Queen Anne's County

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Queen Anne's County
2011 Comprehensive Water and Sewerage Plan
Amendment No.11-05
September 9, 2014

Text Amendment – (replace as indicated)

EXECUTIVE SUMMARY – SEWERAGE SERVICE NEEDS

(replace in its entirety)

Queen Anne's County recognizes two sewerage Public Health Areas of Concern. Many of the septic systems existing in the two areas of concern are not operating correctly and are discharging septic effluent directly into the groundwater on a seasonal basis (typically the spring). This ongoing, direct seasonal penetration of groundwater does not conform to the Code of Maryland Regulations' (COMAR) requirement for unsaturated soil treatment zones. In addition, many of the properties lack sufficient land area for a replacement system regardless of the groundwater penetration violations.

The two Public Health Areas of Concern consist of nine communities known as Southern Kent Island (SKI) along the mid to lower extents of MD Route 8 (Romancoke Road), and the two communities at the end of MD Route 552 (Dominion Road) consisting of the Marling Farms and Dominion (MFD) communities. The SKI area has been the primary concern given the greater incidence of failure, the hydro-geological nature of the area, its poorer surface drainage, and the typically smaller lots sizes. Thus, all efforts over the past several decades have focused on this area.

It is the intent to move forward with serving the MD Route 8 Corridor with a sewer service area closely resembling the 2011 Johnson Mirmiran & Thompson, Inc. study scenario known as "Plan B" (which excludes large blocks of contiguous vacant lots within the communities from the proposed service area in accordance with the Attorney General's opinion of April 13, 2005). The service area will include the 1,518 existing dwellings as well as the commercial areas in Queen Anne Colony and Kentmorr. This scenario also includes approximately 1050 vacant lots of record in the service area.

A 'lot consolidation' ordinance was adopted by the County (Ordinance 13-24 – refer to Appendix IX – Section 3) has required adjacent vacant lots in common ownership to be combined to meet the overlying zoning of the service area. This will effectively reduce the maximum number of vacant lots from approximately 1050 to 632. It is anticipated that additional voluntary consolidations will occur bringing the ultimate number of vacant lots to approximately 560. The anticipated flow from the 1,518 existing dwellings, 8 commercial properties, and the 632 vacant lots is anticipated to generate an average daily flow of approximately 450,000 gallons per day (using 200 gallons per day per dwelling as the average anticipated flow per dwelling and an additional 7,500 gpd for commercial use).

It is envisioned that the first phase of the project would be to construct the sewerage force main and the collection system to service Kent Island Estates & Romancoke on the Bay. It is anticipated that the in-service timeframe for these two subdivisions will be within 6 years from the initiation of design. Subsequent phases would be addressed from a south (Tower Gardens) to north progression, with the entire service area online within approximately 10 years.

CHAPTER 4 – SEWERAGE DISPOSAL

(insert at end of Chapter)

4.5 SEWERAGE PUBLIC HEALTH AREAS OF CONCERN

Queen Anne's County recognizes two sewerage Public Health Areas of Concern. Many of the septic systems existing in the two areas of concern are not operating correctly and are discharging septic effluent directly into the groundwater on a seasonal basis (typically the spring). This ongoing, direct seasonal penetration of groundwater does not conform to the Code of Maryland Regulations' (COMAR) requirement for unsaturated soil treatment zones. In addition, many of the properties lack sufficient land area for a replacement system regardless of the groundwater penetration violations.

The two Public Health Areas of Concern consist of nine communities known as Southern Kent Island (SKI) along the mid to lower extents of MD Route 8 (Romancoke Road), and the two communities at the end of MD Route 552 (Dominion Road) consisting of the Marling Farms and Dominion (MFD) communities. The SKI area has been the primary concern given the greater incidence of failure, the hydro-geological nature of the area, its poorer surface drainage, and the typically smaller lots sizes. Thus, all efforts over the past several decades have focused on this area.

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A 'lot consolidation' ordinance adopted by the County (Ordinance 13-24 – refer to Appendix IX – Section 3) has required adjacent vacant lots in common ownership to be combined to meet the overlying zoning of the service area. This will effectively reduce the maximum number of vacant lots from approximately 1050 to 632. It is anticipated that additional voluntary consolidations will occur bringing the ultimate number of vacant lots to approximately 560. The anticipated flow from the 1,518 existing dwellings, 8 commercial properties, and the 632 vacant lots is anticipated to generate an average daily flow of approximately 450,000 gallons per day (using 200 gallons per day per dwelling as the average anticipated flow per dwelling and an additional 7,500 gpd for commercial use). This wastewater will be treated at the County's existing wastewater treatment plant in Stevensville.

All full discussion on this issue can be found in Appendix VI of this Plan.

(insert three Public Health Areas of Concern sewer service area maps)

CHAPTER V – SECTION 5.14.3.8 – SUFFIX DEFINATIONS

(add below the "P" suffix definition)

Exempt Lots in 'P' service areas – Certain lots as shown on the Public Health Areas of Concern maps are "exempt" from paying the benefit assessment in accordance with Section 10.a of Resolution 14-07 due to suspected environmental constraints (refer to Appendix IX – Section 3). These lots of record are technically in the service area, in accordance with the April 2005 Attorney General's opinion, but will not be served with sewer unless a written request is made by the property owner to the contrary. Upon request, and upon presentation of satisfactory evidence that the lot in question is buildable, the lots will be served and will be required to pay the applicable benefit assessment. At a minimum, the evidence shall consist of an Army Corp of Engineers jurisdictional determination and verification of the limits of any non-tidal wetlands, if any, on the lot. These lots are represented on the service area maps as having a 'red' outline. Owners of other properties that are not 'red-line' designated, and which have evidence that those properties are unbuildable, may apply for an "exempt" designation in accordance with County Resolution 14-07.

APPENDIX VI – WATER & SEWERAGE PROBLEM AREAS – SEWERAGE PROBLEM AREAS

(replace in its entirety)

Introduction

Although there is a County operated central system serving part of the Kent Island, residents outside the service area still use individual on-site disposal systems (OSDS – i.e. septic systems) for the treatment of their domestic wastewater. In order to function properly in the removal of pathogens, a minimum dry soil 'treatment zone' of at least 2-feet beneath the bottom of the disposal trench is necessary year round.

The approving authority for OSDS is the local Environmental Health Department of the County Health Department, a division of the State of Maryland's Department of Health and Mental Hygiene. This duty is delegated to the Environmental Health Department by the Maryland Department of the Environment which by law regulates OSDS.

Queen Anne's County recognizes two sewerage Public Health Areas of Concern. Many of the septic systems existing in the two areas of concern are not operating correctly and are discharging septic effluent directly into the groundwater on a seasonal basis (typically the spring). This ongoing, direct seasonal penetration of groundwater does not conform to the Code of Maryland Regulations' (COMAR) requirement for unsaturated soil treatment zones. In addition, many of the properties lack sufficient land area for a replacement system regardless of the groundwater penetration violations.

The two Public Health Areas of Concern consist of nine communities known as Southern Kent Island (SKI) along the mid to lower extents of MD Route 8 (Romancoke Road), and the two communities at the end of MD Route 552 (Dominion Road) consisting of the Marling Farms and Dominion (MFD) communities. The SKI area has been the primary concern given the greater incidence of failure, the hydro-geological nature of the area, its poorer surface drainage, and the typically smaller lots sizes. Thus, all efforts over the past several decades have focused on this area.

Southern Kent Island Public Health Area of Concern - Introduction

In February 1989, the Director of Environmental Health presented a report to the County Commissioners that detailed rates of uncorrectable septic system failure for four major subdivisions on Kent Island (Cloverfields, Bay City, Kent Island Estates and Romancoke on the Bay - the first two priorities, Cloverfields and Bay City, have since been served with County sewer). The report defined uncorrectable failures as those that cannot be remedied without direct groundwater penetration or a "holding tank." However, while holding tanks are a means to correct failures, they are still defined in regulation as OSDS and are a poor solution.

Such was the Director's concern over the situation that his office took the unprecedented step in 1989 of overturning 216 existing, previously approved, percolation tests (i.e. indicating a septic system was viable and hence the lot was buildable) in the communities that now comprise the Southern Kent Island service area (as well as another 139 perc tests in other communities on Kent Island) and required the lots to be re-tested under the then current criteria. Over 90% failed the re-test. Since the time that the re-tests were conducted, the percolation test criteria have become even more stringent.

The other two subdivisions identified in the 1989 report, Kent Island Estates and Romancoke on the Bay (which were not adjacent to the original service area as were Cloverfields and Bay City), have long been identified as areas of concern. They have been mapped as needing sewer service in each of the County's Comprehensive Water and Sewerage Plans since the Plans' inception (i.e. in 1974, 1984, 1990, 1996, 2006 and again in the draft of the 2011 Plan).

Subsequent documentation has been provided by the Environmental Health Department to reinforce the need for a solution for the original two communities, as well as documenting the need for the additional seven communities (refer to Appendix IX – Section 1). This concern is due to the large number of existing septic systems, estimated to be at least 80% by the local Environmental Health office, that discharge directly into groundwater during seasonal high water table months. To demonstrate this groundwater issue, the Maryland Department of the Environment developed maps using available soil data which show the groundwater elevations for the nine subdivisions (refer to Appendix IX – Section 6). The lack of a 'dry soil treatment zone' beneath the drain field trench inhibits the remediation of pathogens leading to a concern that a communicable disease could infect the residents.

The SKI service area is defined as nine 'older' subdivisions or communities consisting of (from north to south) Matapeake Estates, Normans (also known as Batts Neck), Sunny Isle of Kent, Chesapeake Estates, Kentmorr, Queen Anne Colony, Kent Island Estates, Romancoke on the Bay, and Tower Gardens, in which 1518 homes exist.

An additional concern is the amount of nitrogen being released into the Chesapeake Bay and its tributaries given the proximity of these failing systems to these waters. An analysis by the Maryland Department of the Environment in January 2014 indicated that 30,400 pounds per year of nitrogen was entering the environment from the 1518 existing homes. Thus, the septic systems on SKI pose an environmental concern as well.

In April 2014, the Environmental Health Department adopted a Holding Tank Policy that requires any property with an uncorrectable failure and inadequate land area for a replacement system to install a holding tank (refer to Appendix IX – Section 3). This places a tremendous financial burden on the property owner and makes the sale of the property extremely difficult. It should be noted that it is not typically a government agency that determines a system is failing. It is usually an independent inspection contractor hired by the purchaser at the time of a pending property transfer. Only if deemed failing by the contractor is the Environmental Health Department contacted to see if there is a solution short of a holding tank.

This amendment to the 2011 Plan proposes a sub district be established to serve Southern Kent Island (SKI) and to be operated by the County's Sanitary District. This total area, from Matapeake Estates to Tower Gardens, was identified in the 2006 Plan as areas of increasing concern.

It is not the intent to incorporate any other intervening vacant lands along this route. To further restrict any new development on currently large vacant tracts, the sewerage pipe connecting the communities being served to the wastewater treatment plant will carry a '**denied access**' provision as defined in section 5.8 of this plan. The County has two existing '**denied access**' pipes, the oldest being the pipe from Prospect Bay placed in service in 2000, and has successfully enforced the denial of new connections to the pipe.

Many opponents to the extension of sewer service indicate that the threat to public health occasioned by this situation is exaggerated. It is the Environmental Health Department's charge to

prevent disease from occurring and the threats of disease from contact with untreated sewage has been acknowledged for centuries. In fact there have been 37 reported incidences of communicable disease from 2007 through 2012 in the 21666 zip code area (which is how the Health Department categorizes the cases). These include incidences of Giardiasis, Cryptosporidiosis, Shigellosis and Shiga toxin-producing Escherichia Coli which can be caused by contact with untreated sewage. However, though it is accurate to state there has been no direct link documented between these diseases and the failing septic systems, direct causation would be difficult to establish even if attempted. It is noted these are the reported communicable disease figures and there certainly may be cases where a physician was not seen, so no report was made, or if seen by a physician stool cultures were not taken and analyzed to determine the exact cause of the illness.

Southern Kent Island - Alternative Solution Investigations

The 1990 Comprehensive Water and Sewer Plan, prepared by Gannet Fleming, Inc., evaluated a number of options to alleviate these areas of concern. On-site, clustered or shared systems, and land disposal central systems were rejected due to the site constraints of soil, surface water, or available land. Thus, on-site correction was not considered a viable alternative.

Gannett Fleming, Inc. also developed a concept for a new central sewage treatment facility located in the region. Land disposal of the effluent was evaluated for the problem area. Ultimately, land disposal could require nearly 750 acres (if required buffers are included) under the most optimistic scenario just for Kent Island Estates and Romancoke subdivisions due to the poor soils prevalent in the area. This alternative was therefore rejected.

In 2005 the County hired Dr. A. Robert Rubin, at that time a professor with North Carolina State University (as well as in this capacity, a consultant with the engineering firm, McKim & Creed, Inc.), to investigate the possibility of alternative on-site, off-site cluster, or other community soil adsorption means to resolve the issue (the Rubin Report). Dr. Rubin has a reputation for favoring 'decentralized' solutions to septic system problems as opposed to connecting the areas of concern to a regional sewer treatment plant. However after an extensive review of the Environmental Health Department's septic system installation records, and given the hydro-geological constraints of the area, he concluded that connecting the area to a wastewater treatment plant was the only viable permanent solution.

In the spring of 2007, the County Commissioners assembled a "Department of Public Works Citizen Advisory Board" to provide input on various Public Works issues. The SKI issue consumed the majority of the Board's efforts. A SKI subcommittee was formed and three groups were formed under this subcommittee: Options, Construction, and Financing. It was the Options Group's task to determine what options were viable to resolve the failing septic system issue. On November 14, 2007, the Options Group submitted their final recommendation which indicated that on-site solutions were not viable given the site constraints that occasioned the septic system failures problem to begin with, i.e. "poor soils, high water table, and small lots."

In 2011 an exhaustive study was completed by the consulting firm of Johnson Mirmiran & Thompson, Inc (JMT). The study looked at the costs of providing sewer (and water) service to the

Route 8 communities. The study not only evaluated the cost of these sanitary services but also the associated costs of growth that service to the area may bring should any of the existing unbuildable vacant lots of record be served (schools, public safety, traffic, etc.). The study also considered any incidental environmental impacts the new development would cause due to loss of forest or wetlands, as well as increases in runoff from new impervious areas.

The JMT report evaluated six service area scenarios from a scenario known as Plan A, in which all existing vacant lots of record are served, to Plan E in which zero vacant lots were served. The sixth scenario, a variation of Plan E known as Plan F, used a different sewerage collection technology (Septic Tank Effluent Pumps) and envisioned a new wastewater treatment plant to be constructed in the vicinity of the end of MD Route 8.

Plans A through E of the JMT report envisioned three vacuum sewer collection systems connecting to a 'denied-access' sewerage force main extending from the existing Kent Narrows/Stevensville/Grasonville Wastewater Treatment Plant (KNSG WWTP), located in downtown Stevensville, south along MD Route 8 to the vicinity of its intersection with Kent Point Road, to convey sewerage from the nine communities to the WWTP. The '**denied access**' provision would prohibit service to any large tracts of vacant or agricultural properties located outside of the nine designated communities along these corridors.

Plan F of the JMT report envisioned the utilization of Septic Tank Effluent Pumps (STEP) with a new regional wastewater treatment facility located in the midst of the SKI service area. This plan was partially rejected as it was determined that it would be very difficult to obtain a new surface water discharge permit into the Chesapeake Bay for the treated wastewater effluent, particularly when there was existing capacity available and reserved for this service area at the Kent Narrows/Stevensville/Grasonville (KNSG) wastewater treatment plant.

This option of utilizing the existing KNSG wastewater treatment plant has both advantages and disadvantages. The primary advantage is the ability to serve other older, but significantly smaller, intervening small lot subdivisions that exist along the Route 8 corridor which also have varying degrees of septic system failure. These communities were first mapped as problem areas in 2006. Another advantage is these intervening communities could share the cost of the transmission system thereby reducing the per lot cost for sewer.

The disadvantages with this option are basically the inherent negative impact from any increase in population due to infill in the service areas if currently unbuildable vacant lots are developed as well as the pressure for new development along Route 8 created by the sewer force main traveling its entire length. For instance, the force main carrying the wastewater along Route 8 from Kent Island Estates and Romancoke would cross a few large parcels designated in the Comprehensive Land Use Plan as low density, primarily large agricultural properties. This causes some concern that the force main would enable new development in these low-density lands. However, as the force main would be designated as '**denied access,**' and much of the vacant lands are already designated Resource Conservation Areas in the Critical Area Ordinance (which limits lot sizes to 20 acres), the County should be able to resist any effort to rezone the existing lands to a higher density (dwellings per acre) unless the increase in density

is already supported by the Comprehensive Land Use Plan. It should be noted that in order to develop these intervening vacant lands, the County's Comprehensive Land Use Plan would have to be amended, the zoning of the lands would have to be changed, an amendment into this Water and Sewerage Plan would be required, and Critical Area Growth Allocation would need to be granted. All four of these steps are public processes, the last two of which require the State's review and concurrence.

The infill issue is caused by serving the existing, but currently unbuildable, vacant lots within the planned service areas with sewer. While serving the existing vacant lots makes the project more affordable for existing residents, the associated increase in population occasioned by serving the currently unbuildable vacant lots aggravates two other issues always associated with residential growth; traffic and schools. All of these issues were evaluated in the study conducted by Johnson Mirmiran & Thompson.

In order to mitigate the growth issue to the extent legally possible, the County took two steps. First the proposed service area was drawn to exclude large blocks of contiguous vacant lots in accordance with the Attorney General's opinion. This reduced the number of vacant lots to be served from approximately 1600 to approximately 1050. In addition the County adopted Ordinance 13-24 which mandates adjacent vacant lots of record in common ownership to be combined in order to meet the existing zoning. This further reduced the number of vacant lots to 632. It is anticipated there will be further voluntary lot consolidation as well as some lots within the service area being unbuildable due to severe environmental constraints.

Southern Kent Island - Alternative On-Site Disposal Systems Investigated

Opponents of serving the area with County sewer postulate that there are a number of On Site Disposal Systems (OSDS) that would resolve the problem on a case by case basis and thereby not force all properties to connect to the system or allow the current unbuildable vacant lots to develop. This theory is flawed due to the following factors:

- The issue isn't just inadequate treatment of the wastewater, the issue is more of a wastewater disposal issue. Given the hydro-geology of the area and additional limitations imposed by lot sizes, there simply is no way to comprehensively dispose of the treated wastewater employing OSDS in a manner in accordance with regulation.

- On-site systems are typically more expensive to construct and operate than the current proposal to serve the areas with County sewer.

- These advanced on-site systems require perpetual maintenance in order to operate properly.

- Should there be a system that could overcome these issues, it is likely the currently unbuildable vacant lots could avail themselves of the technology which could occur with none of the growth mitigation efforts the County seeks to employ.

Southern Kent Island - Proposed Solution

In recognition of this issue, in 2004 the County Commissioners, sitting as the Sanitary Commission, via Resolution 04-68, determined to utilize the existing KNSG wastewater treatment plant to service the Public Health Areas of Concern and thereby set aside 500,000 gallons of the 1 million gallon wastewater plant expansion completed in 2007 in order to begin addressing this concern. It should be noted that the 500,000 gallons per day (gpd) reserved is unlikely to be enough to service all 11 communities (9 on Route 8 & 2 on Route 552), particularly if a substantial number of the existing vacant lots of record in those communities are served.

The STEP collection system was further evaluated and found to have merit in addressing the collection system issue in that it had some advantages over the vacuum system. In regards to the capital cost of constructing the system, its cost to design and construct was considered to be much more affordable than a vacuum system. First, the majority of the mains could be installed using the horizontal drilling technology which greatly reduces the amount of road disturbed during construction, thereby avoiding much of the cost of road restoration. Secondly, certain STEP systems also have pumps with sufficient capacity to pump the entire distance from the home to the WWTP, thereby eliminating the need to design and construct intermittent pumping stations.

From an operation and maintenance point of view, three issues keep the monthly cost of a STEP system less than that of a vacuum system. First there is no electricity cost to pass on to the customer as each home's electric supplies power to the pump serving their property. Secondly, as the STEP tanks are typically 1,500 gallon tanks, of which only a portion is typically used during normal operations, there is a day or two of emergency storage available in the tank should there be a pump malfunction or a prolonged electrical outage. This allows staff to respond during normal business hours rather then having staff available 24/7 as is essential with a vacuum system. Lastly, the pumps have a long service life (the pumps are essentially high-head well pumps) and are relatively cheap to purchase when they need to be replaced relative to other sewerage pumping systems. It is the intent that the County's Sanitary District will own and operate the STEP assemblies.

There are disadvantages to the STEP system as well. The primary one being that the STEP assemblies need to be placed on each individual yard thereby requiring a permanent easement to allow the County to maintain. Also, as implied by the STEP name, only the effluent from the tank is being pumped, the solids are captured in the tank and need to be removed via a vacuum truck periodically by the County. However, communities on the west coast, where STEP systems are more prevalent, indicate that the necessity to pump out the tanks is quite infrequent, typically on the order of every 5 to 10 years.

It is the intent to move forward with serving the MD Route 8 Corridor with a sewer service area closely resembling the JMT scenario known as "Plan B" which will service the 1518 existing dwellings as well as the commercial areas in Queen Anne Colony and Kentmorr. This scenario also includes approximately 1050 vacant lots of record. However the County has adopted a 'lot consolidation' ordinance (County Ordinance 13-24) which will compel adjacent vacant lots in common ownership to be combined to meet the overlying zoning of the service area. It is believed this will reduce the maximum number of vacant lots to 632 with the belief that additional voluntary consolidations may

bring the number of vacant lots to approximately 560. The anticipated flow from the 1518 existing dwellings, 8 commercial properties, and the 632 vacant lots is anticipated to generate an average daily flow of approximately 450,000 gallons per day (using 200 gallons per day per dwelling as the average anticipated flow and an additional 7,500 gpd for the commercial uses).

It is envisioned that the first phase of the project would be to construct the sewerage force main and the collection system to serve Kent Island Estates & Romancoke on the Bay. It is anticipated that the in-service timeframe for these two phases will be within 6 years from the initiation of design. Subsequent phases would be addressed from a south (Tower Gardens) to north progression, with the entire service area being served in 10 years if there is no 'down-time' between phases.

In order to keep the project affordable to property owners, the county does not intend to serve the areas with public water as there is no known health or environmental issue associated with the on-site wells currently being used.

Southern Kent Island - Funding

The estimated cost of the STEP system is $37.4M as is detailed on the estimates provided in Appendix IX – Section 5. This is considerably cheaper than the $49.1M cost for a vacuum system and it is believed that the actual cost for the STEP system will be cheaper than the current estimate of $37.4M

Funding for the project comes from three primary sources.

