

**MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER and SCIENCE ADMINISTRATION**

**1800 Washington Boulevard
Baltimore, Maryland 21230**



Bermed Infiltration Pond Study

November 2022

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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Executive Summary

This report is prepared by the Maryland Department of the Environment (MDE or the Department) Water and Science Administration Onsite Systems Division for the purpose of reviewing the condition and effectiveness of Bermed Infiltration Ponds (BIPs) particularly in Dorchester County. BIPs have been a recognized method for sewage disposal in Maryland and primarily utilized in Dorchester County.

Recently the condition and reliability of BIPs has led the Department to take aggressive actions to protect public health and the environment. In July 2021, the Secretary of the Department instructed staff to perform an in-depth assessment of the viability of serving residential housing with BIPs. The study action plan highlights the need for the Department to review previously approved disposal methods to ensure acceptability and functionality.

To effectively study each BIP, the Department categorized BIPs in relation to volume of wastewater flow, recognizing that any BIP serving more than one lot is a shared facility (details on shared facilities will be discussed later in this report).

BIP type	Total of BIPs	Failing or Imminent Risk BIP
Wastewater flow >5,000 gallons per day (gpd)	12	6
Wastewater flow >1,200 gpd and <5,000 gpd	17	8
Wastewater flow > 600 gpd and <1,200 gpd	19	13
Individual BIP <600 gpd (not a shared facility)	Unknown at this time	Unknown at this time

The Department developed a *Design and Construction Manual for Bermed Infiltration Pond Systems* in July 1992, which was intended to be utilized for small residential systems serving five bedrooms or less, with a maximum wastewater flow of 750 gpd. The usage of BIPs for larger systems serving multiple dwellings evolved into the large number of shared facilities currently under study. Increasing the design to accommodate larger wastewater flows does not account for the complexity of responsibilities associated with shared facilities.

In Dorchester County, there is a total inventory of 47 shared facilities served by BIPs; this is a combination of 253 building lots, of which 69 are currently undeveloped. This study confirms that 60% of the 45 regularly inspected BIPs are in a current state of failure or imminent risk of

failure. To further exacerbate the environmental impact, seven BIPs have been identified as actively discharging sewage effluent onto the ground surface during the field inspections while conducting this study. The discharges ranged from a continual overflow to a sporadic overflow based on factors such as precipitation, use and site conditions.

The inventory of BIPs can be categorized as individual or shared facilities and new or existing. Subsets to any of these categories are the undeveloped previously approved lots. To date the Department proposes to notify all local Approving Authorities in all counties to discontinue any blanket approvals for development based on a BIP as a method of sewage disposal. For the number of properties that have previous approval, but have not constructed the BIP, the Department and the local Approving Authority should identify the total inventory of these affected properties and analyze them on a case-by-case basis. Further evaluation should be performed to determine if an alternative method of sewage disposal may be utilized prior to considering the construction of a BIP.

For properties served by existing BIPs that are not presently failing or at risk for imminent failure, development should be allowed based on site specific conditions. These would include identification of responsible parties, renewal of groundwater discharge permits (where applicable), BIP inspection, operation and maintenance schedule, physical conditions, safety measures and a plan for addressing emergency conditions.

For properties served by existing BIPs that are failing, development should not be considered until identification of the repair method is identified and implemented. In the interim conditions for addressing the failure will need to be determined. Recommendations will be based on availability for public sewer connection, on-going maintenance, and monitoring of the existing BIP, and any alternative on-site sewage disposal method.

The Department will continue frequent monitoring and potential development of consent orders, while working toward alternative solutions and ultimate abatement. This study denotes the complexity surrounding privately-owned community systems, shared facility requirements, operation and maintenance of systems, public health risk and environmental protection, which may necessitate an addendum to this report. The Department intends to follow-up with detailed strategies with an addendum to update the findings and recommendations.

Purpose of this document

This document has been prepared by the Department to provide an overview of the historic use, design and construction, current status and considerations of the use of BIPs in Maryland. Through the ongoing efforts of the Department in a focused study, this report highlights findings and recommendations on this method of on-site sewage disposal with regard to the protection of public health and the environment.

Introduction to a BIP

In specific areas of Maryland such as the Coastal Plain Physiographic Province, BIPs have been utilized as part of a conventional onsite sewage disposal system (OSDS) in which primarily treated sewage effluent is discharged to a pond structure that intersects shallow groundwater. Typically, less permeable or hydraulically restrictive soil near the ground surface is excavated; exposing underlying saturated sandy material to create a pond, and spoils from the excavation are piled above the surrounding ground to create a dam-like structure. Household wastewater enters a typical multi-chambered septic tank where it settles into layers and is ready for conveyance for final dispersal/disposal. The partially treated liquid effluent is then conveyed and discharged to the BIP, for additional treatment through dilution and natural bio-chemical processes for final disposal. Biological organisms in the pond, along with dilution, provide treatment of the wastewater, after which the wastewater moves into and through shallow groundwater beneath and surrounding the pond or is removed due to evaporation near the surface.

