drive the

roads and look at the properties, to see where the streams and the water-filled ditches are, to study the aerial photos.

We enlisted the aid of a long-time resident with geographic information system (GIS) expertise and first-hand knowledge of the lands, waters, ditches, roadways and structures in the nine communities. We asked for an identification of specific properties that can be expected to have water on the ground in wet seasons or after rain events that flood clogged systems. That exercise identified 163, or 11%, of the 1,518 SKI septics as failing in the sense of being likely on occasion to contaminate ground water.

The specific findings were as follows:

No systems likely to contaminate surface water were identified in Tower Gardens, Queen Anne's Colony, Kentmorr, or Matapeake Estates. Indeed, in these communities the estimate was that more than 90% of the systems do not even have groundwater intrusion into drain fields.

In five remaining communities, the following numbers of systems were identified as having the potential to contaminate surface water:

- Romancoke on the Bay: 51 (of which 15 are in the Critical Area)
- Kent Island Estates: 94 (of which 70 are in the Critical Area)
- Sunny Isle of Kent and Chesapeake Estates: together less than 5 (all in the Critical Area)
- Normans: 13 (none are in the Critical Area)

Total health-relevant failing systems: 163. For convenience, we will hereafter refer to these as "surface failing septic systems", or "**SFS** systems".

We recognize that this number can only be an approximation, absent a depth of analysis that we are not equipped to do. We are inclined to believe that the approximation is a good one, however, since it conforms very closely to the surveys of septics in Romancoke and Kent Island Estates that the EHSD did in 1990 and 1995 (and which are posted on the County website).

Those two surveys identified homes in the two communities that had septic, laundry (or, in the 1995 survey, kitchen) wastes "ponding on the ground surface" (1995, "in the grass") "or discharging into nearby ditches".

The numbers for the two EHSD surveys in Romancoke were 19 and 31; our citizen expert identified 51 in Romancoke. The EHSD's numbers for Kent Island Estates were 92 and 86; our citizen expert identified 94 in Kent Island Estates. These correlations suggest that when it comes to surface water discharges from septic systems, the trained eye knows it when it sees it – and when it doesn't.

At the very least, our preliminary identification effort, backed up by these older surveys, provides an important corrective to broad-brush claims of 80% failing septics on SKI. The number that are failing *in a health-relevant sense* is more likely to be on the order of 10-15%.

ISSUE #3: ASSESSING ALTERNATIVES (What cost-effective measures are available to reduce or eliminate the health risk posed by the SFS systems on SKI?)

The key elements of a cost-effective remediation strategy are suggested by the decades-long absence of disease caused by even by those septic systems that are likely to be seasonally contaminating surface waters (in our terminology, the SFS systems). We should ask what it means that the dog never barked. Why has there been no detectable disease if there has been surface water contamination?

Is it the case that people have not in general come into contact with the contaminated waters? And if they haven't, why not? Is it that the surface waters are contaminated mainly in times of cold weather (February – April) when people are unlikely to swim or go barefoot in streams, ponds or puddles? Is it that parents typically caution their children not to play in smelly, dirty water in ditches or over drainfields?

Any answers to these and many other possible questions about the absence of septics-caused disease would have to be speculative. But the fact that questions like these can be asked at all suggests the first element of a strategy to deal with SKI SFS systems: education. Whether or not residents may already be avoiding contact with contaminated surface waters for

whatever reasons, it will likely further reduce health risk if they are regularly reminded of the need to avoid such contacts.

One model here is the Chesapeake Bay Foundation's effort to better inform swimmers and others not to come into contact with tidal or fresh water for 48 hours after significant rain storms flush bacteria from the land into the waters. A similar effort by the QAC Health Department directed toward SKI residents near potentially polluted surface waters would reinforce any precautions already being taken by affected residents. The cost of assigning one staff person the responsibility for regular, targeted health advisories to SKI residents would be quite modest – and indeed Bay Restoration Funds may be specifically available for this educational purpose.

But, as CBF says about the risks to swimmers from stormwater run-off (and as QACA says about the health risks from some SKI septics), "we don't have to live like this". The SKI SFS systems should be repaired or replaced so that they no longer contaminate surface waters and SKI residents can splash around in puddles wherever and whenever they want. Similarly, it would be desirable to replace all old SKI septic systems, even if they are not or have not yet become SFS systems, with newer systems that better reduce nitrogen loading. In both cases, however, an important caveat applies: if the repairs or replacements are to be done, they must be done at a cost that is justified by the seriousness of the problem being addressed. To require cost-justification of expenditures on SKI septics is nothing more than a specific instance of what good government is supposed to do generally: since needs always exceed resources, taxpayer dollars should be spent on those projects with the greatest pay-off for the public good.