- The construction cost will be funded via a low interest loan from the Maryland Department of the Environment's Water Quality Loan Fund. As the service area is not located in a Priority Funding Area, the project must be granted a Public Health Exception from the State of Maryland's Smart Growth Coordinating Committee.

- The 2014 Maryland Legislature passed a modification to the Bay Restoration Fund law (know as HB-11) that allowed those grant funds to be used to subsidize the cost of connecting existing homeowners to the system, again provided the project is granted a Public Health Exception from the State of Maryland's Smart Growth Coordinating Committee.

- Following the convention utilized in both the Cloverfields and Bay City's septic system abatement projects, unbuildable vacant lots within the service area (i.e. those lots without a valid 'perc' test, without which a septic system cannot be constructed) are charged an additional fee which is known as the Economic Benefit Premium. This fee is justified since the increase in the value of an unbuildable vacant lot once served with sewer, and hence deemed buildable, far exceeds the increase in value enjoyed by an existing home once connected to sewer. The fee is formula driven and is a function of the number of unbuildable vacant lots ultimately served by the sewer system, as well as the final construction cost.

Refer to Resolution 14-07 for more details on funding (Appendix IX – Section 3).

On July 9, 2014, the State of Maryland's Smart Growth Coordinating Committee conditionally approved the County's request for a Priority Funding Area (PFA) Public Health Exception (refer to Appendix IX – Section 2). The 7 conditions are listed below:

"The following conditions shall apply to the approval of the PFA Exception and failure to implement or comply with any one or more of these conditions may result in revocation of approval.

1. *The provision of sewer service under this PFA exception shall be limited to 1,518 existing single family homes and to no more than 632 currently vacant lots, as shown on the attached sewer service area maps. Service to the vacant lots is to be for single family residential use only. Sewer Service Area maps, clearly delineating the sewer service area boundary, shall be submitted to MDE for approval as an amendment to the county's Master Water and Sewer Plan and referenced in the county's comprehensive plan.*

2. *The county shall report on the status of the provision of sewer service and compliance with these conditions annually through its annual report submission to MDP. The report should include number and location of new connections.*

3. *The sewerage capacity to be provided within the sewer service area as shown on the attached maps shall not to exceed 500,000 gpd. Except for certain non-residential properties as discussed below, each of the lots to be served shall be assigned one EDU which shall not be transferable to another lot. This allocation of maximum capacity shall be submitted to MDE for approval as an amendment to the county's Master Water and Sewer Plan.*

4. *Sewer service to the Kentmorr marina property and other non-residential uses in the service area shall be allocated based upon the existing uses or to the equivalent amount of capacity should an existing use change before service is provided.*

5. *The project must ensure denial of access for any future connections that are not included in the project's service area. This provision must also be incorporated into the county's Master Water and Sewer Plan.*

6. *The county shall adopt provisions in its floodplain ordinance in conformance with the 2013 model Maryland Floodplain Ordinance, requiring all new, substantially improved, and reconstruction of substantially damaged structures as meeting or exceeding the requirements of the 2013 model Maryland Floodplain Ordinance, that are located within a mapped Special Flood Hazard Area, to be constructed with a minimum of two (2) feet of freeboard above the 100-year base flood elevation, as defined by the National Flood Insurance program.*

7. *Queen Anne's County, with the technical assistance of the Maryland DNR, shall more thoroughly assess climate change impact vulnerability and outline specific strategies for enhancing resilience to the impacts of climate change (i.e., sea level rise, coastal storm surge, drought, and extreme precipitation related events)."*

Southern Kent Island - Phasing

Phase 1 - Kent Island Estates and Romancoke on the Bay

Platted in the late 1950s, Kent Island Estates and Romancoke are located near the southern extremity of Kent Island, directly adjacent to each other. They share similar soil conditions and both have small lot sizes (typically 10,000 to 20,000 square feet). The two subdivisions combined had approximately 2260 lots of record when platted, of which 777 homes have been constructed (typically on more than one lot). Of the 851 vacant lots remaining, 124 contiguous vacant lots are excluded from the service area in accordance with the Attorney General's opinion of April 13, 2005. Of the 727 remaining lots in the service area, only 450 will remain after the mandatory lot consolidation ordinance.

The Environmental Health Department has estimated that 90% of the existing septic systems in the Kent Island Estates/Romancoke area discharge directly into groundwater on a seasonal basis (March and April when water tables are at their highest). These systems cannot be remedied without utilizing direct groundwater penetration during the high water table season or a holding tank. Because of the small lot sizes, poor soil conditions, and seasonal high water table, such on-site correction is not considered a long-term viable alternative.

In addition, the Environmental Health Department has indicated that of the 777 improved properties, 245 appear to have insufficient land available for a replacement septic system and if deemed failing, a holding tank would be required.

It is anticipated that construction of this phase, which includes the construction of the sewage transmission main along MD Route 8, will begin January 2016 and conclude July 2020. The estimated cost of these improvements is $22,400,000 ($7,000,000 for the transmission main and $15,400,000 for the collection system).

Phase 2 – Tower Gardens Subdivision

Tower Gardens was platted in the early 1970s and is located south of Kent Island Estates on Kent Point Road. Overall the situation in Tower Gardens is not as bad as in Kent Island Estates and Romancoke since the community is not as old and some of the inland lots are much larger than those in Kent Island Estates and Romancoke. However there are numerous small lots, primarily located along the shore of the Chesapeake Bay and Carter Creek, which suffer the same issues as the Kent Island Estates and Romancoke subdivisions. Currently it is estimated that there are 254 properties of which 199 are improved.

The subdivision had 254 lots of record when platted of which 199 homes have been constructed. Of the 33 remaining lots in the service area, only 25 will remain after the mandatory lot consolidation ordinance.

The Environmental Health Department has indicated that of the 199 improved properties, 101 appear to have insufficient land available for a replacement septic system and if deemed failing, a holding tank would be required.

It is anticipated that construction of this phase will begin July 2020 and conclude July 2021. The estimated costs of these improvements are $3,700,000.

Phase 3 - Queen Anne Colony and Kentmorr

These two subdivisions were also platted in the 1950s and 1960s and are immediately adjacent to each other. While Queen Anne Colony typically has one-half to one-acre lots, the poor permeability of the soils and the high water table, particularly amongst the properties along Price Creek, have uncorrectable failures. Kentmorr, on the other hand, has very small lots (typically 5000-ft2) and most improved properties consist of two to four lots of record.

The two subdivisions combined had 944 lots of record when platted, of which 332 homes have been constructed (typically on more than one lot). Of the 412 vacant lots remaining, 272 contiguous vacant lots are excluded from the service area in accordance with the Attorney General's opinion of April 13, 2005. Of the 141 remaining lots in the service area, only 90 will remain after the mandatory lot consolidation ordinance.

The Environmental Health Department has indicated that of the 102 improved properties in Kentmorr, 26 appear to have insufficient land available for a replacement septic system and if deemed failing, a holding tank would be required. Similarly, for the 230 improved lots in Queen Anne Colony, 72 appear to have insufficient land available for a replacement septic system.

It is anticipated that construction of this phase will begin July 2021 and conclude July 2022. The estimated costs of these improvements are $6,800,000.

Phase 4 - Chesapeake Estates, Sunny Isle of Kent, Normans/Batts Neck and Matapeake Estates

These three subdivisions were platted in the 1960s with Chesapeake Estates and Sunny Isle of Kent being immediately adjacent to each other. The community of Normans, also known locally as Batts Neck, is northeast of these two subdivisions and predates any of the subdivisions along Route 8. Matapeake Estates is the northern most community in the SKI service area and is small with regards to

the number of lots, which are typically one acre in size or greater. However, they also have poor soils as is typical of the service area.

The three subdivisions (and Batts Neck/Normans) combined had 510 lots of record when platted of which 210 homes have been constructed (typically on more than one lot). Of the 254 vacant lots remaining, 156 contiguous vacant lots are excluded from the service area in accordance with the Attorney General's opinion of April 13, 2005 (predominately in the Sunny Isle of Kent subdivision). Of the 98 remaining lots in the service area, only 67 will remain after the mandatory lot consolidation ordinance.

The Environmental Health Department has indicated that of the 210 improved properties, 70 appear to have insufficient land available for a replacement septic system and if deemed failing, a holding tank would be required.

It is anticipated that construction of this phase will begin July 2022 and conclude July 2023. The estimated costs of these improvements are $4,500,000.

This concludes the discussion on the Southern Kent Island Public Health Area of Concern.

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

(insert in its entirety – only the document's date and title are listed below)

Section 1 – Environmental Health Documentation & Other State of Maryland Documents

- May 25, 1990 – John Nickerson to Department of the Environment
- April 29, 1997 - John Nickerson to Queen Anne's County Public Works
- December 17, 1998 - John Nickerson to Queen Anne's County Public Works
- February 12, 2004 - John Nickerson to Queen Anne's County Public Works
- November 14, 2007 – Dr. Devadason to Department of the Environment
- July 8, 2011 - John Nickerson to Queen Anne's County Citizen Advisory Board
- June 9, 2014 – Dr. Ciotola to County Commissioners

Section 2 - July 17, 2014 – Maryland Department of Planning – Smart Growth Coordinating Committee – Priority Funding Area Public Health Exception

Section 3 – Policies, Ordinances, and Resolutions

- December 14, 2004 – Resolution 04-68
- April 1, 2013 – Policy Regarding Sewage "Holding Tanks"
- November 12, 2013 – Ordinance 13-24
- May 27, 2014 – Resolution 14-07

Section 4 – Rubin Report

Section 5 – STEP Cost Estimate

Section 6 – Department of then Environment – Depth to High Water Table Maps

Map Amendments

Chesapeake Estates/Sunny Isle of Kent/Batt's Neck/Kentmorr Sewerage Public Health Areas of Concern

Queen Anne Colony and Kentmorr Sewerage Public Health Areas of Concern

Kent Island Estates and Romancoke Sewerage Public Health Areas of Concern

(end of amendment 11-05)

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

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SKI

QUEEN ANNE'S COUNTY
HEALTH DEPARTMENT

206 N. COMMERCE STREET
CENTREVILLE, MARYLAND 21617
301 758-2281

May 25, 1990

Mr. J. L. Hearn, Director
Water Management Administration
Department of Environment
Baltimore, Maryland 21201

Re: Romancoke on the Bay
Kent Island Estates
Sanitary Survey

Dear Mr. Hearn:

The Sanitary Survey for the above referenced subdivisions in Queen Anne's County has been completed with the following results:

I. Romancoke-on-the-Bay
   (a) Number of total homes is 155.
   (b) 132 homes were surveyed.
   (c) 19 homes had septic wastes or laundry wastes ponding on the ground surface or discharging into nearby ditches.
   (d) 6 people indicated their septic systems were sluggish during wet weather.
   (e) Several auger holes (piezometers) were drilled in Romancoke on the Bay. Based upon the seasonal high water table readings in the auger holes, I estimate at least 90% of the homes have septic wastes which directly discharge into the groundwater during the wet season.

II. Kent Island Estates (Sections I, II, III)

   (a) Total number of homes is 572.
   (b) 513 homes were surveyed.
   (c) 92 homes had septic wastes or laundry wastes ponding on the ground surface or discharging into nearby ditches.
   (d) 16 people indicated their septic systems were sluggish during wet weather.

(e) Seasonal high water table readings were observed in several auger holes and piezometers. Based upon these observations I would estimate 70-75% of the homes have septic wastes which directly discharge into the groundwater during the wet season.

There are no known shallow wells in either subdivision. Both communities are served by individual deep wells.

In conclusion, I hope this information is useful in assessing Queen Anne's County's Public Sewer needs. If you or Charlotte have any questions please call me at 758-2281.

Respectively yours,

John E. Nickerson

John E. Nickerson, Director
Environmental Health Services

CC: Honorable Queen Anne's County Commissioners
Dr. John Ryan
Dr. Larry Durante
Mr. Robert Sallitt
Mr. Steve Walls
Mr. Wayne Asplen

ENVIRONMENTAL HEALTH SERVICES
QUEEN ANNE'S COUNTY
HEALTH DEPARTMENT

206 N. COMMERCE STREET
CENTREVILLE, MARYLAND 21617
PHONE: 410-758-2281

April 29, 1997

Mr. D. Steven Walls, Director
Queen Anne's Co. Dept. Of Public Works
P.O. Box 56
Centreville, Maryland 21617

RE: Romancoke on the Bay
Kent Island Estates
Sanitary Survey in the Spring of 1995

Dear Steve,

As a follow-up to our office's sanitary survey conducted in 1990 of the above referenced subdivisions another survey was completed in the Spring of 1995. It should be noted that the weather pattern was one of extreme drought and caution should be exercised as to whether this survey is comparable to a normal wet season. However, this survey's information is valuable in providing additional data for future sewer need evaluations in the Kent Island Estates and Romancoke on the Bay area.

The following comments and results are offered:

I. Background Information

1. A physical survey of this type is only a representation of what was observed or documented on the given survey day.
2. Some of the septic systems showing septic wastes, laundry wastes or kitchen wastes on the ground surface or weeping into nearby ditches, may be exhibiting these conditions only during the seasonal high water table period.
3. Conversely, other systems not shown as failing in this matter during the survey time, may be failing now due to age, lack of maintenance, or increased usage.
4. Other systems observed may be failing intermittently during peak usage even though the survey found no evidence.
5. Of particular importance, is the fact that septic systems are by nature an interim means of waste disposal and will eventually clog to the point they cannot handle the given house's wastewater flow. When this occurs they will "back-up" into the house's plumbing or weep-out to ground level. They then have to be replaced, repaired, or added on to, if there remains a suitable replacement or "recovery area"; state regulations for old lots of record required only one replacement area.

II. Recent and Current Health Department Activities

1. Our office starting in 1989-1990 began implementing more stringent and in general more costly methodologies when repairing or replacing a septic system.
2. Drainfield systems were required in many instances to be elevated and a method of low pressure dosing was utilized to evenly spread the wastewater over the entire drainfield. This requires pump chambers, alarms, pumps, electrical wiring and in general a more complex maintenance procedure. It is our experience (as a generalized statement), the average homeowner lacks the experience or aptitude to assure routine maintenance of his or her septic system. They usually respond when it "doesn't work." (I.e. "The car is

completely broke down")

3. When a homeowner has their septic system repaired by elevating their waste disposal area, they often impact negatively upon surrounding properties. Typically, the run-off water now diverts more intensely to a lower surrounding lot. Hence, some of these repair jobs bring complaints from neighbors about the effects upon their property.
4. Most repairs are now utilizing sand-lined trenches. Use of this technology hopefully will cause the "clogging mat" to form more closely to the land surface. If this "clogging mat" forms close enough to the surface we may be able to physically dig out failed clogged trenches and replace with fresh sand in an attempt to rejuvenate existing drainfields.

III. Results of the 1995 Sanitary Survey are as follows: (Please see 5-25-1990 attached letter to J. L. Hearn for comparison to 1990 Sanitary Survey)

1. Romancoke on the Bay
   a. 160 Homes were surveyed
   b. 31 Homes had septic wastes, laundry wastes or kitchen wastes ponding in the grass or discharging into nearby ditches.
   c. Of the occupants at home, 15 were in favor of public sewer and 10 were opposed.

2. Kent Island Estates (Section I, II, III)
   a. 592 Homes were surveyed
   b. 86 Homes had septic wastes, laundry wastes or kitchen wastes ponding in the grass or discharging into nearby ditches.
   c. Of the occupants at home 98 were in favor of public sewer and 74 were opposed.

IV. Other Comments:

1. Seasonal high water table readings observed in piezometers and auger holes indicate that approximately 80% of the houses discharge septic wastes directly to the groundwater during the wet season.
2. There are no known shallow wells in either subdivision and both subdivisions are served by individual deep wells screened in the Aquia Aquifer.
3. The well casings must pass through the shallow unconfined aquifer in which septic wastes are being discharged. This poses some health risks if the well casings pit or crack or if the grout is inadequate.

In summary, our Environmental Health Division considers public sewer as the long term vision for providing adequate waste disposal for the Kent Island Estates-Romancoke on the Bay subdivisions. If you have any questions please call me at 758-2281.

Sincerely,

John E. Nickerson

John E. Nickerson, Director
Environmental Health Services

CC: The Honorable Queen Anne's County Commissioners
Dr. Devadason, Q.A. County Health Officer
Mr. LaMonte Cook, Acting County Administrator
Mr. Steven Kai-Zeigler, Planning Director

Enclosures: 5-25-90 Letter to J.L. Hearn
11-7-94 Letter to Steve Walls
Regarding Master Water and Sewer Plan Update Issues.

Queen Anne's County Health Department
State of Maryland

206 N. Commerce Street, Centreville, MD 21617-1049
Tel: 410-758-2281 • Fax: 410-758-6602

February 12, 2004

ENVIRONMENTAL HEALTH SERVICES

To: Mr. D. Steven Walls, Director of Public Works

From: John E. Nickerson, Director of Environmental Health JEN

Re: Kent Island Environmental Health Department Concerns Regarding Failing and Inadequate Septic Systems in "Older Subdivisions"

Attached are a compilation of various letters, documents and comments regarding the above referenced subject by our office. In addition, the following comments are offered:

1. The need for public sewer to Kent Island Estates - Romancoke on the Bay remains as strong or stronger than as stated in previous discussions.
2. Other smaller "older-type subdivisions" such as Matapeake Estates, Sunny Isle of Kent, Chesapeake Estates, Kentmorr, Queen Anne Colony, Marling Farms, Dominion area and to a lesser extent Tower Gardens are all in need of public sewer to address their inadequate on-site waste disposal. These needs are similar to Kent Island Estates & Romancoke on the Bay except for the magnitude of the number of failures. House percentage failure rates are comparable.
3. Isolated individual homes in the Batts Neck-Normans cluster area should be served by public sewer, as this area also has seasonal septic system failures.
4. Once a decision is finalized to provide public sewer, the timing of serving each community can be implemented by the most cost effective method for staging of construction.
5. The Health Department's position is that public sewer is the only practical and permanent solution to provide adequate domestic waste disposal to these "older subdivisions". In addition, public health nuisances, groundwater contamination concerns and the negative impact to nearby shellfish growing waters would all be eliminated with public sewer service to these areas.

CC: Dr. Devadason, Health Officer
The Honorable Queen Anne's County Commissioners

Enclosures: 12/17/98 Letter to Steve Walls
4/29/97 Letter to Steve Walls
Wastewater and Health Article
The History of Plumbing Article
Septic Systems Handbook
5/25/90 Letter to J.L. Hearn

ENVIRONMENTAL HEALTH SERVICES
QUEEN ANNE'S COUNTY
HEALTH DEPARTMENT
206 N. COMMERCE STREET
CENTREVILLE, MARYLAND 21617
PHONE: 410-758-2281

TO: Mr. D. Steven Walls, Director of Public Works

FROM: John Nickerson, Director of Environmental Health

DATE: December 17, 1998

RE: Southern Kent Island Environmental Health Department Issues

The following information and comments are offered regarding certain public health concerns which you may wish to incorporate or reference in your executive summary to the County Commissioners.

General Comments:

1. As "Approving Authority" for individual on-site waste disposal systems and water supplies for Queen Anne's County the "older small lot subdivisions" on Kent Island represent the greatest challenge for our office in assuring adequacy of water and sewer. In most instances lot size constraints represent the most significant limiting factor to continue providing adequate on-site waste disposal. Repairing, replacing or adding on to existing septic systems becomes increasingly difficult and more expensive. Homeowners are limited as to expanding their living space or allowing accessory uses such as swimming pools or garages when these proposals adversely affect their sewage system replacement areas. Our office has not formally tracked building and use permit denials or alterations. My staff indicates the majority of these denials or changes to the original requests occur via phone or via office visits prior to actual building permit applications. Public sewer to the "older small lot subdivisions would be of intrinsic benefit to property owners as it would allow them to maximize their uses according to zoning restraints.

2. Kent Island Estates-Romancoke on the Bay continue to "stand out" as the designated number one priority area for public sewer from an Environmental Health viewpoint. If one were to review and consider all areas of Queen Anne's County currently served by septic systems this area has the greatest priority for the following reasons:
   a. Small lot sizes
   b. Number of existing houses clustered on a limited acreage
   c. A seasonal high water table (Feb-April) which causes the septic system discharges not to be properly attenuated before entering the State's groundwater. This condition constitutes a septic system failure by traditional public health definition. A homeowner's definition of failure would be when wastewater backs up in the house

plumbing or significantly overflows on the ground surface.

3. The 1989 Health Department Study currently in Queen Anne's County Master Water and Sewer Plan was conducted by E. Wayne Asplen, Regional Consultant for the Maryland Department of Environment and myself. It must be emphasized that this study assigned higher risk weight to sewage directly penetrating groundwater and that the uncorrectable failures relates to failures because of groundwater penetration. This study does not correlate to the failure that homeowner's recognize which is sewage backing up in their plumbing or overflowing on the ground.

4. There are over 750 homes in Kent Island Estates-Romancoke on the Bay. Seasonal high water tables observed in piezometers and auger holes indicate at least 80% of these houses discharge septic wastes directly to the groundwater during the wet season (March, April). All the well casings for these homes go through the shallow groundwater where sewage wastes discharge in order to reach the Aquia Aquifer which is a "confined aquifer" utilized for their water source. There is no known bacterial contamination or nitrate-nitrogen contamination of the Aquia Aquifer at this location. However, there is a risk associated with this existing situation. Pitted or cracked well casings or inadequate grouting around the casings is a risk factor which could cause contamination to the drinking water. The health risks because of the density of housing and the direct penetration of the groundwater with sewage wastes is significantly higher than areas of the County where there is less density and no direct penetration of the groundwater with sewage wastes.

5. Documented health disease outbreaks because of sewage wastes occurs most often when people drink water contaminated with sewage. (See attached plumbing history, septic systems handbook, and wastewater and health literature) There are risks with sewage discharging on top of the ground if children, animals, or adults physically come in contact with the wastes. Health journals indicate flies, cock roaches and other pests may cause indirect contamination of food sources. There have been several outbreaks of disease associated with shellfish (oysters, clams) contaminated from sewage wastes running off into shellfish growing areas.
Again, Kent Island Estates-Romancoke on the Bay rate the first priority for public sewer in Queen Anne's County because of the potential for a water related sickness caused directly or indirectly by sewage contamination. Health officials have particular concerns about what they refer to as infective doses or concentrations. The high density of homes in this area causes a greater concentration of sewage wastes in the shallow groundwater.