A BIP can serve a single home or multiple homes, and BIPs serving multiple homes are considered shared facilities for regulatory purposes. BIPs need regular maintenance in order to function properly. This includes keeping tall vegetation and trees away from the BIP in order to maximize light and air flow to the pond and to limit the addition of extra organic material to the water. Without adequate light and air flow, the biological organisms that treat the effluent in the BIP will die and the BIP will cease to function. Furthermore, BIPs need proper safety equipment, fencing and signage to prevent undue harm to the public through unwanted access and or contact with these deep-water features.

History of BIPs

The use of BIPs in Maryland began as a result of natural site limitations, including very shallow seasonal groundwater water table elevations, limited soil permeability/impermeable sub-soils, and numerous failing conventional trench septic systems in the Little Choptank and Neck Districts of Dorchester County. Beginning in the late 1960s and into the mid-1970s, the Dorchester County Office of Environmental Health began experimenting with BIP evaluation, construction, and monitoring on several properties.

With studies conducted into the mid- and late-1980s, the use of and approval for BIPs became regulatory history with the inception of County Groundwater Protection Reports (GPRs) in several coastal plain regions of the Eastern Shore. Along with the GPRs, additional reports were produced by various agencies such as the University of Maryland Center for Environmental and Estuarine Studies (UMCES) at Horn Point, Department of Natural Resources (DNR), and the Maryland Department of Health (MDH /MDE. Running concurrently to the evaluation of the use

of BIPs as an alternate means of sewage disposal, the expanding proposal for and construction of BIPs in Dorchester County was underway between 1985 and 1995.

The majority of BIPs within Dorchester and other Eastern Shore counties are located in environmentally sensitive areas prone to nuisance tides, wetlands distribution, and sea level rise.