What repair or replacement options are available, and at what costs? Our review of the literature and conversations with the experts whom we have consulted suggest the existence of a range of options, including those falling under the general heading of "decentralized wastewater treatment", which encompasses both individual onsite systems and small community systems located near the wastewater sources. A principal purpose of the June 9 Workshop is to have a knowledgeable presentation of these options as alternatives to a long-distance connection to the Kent Narrows

Stevensville Grasonville (KNSG) sewer plant next to Terrapin Park just north of the Bay Bridge.

In his 2-14-13 Planning Commission presentation, the EHSD stated that the public health standard these options should meet on SKI is the achievement of "**tertiary treatment**". This term refers to treatment that allows the treated effluent to be discharged to land or water surfaces (or even, with sufficiently advanced treatment not required on SKI, to be used for drinking water). According to the EHSD, the BAT (Best Available Technology) systems approved by MDE (Maryland Department of the Environment) for BRF (Bay Restoration Fund) grants do not achieve tertiary treatment, and that while there are systems that do achieve tertiary treatment, "we have none that's approved . . . no manufacturer has submitted those to the State . . . How many are out there? I haven't seen one". (QACTV 107:00)

Again, it will be the function of the Workshop to explore these options which the EHSD "hasn't seen". We suggest, however, that the EHSD has in fact seen systems providing tertiary treatment, even if he didn't recognize them as such. For example: one of the septic systems approved by MDE for BRF funding is a system, manufactured by SeptiTech of Lewiston, Maine, that is approved in some jurisdictions to be fitted with a drip hose that discharges the treated effluent to the surface of the ground and thus eliminates the need for a drainfield. See http://www.septitech.com/Driphose.shtml. That would certainly appear to be a system that achieves what the EHSD might have in mind for tertiary treatment on SKI.

The SeptiTech system, to stay with just that one example, is evaluated by MDE as having a cost of purchase, installation and 5 year operation maintenance of $13,056. In addition to that cost, the SFS systems probably have a drainfield that will have to be replaced or extensively renovated. If all 163 SFS systems on SKI were replaced with a SeptiTech system, and the needed drainfield work added $10,000 to the cost of the replacement, the total cost would be (163 X 23,056) = $3.76 million. That one-time initial capital expenditure, *prima facie* sufficient to solve the health problems

created by failing SKI septics, obviously compares very favorably with the $53.1 million cost of the pipeline connection to KNSG.

Some supporters of the pipeline claim that any consideration of tertiary onsite treatment systems as replacements for existing systems that contaminate surface waters will open the door to their use for new construction on the vacant SKI lots. QACA sees no reason why their use cannot be restricted to replacements only. The vacant lots, even after the (partial) lot consolidation that has been proposed, typically have insufficient lot area and unsuitable soil for conventional or near-conventional systems that are neither as costly nor as complicated to maintain as the new systems providing tertiary treatment. Indeed, the EHDS has dismissed these new systems in significant part because he does not want to assume the regulatory burden of making sure they are working; in his words, they do not constitute a "permanent" solution of the kind represented by a sewer connection or a low-maintenance conventional septic system.

The health risk posed by existing systems discharging to surface water justifies both the use (indeed, the requirement) of the new systems and the regulatory burden that is involved. But no such risk attaches to currently vacant lots. They can be rationally distinguished from the existing homes and denied the option of installing septics that have monitoring and maintenance requirements greater than those of sewer connection or conventional septic. For the present, the ultimate fortunes of the vacant lots can be rationally left to whatever simpler, lower-maintenance technologies may someday be available (and to the decisions that will have to be made about whether to allow more development on a sinking island in a rising sea).

Because the onsite systems so far approved by MDE do not reduce nitrogen loading from homes on SKI by more than 76% as compared to KNSG's 90% reduction, some have claimed that this difference makes sewer connection to KNSG the preferable alternative for the homes requiring replacement systems. That claim directly raises the issue discussed in the next section of this working paper: the cost-effectiveness of connection to KNSG.

We conclude this discussion of alternatives by repeating that it is entirely preliminary. We expect that the presentations at the June 9 Workshop will provide a much better view of the range of alternatives not heretofore presented by the EHSD.

ISSUE #4. ASSESSING THE PIPELINE ALTERNATIVE (Is it cost-effective to reduce QAC nitrogen loading to the Bay by connecting the 1518 SKI homes on septic to the KNSG WWTP?)