6. There have been two physical surveys of Kent Island Estates-Romancoke on the Bay to document sewage wastes ponding in the grass or running into nearby ditches. (See attached 1990 and 1995 surveys and discussion in letter of 5-25-90 to J.L. Hearn and letter of 4-29-97 to Steve Walls.) Conducting any further studies of this type for this area, I believe, would serve no particular value as there appears to be no significant difference in the pattern of "homeowner type failures." Weather conditions, change of ownership, changes in wastewater volume, and an average of approximately (7) seven repairs of septic systems per year in this area provide a continual change year to year. My staff has

not formally tracked complaints, but are of the opinion there is no significant noticeable increase in the level of complaint activity from Kent Island Estates-Romancoke on the Bay. They estimate an average of 10-12 citizen complaints per year from this area regarding septic system failures. This represents the highest number of complaints when compared to any other area (subdivision) in the County.

7. As you are aware, Planning and Zoning have segmented Southern Kent Island into four (4) segments (A,B,C,D) for purposes of evaluating certain scenarios if public sewer served these segments. It is obvious by their map where the greatest density of small lots clustered together occurs. Subdivisions such as Sunny Isle of Kent, Chesapeake Estates, Kentmorr and Kent Point are similar in lot sizes as Kent Island Estates-Romancoke on the Bay. As a generalized statement these subdivisions have comparable Environmental Health concerns as Kent Island Estates and Romancoke on the Bay. The per cent of homes with their sewage wastes directly penetrating groundwater during the wet season is approximately 75 per cent and a physical sanitary survey would probably show similar "homeowner failure per cent rates. The difference is in the number of lots, the number of existing homes, and citizens being affected.

8. Public water would not be required by our Environmental Health office should any or all of these areas be served with public sewer. However, public water is considered as a better method of providing water rather than each lot having its own well. In addition, there will occur demand for a significant number of new wells to serve vacant lots which would become buildable with public sewer. This increased usage may cause the potential for increased salt-water intrusion into the Aquia Aquifer along the western edge of Kent Island. Our office would strongly recommend that if public water were provided that all existing wells be required to be abandoned and sealed. Existing wells left in Cloverfields and Bay City have become an enforcement "nightmare" to determine if they are routinely in use. Wells not routinely used pose the specific hazard of the homeowner not recognizing any changes in the water such as "dirty water" from an eroded casing. This in turn causes unnecessary risks for contamination of the Aquia Aquifer.

Summary Comments:

1. The critical question becomes when should public sewer be provided for these "older small lot subdivisions," in particular Kent Island Estates-Romancoke on the Bay. If one considers a septic system failure as one with direct groundwater penetration then the answer is immediately. As a practical matter the homeowner definition of failure should be weighed more heavily, because ultimately the people within the communities must acknowledge and recognize they have a significant problem that public sewer would rectify. In addition, I am of the opinion that most vacant lot owners would vote for public sewer immediately. The cost to each homeowner for public sewer will become the overriding decision factor.

2. There are other County Commissioner concerns besides the health Department issues, such as vacant lot build out overcrowding schools, increased road traffic, private versus public roads, stormwater management, solid wastes increase, and last but not least, debt load.

3. Our office will continue to strive to serve the citizens with on-site repairs. I do not believe "pump and haul" methods are practical because of excessive costs.

4. Currently, I am reviewing (as time permits), each record of the older subdivisions on Southern Kent Island that our office has on file. I am compiling a list of the dates of septic system installations, the type of system installed, and the corresponding Lot, Block, Section Number. This information will prove useful for tracking new type of installations such as low pressure dosing, sewage effluent pumped systems, sand lined trenches, septic tank replacements. In addition, I am tracking some seasonal water table readings from utilizing the piezometer or auger hole reading method.

CC: Dr. Devadason, Health Officer

Enclosures: 5-25-90 Letter to J.L. Hearn
4-29-97 Letter to Steve Walls
Wastewater and Health Article
The History of Plumbing Article
Septic Systems Handbook

SKI File

Queen Anne's County Health Department
State of Maryland

206 N. Commerce Street, Centreville, MD 21617-1015
Tel: 410-758-2281 • Fax: 410-758-6602

ENVIRONMENTAL HEALTH SERVICES

November 14, 2007

Robert Summers, Ph.D.
Deputy Secretary
Maryland Department of Environment
1800 Washington Blvd.
Baltimore, Maryland 21230

Sub: Queen Anne's County - Southern Kent Island older subdivisions- Public Sewer

Dear Doctor. Summers:

I first want to thank you and your staff for meeting with us on November 8, 2007. My staff and I found the meeting very helpful and productive. The following comments summarize our discussions.

1. Areas of failing septic systems on southern Kent Island have been designated in Queen Anne's County Master Water and Sewer Plan since 1975. (see attached Exhibit 1).
2. The former Environmental Health Director, Mr. James Morris, who retired in July, 1987, held the opinion that the "older subdivisions" platted on Kent Island would eventually be served by public sewer.
3. Since 1987 the current Environmental Health Director, Mr. John Nickerson, has spent considerable time and effort interacting with Queen Anne's County officials as to the need for a permanent solution to the wastewater disposal needs of these older subdivisions. You have copies of some of his correspondence to county officials.
4. Mr. Nickerson and his Assistant Director, Mr. Chester Cissel, Jr. have over 70 years of experience regulating on-site waste disposal in Queen Anne's County. Both concur that these "older subdivisions" on Kent Island are the number one priority in Queen Anne's County for a permanent solution to their wastewater disposal issues.
5. The Department of Environment in 1989 concurred and supplied legal support to enable Mr. Nickerson to require re-evaluation of vacant lots with approved soil evaluation tests of which several hundred were re-evaluated with many prior approvals overturned in these "older subdivisions".
6. The Department of Environment and the Queen Anne's County Commissioners approved a Groundwater Protection Report for Queen

Anne's County written in 1989 by Mr. Nickerson. This plan was incorporated into the Queen Anne's County Master Water and Sewer Plan and addresses the need for a permanent solution to the wastewater disposal for older subdivisions on Kent Island.

7. Most of the individual waste disposal systems in these older subdivisions are non-conforming and have been considered an interim means of disposal until a permanent solution can be provided.
8. The Queen Anne's County Master Water and Sewer Plan indicated that the Kent Island Estates-Romancoke on the Bay subdivisions would be served with public sewer by the year 1998. (see attached Exhibit 2)
9. A seasonal high water table map indicates that approximately 90% of the septic systems in Kent Island Estates-Romancoke on the Bay Subdivisions directly penetrate the shallow groundwater. (plat labeled as Exhibit 3 is attached)
10. A report by Accurate Environmental, a private consulting firm, which evaluates septic systems for real estate transfers, indicates a 53% failure rate in Kent Island Estates-Romancoke on the Bay. This compares to a 15% rate on their statewide evaluations. (Report labeled as Exhibit 4 is attached)
11. The Queen Anne's County Commissioners hired a private consultant, Doctor Rubin, to review possible options to address the failing septic system problems in these "older subdivisions". His report is attached and labeled as Exhibit 5. It should be noted that Dr. Rubin, who has a reputation as one who is opposed to the so-called "big sewer" solution. His summary report indicates that public sewer seems to be the most viable option to address the failing septic system problem on Kent Island.
12. Fortunately, the water wells in these "older subdivisions" are deep wells in the Aquia Aquifer and the Queen Anne's County Health Department has no known incidents of sewage wastes in their water supply.
13. From 9-1-2006 until 3-29-2007 the Environmental Health Office of Queen Anne's County responded to 107 requests concerning repair or replacement of septic systems for the entire Queen Anne's County. It is noteworthy that 37 of these requests were in the subdivisions of Kent Island Estates-Romancoke on the Bay. (See the attached Exhibit 6)
14. Environmental Health staff have a difficult time responding to septic system repair requests in these areas designated for public sewer. Understandably citizens do not want to expend on a short term solution because of anticipated public sewer.

We believe that there is clear evidence of continuing septic failures and that a permanent solution is warranted, which will not only alleviate public health concerns, but also minimize or eliminate environmental pollution as they relate to ground water penetration and the health of the Chesapeake Bay. You will agree that the mission of local public health is to prevent disease rather than to respond to outbreaks once they occur.

It is worth mentioning that the Board of County Commissioners by resolution set aside 500,000 gallons of sewer capacity in anticipation of a public sewer system serving this part of Kent Island.

Your concurrence to our recommendation will be appreciated. We look to the Maryland Department of the Environment to support the efforts that have been undertaken at the local level on behalf of MDE and public health, in protecting the peoples' health and the environment.

Sincerely,

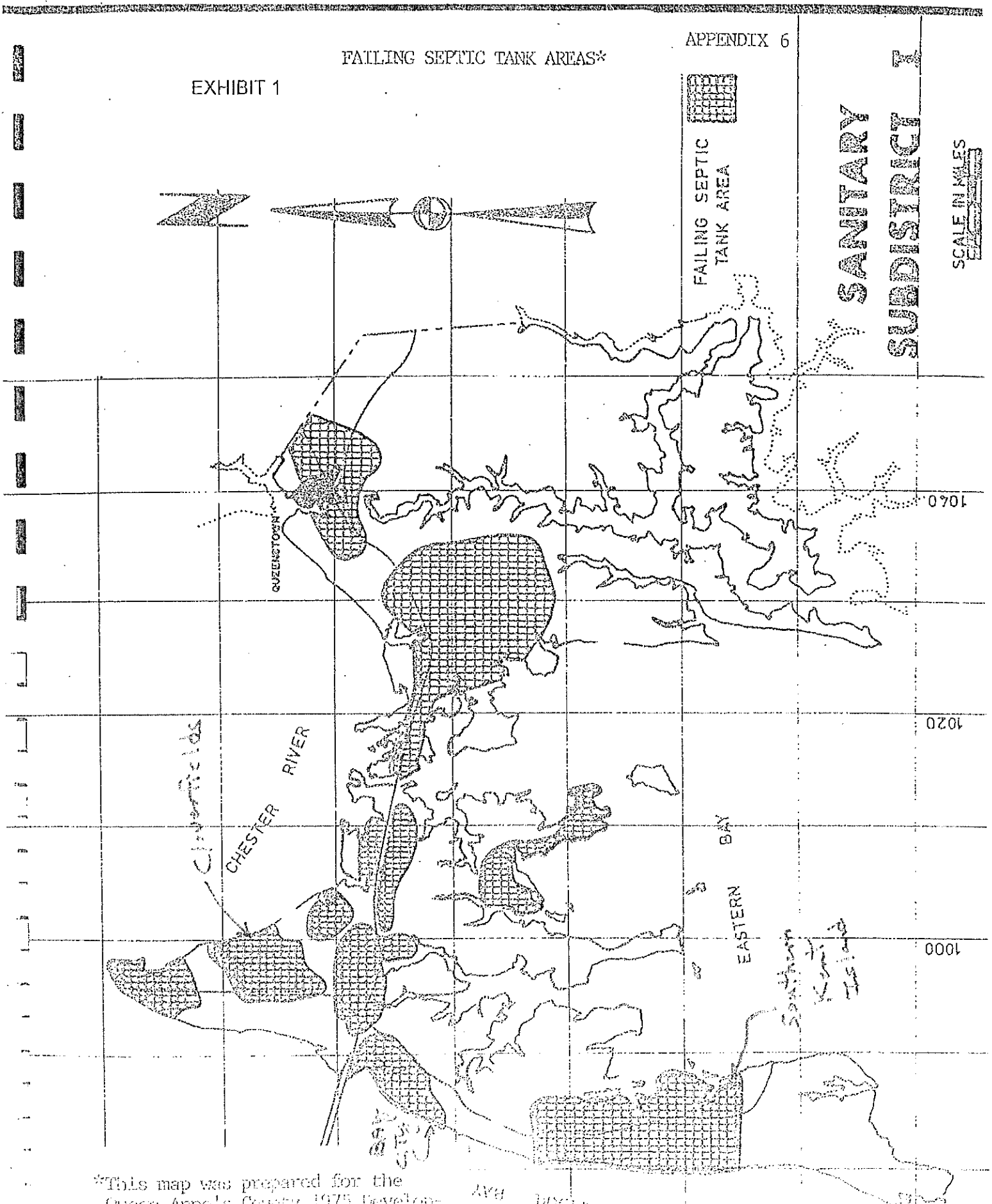
Dr. C. Devadason
Health Officer

Cc: Queen Anne's County Commissioners
Mr. D. Steven Walls, Director of Public Works
Mr. Myron Richardson, Chairman –Q.A.C. Public Works Advisory Board
Mr. John Borders, County Administrator
Mr. John Nickerson

APPENDIX 6

FAILING SEPTIC TANK AREAS*

EXHIBIT 1



*This map was prepared for the Queen Anne's County 1975 Development Study based on a map which appears in the [illegible]

EXHIBIT 2

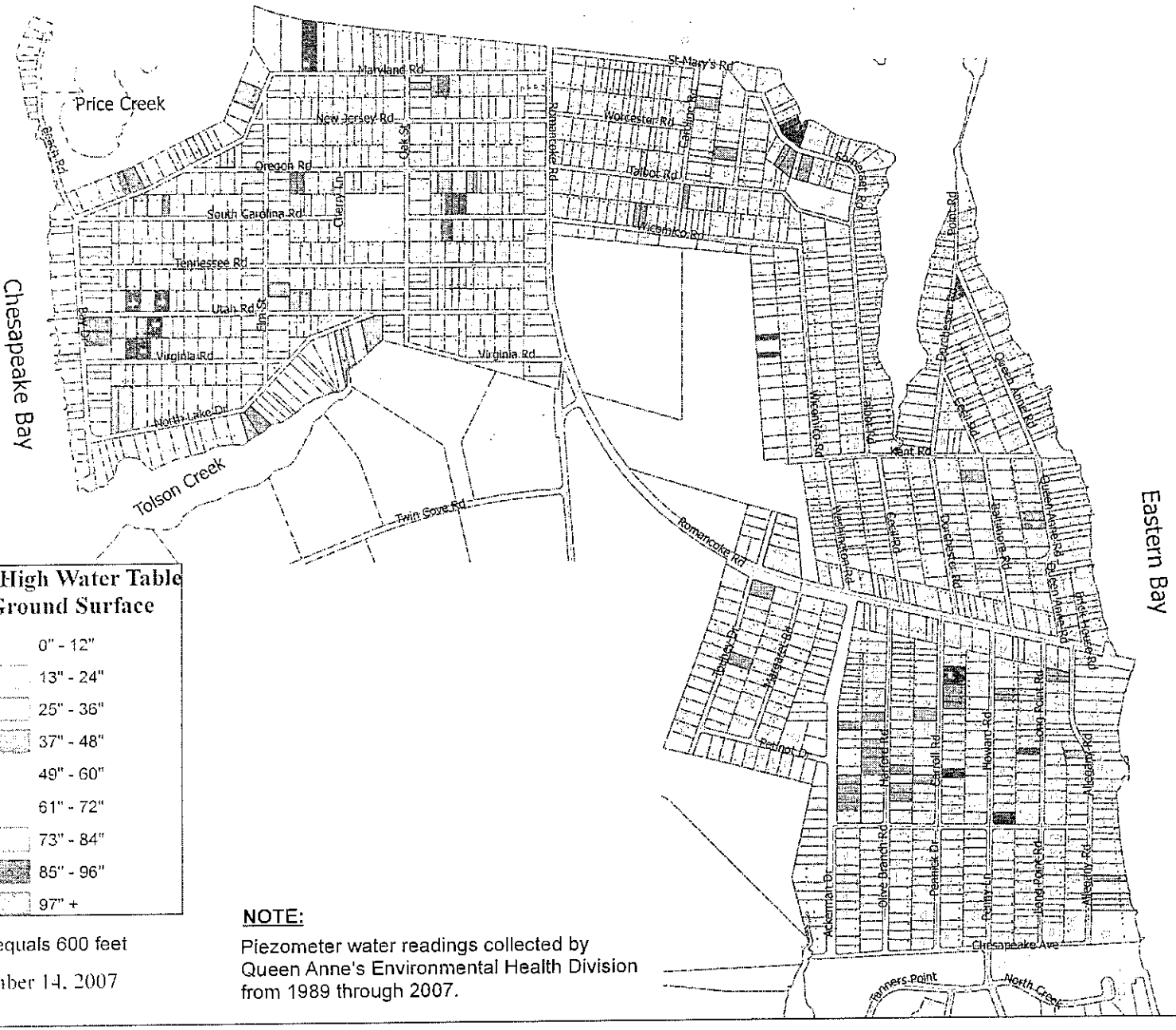
1992 PLAN

TABLE 3-8

QUEEN ANNE'S COUNTY
IMMEDIATE, 5- AND 10-YEAR PRIORITIES FOR
SEWERAGE DEVELOPMENT

Fiscal Year and Project Number	County Priority	Coordinate Location	Description	COSTS Total $ (x 1000)	PL 600 Eligibility	Other Federal	Local	PROJECT SCHEDULE Preliminary Plans	Financial Plans	Start Construction	Complete Construction
1990-01	1	425N 997E	Cloverfields	7,605				FY 1990	FY 1992	FY 1993	FY 1995 — Built
1990-02	2	413N 987E	Bay City	6,072				FY 1991	FY 1993	FY 1994	FY 1996 — Built
1992-01	3	Plant 397N 982E	Southern Kent Island	6,621				FY 1992	FY 1993	FY 1994	FY 1998
		Overall 396N 975E		7,661							
1998-01	4	405N 1005E	Dominion Marling Farms	6,070				FY1998	FY 2000	FY 2000	FY 2002

Kent Island Estates & Romancoke on the Bay - Seasonal High Water Table From Ground Surface



1 inch equals 600 feet

November 14, 2007

NOTE:

Piezometer water readings collected by Queen Anne's Environmental Health Division from 1989 through 2007.

Accurate Environmental Consulting, LLC

9317 High Banks Dr., Easton, MD 21601
Phone: (410) 819-3166
Fax: (410) 763-7200

July 8, 2004

EXHIBIT 4

John Nickerson, Director
Division of Environmental Health
Queen Anne's County Health Department
Centreville, MD 21617

Dear Mr. Nickerson:

Review of the data regarding the inspection of septic systems in Queen Anne's by this firm in the last five years shows the following:

Statewide failure rate: 15% (3000+ inspections)

Queen Anne's County failure rate: 29% (568 inspections)

Failure rate within Kent Island Estates and Romancoke: 53% (133 inspections)

If the later two subdivisions are removed from the data Queen Anne's County shows a 20% failure rate.

Systems that are less than five years old are rarely requested to be tested by the complete septic system evaluation process. Thus the failure rate is slightly skewed. Also, Accurate Environmental is often contracted to provide a second opinion on septic systems deemed unacceptable by individuals who do not possess our unique environmental health license foundation of knowledge, training and experience.

As you are well aware homeowners consider failure to be sewage ponding on the ground surface. They do not consider sewage seeping toward the surface as failure that we must consider when performing an inspection for a real estate transfer. Nor do they consider their attempts to manage their wastewater so the back-ups into the house are controlled as failure of the system, which we often must prove with the inspections. Also, homeowners and all inspection firms do not account for groundwater contamination, which occurs from the systems penetrating the water table on lower Kent Island.

Sincerely,

Lester W. Coble, Jr., R.S.
Environmental Health Scientist

Queen Anne's County Health Department
State of Maryland

206 N. Commerce Street, Centreville, MD 21617-1049
Tel: 410-758-2281 • Fax: 410-758-6602

ENVIRONMENTAL HEALTH SERVICES

7/8/11

Mr. J. Michael Warring PE, Chairman
Queen Anne's Co. Public Works Advisory Board
P.O. Box 31
Queenstown, MD 21658

Re: (S.K.I.) Southern Kent Island Sewage Concerns

Mr. Warring,

After attending the 6/1/11 Public Works Advisory Board Meeting the following comments are offered for your consideration:

1. It was evident to me there are members of the Board you chair that understand the scientific facts of the issues regarding the S.K.I. sewage disposal problems. There are others who question the scientific facts and even the testimony of those recognized as experts.
2. I base my final decisions upon the best known scientific facts available to me as "Approving Authority" for on-site waste disposal in Queen Anne's County. The Judicial system has upheld my decisions based upon scientific facts. Those facts have not changed no matter what developers, individual lot owners or individual citizens choose to understand.
3. The following facts continue to exist:
   (a) Seasonal high water tables causing severe limitations to on-site waste disposal systems.
   (b) Small lot sizes and small lot areas to accommodate on-site waste disposal systems.
   (c) Slowly permeable soil conditions which limit the ability of the sewage wastes to percolate through the upper soil strata.
   (d) Poor surface drainage.
   (e) Failing septic systems needing a permanent solution to the property's wastewater disposal needs as on-site remedies require continual penetration of the State's Groundwater with sewage wastes. Less and less available lot area for even these types of system repairs.
   (f) The impractical solution of "holding Tanks" because of homeowner pumping costs and enforcement problems. In addition, the sewage still has to be trucked at great energy and money costs to the K.N.S.G. sewage treatment plant versus being transported by a sewer main.

(K)

4. When our office overturned previously approved percolation tests the Administrative Judicial System upheld our decisions based upon testimony regarding failing septic systems. The Maryland Department of Environment provided technical and legal support of the denied septic system permit applications. It is to be noted, if there were no septic system failure problems then many of the existing vacant lots would be able to obtain a permit to build.

5. One of your Board members suggested each home could have their own "little sewage treatment plant" in lieu of one well run County Operated Sewage Treatment Plant. These "little package treatment plants" historically were produced by manufacturers at the requests of developers and builders. The developers were seeking some method to overcome the denial of building permits because of unsuitable lot and soil conditions for on-site waste disposal. Some states allow these technologies to treat and surface discharge the treated sewage wastes. My professional opinion is that it is unsound thinking to conclude that ultimately 1500+ individual homes each having their own little sewage treatment plant would operate correctly as a permanent wastewater disposal solution versus one main sewer collection pipe transporting the sewage wastes to a properly run E.N.R. Sewage Treatment Plant. In addition, 500,000 gallons of the County owned Plant (K.N.S.G.) is dedicated to the S.K.I. sewage disposal problem. The E.P.A. concludes that individual homeowner managed treatment plants across the nation are a failure because of lack of maintenance and lack of enforcement capabilities to assure their proper operation. The majority of these small treatment plants at best provide partial secondary treatment and not tertiary treatment to remove all the pathogenic organisms. Also, if these individual treatment units were a permanent wastewater disposal option, then it would be plausible the vacant lot owners could utilize the same technology to exercise their right to build.

6. Comments made at the 6/1/11 meeting suggested that "mound systems" were the solution to the septic system failure problem. Mound systems are a disposal technique that is site specific. They are not a "cure all" for all lot soil and site conditions; otherwise many of the vacant lots would be using this technology. When our office evaluates a vacant lot of record for on-site waste disposal and an existing home's septic system repair or replacement options, mound system potential is taken into consideration as an option.

   Vacant lots have failed mound tests because of slowly permeable soils within the first 2 feet from ground surface. Infiltration rates ranged from 1/8 inch in 600 minutes to ¼ in 800 minutes. Conventional mounds for subdivision of ground require infiltration rates no slower than 1 inch in 60 minutes. Alternative mounds for lots of record require infiltration rates no slower that 1 inch in 120 minutes. Innovative mounds for existing septic system repair require infiltration rates no slower than 1 inch in 240 minutes. All mounds require a seasonal high water table no closer than 2 feet from ground surface.

   Soil conditions on Southern Kent Island in the first 2 feet from ground surface are clay, clay loams, silts, silt loams and sandy clay loams with poor soil structure. These soils normally will not pass mound tests. Even if soils could be found to pass infiltration tests, most lots have insufficient lot area and lot configuration to accommodate a mound system.

What our office has approved are elevated low pressure dosed sand lined trenches directly penetrating the groundwater into the water bearing sand strata. These trenches are elevated in an attempt to overcome high water tables. They help shed surface water, but typically adversely impact surrounding land by diverting rainwater to lower areas. Lay people and homeowners sometimes think these systems are "mound systems".

7. A regular septic system discharges approximately 60 mg/liter of nitrogen. A Best Available Technology ("BAT") septic system discharges approximately 20-30 mg/liter of nitrogen. The County owned KSNG enhanced nutrient reduction sewage treatment plant discharges approximately 2.5-3.0 mg/liter of nitrogen. Connecting septic systems to public sewer is an EPA and State of Maryland priority to help reduce nutrient pollution to the Chesapeake Bay and its Tributaries.

8. The State of Maryland's Revolving Loan fund and Grant finding should be sought to help defray the costs of the public sewer. Because of the public health concern the project should qualify for eligibility requirements even though it currently is not a priority funding area.

9. The County listed these failing septic system areas in their Master Water and Sewer Plan for over 30 years. The 1990 Master Water and Sewer Plan indicated the Kent Island Estate-Romancoke on the Bay area would be served with public sewer starting construction in Fy 1994. (Table 3-8 enclosed) The local Department of Health has been placed in the awkward position of responding to septic system repairs and failures, attempting to keep sewage wastes from ponding directly on the ground surface or running into drainage areas, while believing the County would follow their own Master Water and Sewer Plan and provide public sewer as a permanent solution.

In conclusion, it is my professional opinion public sewer is the proper permanent solution to the S.K.I. sewage disposal issues. The County already has a well run E.N.R. Sewage Treatment Plant with 500,000 Gallons of its capacity dedicated for this purpose.

If I can be of further service please call me at 410-758-2281.

Sincerely,

John E. Nickerson

John E. Nickerson, Director
Environmental Health Services

CC: The Honorable Queen Anne's County Commissioners
Mr. Gregg Todd, County Administrator, Queen Anne's County
Mr. Todd Mohn, Director Queen Anne's County Dept. of Public Works
Mr. Alan Quimby, Chief Sanitary District Engineer, Queen Anne's County
Dr. Robert Summers, Secretary Maryland Dept. of Environment
Dr. Chinnadurai Devadason, Health Officer, Queen Anne's County

TABLE 3-8

QUEEN ANNE'S COUNTY
IMMEDIATE, 5- AND 10-YEAR PRIORITIES FOR
SEWERAGE DEVELOPMENT

Fiscal Year and Project Number	County Priority	Coordinate Location	Description	COSTS Total $ (x 1000)	PL 600 Eligibility	Other Federal	Local	PROJECT SCHEDULE Preliminary Plans	Financial Plans	Start Construction	Complete Construction
1990-01	1	425N 997E	Cloverfields	7,605				FY 1990	FY 1992	FY 1993	FY 1995
1990-02	2	413N 987E	Bay City	6,072				FY 1991	FY 1993	FY 1994	FY 1996
1992-01	3	Plant 397N 982E Overall 396N 975E	Southern Kent Island	6,621 7,661				FY 1992	FY 1993	FY 1994	FY 1998
1998-01	4	405N 1005E	Dominion Marling Farms	6,070				FY1998	FY 2000	FY 2000	FY 2002

Queen Anne's County Department of Health
Division of Environmental Health Services
206 N. Commerce Street, Centreville, MD 21617-1049
Tel: 410-758-2281 • Fax: 410-758-6602

Memo to: The Honorable Queen Anne's
County Commissioners

From: Dr. Joseph Ciotola, Health Officer
for Queen Anne's County

Date: June 9, 2014

RE: Need to serve "older subdivisions" on Southern Kent Island (SKI) with public sewer

The following comments are offered for your consideration:

1. The Queen Anne's County Department of Health's position remains firm that the permanent solution for domestic wastewater disposal from homes in the SKI communities is the County owned and maintained ENR Sewage Treatment Plant that has 500,000 gallons of dedicated capacity to eliminate the inadequate on site waste disposal systems.
2. There are numerous previous correspondences from the Queen Anne's County Department of Health detailing needs and concerns for a permanent means of sewage treatment and disposal for the SKI communities.
3. Dr. Rubin's report concurs with the our Department's position as stated below:
    a. "The small lots in the Kent Island communities are not well suited as permanent receiver sites for treated domestic wastewater."
    b. "In addition, these package treatment systems cannot rectify the hydraulic limitation of the soils. As such surface breakthroughs by the sewage would not be remedied nor would any existing "backing up" of the plumbing into the home during wet weather periods."
    c. "Since no large scale dispersed treatment options are available, use of the Public Utility District facility appears most cost effective. Use of this centrally managed facility offers the greatest potential for assuring assets are available to improve treatment levels in the future."
4. Your Department of Public Works Advisory Board after extensive review concluded the SKI area is an area of definite "public health concern" because of failing on-site waste disposal systems and the County ENR Sewage Treatment Plant is the recommended permanent solution to address this public health concern.

In conclusion, the Department of Health does not consider it prudent to delay installing a "collection system" to convey the sewage to your ENR Sewage Treatment Plant. This project was slated in your Master Water and Sewer Plan to be completed in 1998. Our office is now having to require "sewage holdings tanks" whereby the sewage is pumped and hauled to your ENR plant. This is very costly and inefficient as compared to well known collection system options.

If you have any questions or if our Department can be of further service please contact me.

Cc: Mr. Greg Todd, County Administrator
Mr. Todd Mohn, Director of Public Works
Mr. Alan Quimby, Sanitary Engineer
Dr. Summers, Secretary Maryland Dept. of Environment
Dr. Joshua Sharfstein, Secretary Dept. of Health and Mental Hygiene

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

Section 2 - July 17, 2014 – Maryland Department of Planning – Smart Growth Coordinating Committee – Priority Funding Area Public Health Exception – Approval Letter

July 17, 2014

Virginia Kearney
Deputy Director
Water Management Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Dear Ms. Kearney:

The Smart Growth and Neighborhood Conservation Coordinating Committee (SGCC) met on July 9, 2014, to review a request by the Maryland Department of the Environment for a Priority Funding Area (PFA) exception for a sanitary sewer project in Southern Kent Island in Queen Anne's County.

Queen Anne's County is requesting a Priority Funding Area (PFA) exception to provide public sewer to 1,518 existing homes and a maximum of 632 vacant lots on Southern Kent Island (SKI) in an area that is not in the PFA. This project will provide public sewer to nine communities on SKI bordering the Chesapeake Bay and the Eastern Bay.

The Program /Funding Source for the project includes $ 37.4 million in State Revolving Loan (SRF) funds for four phases of construction and $ 11.76 million in Bay Restoration Funds (BRF) to cover the WWTP fee of $7,750 for each of the existing 1,518 homes.

MDE presented information to the SGCC that this area is of significant public health and environmental concern due to the large number of septic systems penetrating groundwater. Currently, almost all of the septic systems in the SKI service area discharge directly into groundwater and 70% are in the Critical Area, which means that they are within 1,000 feet of the Chesapeake Bay or Eastern Bay. The SKI region has a high groundwater table and soils with poor permeability. These two characteristics are unsuitable for on-site sewage disposal systems (OSDS). The high groundwater results in insufficient treatment of pathogens found in sewage. The poor surficial soil permeability limits the utilization of alternative systems that do not penetrate groundwater, such as mound systems. These site characteristics also facilitate the delivery of nitrogen to the Chesapeake Bay. In addition, most of the lots are too small for replacement OSDS systems. However, even if the lots were larger, innovative systems at this location would not

eliminate the liquid component of sewage, treat pathogens, or reduce nitrogen loads adequately to alleviate the public health and environmental concerns.

The replacement of OSDS systems on SKI is not a feasible alternative according to MDE. The County's proposal to provide public sewer will overcome the site limitations of the region by segregating the sewage effluent from the high groundwater and will provide superior treatment of the effluent at the existing Kent Narrows / Stevensville / Grasonville (KNSG) wastewater treatment plant (WWTP) by eliminating pathogens as well as reducing the nitrogen loads to Enhanced Nutrient Removal (ENR) levels.

The SKI Sanitary Project proposes to serve 1,518 existing homes and a maximum of 632 vacant lots out of a potential of 1,600 vacant lots in the proposed SKI service area. As to the 632 vacant lots in the proposed SKI service area, the 2005 Opinion of the Attorney General indicates that service should generally be provided to vacant lots adjacent to a sewer line (with certain exceptions). To minimize infill while complying with the Attorney General's Opinion, the County is implementing several measures. First, the County purposely did not increase the density in the SKI area (by not designating this area as a growth area) and did not seek a PFA designation. Second, the County designed the sewer service area to exclude large blocks of vacant lots from the service area and to only include vacant lots interspersed among existing homes. Third, the County reduced the number of potential vacant lots through adoption of a Lot Consolidation Ordinance. Fourth, the County allocated a limited amount of capacity (500,000 gpd) at the KNSG WWTP to serve just the existing homes and vacant (consolidated) lots in the service area. Fifth, the County included a "denied-access" designation on the main sewer line in its draft Water & Sewer Plan to prevent additional sewer connections. Finally, the County will further acknowledge the location of the service area and the maximum number of sewer connections allowed when it signs agreements with MDE for grants. (The grant conditions considered necessary to alleviate a significant health hazard have been upheld by the Maryland courts.) Although the County proposes to serve a maximum of 632 vacant lots, the County anticipates that only 560 vacant lots will ultimately be served due to environmental site constraints and historical build-out patterns. The County's actions have thus reduced the amount of infill development in the SKI service area from a potential of 1,600 lots to a maximum of 632 lots, a reduction of almost 1,000 lots.

MDE estimates that 30,400 pounds per year of nitrogen are currently being discharged into the Bay from the SKI service area. Once connected to the KNSG wastewater treatment, MDE estimates that 13,100 pounds per year of nitrogen will be discharged from the SKI service area. This is a reduction of 17,300 pounds per year of nitrogen, which far exceeds the nitrogen reduction from alternative OSDS systems. This reduction in nitrogen loads will also help the County reach about 33 percent of its septic system goal for the Chesapeake Bay Watershed Implementation Plan (WIP).

The SKI Sanitary Project strikes a balance between solving a significant public health problem and allowing a limited amount of infill development. Almost all of the septic systems in the proposed service area are discharging untreated sewage into groundwater. Because of high groundwater, poor soil permeability and small lot sizes, the replacement of

OSDS systems on SKI is not a feasible alternative. On the other hand, the proposed SKI Sanitary Project will provide superior treatment of sewage at the KNSG wastewater treatment plant by eliminating pathogens as well as reducing the nitrogen loads to ENR levels. Given the constraints of State law concerning the provision of sewer service to vacant lots and the ability of the SKI residents to afford an effective solution to this significant public health problem, the SKI Sanitary Project is the best alternative.

The Committee voted to approve this as an exception for the provision of sewer service outside of the PFA based on the applicable criteria of the PFA law: that the project is necessary to protect public health or safety. As approved by the Committee, the PFA exception is subject to the following conditions and failure by the County to implement or comply with any one or more of these conditions may result in revocation of the approval:

1. The provision of sewer service under this PFA exception shall be limited to 1,518 existing single family homes and to no more than 632 currently vacant lots, as shown on the attached sewer service area maps. Service to the vacant lots is to be for single family residential use only. Sewer Service Area maps, clearly delineating the sewer service area boundary, shall be submitted to MDE for approval as an amendment to the county's Master Water and Sewer Plan and referenced in the county's comprehensive plan.

2. The county shall report on the status of the provision of sewer service and compliance with these conditions annually through its annual report submission to MDP. The report should include the number and location of new connections.

3. The sewerage capacity to be provided within the sewer service area as shown on the attached maps shall not exceed 500,000 gpd. Except for certain non-residential properties as discussed below, each of the lots to be served shall be assigned one EDU which shall not be transferable to another lot. This allocation of maximum capacity shall be submitted to MDE for approval as an amendment to the county's Master Water and Sewer Plan.

4. Sewer service to the Kentmorr marina property and other non-residential uses in the service area shall be allocated based upon the existing uses or to the equivalent amount of capacity should an existing use change before service is provided.

5. The project must ensure denial of access for any future connections that are not included in the project's service area. This provision must also be incorporated into the county's Master Water and Sewer Plan.

6. The county shall adopt provisions in its floodplain ordinance in conformance with the 2013 model Maryland Floodplain Ordinance, requiring all new, substantially improved, and reconstruction of substantially damaged structures as meeting or exceeding the requirements of the 2013 model Maryland Floodplain Ordinance, that are located within a mapped Special Flood Hazard Area, to be constructed with a minimum of two (2) feet of freeboard above the 100-year base flood elevation, as defined by the National Flood Insurance program.

7. Queen Anne's County, with the technical assistance of the Maryland DNR, shall more thoroughly assess climate change impact vulnerability and outline specific strategies for enhancing resilience to the impacts of climate change (i.e., sea level rise, coastal storm surge, drought, and extreme precipitation related events).

Additionally, though not a condition of approval, Queen Anne's County is encouraged to work with the Maryland Department of Housing and Community Development to identify opportunities and resources that can be directed toward the provision of affordable housing within the service area.

Should you have any questions, please don't hesitate to contact me.

Sincerely,

Richard Josephson, AICP
Director of Planning Services
Chair, Smart Growth Coordinating Committee

CC: Richard E. Hall, Secretary, MDP
Todd Mohn, Queen Anne's County
Steve Cohoon, Queen Anne's County

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

Section 3 – Policies, Ordinances, and Resolutions

December 14, 2004 – Resolution 04-68

April 1, 2013 – Policy Regarding Sewage "Holding Tanks"

November 12, 2013 – Ordinance 13-24

May 27, 2014 – Resolution 14-07

Resolution 04 - 68

Sewer Policy Statement

Whereas the Queen Anne's County Commission have long stated our desire to protect the environment and the Chesapeake Bay, and

Whereas the Queen Anne's County Commission have a policy of increasing the amount of desirable commercial development and controlling the rate of residential development, and

Whereas the Queen Anne's County Commission wishes to control growth in Queen Anne's County, and especially on Kent Island, and protect communities that could have future health problems, and

Whereas the Queen Anne's County Commission have been delayed with regard to the completion of the 2004 update to Master Water Sewer Plan as they wait for an opinion of the Attorney General, and await the results of an alternative septic study, and not made a final decision on which communities will be served, or if vacant lots are to be served, and

Whereas the Queen Anne's County Commission desires to effectively state its policy and plan with regard to how the sewer is handled prior to issuing/ voting on the bids for the sewer plant,

Therefore, be it resolved that the Board of Queen Anne's Commission will include terminology in the final version of Master Water Sewer Plan, or an amended current plan, to provide for the following principles:

1. Public Health SEWER RESERVE - 500,000 gallons are to be reserved for possible failing sceptics. This reserve is not removable without a 4/5th vote of the Queen Anne's County Sanitary Commission.

2. Commercial/ Institutional SEWER RESERVE - 200,000 gallons are to be reserved for commercial and institutional uses. This reserve is not removable without a 4/5th vote of the Queen Anne's County Sanitary Commission.

3. The remaining new 300,000 gallons of capacity is designated for current commitments, and for growth off Kent Island.

QUEEN ANNE'S COUNTY
BOARD OF COUNTY COMMISSIONERS

Joseph F. Cupani, President

R. O. "Nemo" Niedomanski

Benjamin F. Cassell, Jr.

Gene Ransom III

Michael S. Koval

Attest:

Margie A. Houck, Executive Assistant

Queen Anne's County Department of Health
Division of Environmental Health Services
206 N. Commerce Street, Centreville, MD 21617-1049
Tel: 410-758-2281 • Fax: 410-758-6602

Policy Regarding Sewage "Holding Tanks" In Failing Septic System Areas

Date: April 1, 2013

Purpose: This policy is based on protecting the public health and the environment. Holding tanks are not suitable for new construction, adding additional living space to an existing building, or change of uses generating additional wastewater flow. Installation of a holding tank system to replace a failing septic system shall be required when it has been determined that an on-site system that discharges to the soil cannot be installed that could be expected to provide long-term adequate protection of public health or the environment.

Subject: The following minimum guidelines are to be considered as to when sewage "holding tanks" are to be required in lieu of some other method of on-site waste disposal.

Guidelines: Installation of a holding tank system shall be required when any of the following apply:

1. Inadequate lot size and other restraints such as well distances, buildings, topography, water bodies, streams or any other physical objects preclude a sufficient land area to install a suitable replacement system.
2. Insufficient land area exists to install a properly sized replacement system because of previous on-site waste disposal system installation locations.
3. Properties where the seasonal high water table is expected to be closer than 24 inches to the land surface in combination with other limiting factors. All historical information in the immediate vicinity of the said area for system installation will be utilized to determine the expected seasonal high water table. When available actual test holes will be installed in the proposed installation repair area to observe the water table during wet season periods. Additionally, the presence and depth to low chroma soil colors in a test hole may be used to estimate maximum seasonal high water levels.

4. Site and soil conditions, including surface and subsurface drainage characteristics, indicate an on-site waste disposal system in the proposed installation area would not be expected to function "hydraulically" on a year around basis.
5. Any other data that would indicate a sewage "holding tank" is warranted such as historical septic system failures in the immediate vicinity of the proposed installation area. Wastewater volumes or house bedroom numbers that would cause system replacement size to exceed available installation area.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

April 2, 2013

John Nickerson, Director of Environmental Health
Queen Anne's County Health Department
208 N. Commerce Street
Centreville, Maryland 21617

Dear Mr. Nickerson:

Thank you for the opportunity to review Queen Anne's County Health Department's Policy Regarding Sewage Holding Tanks in Failing Septic System Areas. This policy is consistent with Maryland regulations and direction provided by Maryland Department of the Environment (MDE). In those circumstances where an existing septic system is failing and site conditions are such that an on-site disposal system that discharges to the environment cannot be installed without compromising the public health, a holding tank may be required. Holding tanks may not be used for new construction or where an increase in the existing volume of wastewater is proposed. Sites should be evaluated on a case by case basis in consultation with MDE's On-Site System Division's regional consultant prior to requiring a holding tank.

If you have any questions on the above matter, please feel free to contact me.

Sincerely,

Jay Prager, Deputy Program Manager
Waste Water Permits Program
Water Management Administration
Maryland Department of the Environment

Cc: Jay Sakai
Virginia Kearny
Edwal Stone
Barry Glotfelty
Don Hammerlund

§ 9-222. Secretary may order installation of public water supply system, public sewerage system, or refuse disposal system.

(a) *Findings by Secretary that justify order.* — The Secretary may issue an order under subsection (b) of this section, if, after investigation, the Secretary determines that the absence or incompleteness of a public water supply system, public sewerage system, or refuse disposal system in a county, municipal corporation, sanitary district, subdivision, or locality:

(1) Is sufficiently prejudicial to the health or comfort of that or any other county, municipal corporation, sanitary district, subdivision, or locality; or

(2) Causes a condition by which any of the waters of this State are being polluted or could become polluted in a way that is dangerous to health or is a nuisance.

(b) *Contents of order.* — An order under this section may require:

(1) The installation, alteration, extension, utilization, operation, or the completion of a public water supply system, public sewerage system, or refuse disposal system in a county, municipal corporation, sanitary district, subdivision, or locality within a time that the Secretary sets; or

(2) The installation of any device, the establishment of any method, or the enforcement of any measure or regulation that the Secretary considers proper under the circumstances. (HE § 9-209; 1987, ch. 612, § 2; 1988, ch. 412.)

State only authorized to order construction and operation of sewage treatment plant. — Having found as a fact that the absence of a sewage treatment plant is a menace to the health of the municipality, all that the State has authority to do, under the terms of this section, is to order the city to construct a plant and put it in operation within a specified time and enforce such order as it might deem proper under the circumstances. Mayor of Havre de Grace v. State Bd. of Health, 234 Md. 222, 198 A.2d 732 (1964).

Authority of State. — State is not authorized to select site for location of plant. Mayor of Havre de Grace v. State Bd. of Health, 234 Md. 222, 198 A.2d 732 (1964).

Basis for orders. — Orders under this section and §§ 9-220 and 9-221 of this subtitle must be based on finding of inefficient operation, potential nuisance or hazard, so where no facts were adduced or alleged by land developers showing a nuisance or menace to health or any danger of water pollution, the Secretary could not be found to have abused his discretion by not making such findings himself and ordering the expansion of the Patuxent sewerage treatment plant. Wincamp Partnership v. Anne Arundel County, 458 F. Supp. 1009 (D. Md. 1978).

An order under this section must be based on a finding that the absence or incompleteness of a public sewerage system is sufficiently prejudicial to the health or comfort of the county, or causes a condition by which waters of Maryland are polluted in a way that is dangerous to health or is a nuisance. Northwest Land Corp. v. Maryland Dep't of Env't, 104 Md. App. 471, 656 A.2d 804 (1995).

Environmental Service not under duty to construct sewage treatment facilities in absence of Secretary's order. — Under § 3-110 of the Natural Resources Article, the Environmental Service's duty to construct sewage treatment facilities is premised on an order of the Secretary under this section and §§ 9-220, 9-221, and 9-224 of this subtitle, which order must be based on a finding of a nuisance, a menace to health or a threat of pollution, and where there was no record of such a situation, the Director of the Environmental Service was not under a duty to construct sewage treatment facilities. Wincamp Partnership v. Anne Arundel County, 458 F. Supp. 1009 (D. Md. 1978).

Entitlement to contested case hearing. — The Department of the Environment had the legal authority to enter into a consent agreement that allowed for a vertical expansion of a Prince George's County landfill in advance of providing an opportunity for a contested case hearing. 78 Op. Att'y Gen. 174 (November 8, 1993).

Quoted in Days Cove Reclamation Co. v. Queen Anne's County, 146 Md. App. 469, 807

COUNTY ORDINANCE NO. 13-24
(As Amended)

AN EMERGENCY BILL ENTITLED

AN ACT CONCERNING the Use and Merger of Certain Substandard Lots in the Neighborhood Conservation (NC) District;

FOR THE PURPOSE of requiring that certain contiguous, substandard lots in the NC District be merged to comply with current Zoning Regulations and land use policies; and for the purpose of requiring such merger without interfering with rights guaranteed by the United States and Maryland Constitutions as interpreted by Federal and State Courts; and for the express purpose and intent of giving this Bill retroactive application by imposing such merger requirements based on lot ownership as of November 12, 2013, the date of introduction of this Bill to prevent individuals from defeating or undermining the purposes of this Bill by altering the ownership of properties between the date of introduction of this Bill and the Bill's effective date;

BY ADDING a new Subsection 18:1-19G. to Section 18:1-19 of the Code of Public Local Laws.