The County puts the total cost of the pipeline project at $53.1 million, comprising $37.4 million in construction cost and $15.7 million in treatment fees. Commissioners supporting the KNSG pipeline project have urged on the County website that "[t]he environmental benefits of the Project are compelling. By hooking 1,518 septic systems to public sewer, the Project reduces nitrogen infusion into the Bay by 17,300 pounds annually, which is one-third of the County's septic system nitrogen reduction goal."

One perspective on the cost-effectiveness of the pipeline's nitrogen reduction is furnished by comparisons with the nitrogen-reducing systems so far approved by MDE. See http://www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/Water/cbwrf/osds/brf_bat.aspx The Advantex system, a top performer, costs $12,300 and reduces nitrogen by 76%; adding $10,000 (as in the previous section) for drainfield rehabilitation, and installing Advantex in 1,518 homes, produces a cost of $33.9 million. The County calculates that the existing septic systems of the 1,518 homes are currently discharging 21,993 pounds of nitrogen per year; reducing that by 76% would reduce their loads by 16,715 pounds. So for the difference between $53.1 million and $33.9 million, or $19.2 million, one gets in additional nitrogen reduction only the difference between 17,300 pounds and 16,715 pounds, or 585 pounds.

Other calculations can produce other, less dramatic results, but basically the same picture emerges. For example, MDE appears to have a higher figure, 24.32 pounds, for the nitrogen loading from an average house;

using this number would mean the Advantex system in 1,518 homes would reduce nitrogen by 28,057 pounds as against something on the order of 33,226 pounds for the sewer connection, increasing the pipeline's nitrogen reduction advantage over onsite systems to 5,169 pounds. On the other hand, our $10,000 number for drainfield renovation is generous and not likely to be applicable to all SKI homes; reducing it to an average of $5,000 per home increases the cost advantage of onsite versus pipeline to $26.8 million. Adding a possible discount of 20% for a negotiated group purchase of systems increases the cost advantage of onsite versus pipe to $30.6 million. However one figures it, a lot of extra money is being spent on the pipeline to achieve its modest additional amount of nitrogen reduction.

(Another perspective is furnished by starting with the MDE/BRF calculations that the systems they are approving reduce nitrogen loading at a cost of from $68.55 to $93.19 per pound. Our first attempts at developing a comparable figure for the pipeline indicate a per-pound cost roughly double the figures for the onsite systems.)

It is, however, a larger perspective than any of the foregoing that most dramatically shows the relative cost-ineffectiveness of the pipeline as a means of nitrogen reduction. It is widely recognized that there are far more cost-effective ways of reducing nitrogen pollution than by upgrading or replacing septic systems. For example:

As part of the Bay clean-up effort, the County's WIP (Watershed Implementation Plan) goal for annual nitrogen reduction by 2025 is 651,000 pounds. The septics sector share of that goal is currently set at 53,000 pounds, as against the ag sector's share of 564,000 pounds. The EHSD has previously suggested that State dollars spent on cover crops would do more for nitrogen reduction than remediating septics. Research indicates that 173 acres planted annually in a cover crop of radishes would achieve the same nitrogen reduction as the pipeline project. Wouldn't the cost of doing that likely compare very favorably to the pipeline's cost?

Proponents of the pipeline counter that under the Bay clean-up program rules, 53,000 pounds of nitrogen reduction have to come from the septics sector, so what the County can admittedly do more cost-effectively in

the ag sector doesn't help it reach its septics goal. QACA believes, however, that the Bay clean-up is clearly a work in progress. At a recent conference in Easton, a high-level MDE official, noting the wide cost differences in achieving nitrogen reduction in the different sectors, stated that "cross-sector trading is likely be there within jurisdictions", and we have heard other sources predict that changes will come, in one form or another, in the sectoral allocations. Is it wise for the County to bet so heavily that the present septic sector reduction requirement will not ultimately yield to economic reality?

Finally, the cost-ineffectiveness of the pipeline solution is magnified by the environmental and other costs that have not so far been adequately accounted for. No accounting has been offered for the inevitable spills and malfunctions that will attend transporting wastewater several miles from its multiple sources to the KNSG plant. No adequate accounting has been offered for the environmental damage and habitat loss from the 560 new houses on SKI that the pipeline project will concededly bring with it: these houses and their lawns will cover lands that are now two-thirds forested and one-quarter wetlands. The JMT report of 2011 put the capital costs of roadway/stormwater upgrades to handle increased traffic from 593 new houses (Scenario D) at almost $30 million – a number not discussed of late. The costs associated with increased school enrollments have likewise not had careful attention. Nor has the fact these new houses will be a permanent drag on County finances. As is well established by the American Farmland Trust and others, residential development typically does not generate enough tax revenue to cover the cost of the increased community services that residential development requires.