SECTION I

BE IT ENACTED BY THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY, MARYLAND that Chapter 18:1 (Zoning and Subdivision Regulations) of the Code of Public Local Laws be amended by adding the following Subsection 18:1-19G. to Section 18:1-19.

Chapter 18:1
Zoning and Subdivision Regulations

...

§ 18:1-19. Neighborhood Conservation (NC District).

...

G. Use and merger of lots of substandard area or dimensions in Neighborhood Conservation (NC) District in areas designated S-3 or higher in the Comprehensive Water and Sewerage Plan.

(1) The provisions of this subsection shall apply in the NC District in areas designated S-3, S-4, S-5, and S-6 in the Comprehensive Water and Sewerage Plan on or after the effective date of this subsection G and shall apply notwithstanding any other provision in this Article, including, without limitation, those relating to non-conforming uses or lots. The provisions of this subsection shall not be construed to affect the non-

conforming use or lot status of lots in Zoning Districts or areas to which this subsection does not apply.

(2) Except as provided in subsections (3) and (4) of this subsection, a dwelling may be constructed on a lot that does not comply with the minimum area or dimensional requirements of the zoning district in which the lot is located, provided that the lot complied with applicable minimum area and dimensional requirements, if any, at the time it was created.

(3) A dwelling may not be constructed on an unimproved lot or lots that do not comply with the minimum area or dimensional requirements of the zoning district in which the lot or lots are located if the unimproved lot or lots are contiguous with an improved lot under the same ownership on November 12, 2013. An unimproved lot or lots governed by this subsection shall be administratively merged with the contiguous improved lot under the same ownership as of November 12, 2013 prior to the extension of public sewer service to the improved lot. Further, an unimproved lot or lots that must be merged with an improved lot under this subsection shall be merged with an additional contiguous unimproved lot or lots with the same ownership on November 12, 2013 that is or are necessary to prevent leaving an unimproved lot that does not satisfy the minimum area and dimensional requirements of the zoning district. The owner conducting a merger pursuant to this subsection must apply and receive approval of an administrative subdivision pursuant to §18:1-171 of the public local laws of Queen Anne's County prior to the extension of public sewer service to the improved lot. If the owner of a lot or lots required to be merged under this subsection G(3) fails to apply for and receive approval of an administrative subdivision, the Director of Planning shall process, consider and approve an administrative subdivision effecting the merger pursuant to §18:1-171 of the public local laws of Queen Anne's County.

(4) Except as provided in subsection (5) of this subsection, an unimproved lot that does not comply with the minimum area or dimensional requirements of the NC District in effect at the time an application for a building permit is submitted may not be used for the construction of a dwelling if the lot was contiguous to and under the same ownership as one or more unimproved lots on November 12, 2013.

(5) A lot described in subsection (4) of this subsection may be used for the construction of a dwelling if the lot is merged with the contiguous, unimproved lot or lots in order to create a lot that (i) complies with, or comes as close as possible to complying with, the minimum area and dimensional requirements of the NC District, and (ii) does not leave a contiguous lot under the same ownership that does not comply with minimum area and dimensional requirements of the zoning district. The owner conducting a merger pursuant to this subsection must apply for and receive approval of an administrative subdivision pursuant to §18:1-171 of the public local laws of Queen Anne's County as a condition precedent to receiving a building permit for the dwelling.

(6) The seller of a lot subject to merger under this subsection G. must disclose in writing to any buyer of the lot the fact that the lot is subject to merger with

another lot or lots under subsection G. This disclosure shall also be contained in all contracts of sale, deeds or similar documents relating to the sale and shall cite this subsection G. and be displayed prominently with the heading "Notice of Required Lot Merger."

SECTION II

BE IT FURTHER ENACTED that it is the County Commissioners' express purpose and intent that the provisions of this Bill be given retroactive application to the extent that the provisions impose merger requirements based on lot ownership as of November 12, 2013.

SECTION III

BE IT FURTHER ENACTED that the provisions of this Act shall be severable and a determination that one or more provision is invalid shall not affect the validity of the remaining provisions.

SECTION IV

BE IT FURTHER ENACTED that this shall be declared an emergency bill affecting the public health, safety and welfare of the County and upon the affirmative vote of at least four-fifths of the total membership of the Board of County Commissioners shall take effect immediately, otherwise the same shall not be deemed an emergency bill and shall take effect on the forty-sixth (46^{th}) day following its passage.

INTRODUCED BY: Commissioner Dunmyer

DATE: November 12, 2013

PUBLIC HEARING HELD: May 1, 2014 @ 7 p.m. Kent Island High School

VOTE: 4 Yea 1 Nay (Commissioner Olds opposed)

DATE OF ADOPTION: May 27, 2014

EFFECTIVE DATE: May 27, 2014

RESOLUTION 14-07

A Resolution of the County Commissioners of Queen Anne's County, sitting as the Sanitary Commission, providing for the establishment of the South Kent Island Wastewater Subdistrict of the Queen Anne's County Sanitary District; prescribing the boundaries of the South Kent Island Wastewater Subdistrict; classifying properties within the South Kent Island Wastewater Subdistrict for the purpose of assessing benefits; establishing and providing the methodology for fixing, levying and collecting special benefit assessments for the purpose of providing funds for the payment of the principal of and interest on indebtedness incurred by the County to finance sewage collection and transmission system to serve the South Kent Island Wastewater Subdistrict; defining certain terms; making certain findings; and generally relating to establishment of the South Kent Island Wastewater Subdistrict and the financing of a sewage collection and transmission system to serve that Subdistrict.

RECITALS AND FINDINGS

Under Chapter 24, § 24-1 of the Code of Public Local Laws of Queen Anne's County (1996 Edition, as amended by 2013 Supplement) (the "Act"), Queen Anne's County is declared to be a sanitary district under the jurisdiction and control of the County Commissioners of Queen Anne's County, sitting as the Sanitary Commission.

Section 24-11A. of the Act states that, in order to provide for the general health and welfare of the residents of Queen Anne's County, the County Commissioners of Queen Anne's County (the "County") may acquire, construct, operate, and maintain whatever water, sewer, solid waste, and drainage systems it deems to be in the public interest. Section 24-28A. states that the County shall divide all properties in the Sanitary District into four classes: agricultural, small acreage, industrial or business, and subdivision. Further § 24-28B. states that the County may subdivide the sanitary district classes into water, sewerage, solid waste, and drainage subdistricts in such way as in its judgment will best serve the needs of the sanitary district, promote convenience and economy of installation and operation, and permit the raising of revenues and apportionment of costs to those served on an equitable basis.

Section 24-27A. of the Act provides that, for the purpose of paying the principal of and interest on indebtedness incurred by the County for water supply, sewerage, or drainage

systems constructed, purchased, or established under the Act, the County is empowered to fix an assessment on all properties, improved and unimproved, abutting upon a street, road, lane, alley or right-of-way in which a water main, sewer or drain has been built. Section 24-27B. further provides that the County may authorize such benefit assessments to be made on any basis considered appropriate by the Director of Public Works for the equitable distribution of charges.

In order to preserve and enhance the public health, safety, and welfare, the County has determined to construct and install a sewage system (the "Sewage System") to service the unincorporated area known as South Kent Island, composed primarily of the residential subdivisions located on Kent Island in the County which include all or portions of Tower Gardens, Romancoke on the Bay, Queen Anne Colony, Kentmorr, Chesapeake Estates, Sunny Isle of Kent, Normans, Matapeake Estates, and Kent Island Estates 1, 2 and 3, and certain adjoining residential areas (collectively, the "South Kent Island Wastewater Subdistrict or Service Area"). To provide for the financing of the Sewage System and acting pursuant to the authority of the Act, the County intends to utilize such bonds, loans or other evidences of obligation as may be required to finance the total capital costs of construction and installation of the Sewage System.

The Service Area is partially developed at this time: residential dwellings and some commercial or institutional uses have been built on some of the lots in that area, but many residential lots remain vacant. With some exceptions, the lots that are vacant are not "buildable" under current health regulations and standards (i.e., the characteristics of the soil in the area are generally such that acceptable septic systems cannot be installed and thus building permits cannot be issued).

The County finds that all of the properties located in the Service Area will be specially benefited by the construction and installation of the Sewage System. The County further finds, however, that the owners of properties which are now vacant and which are not buildable under current regulations will realize a substantially greater economic benefit from the construction and installation of the Sewage System than will the owners of properties that have been improved and owners of properties that are vacant but which can be improved under current regulations. The County has obtained a real estate study from W. Fitzhugh Turner to assist it in the determination of the additional benefit enjoyed by vacant, unbuildable properties. Further, as a part of the project, the County will construct on improved properties tank and pumping systems ("STEP Systems") to transfer effluent to the County's sewer lines. The tank and pumping systems, however, will not be constructed for vacant lots. If and when vacant lots are developed in the future, tank and pumping systems will have to be constructed for the lots at the expense of the owner. This requirement will apply to vacant lots that are both unbuildable and buildable. The County has determined that the construction of the STEP Systems for improved properties will be a substantial benefit for those properties. Accordingly, the County has determined that it is just, reasonable, equitable and in the public interest to establish the subclasses of properties specified herein and to provide for a system of Sewage System benefit assessments that takes into account the differences in the economic benefit that owners of the properties in those different subclasses will realize as a result of the construction and installation of the Sewage System.

The County imposes an allocation charge on the owners of structures connected to the County's public sewage system in order to recover each unit's pro rata or portional share of the capital costs incurred by the County to finance the construction of capacity in the County's

wastewater treatment plant to serve new customers. Currently, the County imposes the allocation charge on vacant and improved properties in the amount of $7,750. It is anticipated that the State of Maryland will award Bay Restoration Fund grants for the purpose of financing the expansion of the County's wastewater treatment plant to permit the connection of existing, improved properties in South Kent Island and thereby address health and environment issues relating to failing septic systems in this area. Because of the expansion of the wastewater treatment plant to accommodate existing, improved properties on South Kent Island, the County will not impose allocation charges on improved properties on South Kent Island. All unimproved properties are subject to the standard allocation charge in effect at the time service is available or as a condition of building permit.

NOW, THEREFORE, BE IT RESOLVED BY COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY:

Section 1. Definitions. Unless the context clearly requires otherwise, in this Resolution the following words have the meanings indicated:

(a) "Act" means the Code of Public Local Laws of Queen Anne's County (1996 Edition, as amended by 2013 Supplement).

(b) "Completion Date" means, with respect to the Sewage System, the date determined by the Director as the date on which the Sewage System or a phase of the Sewage System project has been completed.

(c) "County" means County Commissioners of Queen Anne's County, a body politic and corporate and a political subdivision of the State of Maryland.

(d) "Director" means the Director of Public Works of the County.

(e) "Quarterly Payment Date" means each January 1, April 1, July 1, and October 1.

(f) "Subdistrict" means the South Kent Island Wastewater Subdistrict, a subdistrict of the Queen Anne's County Sanitary District established by this Resolution.

(g) "Sewage System" means the sewage collection and transmission system serving the Subdistrict.

(h) "Sewage System Bonds" means collectively all evidence of obligation as may be required to finance the total capital costs of construction and installation of the Sewage System.

Section 2. Subdistrict Established. A South Kent Island Wastewater Subdistrict is hereby established in accordance with § 24-28B. of the Act. The boundaries of the Subdistrict are those set forth on Exhibit A to this Resolution, which is incorporated herein by reference.

Section 3. Classification of Properties. All of the properties in the Subdistrict are classified as either "subdivision property" or "industrial or business" (hereinafter "IB") within the meaning of § 24-28A. of the Act. All properties in the South Kent Island Wastewater Subdistrict classified "IB" are currently improved with structures and have installed septic systems. In accordance with § 24-28B., properties in the Subdistrict classified as subdivision property are further classified as follows for the purpose of levying Sewage System Benefit Assessments into the following subclasses:

(a) Class A Properties - All lots of land in the Subdistrict on which permanent dwelling units have been lawfully constructed and appurtenant septic systems installed;

(b) Class B Properties - All lots of land in the Subdistrict except those classified as Class A or Class C and those exempt under Section 10 hereof; and

(c) Class C Properties - Unimproved lots of land in the Subdistrict with respect to which the owner has presented evidence satisfactory to the Director establishing that, prior to January 1, 2016, the property has passed a soil percolation test meeting all the requirements of the Department of Environmental Health of the County.

Section 4. Sewage System Benefit Assessments.

(a) In accordance with Section 24-29 of the Act and for the purpose of providing funds for the payment of debt service on the Sewage System Bonds, upon completion of the Sewage System, there shall be fixed and levied (i) on each Class A and IB property, a Sewage System Benefit Assessment in principal amount equal to the Sewage System Base Cost plus the STEP System Cost, both as defined below, (ii) on each Class B property, a Sewage System Benefit Assessment in principal amount equal to the sum of the Sewage System Base Cost plus the Economic Benefit Premium, both as defined below, and (iii) on each Class C property, a Sewage System Benefit Assessment in principal amount equal to the Sewage System Base Cost, as defined below. Interest shall accrue on the unpaid principal amount of each such benefit assessment, from 60 days following the Completion Date of the Sewage System applicable to the property on which the benefit assessment is fixed and levied until the principal amount is paid in

full, at the rate of interest accruing on evidences of obligation as may be required to finance the total capital costs of construction and installation of the Sewage System.

(b) As used herein, the term "Sewage System Base Cost" means an amount as determined by application of the following formula:

$$BC = \frac{TC - (SC \times A) - (B \times EBP)}{A+B+C}$$

where A = Class A properties – improved with permanent dwelling units and IB properties as improved.

B = Class B properties – unbuildable lots not included in Classes A or C or exempted in Section 10 hereof.

C = Class C properties – unimproved but buildable lots having a valid percolation test.

TC – Total Construction Cost – includes public sewer force main for all properties, public sewer collection lines for all properties, and STEP System for Class A and IB improved properties.

STEP System – includes a holding tank, pump and on-lot service lines and all associated on-lot electrical and plumbing work required for a property to connect into a public sewer collection line.

SC – STEP System Cost – average per-lot cost of constructing STEP Systems (tank and pumping systems to transfer effluent from structures to the County's sewer lines) for Class A and IB properties. STEP System Cost shall not include capital costs funded by a State or Federal grant (but shall include capital costs funded by Sewage System Bonds).

EBP – Economic Benefit Premium – represents the additional incremental increase in fair market value that vacant, unbuildable properties will enjoy over the gain in fair market value that buildable properties will enjoy as a result of the extension of public sewer. The County has determined that the EBP will be determined as of the Completion Date of the first phase.

BC – Sewage System Base Cost – base Benefit Assessment gain in fair market value applicable to all properties.

Section 5. Quarterly Payments. The special assessments established hereby shall be payable in eighty (80) consecutive quarterly installments of principal and interest commencing with the first Quarterly Payment Date that occurs following the giving of notices to property owners as specified in Section 11 hereof. Payment of the principal amount of the special assessments shall be amortized so that, for property owners within each class, the payments (principal and interest) due on each special assessment on each Quarterly Payment Date shall be approximately equal from quarter to quarter. Bills for benefit assessments shall be sent quarterly by the Department of Public Works and shall specify the portion of the payment due that is allocable to principal and the portion that is allocable to interest.

Section 6. Prepayments. The benefit assessments levied under Sections 4 and 5 of this Resolution may be prepaid in full and discharged at any time upon the payment to the Director of an amount equal to the outstanding principal amount of the benefit assessment and accrued interest thereon to the date of prepayment.

Section 7. Partial Deferral of Principal of Sewage System Benefit Assessments. The owner of a Class B property may elect to make quarterly payments in the amount applicable to the Sewage System Base Cost, plus interest in an amount equal to interest on the Economic Benefit Premium at the rate specified in Section 4 hereof, by filing with the Director a written election to that effect. Any such election shall be filed prior to the first Quarterly Payment Date and in such a form as the Director may prescribe. As a condition to any such deferral, the owner shall agree to pay a sum equal to the full amount of the Economic Benefit Premium upon the first to occur of the following:

(a) Issuance of building permit with respect to the property; or

(b) Ten years from the first Quarterly Payment Date; provided, however, that the owner in this situation shall have the option of paying the Economic Benefit Premium in eighty (80) equal quarterly installments of principal and interest at the end of the ten year deferral period at the rate specified in § 4(a) hereof, in addition to the quarterly payments for the Sewage System Base Cost.

Section 8. Payment of Assessments Upon Transfer. The Sewage System Benefit Assessment levied on a property in the Subdistrict pursuant to this Resolution shall be a continuing lien against the property collectable in the same manner as County real property taxes and is not required to be paid in full upon transfer of the property assessed.

Section 9. Contiguous Lots. One or more lots which must be merged pursuant to the merger requirements set forth in Ordinance No. 13-24 shall be treated as one lot for purposes of the benefit assessment established by this Resolution. In addition, an owner of two or more contiguous lots of land in the Subdistrict which either are not required to merge under Ordinance No. 13-24 or have been merged under Ordinance No. 13-24, may elect to have such lots assessed as a single property for purposes of this Resolution by filing among the land records of Queen Anne's County prior to January 1, 2016, an instrument in writing irrevocably surrendering any right to create future additional lots from such property. Such instrument shall be in a form approved by the County Attorney, as evidenced by his signature endorsed thereon.

Section 10. Exemptions. The assessments levied hereby shall not apply to a lot of land in the Subdistrict if and so long as (a) a single family dwelling may not be constructed on the lot of land under the provisions of a law or regulation protecting wetlands or other applicable Federal, State, or County law or regulation, or (b) the lot of land does not abut upon a street, road, lane, alley or right-of-way in which a sewer line

has been built. Each property in the Subdistrict shall be subject to the applicable assessment levied hereby unless and until satisfactory proof of entitlement to an exemption under this Section has been provided to the Director and the Director has issued a certificate of exemption.

Section 11. Notices. As soon as practicable following the Completion Date of the Sewage System, the Director shall (i) determine the amount of the special assessments applicable to each class of property in the Subdistrict in the manner described in Section 4 or Section 5 hereof, as applicable, (ii) assign each lot of land in the Subdistrict to one of the Classes established by Section 3(a) or Section 3(b) hereof, as applicable, and (iii) give notice to the owner of each lot of land in the Subdistrict of the assessments established hereby in accordance with the provisions of § 24-29B. of the Act. The notices shall be given in the manner, and shall contain the information, specified in said § 24-29B.

Section 12. Effective Date. This Resolution shall take effect from and after the date of its passage.

Adopted by the County Commissioners of Queen Anne's County, sitting as the Sanitary Commission, this 27 day if May, 2014.

ATTEST:

Margie Houck

THE BOARD OF COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY

Philip L. Dumenil, President

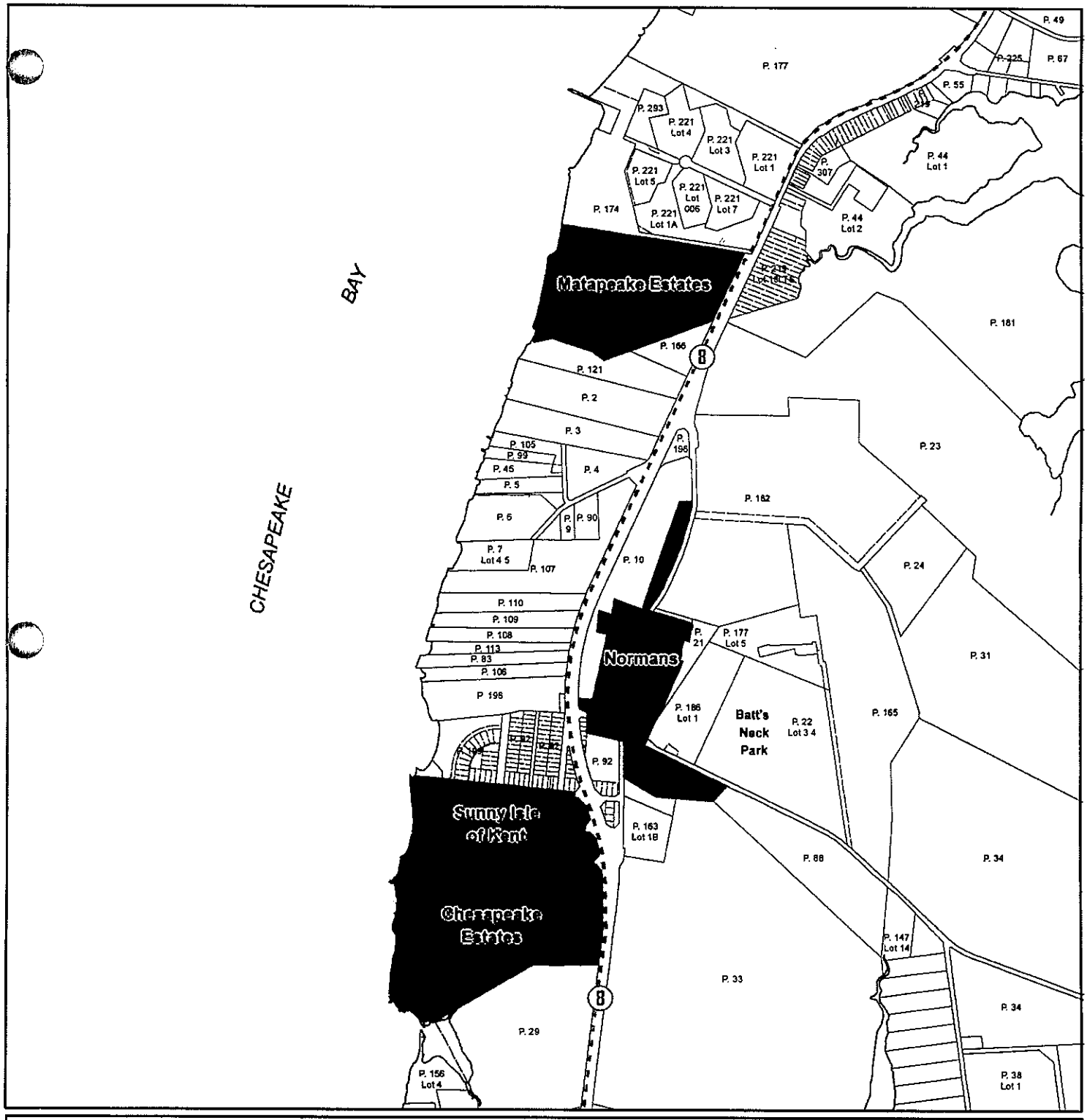
David L. Dunmyer, Vice President

James J. Moran, Commissioner

David Olds, Commissioner

Bob Simmons, Commissioner

Chesapeake Estates/Sunny Isle of Kent/Batt's Neck/Matapeake Estates
Public Health Sewer Service Area



SOUTH KENT ISLAND WASTEWATER SUB DISTRICT

Queen Anne's County, Maryland

Exhibit A Page 1

Source: 2006 Comprehensive Water & Sewerage Plan

Legend

Sewer Service Area

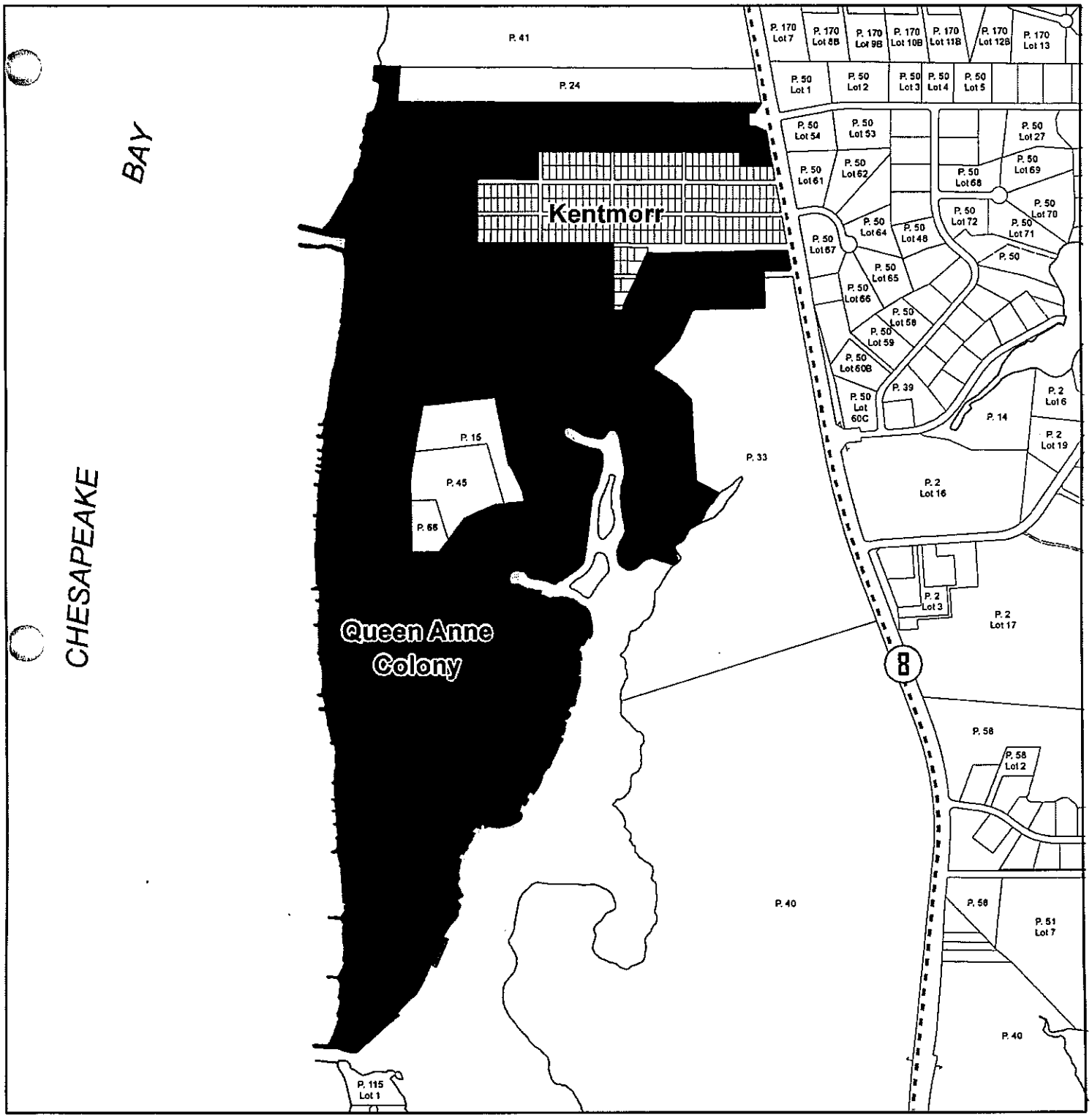
S3

Denied Access Sewer Line

1,500 750 0 1,500 Feet

File No.: 040414-DPW01

Queen Anne Colony and Kentmorr
Public Health Sewer Service Area



SOUTH KENT ISLAND WASTEWATER SUB DISTRICT

Queen Anne's County, Maryland

Exhibit A Page 2

Source: 2006 Comprehensive Water & Sewerage Plan

Legend

Sewer Service Area

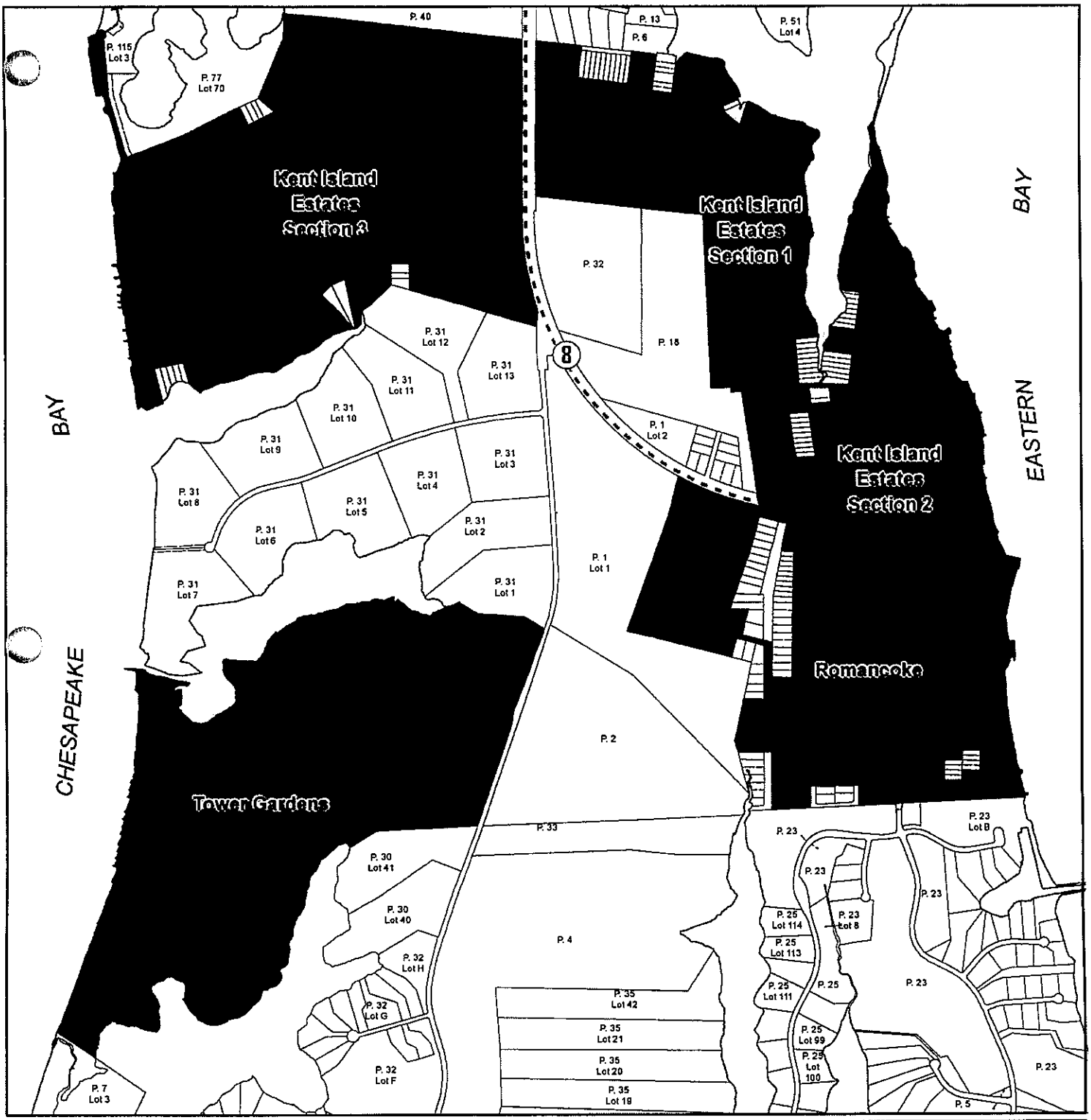
S3

Denied Access Sewer Line

1,000 500 0 1,000 Feet

File No.: 040414-DPW02

Kent Island Estates / Romancoke / Tower Gardens
Public Health Sewer Service Area



SOUTH KENT ISLAND WASTEWATER SUB DISTRICT

Queen Anne's County, Maryland

Exhibit A Page 3

Source: 2006 Comprehensive Water & Sewerage Plan

Legend

Sewer Service Area

S3

Denied Access Sewer Line

1,350 675 0 1,350 Feet

File No.: 040414-DPW03

Resolution 14 - 07

Exhibit B

Illustrative calculations for the value of the Economic Benefit Premium that could be assigned to vacant unbuildable (Class B) properties at different levels of buildout. In all cases, the monthly charge to the existing homeowners is set at $100 per month or less and:

A = 1,526 = Class A properties – improved with permanent dwelling units and IB properties as improved.

C = 12 = Class C properties – unimproved but buildable lots having a valid percolation test.

TC = $ 37,433,326 – estimated total cost of construction – includes public sewer force main for all properties, public sewer collection lines for all properties, and STEP System for Class A and IB improved properties.

B = Class B properties – unbuildable lots not included in Classes A or C

EBP = Economic Benefit Premium

B	**EBP $**
360	40,900
410	35,900
460	31,600
510	28,300
560 *	25,600

*This level of buildout represents 85% of the total number of vacant lots 658 which will result from the lot consolidation ordinance #13-24 becoming effective.

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

Section 4 – Rubin Report

Project Report
Kent Island and Rural Queen Anne's County
Queen Anne's County Onsite and Decentralized Wastewater Study

Executive Summary:

The Board of Commissioners in Queen Anne's County Maryland commissioned a study to assess the types and functionality of onsite wastewater systems prevalent in the Kent Island Area and in designated rural areas within the County. The study entailed an assessment of permits on file with the Queen Anne's County Health Department representing wastewater systems permitted on Kent Island and designated areas of the county. Permit files were reviewed to determine the type of permitted wastewater system serving a specific property. This entailed a comprehensive file-by-file review of the history of onsite systems at over 2500 dwelling units in Kent Island and over 150 in less densely developed, more rural areas of the county.

The study also entailed a review of the available soils information in the study areas with some actual field tests of the soil's hydraulic capability and background soil fertility levels. These parameters may become more critical or important if large, land based wastewater systems are assessed as a part of the overall wastewater management strategy for Queen Anne's County.

Onsite wastewater systems utilized early in the development of the Kent Island area consisted primarily of deep trench or deep pit systems which placed sewage into shallow groundwater. As these systems have malfunctioned through time, the most common repair or replacement option has been the deep trench or pit option. Few advanced onsite wastewater treatment systems have been employed and few mound or pressure dosed soil absorption systems have been installed as repair options.

The predominance of the groundwater penetrating systems suggests an indirect connection between individual onsite wastewater systems through the underlying groundwater and to the Bay and its tributaries. Seasonal groundwater penetrating systems meet the definition of a failed septic system.

Over 2000 onsite system permits reviewed indicate trench depths of over 8 feet. Review of soils information and original siting data from the permits indicate seasonal saturation was encountered at depths of less than 4 feet. This suggests that domestic wastewater is placed directly into groundwater which ultimately

flows into the Bay. In the target communities on Kent Island, the transit time from the onsite system to the Bay is short. The soil's hydraulic limitations also occasion soil surface breakthroughs in the worst cases leading to the County's concern for public health. It is recognized that the number and intensity of these system failures will only increase in time if not addressed in some manner. Exacerbating this issue is the very small lot size in the study area. The small lot size necessitates utilization of the groundwater penetrating systems as the only available option for repair.

In addition to the public health concerns, simple calculations assuming typical residential wastewater quality and limited occupancy indicates a potential for over 37,000 pounds of nitrogen input to the Bay from the onsite wastewater systems serving the Kent Island Area. Unless these indirect discharges are corrected, the input of nitrogen and other wastewater constituents will continue.

Nitrogen and pathogen removal technologies are available that may be employed at the individual home level. These systems are expensive to construct and operate and require a comprehensive management program to assure they remain in proper operating condition for the life of a property. The Maryland Department of the Environment (MDE), Groundwater Protection Branch and Chesapeake Bay Restoration program currently has no mechanism to issue operational permits designed to assure proper operation. In addition, these systems cannot rectify the hydraulic limitation of the soils. As such surface breakthroughs by the sewage would not be remedied nor would any existing 'backing-up' of the plumbing into the home during wet weather periods.

One solution to these problems may be a cluster system option using land based systems designed to handle the hydraulics and remove nutrients and pathogens. These land based options are recognized as viable by MDE, but they too must be managed to assure long term viability and to realize any mandated nutrient removal goals. These land based systems too help maintain base flow in streams and small watercourses.

Another alternative is the installation of a centralized watertight wastewater collection system from the highly developed portions of Kent Island to the QAC Sanitary District's wastewater treatment facility located in Stevensville. This facility operates in accordance with a NPDES permit and nutrient removal is required by permit condition.

The large lots permitted through the local health department since approximately the early 1990's possess significant potential to function hydraulically, treat pathogens via dry soil, and retain nutrients on site. Large lots (1 acre or more) permitted in accordance with current siting criteria and relying on soil treatment typically possess sufficient potential to retain nutrients and biological materials on site for treatment and renovation. The use of these properly sited, designed, and operated on-lot systems may help maintain base flow in receiving waters. The continued operation of the old sub-standard systems may maintain base flow, but with poor quality waters. In areas with slowly moving waters, this contravention of water quality may have serious implications for the Kent Island Communities.

In addition to examination of the data from individual residential and commercial properties in the target communities, several large areas of agricultural or silvicultural land were examined. This examination was an assessment of soil properties as published in the soil survey and analysis of soil samples collected adjacent to these properties. This analysis suggests that there are several large areas of forest land or agricultural land that may be suited to receive treated wastewater through a permitted reuse system. Based on assessment of all options, the community collection and either dispersed treatment or centralized treatment option appears to offer the most reliable of the options available for the Kent Island Communities. Since no large scale dispersed treatment options are available, use of the Public Utility District facility appears most cost effective. Use of this centrally managed facility also offers the greatest potential for assuring assets are available to improve treatment levels in the future. Asset management activities are emerging as critical concerns for infrastructure nationally. Building this local asset management capacity will become more critical in the future.

The Barclay, Price, Queen Anne, and Templeville areas have more options available because soil materials in these areas may be well suited for large land based systems. Soil sampling in these areas suggest soil fertility levels are satisfactory for agricultural and silvicultural crops, soil properties are conducive for land treatment, and large areas of agricultural and silvicultural land is present.

Project Report
Kent Island and Rural Queen Anne's County
Queen Anne's County Onsite and Decentralized Wastewater Study

Background: Onsite wastewater systems have been an important part of the infrastructure in Queen Anne's County (QAC) for many years. Nationally and throughout Maryland, the practices associated with the siting, sizing, design, installation and operation of these systems have changed dramatically over the last 50 years. The Onsite Wastewater Management program within the State of Maryland is conducted by representatives of the State assigned to individual county offices. In this capacity, these individuals are responsible for assuring that State programs are conducted properly. The prime responsibility for the onsite wastewater program is the Maryland Department of the Environment, Groundwater Protection Division. Local support for the program is accomplished through the Environmental Health Section within the Queen Anne's County Department of Health, a division of the Maryland Department of Health and Mental Hygiene.

This report is not intended as an assessment of the current status of the onsite wastewater systems permitting program in QAC. Rather, the two purposes of this report are:

1. An assessment of onsite wastewater systems in the Kent Island study area and a discussion of collection and point, non-point or land based wastewater management options available for the proper treatment and disposal of the effluent.
2. An assessment of wastewater management practices in several of the small rural centers (Queen Anne, Barclay, Price, and Templeville) located through the county and a discussion of collection and non-point or land based wastewater management options available to these dispersed rural communities.

Present statewide practice in Maryland utilizes scientific principles and sound planning as a component of the onsite wastewater management program. Presently the standard of practice in the State of Maryland for environmental health practices associated with the onsite wastewater treatment and disposal systems requires a dry soil treatment zone of at least 4 feet between the bottom of the disposal system and the seasonal high groundwater. The State of Maryland recognized this requirement was unlikely to be met in many areas of the Eastern

Shore Counties and allowed a deviation from the 4 feet of dry soil treatment in defined management zones upon the approval of a Groundwater Protection Report for each County and its subsequent incorporation into each County's Comprehensive Water and Sewerage Plan.

Queen Anne's County currently utilizes a minimum 2 foot dry soil treatment zone for new development in much of Kent Island. Code compliance is essential to protect public health, environmental quality, community investment, and property investment and ultimately contribute to the restoration of the Chesapeake Bay water quality efforts.

Many of the old systems (initial installation dates early 1990's and previous) investigated on Kent Island do not even meet this 2-foot dry soil zone requirement. These systems are hydraulically malfunctioning to the extent of soil surface breakthrough into lawns or adjacent ditches. This hydraulic failure, combined with no dry soil pathogen treatment zone, has caused a public health concern for some time. Incorporation of the variance into the wastewater permitting program has resulted in the proliferation of small lot systems throughout the study area. The small lot sizes eliminate potential to develop the more traditional soil treatment systems whenever repairs are required.

The Chesapeake Bay restoration effort has identified thirteen (13) essential program elements necessary to reestablish the quality of Bay waters; correcting improperly operating septic systems constitutes one of those elements. Nutrients and microorganisms (i.e. bacteria and virus particles) are introduced to the Bay through many sources including improperly designed and operated onsite wastewater systems. The Bay Restoration act requires implementation of nutrient removal strategies to correct an ongoing problem. The problem was created in part by onsite wastewater systems installed prior to the State requiring dry treatment zones. Correcting the nutrient issues in the Bay will require addressing existing systems that have contributed to the current water quality problems as well as assuring that future systems are installed and operated in accordance with sound design principles.

The EPA Report, Potential for Nutrient Loadings from Septic Systems to Ground and Surface Water Resources and the Chesapeake Bay (USEPA, 1997), indicates the nitrogen input to the Chesapeake Bay from a variety of point and non-point sources. Total Nitrogen input to the Bay from all onsite wastewater sources is reported as over 22,410,000 pounds per year. The report lists nitrogen input from the over 8500 onsite wastewater systems in the county (reported in this 1997

report) as over 150,000 pounds per year. This value may not reflect the propensity of groundwater penetrating onsite wastewater systems utilized in Queen Anne's County.

In 2002 the State of Maryland passed the Bay Restoration Fund program that instituted a fee for discharge of pollutants within the boundaries of the State. The sewer use ordinance established a fee of $2.50 per month per equivalent dwelling unit for discharges; regardless of the point of discharge, whether to surface waters or to the land, which thereby included individual septic systems

Introduction: The Kent Island area of Queen Anne's County (QAC) began to develop intensively following construction of the Chesapeake Bay Bridge in the early 1950's. Building permit activity in the Kent Island area increased dramatically through the 1960's and 1970's. Since there was no community-wide wastewater collection and treatment system, development relied on the septic or onsite wastewater system. Other areas of the county also rely on the onsite options and the practices utilized in these small communities were assessed by examining available permitting data available the Health department.

In 1989 the Groundwater Protection Plan for Maryland was modified for QAC to allow development of onsite wastewater systems in certain areas with 2 feet of separation between the zone of waste application and seasonal saturation.

In May 2005, the Commissioners in QAC commissioned a study of the onsite wastewater systems as defined in a proposal as three task areas:

Task 1 – Kent Island Estates and Romancoke

Task 2 – Other Kent Island Communities

a. Kent Point Farms
b. Tower Gardens
c. Queen Anne's Colony
d. Kentmorr
e. Chesapeake Estates
f. Sunny Isle of Kent
g. Normans (Batts Neck)
h. Matapeake Estates
i. Marling Farms
j. Dominion

Task 3 – Other County Areas

a. Barclay
b. Templeville
c. Price
d. Queen Anne

The purposes of the study was to determine the degree of compliance with current laws and rules influencing development and use of onsite wastewater systems and to describe options available to provide safe and effective, sustainable wastewater management systems for the residents of Queen Anne's County and to assure the natural resources in the area are protected adequately.

Procedures: Prior to examining permit data for the QAC communities, Maryland State Rules and Regulations governing the development and use of onsite wastewater systems were consulted to determine current State of Maryland mandated requirements for onsite wastewater systems utilized throughout the State. Additionally, assessments of the Groundwater Protection Rules and the Rules for Municipal Wastewater Management were accomplished. This assessment included, but was not limited to, a review of separation requirements between the bottom of wastewater system effluent dispersal trenches and the top of the shallow, unconfined groundwater system, soil loading rates, buffer requirements between water supply wells and onsite wastewater systems, and buffer requirements between surface water and onsite systems. Presently, the State has no mandated management requirements for sub-surface wastewater treatment and dispersal systems.

Following the assessment of state and local rules and regulations, the soils information for the county was examined. This soils information was available through the Modern Soil Survey of Queen Anne's County and the QAC GIS system. Further, soil resources in the Kent Island area were examined to ascertain any potential to host wastewater recycling and reuse system utilizing land application guidelines established by Maryland Department of the Environment (Guidelines for Land Treatment, MDE –WMA-001-07/03). Clearly, sites are present in the Kent Island area consistent with the provisions contained in these land application guidelines, once the wastewater is properly treated, and many of these sites are considered prime agricultural resources.

Additionally, the Groundwater Protection Plan for Queen Anne's County (1989 and updated 1995) was consulted. This plan established management zones

essential in the protection of groundwater resources. The report indicates that new onsite wastewater systems installed utilizing groundwater penetrating options are not permitted in the county and are to be utilized only as repair options. This groundwater protection plan suggested that systems failing to meet criteria for onsite systems should be connected to the centralized QAC Sanitary District facility.

The study plan developed purported to examine the onsite wastewater permits issued to, and on file in support of, building activities in several QAC communities. The target communities and general permit information is presented in Table 1, Permitted Onsite Wastewater Systems in Kent Island Area of QAC (Tasks 1 and 2) and Table 2, Permitted Onsite Wastewater Systems in Barclay, Price, Queen Anne, and Templeville (Task 3). These two tables indicate the anticipated level of compliance with a true groundwater protection program.

In addition to the assessment of the treatment currently utilized, options for development of community collection and land based treatment options were assessed on a preliminary basis in the more rural communities located off Kent Island. This assessment involved examination of the soil resources in the area and analysis of soil materials to determine soil fertility levels. Those soil fertility levels are important in determining the potential for land based wastewater management systems. The results of the soil fertility testing are presented for these communities are presented in Table 3, Background Soil Fertility Levels in Target Queen Anne's County Communities. The soil materials for the testing were collected from areas near the community on the edge of agricultural fields. Samples were collected using standard agricultural practice (a one inch diameter stainless steel core sampler) and a composite sample was collected from the areas. These soil tests are preliminary and are not to be used for design purposes, rather as background.

The initial QAC study plan called for an assessment of permits in the target communities of Kent Island and a less comprehensive, but statistically sound assessment of permit data in the more rural areas of QAC. The permits assessed in these communities do not represent a lot-by-lot assessment of permits rather a sampling of permits issued in the communities.

The files were examined to determine the type of onsite wastewater system utilized at a specific property. The types of dispersal systems represented in the files include trench systems, pit or dry well systems, low pressure pipe systems, and sand lined trench systems. Permit information when available may include

information concerning the location of a system on a specific property, the characteristics of the site and soil system such as depth to groundwater and estimated soil permeability, well location, etc.

Trench depth or liquid placement is a critical factor in assessing the performance of a soil based, onsite wastewater system. Typically, the bottom of the effluent dispersal system was located at a depth of between 6 feet and as much as 12 feet. Few systems were installed at depths of 4 feet or less. This is critical since the soils information suggests that seasonal water tables are present in many of the soils represented in the area at depths of 48 inches or less. This placement data suggest that the majority of systems installed in the Kent Island area of QAC are installed in intimate contact with shallow groundwater tables. Review of permit data for the outlying communities suggests that similar system (very deep trench or bed systems) placement was used throughout the county.

Recent system installations (early 1990's and current) permitted under current health department procedures and utilizing current staff have developed large lot sizes and permitting procedures in compliance with current recognized practice. The large lot sizes and the utilization of a site and soil analysis procedure should result in development of systems consistent with state practice.

Onsite Wastewater Systems: Kent Island (Tasks 1 and 2)

Permit histories were examined dating back to the late 1960's through the present. The assessment of the permit data indicates that the majority of the onsite wastewater systems permitted in the Kent Island communities assessed are groundwater penetrating systems. Typical practices were for the soil materials in areas of the lot permitted as receivers for wastewater to be removed to depths of 6 to 15 feet, filled with sand or gravel, perforated pipe is placed atop the gravel or sand and the area covered with soil. Excess soil is removed from the area.

The number of onsite system permits assessed in the target Kent Island communities are presented in Table 1 and represent the number of permit files available in the Kent Island area for review by the team from McKim & Creed in the Environmental Health Section of the QAC Health Department. The accuracy of these files as representative of the number of building lots with onsite systems is not questioned. The numerical values presented in the table represent health department file information for residential, commercial, recreational, and

community facilities located in the Kent Island communities listed and examined for purposes of this report.

Table 1, Permitted Onsite Wastewater Systems in Kent Island Area of QAC

Community	Permits Assessed	Groundwater Penetration	Unknown	Possible Compliant	LPP or other
Chesapeake Estates	124	77	39	8	?[1]
Dominion	136	55	41	40	7
Kent Island Estates	795	?	?	?	29
Kentmorr	100	50	18	32	4
Marling Farms	312	93	49	170	7
Queen Anne Colony	231	141	45	48	21
Romancoke	272	45	137	90	15
Tower Gardens	89	58	11	20	6
Kent Point	24	12	2	12	2
Sunny Isle	33	10	5	18	3
Batts Neck	48	14	6	34	4
Matapeake Est.	22	10	2	12	1

1. A "?" in the table indicates inadequate information available to assess a value

Onsite Wastewater Systems: Rural Areas (Task 3)

Specific findings for each of the remaining target communities are presented in Table 2, Wastewater System Design and Installation Criteria, QAC Communities, below. These data summarize the depth of placement of systems, the type of system and the potential for onsite wastewater system designs consistent with Maryland Criteria for Onsite wastewater Systems (Maryland Administrative Code). The replacement systems are installed in accordance with the groundwater protection plan for the county, but the plan is inconsistent with groundwater and surface water protection criteria generally accepted for onsite systems.

New onsite wastewater systems installed since early 1990's are generally developed on large acreage tracts and at soil loading rates consistent with

accepted practice. Utilization of these design practices on the new properties should eliminate issues as described on many of the older lots.

Table 2, Wastewater Systems QAC Rural Areas

Community	Permits Assessed	Groundwater Penetration	Unknown	Possible Compliant	LPP/ATU/SF
Barclay	58	32	4	2	2
Price	24	20	?[1]	4	?
Queen Anne	29	20	2	7	?
Templeville	21	10	?	11	2

1. A "?" in the table indicates inadequate information available to assess a value

The supporting documentation for these system numbers is attached for each of the target communities. The purpose of this report is to demonstrate the data available for the communities and to suggest potential uses for these data to develop long term and sustainable wastewater management solutions for the area. The values represented for the communities were obtained by examining each permit on file and updating information provided by the County. These community files are presented in the appendix to this report.

Nutrient Considerations

Nutrient input based on typical flows of 69 gallons per person per day [American Water Works Association] and assume.4 people per household [2000 Census] (assumes majority of residential units occupied by mature adults, few children). Anticipated flow from the 2500 homes in the target area is calculated as:

2500 homes x 4 people/home x 69 gal/person/day = 414,000 GPD

Assuming the septic system operates properly, the significant contribution to the environment is ammonium nitrogen. Typical ammonium concentrations from septic systems are 25 to 40 mg/l. The nitrogen contribution from these systems may be calculated as:

0.41 MGD x 30 PPM – NH4 x 8.34 x 365/d/yr = 37,442 pounds ammonium/yr

Ammonium is troublesome since it converts to nitrate in aerobic environments and nitrate is often a limiting nutrient where eutrophication of surface waters is an issue.

These sample calculations do not assume any losses for nitrogen that may occur in the hyporheic zone. The unknown in these assumptions and associated calculations is the attenuation in the hyporheic zone (the area where groundwater flow enters surface water). Typically this zone attenuates a significant amount of nitrogen. Estimates of the activity in this zone suggest losses of as much as 50% in Nitrogen. The contribution of nitrogen to the Bay from the direct penetration of wastewater into shallow groundwater is estimated to be over 10,000 pounds per year. This zone is biologically active and occurs in the saturated area between groundwater and surface water. Chemical transformations for nitrogen generally result in denitrification, but the level of biochemical conversion has not been well established and may change as seasonal variations in temperature modify biological activity.

Acreage per home lot ranges in size from small lots adjacent to waterways and Bay to lots containing over 1 acre. Average lot size appears to be less than one half acre and the nutrient loading per acre is not excessive, but the loading is discharged to groundwater where input to surface water is problematic.

Hydraulic Considerations

A very preliminary physical assessment of the potential hydraulic conductivity in the shallow groundwater aquifer system was accomplished through a series of shallow well pump-out tests conducted on vacant properties in the Queen Anne Colony, Kent Island Estates, and Romancoke areas. The shallow well pump-out tests were accomplished in October 2005 when water tables were expected to be low. A 3.5 inch diameter hand auger was used to advance an auger hole to a depth of 10 feet. A sand lens was encountered at depths ranging from 6 to over 9 feet. Watertables were measured at 72 inches initially and rose to 36 inches following the testing. The measured permeability of the underlying sand aquifer was determined to be over 5 feet per day. The permeabilities measured 5 feet per day in the slowest condition and 15 feet per day in areas with defined topographic gradients – where there was over 10 feet of fall between the test site and the Bay or a tributary. It should be noted that potable water wells are only required to be located 50 feet from the disposal fields. Permeabilities of 15 feet per day do not allow for much removal of any pathogens.

Rural sections of the county may support a variety of land based wastewater management systems should community collection and treatment be desired. The soil testing indicates some of the soil resources in the target communities are well suited to support land based wastewater treatment. This preliminary conclusion is based on review of published soils information contained in the modern Soil Survey of Queen Anne's County and limited soil testing to ascertain background soil fertility levels. This document lists soil resources throughout the county and provides interpretative materials concerning soil properties. Properties such as seasonal water-table depth, permeability, and drainage potential are listed in this survey. Agricultural and silvicultural fields throughout the county are well suited to receive treated wastewater based on preliminary review of this survey and limited assessment of large land areas in the Kent Island area and on the mainland east of the target communities. Soils with moderate permeability (0.6 to 2.0 inches per hour) and with water-tables located greater than 24 inches below the soil surface are typically well suited as receivers for reclaimed water. The high quality wastewater generated at the QAC facility is well suited to apply to land. Addition of water from the target communities will increase the volume of water available for discharge and potentially for beneficial reuse. Further testing of individual sites will be required to assure land treatment potential, but golf courses, recreational lands, agricultural fields and forested sites all benefit from well managed reuse programs.

The potential for land based treatment is increasingly important as regulatory agencies impose more stringent limits on discharges to nutrient sensitive waters. Land based treatment utilizing a portion of the water collected and treated from target communities may offer an option to reduce nutrient loadings to the bay. Golf courses and recreational areas often require water to optimize plant growth and create desirable landscapes.

The modern soil survey of Queen Anne's County indicates that areas containing the following soil resources may be suitable to host land based wastewater management through some form of surface irrigation: Matapeake, Matapex, and Nassawango. These soil materials are discussed in Appendix 2, attached.

These options are selected as a non-point source discharge because of the sensitivity of the water resources in the area. Soil test results are presented in table 3 below.

Table 3, Soil Test Results Queen Anne's County

Test Parameter	Barclay	Queen Anne	Templeville	Price
OM (%)	0.4	0.7	0.5	0.6
pH (SU)	5.7	5.9	5.7	6.0
P (mg/kg)	128 (A)	145 (A)	88 (L)	161 (A)
K (mg/kg)	101 (A)	90 (A)	67 (L)	152 (A)
Ca (%)	55 (A)	61 (A)	70 (A)	50 (L)
Mg (%)	12 (A)	10 (A)	8 (L)	8 (L)
Cu (mg/kg)	1.2 (A)	1.8 (A)	0.9 (A)	1.3 (A)
Zn (mg/kg)	2.0 (A)	1.7 (A)	1.9 (A)	2.1 (A)

"A" signifies adequate nutrient available, "L" is a potential nutrient deficiency

Soil fertility levels in the rural communities are well suited for production of a wide variety of agricultural and silvicultural crops. Soil pH and nutrient levels can be adjusted as required to optimize soil productivity and potential for proper performance of a land based wastewater system. Slow rate spray irrigation systems onto permitted or dedicated land or onto a non-dedicated site as an irrigation resource for recreational lands has offered an excellent option for reusing treated wastewater beneficially. A dedicated receiver site is one permitted by appropriate regulatory agencies and dedicated to wastewater application. A non-dedicated site is typically a recreational or common-use site such as a golf course or park where there is human contact and reclaimed water is used as an irrigation resource. The reuse quality standards are very stringent. Typical reuse standards are: BOD 5 mg/l or less, TSS 5 mg/l or less, Coliform between 2.2 counts/100 ml and 14 counts/100 ml. Agencies may impose standards for ammonium or nitrogen, but the land based systems typically utilize these as nutrients.

Study Results

The assessment suggests that few of the older onsite wastewater systems installed in the target communities meet current standards for onsite systems. Two general types of soil systems are currently permitted in the QAC area. These are a trench system and a pit system. A soil based onsite domestic wastewater treatment system is typically installed at a depth of 30 to 48 inches. This allows a zone of unsaturated natural soil below a dispersal system for wastewater treatment and renovation. Based on the review of permit data available, this

treatment zone is typically not present in the older systems present in the target communities.

Review of permit data indicates that the hydraulic loading utilized to size a wastewater system under current regulations is between 0.5 and 1.0 gallons per square foot per day. The more conservative liquid loading is utilized in the trench based systems while the higher loading is utilized to size a pit system. Trench systems may contain up to 200 linear feet of 2 to 3 foot wide trench while a typical pit system may cover between 115 and 400 square feet.

The depth of trenches utilized in the past within the target communities suggest that soil dispersal component for many of the systems are excavated into the shallow groundwater, filled with gravel or slag and utilized as disposal rather than dispersal systems for septic tank effluent. A less common option is the pit system. In the pit system, large pits are excavated to depths ranging from 8 or 9 feet to over 20 feet. These pits are filled with gravel or slag and septic tank effluent is dispersed over the material – typically relying on simple gravity distribution to spread liquid over the trench or pit system. These deep trench and deep pit systems assure septic tank effluent is placed in intimate contact with shallow groundwater since the area loading is small and the liquid loading is moderately high. These pit systems are disposal systems rather than soil dispersal systems. Assuming the quality of the septic tank effluent discharged into the shallow groundwater is typical of septic tank effluent reported in USEPA design manuals (typical BOD: 150 – 200 mg/l; typical TKN 45 mg/l, typical fecal coliform levels 1,000,000 to 10,000,000 counts/100 ml) this disposal practice violates standards for protection of these water resources.

Table 1 lists the prevalence of these sub-standard dispersal systems in the Kent Island study area communities. Based on the information contained in this table, the Queen Anne Colony subdivision has the highest frequency of pit systems while all of the target communities have a significant number of systems considered groundwater penetrating. These groundwater penetrating systems had been common or standard practice in the area prior to the adoption of the Groundwater Protection Report.

The use of groundwater penetrating systems has been approved in other Eastern Shore communities. Dorchester County approved use of lagoon systems for individual homes and these were assessed through an EPA demonstration project. The primary difference between a pit system or deep trench system and a lagoon system is the surface area required. The typical onsite lagoon system

serving the few residential facilities in Dorchester County measure approximately 150 feet by 150 feet. The retention time for liquid in these lagoon systems provides treatment beyond that afforded in a septic tank/pit or trench system.

The highest percentages of systems in the Kent Island area which may not comply with some established standard are found in Romancoke and the number of compliant systems is low. The Kent Island communities pose the most significant environmental and health challenge observed.

The Barclay, Price, Queen Anne, and Templeville areas pose less significant risk because soil materials in these areas may be well suited for large land based systems. The quality of the permit data precludes any reasonable conclusion regarding system sufficiency.

Several permits have been issued for the development of aerobic treatment units (ATU's) followed by some form of soil absorption or pit system. The ATU may be an effective tool for removal of some organic matter, but these mechanically intensive systems do little to remove nutrients as nitrogen and phosphorus. An ATU can be designed and operated to meet moderately stringent nutrient removal goals, but there is no evidence that the systems employed in the Kent Island area are intended as nutrient removal systems. Further, there is no evidence that the ATU's are permitted with anything other than an improvement permit. No monitoring requirements appear to be imposed through the permits issued for these technologies.

A long term operation and maintenance program may be developed for the ATU's utilized to meet performance standards. North Carolina and Virginia have employed mechanical or aerobic treatment systems in areas of environmental concern. The State requirements impose only a very minimum of quarterly monitoring on these advanced treatment units.

Options analysis

Kent Island (Tasks 1 and 2)

1. No Action: A "no action" option only exists where risk to public health and groundwater quality is minimal. This option would allow the continued use of groundwater penetrating systems as the preferred option for use in Kent Island and other areas of the County

2. Development and associated maintenance of code compliant onsite: Site and soil conditions encountered throughout the QAC Kent Island area suggest that nutrient removing technologies would be required to meet standards imposed through the Chesapeake Bay Restoration Program. Nutrient removal systems followed by soil absorption systems may be developed. The cost of onsite nutrient removal systems ranges from $20,000 to $25.000 per system (treatment unit and soil dispersal system). In addition, these systems must be monitored frequently to assure proper system performance. North Carolina has established operation and maintenance criteria for advanced treatment units serving single family facilities. The application of these rules (15 A NCAC, Chapter 18, section 1900) requires systems utilizing mechanical components and permitted as repairs or new installations since 1992 to be managed through a management entity as defined in rule. The operation and maintenance requirements established in rule necessitate a minimum of 4 inspections per year. Typical inspection costs by private service providers are $100.00 to $150.00 per visit and testing is an additional cost. It must be noted that these systems may still not function hydraulically and many of the smaller existing lots may have insufficient room for the construction of such systems.

3. Development of Cluster systems: Areas within target communities may be developed with appropriately sized treatment units followed by soil based treatment units. Utilization of cluster systems where suitable soil materials are present within a reasonable distance of the target communities will reduce the costs of the collection system to convey liquid to a central treatment facility but will require the acquisition of suitable lands. The systems will require operator attention to assure proper long term operation. Cluster systems may be most suitable in the communities assessed off the Kent Island environs simply because of land availability. Nonetheless, some areas are available for cluster systems in the Kent Island area. Estimated costs for cluster systems including collection and treatment may be as high as $25,000 to $30,000 per connection using alternative collection technology and a land based, sub-surface wastewater system. These costs may be higher depending on land costs, high land cost will increase these values and these estimates were based on a land cost of $7500.00/acre. Cluster systems must be managed more intensively than individual onsite wastewater systems.

4. Development of Community Collection and decentralized or distributed treatment: Throughout the Kent Island area soil materials are successfully supporting a variety of agricultural and silvicultural activities. These land areas are well suited to receive reclaimed domestic wastewater through traditional land application systems as permitted through MDE. Further, receiver sites are available that may benefit from use of high quality reclaimed water as an irrigation resource. An alternative land based treatment option potentially suited for use in the area is a constructed wetland system incorporated into wetland infiltration basins. Estimated costs for community systems including collection and land based treatment may be as high as $20,000 to $30,000 per connection using alternative collection technology and a land based, sub-surface wastewater system. These costs are based on a land cost of $7500.00/acre. The per unit cost will increase if cost for land acquisition is greater. Collection system costs depend entirely on the linear footage of collection system. Community systems must be managed more intensively than individual onsite wastewater systems or the small cluster systems. These community based systems utilize similar treatment and dispersal as the small cluster and require significant operator attention, but since the number of connections is potentially high, operational costs may be less on a per customer basis.

5. Development of Community collection and treatment at QAC Sanitary District facility: The Sanitary District of Queen Anne's County currently operates a facility permitted to discharge treated liquid to the Bay. The addition of the target communities will consume capacity in this facility, but will assure the liquid generated in the area is treated according to conditions listed in the NPDES permit. The intent of the NPDES process is to reduce the pounds of pollutant discharged to surface waters. The renewable permits issued to QAC Sanitary District better assure targeted nutrient removal goals are met than do individual permits for individual systems.

Rural Areas (Task 3)

1. No Action in rural areas: A "no action" option exists where risk to public health and groundwater quality is minimal. This option would allow the continued use of groundwater penetrating systems as the preferred option for use in Barclay, Prince, Templeville , Queen Anne, other rural areas of the County

2. Development of code compliant systems in rural areas: Site and soil conditions encountered throughout the more inland rural areas of QAC suggest that nutrient removing technologies would not be required to meet standards imposed through the Chesapeake Bay Restoration Program unless surface waters are located adjacent to wastewater systems. Where required, nutrient removal systems followed by soil absorption systems may be developed, but in those portions of the county with sufficient separation distance to surface waters (say 100 feet) code compliant soil absorption systems could be developed. The cost of onsite wastewater treatment and dispersal systems without nutrient removal ranges from $10,000 to $15.000 per system (treatment unit and soil dispersal system). The treatment system requirement exists because of limited separation distance to groundwater. In addition, these systems must be monitored frequently to assure proper system performance. North Carolina has established operation and maintenance criteria for advanced treatment units serving single family facilities. The operation and maintenance requirements established in rule necessitate a minimum of 4 inspections per year. Typical inspection costs by private service providers are $100.00 to $150.00 per visit and testing is an additional cost.

3. Development of Collection and Land Based Cluster in rural areas: Throughout the rural communities assessed, soil materials are currently supporting a variety of agricultural and silvicultural activities. These land areas supporting these activities are well suited to receive treated domestic wastewater through traditional land application systems as permitted through MDE. Further, potential wastewater receiver sites are available that may benefit from use of high quality reclaimed water as an irrigation resource. An alternative land based treatment option potentially suited for use in the area if sub-surface hydrology is supportive is a constructed wetland system incorporated into wetland infiltration basins. Estimated costs for community systems including collection and land based treatment may be as high as $20,000 to $25,000 per connection using alternative collection technology and a land based wastewater treatment system. Land acquisition cost will influence these values and this estimate is based on a land cost of $7500.00/acre. Collection system costs depend entirely on the linear footage of collection system. Community systems must be managed more intensively than individual onsite wastewater systems or the small cluster systems. These community based systems require significant operator attention, but since the

number of connections is potentially high, operational costs may be relatively low on a per customer basis.

4. Development of Community collection and centralized treatment at QAC Sanitary District facility: The Sanitary District of Queen Anne's County currently operates a facility permitted to discharge treated liquid to the Bay. The addition of the target communities in the isolated rural areas of the county is not recommended since the extensive transmission system costs are potentially high and capacity at the QAC PUD may be better allocated to high development density areas of the county.

Conclusions:

Kent Island (Tasks 1 and 2)

Onsite wastewater systems utilized in the Kent Island area do not meet current requirements as contained in current MDE Rule for system design or operation nor do these systems meet the intent of the Chesapeake Bay Protection Act. The onsite wastewater systems utilized in these target communities are considered, based on permit data available from the local environmental health department, to be placing septic tank effluent into shallow groundwater. There are few aerobic treatment units utilized in these communities. The ATU may provide some benefit regarding removal of organic matter, but little nutrient removal unless specifically designed and operated to achieve performance standards. Repairs to existing onsite wastewater systems must continue with reliance on these groundwater penetrating systems because there is no potential for adequate dispersal based on plat limitations. The best that can be hoped for is some limited nutrient removal from managed pre-treatment units. Based on assessment of all options, the community collection and either dispersed treatment or centralized treatment option appears to offer the most reliable of the options available. The limited availability of suitable land throughout the target community suggests that the use of the NPDES permitted facility operated by the Queen Anne's County Public Utility District offers the most cost effective and sustainable of the wastewater management options available. The QAC PUD facility currently does produce treated effluent meeting treatment levels established in the USEPA Guidelines for Water Reuse suitable for application onto land. Should land based treatment be required as an adjunct or as a conjunctive element of the current permit, that option can be added to the existing permit.

Rural Areas (Task 3)

The Barclay, Price, Queen Anne, and Templeville areas pose less significant risk because soil materials in these areas may be well suited for large land based systems. The quality of the permit data precludes any reasonable conclusion regarding system sufficiency. Examination of permit data does suggest that there are groundwater penetrating systems installed in these communities, but the proximity of these systems to surface waters is not as significant as in the Kent Island Communities. Groundwater penetrating systems are currently permitted and these systems may be required as on-lot repairs in the future because of site constraints imposed by current plats.

Queen Anne's County (Tasks 1, 2, and 3)

Many of the onsite wastewater systems reviewed do not meet current standards for design, installation, operation and maintenance requirements imposed by current standards. Groundwater penetrating systems are typical in the communities surveyed. Many jurisdictions expressly forbid installation or operation of these systems and when encountered, property owners are forced to bring these systems up to a standard (USEPA Title 5, Underground Injection Control).

Compliance with federal rule imposed through the underground injection control program expressly forbids direct placement of wastewater into shallow groundwater. Soil absorption systems are recognized as a viable option, and the soil absorption option is based on providing between 12 and 24 inches of unsaturated flow through a soil. There is no evidence of flow through unsatutrated soil on most sites assessed in Queen Anne's County.

Options for onsite wastewater management systems are severely limited. To comply with state mandate, systems must remove nutrients. Few onsite technologies are available that will meet stringent nutrient limits. Those that may meet these limits will require an extensive management and oversight program that will prove costly to either residents or the county.

Based on this assessment of systems and options, the community collection and treatment at the QAPUD facility option appears to be the most effective and sustainable of the options available. A community collection and treatment option provides a cost effective and sustainable wastewater solution for wastewater management in the Kent Island Communities studied. Collection

technologies are available that can be installed with minimal disruption to residents and all collection options should be assessed as a second phase to the county's effort to address viable and sustainable, long term wastewater management strategies for residents of Queen Anne's County.

Collection and treatment systems can be planned to allow for incorporation of recycle and reuse systems in the future as total maximum daily load (TMDL) conditions and Chesapeake Bay Protection Act requirements are imposed on wastewater systems operated in the area. County operated and maintained wastewater systems offer a sustainable option for long term management of wastewater in Queen Anne's County. The Public Utility District system provides a mechanism to assure assets are available for the life of this infrastructure to provide safe and effective wastewater management for residents of Queen Anne's County.

The small lots in the Kent Island communities are not well suited as permanent receiver sites for treated domestic wastewater. The collection system proposed through the Kent Island communities offers a viable option for assuring sufficient volume of liquid is available to achieve proper levels of wastewater treatment at the PUD facility. The wastewater treatment and reclamation facility operated by the Public Utility District offers a program:

1. To assure high levels of wastewater treatment are consistently achieved,
2. To assure assets required to manage wastewater flows in the future are available, and
3. To assure options necessary to comply with future daily load requirements imposed through Bay Management activities are implemented.

Management through the existing Public Utility District appears to offer a cost effective, environmentally sound option for managing wastewater that is protective of both public health and Chesapeake Bay water quality in accordance with mandates contained in the Bay Preservation Act.

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

Section 5 – STEP Cost Estimate

Southern Kent Island Sanitary Project - STEP Option - 560 Vacants Served **FINAL Estimate** **7/2/2014**

Conceptual Level Estimate

Item	Unit	Cost/Unit	Units	Subtotal	Total
Force Main from Sub Areas to KNSG WWTP					
Saw Cutting	L.F.	$ 4	8,865	$ 35,461	$ 35,461
Pavement Removal and Disposal	S.Y.	$ 2	2,463	$ 3,694	$ 3,694
6' Trench Excavation	C.Y.	$ 5	2,955	$ 13,298	$ 13,298
8" DR11 HDPE	L.F.	$ 44	5,490	$ 241,560	$ 241,560
12" DR11 HDPE	L.F.	$ 95	7,500	$ 712,500	$ 712,500
16" DR11 HDPE	L.F.	$ 135	31,336	$ 4,230,360	$ 4,230,360
24" DR 11 HDPE Rt 50/301 Casing	L.F.	$ 1,000	250	$ 250,000	$ 250,000
Isolation Valves	Ea.	$ 2,000	6	$ 12,000	$ 12,000
16" Magmeter	Ea.	$ 24,000	1	$ 24,000	$ 24,000
Air Relief Valve and Vault	Ea.	$ 10,000	15	$ 150,000	$ 150,000
Metallic Tape	L.F.	$ 0.25	44,326	$ 11,082	$ 11,082
Dewatering	Day	$ 750	22	$ 16,622	$ 16,622
Backfill and Compaction	C.Y.	$ 10	296	$ 2,955	$ 2,955
Pavement Replacement 4" Deep	S.Y.	$ 15	2,463	$ 36,938	$ 36,938
Base Course 6" Deep	S.Y.	$ 14	2,463	$ 34,476	$ 34,476
Trench Box	Day	$ 150	222	$ 33,245	$ 33,245
Maintenance of Traffic	Day	$ 500	89	$ 44,326	$ 44,326
Odor Control at WWTP	Ea.	$ 125,000	1	$ 125,000	$ 125,000
Sub-Total					**$ 5,977,516**
Mobilization (7%)					$ 418,426
Construction Sub-Total					**$ 6,395,942**
Contingency (10%)					$ 639,594
Engineering/Construction Services (5%)					$ 319,797
Construction Total - Force Main					**$ 7,355,333**
Sub Area #1 (976 Homes Kent Island Estates, Romancoke)					
Install Pump System and Service Lines	Ea.	$ 10,000	777	$ 7,770,000	$ 7,770,000
Vacant Lot Services	Ea.	$ 500	399	$ 199,500	$ 199,500
Saw Cutting	L.F.	$ 4	27,995	$ 111,981	$ 111,981
Pavement Removal and Disposal	S.Y.	$ 2	5,690	$ 8,535	$ 8,535
6' Trench Excavation	C.Y.	$ 5	3,414	$ 15,363	$ 15,363
Isolation Valves	Ea.	$ 1,000	122	$ 122,000	$ 122,000
2" DR11 HDPE	L.F.	$ 15	11,505	$ 172,575	$ 172,575
3" DR11 HDPE	L.F.	$ 18	28,878	$ 519,804	$ 519,804
4" DR11 HDPE	L.F.	$ 26	19,235	$ 500,110	$ 500,110
6" DR11 HDPE	L.F.	$ 34	4,010	$ 136,340	$ 136,340
8" DR11 HDPE	L.F.	$ 44	2,360	$ 103,840	$ 103,840
10" DR11 HDPE	L.F.	$ 65	4,000	$ 260,000	$ 260,000
Metallic Tape	L.F.	$ 0.25	25,605	$ 6,401	$ 6,401
Dewatering	Day	$ 500	26	$ 12,803	$ 12,803
Backfill and Compaction	C.Y.	$ 10	683	$ 6,828	$ 6,828
Pavement Replacement 4" Deep	S.Y.	$ 15	5,690	$ 85,350	$ 85,350
Base Course 6" Deep	S.Y.	$ 14	5,690	$ 79,660	$ 79,660
Trench Box	Day	$ 150	128	$ 19,204	$ 19,204
Maintenance of Traffic	Day	$ 500	256	$ 128,025	$ 128,025
Sub-Total					**$ 10,258,318**
Mobilization (7%)					$ 718,082
Construction Sub-Total					**$ 10,976,401**
Contingency (25%)					$ 2,744,100
Engineering/Construction Services (15%)					$ 1,646,460
Construction Total					**$ 15,366,961**
Treatment Costs					
Treatment Cost - Existing Homes	Ea.	$ 7,550	777	$ 5,866,350	$ 5,866,350
Treatment Cost - Vacant Lots	Ea.	$ 7,550	399	$ 3,012,450	$ 3,012,450
Treatment Total					**$ 8,878,800**
Total Phase Cost - Sub Area #1					**$ 24,245,761**

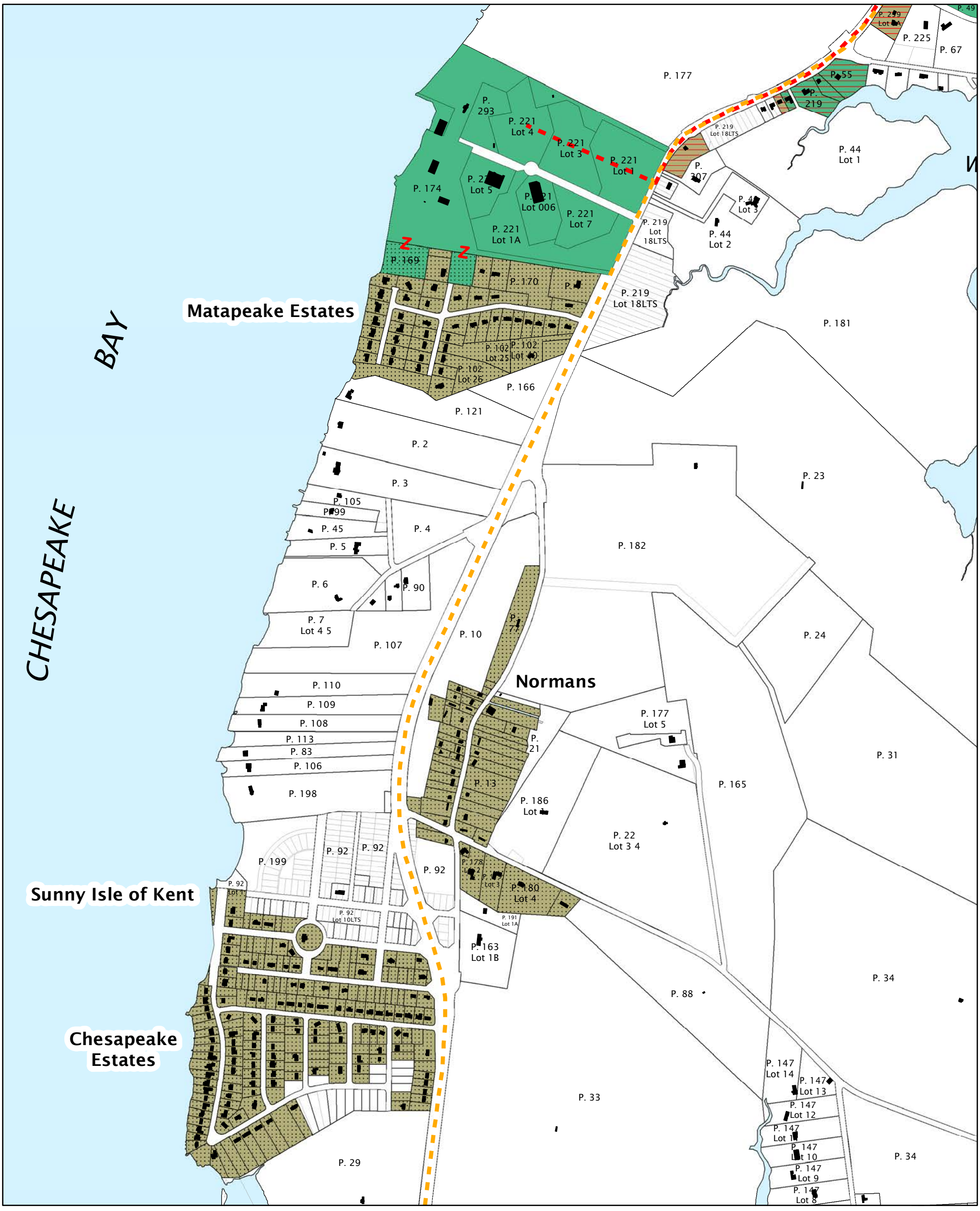
Sub Area #2 (199 Homes Tower Gardens)						
Install Pump System and Service Lines	Ea.	$ 10,000	199	$ 1,990,000	$	1,990,000
Vacant Lot Services	Ea.	$ 500	25	$ 12,500	$	12,500
Saw Cutting	L.F.	$ 4	8,176	$ 32,702	$	32,702
Pavement Removal and Disposal	S.Y.	$ 2	670	$ 1,005	$	1,005
6' Trench Excavation	C.Y.	$ 5	402	$ 1,810	$	1,810
Isolation Valves	Ea.	$ 1,000	20	$ 20,130	$	20,130
2" DR11 HDPE	L.F.	$ 15	9,653	$ 144,795	$	144,795
3" DR11 HDPE	L.F.	$ 18	7,770	$ 139,860	$	139,860
4" DR11 HDPE	L.F.	$ 26	3,016	$ 78,416	$	78,416
Metallic Tape	L.F.	$ 0.25	3,016	$ 754	$	754
Dewatering	Day	$ 500	3	$ 1,508	$	1,508
Backfill and Compaction	C.Y.	$ 10	80	$ 804	$	804
Pavement Replacement 4" Deep	S.Y.	$ 15	670	$ 10,053	$	10,053
Base Course 6" Deep	S.Y.	$ 14	670	$ 9,383	$	9,383
Trench Box	Day	$ 150	15	$ 2,262	$	2,262
Maintenance of Traffic	Day	$ 500	30	$ 15,080	$	15,080
Sub-Total					$	**2,461,063**
Mobilization (7%)					$	172,274
Construction Sub-Total					$	**2,633,337**
Contingency (25%)					$	658,334
Engineering/Construction Services (15%)					$	395,001
Construction Total					$	**3,686,672**
Treatment Costs						
Treatment Cost - Existing Homes	Ea.	$ 7,550	199	$ 1,502,450	$	1,502,450
Treatment Cost - Vacant Lots	Ea.	$ 7,550	25	$ 188,750	$	188,750
Treatment Total					$	**1,691,200**
Total Phase Cost - Sub Area #2					$	**5,377,872**
Sub Area #3 (332 Homes Kentmorr & Queen Anne's Colony)						
Install Pump System and Service Lines	Ea.	$ 10,000	332	$ 3,320,000	$	3,320,000
Vacant Lot Services	Ea.	$ 500	80	$ 40,000	$	40,000
Saw Cutting	L.F.	$ 4	12,098	$ 48,392	$	48,392
Pavement Removal and Disposal	S.Y.	$ 2	4,280	$ 6,420	$	6,420
6' Trench Excavation	C.Y.	$ 5	2,568	$ 11,556	$	11,556
Isolation Valves	Ea.	$ 1,000	42	$ 42,000	$	42,000
2" DR11 HDPE	L.F.	$ 15	10,985	$ 164,775	$	164,775
3" DR11 HDPE	L.F.	$ 18	3,300	$ 59,400	$	59,400
4" DR11 HDPE	L.F.	$ 26	11,350	$ 295,100	$	295,100
6" DR11 HDPE	L.F.	$ 34	4,610	$ 156,740	$	156,740
Metallic Tape	L.F.	$ 0	19,260	$ 4,815	$	4,815
Dewatering	Day	$ 500	96	$ 48,150	$	48,150
Backfill and Compaction	C.Y.	$ 10	2,568	$ 25,680	$	25,680
Pavement Replacement 4" Deep	S.Y.	$ 15	4,280	$ 64,200	$	64,200
Base Course 6" Deep	S.Y.	$ 14	4,280	$ 59,920	$	59,920
Trench Box	Day	$ 150	96	$ 14,445	$	14,445
Maintenance of Traffic	Day	$ 500	193	$ 96,300	$	96,300
Sub-Total					$	**4,457,893**
Mobilization (7%)					$	312,053
Construction Sub-Total					$	**4,769,946**
Contingency (25%)					$	1,192,486
Engineering/Construction Services (15%)					$	715,492
Construction Total					$	**6,677,924**
Treatment Costs						
Treatment Cost - Existing Homes	Ea.	$ 7,550	332	$ 2,506,600	$	2,506,600
Treatment Cost - Vacant Lots	Ea.	$ 7,550	80	$ 604,000	$	604,000
Treatment Total					$	**3,110,600**
Total Phase Cost - Sub Area #3					$	**9,788,524**

Sub Area #4 (210 Homes Matapeake, Normans, Sunny Isle of Kent & Chesapeake)						
Install Pump System and Service Lines	Ea.	$ 10,000	210	$ 2,100,000	$	2,100,000
Vacant Lot Services	Ea.	$ 500	56	$ 28,000	$	28,000
Saw Cutting	L.F.	$ 4	8,344	$ 33,376	$	33,376
Pavement Removal and Disposal	S.Y.	$ 2	4,636	$ 6,953	$	6,953
6' Trench Excavation	C.Y.	$ 5	2,781	$ 12,516	$	12,516
Isolation Valves	Ea.	$ 1,000	26	$ 26,000	$	26,000
2" DR11 HDPE	L.F.	$ 15	11,520	$ 172,800	$	172,800
3" DR11 HDPE	L.F.	$ 18	9,340	$ 168,120	$	168,120
Metallic Tape	L.F.	$ 0	20,860	$ 5,215	$	5,215
Dewatering	Day	$ 500	104	$ 52,150	$	52,150
Backfill and Compaction	C.Y.	$ 10	2,781	$ 27,813	$	27,813
Pavement Replacement 4" Deep	S.Y.	$ 15	4,636	$ 69,533	$	69,533
Base Course 6" Deep	S.Y.	$ 14	4,636	$ 64,898	$	64,898
Trench Box	Day	$ 150	104	$ 15,645	$	15,645
Maintenance of Traffic	Day	$ 500	209	$ 104,300	$	104,300
Sub-Total					$	**2,887,320**
Mobilization (7%)					$	202,112
Construction Sub-Total					$	**3,089,432**
Contingency (25%)					$	772,358
Engineering/Construction Services (15%)					$	463,415
Construction Total					$	**4,325,205**
Treatment Costs						
Treatment Cost - Existing Homes	Ea.	$ 7,550	210	$ 1,585,500	$	1,585,500
Treatment Cost - Vacant Lots	Ea.	$ 7,550	56	$ 422,800	$	422,800
Treatment Total					$	**2,008,300**
Total Phase Cost - Sub Area #4					$	**6,333,505**
TOTAL CONSTRUCTION COST - All Phases (no treatment costs)					$	**37,412,095**
TOTAL TREATMENT COST - All Phases (no construction costs)					$	**15,688,900**
TOTAL PROJECT COST (includes Construction & Treatment)					$	**53,100,995**
		1,518	SAY		$	**53,101,000**

APPENDIX IX – SOUTHERN KENT ISLAND DOCUMENTATION

Section 6 – Department of the Environment – Depth to High Water Table Maps

Chesapeake Estates/Sunny Isle of Kent/Batt's Neck/Matapeake Estates Sewerage Public Health Areas of Concern



LEGEND

Sewer Service

- S1 Current Sewer Service
- S2 1 to 3 years ('15 - '17)
- S3 4 to 10 years ('18 - '23)
- S6 No Planned Service
- Public Health Concern
- Properties with Limited Sewer Allocation

- Existing 3" Denied Access Line
- Proposed Denied Access Line
- Building Footprint

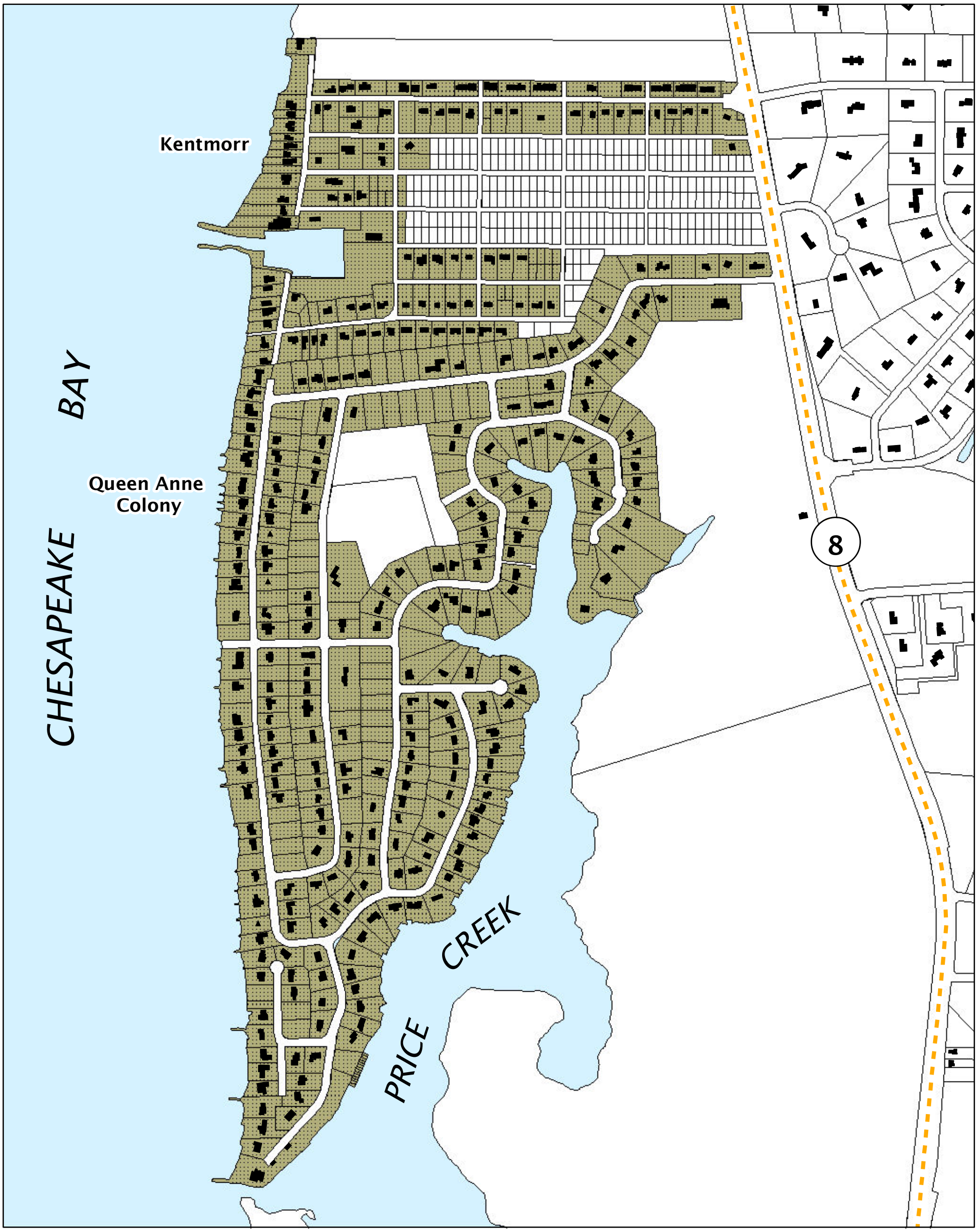
0 450 900 1,800 Feet

N W E S

File No.: 081114- SAN03

XXX

Queen Anne Colony and Kentmorr
Sewerage Public Health Areas of Concern



LEGEND

Sewer Service

- S1 Current Sewer Service
- S2 1 to 3 years ('15 - '17)
- S3 4 to 10 years ('18 to '23)
- S6 No Planned Service
- Public Health Concern
- Proposed Denied Access Line
- Building Footprint

0 300 600 1,200 Feet

N W E S

File No.: 081414- SAN01

XXX

Kent Island Estates and Romancoke
Sewerage Public Health Areas of Concern

LEGEND

Sewer Service

- S1 Current Sewer Service
- S2 1 to 3 years ('15 - '17)
- S3 4 to 10 years ('18 - '23)
- S6 No Planned Service
- Public Health Concern

Building Footprint

Proposed Denied Access Line

Lots in the service area that may be exempt from the benefit assessment due to the presence of existing environmental constraints. Property owners may request relief from the exemption by providing evidence that the property is buildable.

0 700 1,400 2,800 Feet

N W E S

File No.: 081414- SAN02

XXX