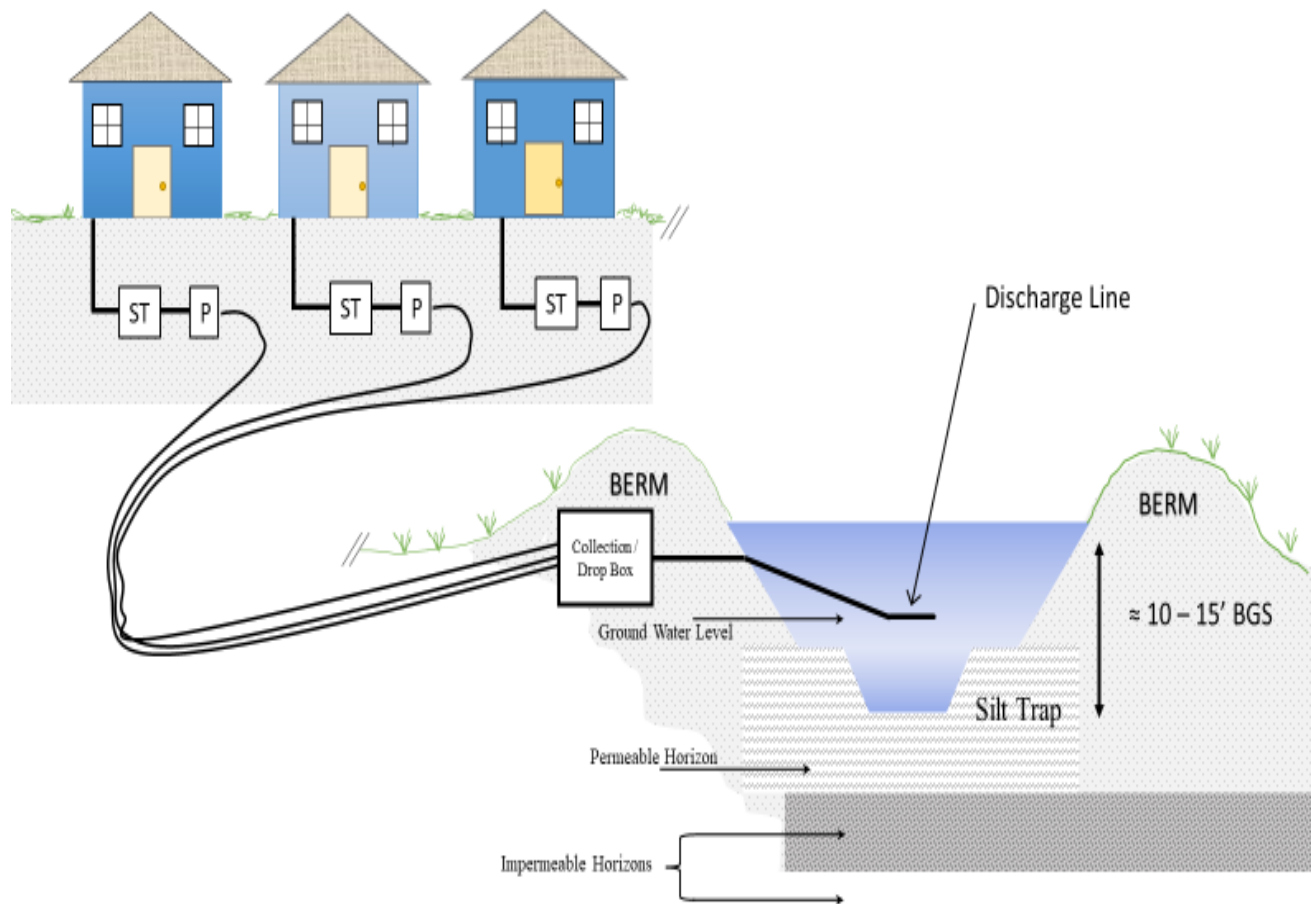
Design of BIPs

In July 1992, the Department published the *Design and Construction Manual for Bermed Infiltration Ponds*. Although relatable site evaluation criteria and standard conventional on-site sewage disposal equipment similar to other groundwater penetrating systems in the state were considered, BIP design and installation with regard to landscape positions differed considerably. BIPs were designed upon completion of a standard site evaluation, including soil and hydraulic conductivity testing, permeability, and identification of sufficient area. Although the manual provides three pretreatment options, multi-chambered septic tanks, sand-filters, and aerobic treatment units to serve as the primary treatment of sewage, BIPs lack effective pretreatment. BIPs have multiple compartment septic tanks, which allows for primary settling as the only pretreatment method. Effluent exits the septic tank and enters a pump chamber for discharge into a BIP.

The pond was excavated to expose a minimum of 2 feet of permeable saturated sandy substratum that is overlain by an impermeable soil at least 5 feet thick. To achieve adequate containerization of water, dilution of waste strength and to provide sufficient hydraulic head, the BIP slope and depth are site specific, but generally range anywhere from 6 to 15 feet below original grade or ground level.

The berm would be constructed utilizing overburden removed from the excavation and graded to provide an interior pond slope no flatter than one and 1.5 feet horizontal to 1 foot vertical with a 1:1 foot slope being preferred for weed control. Furthermore, the section of the berm above and covering the original ground level would be constructed with an interior berm slope between 6:1, or 8:1 slope. Approximately 2 feet off the bottom of the pond is the discharge line for conveying wastewater from the dwelling(s).

Description of treatment in the BIP includes algae and other pond organisms to treat the sewage, it is diluted by groundwater moving into and out of the pond. Effluent is dispersed and disposed through the pond sidewalls and bottom into the water-bearing sandy substratum driven by the hydraulic head formed in the pond. Ponds are sized to expose permeable sidewall adequate to transmit design flow. A systematic of multi-residence (shared facility) BIP is shown below.



STATUS OF BIPS IN DORCHESTER COUNTY

Shared facility BIPs in Dorchester County are overseen by the Dorchester County Sanitary District, Inc. (Sanitary District). The Sanitary District is a public corporate body and is managed by a six-member commission. State law contains provisions unique to the Sanitary District, including the Sanitary District's ability to approve, construct, and operate shared facility BIPs and to levy assessments against BIP users for maintenance and care for the BIPs. *See §§ 9-672 to 9-679 of the Environment Article of the Annotated Code of Maryland.* While the Sanitary District operates shared facility BIPs in Dorchester County, it is ultimately the property owners served by the BIP that are liable for BIP maintenance, repairs, and any environmental violations attributable to the BIP.

The majority of constructed shared facility BIPs surveyed in Dorchester County suffer from non-compliance due to a lack of owner and/or Sanitary District maintenance neglect. Fencing, signage, and life saving devices are typically lacking and/or in disrepair, presenting safety

hazards. Furthermore, lack of vegetation control around BIPs presents both additional organic load (leaves, woody debris), but are also prohibitive of access for inspection and maintenance. Of paramount concern to existing stakeholders using BIPs is the lack of suitable alternatives for replacement of aging and/or failing systems.

Due to the general location of most BIPs in Dorchester County being near transitional landscapes of non-tidal and tidal wetlands, marsh and Chesapeake Bay Critical Area, the effects of land subsidence, sea level rise, and climate change are readily apparent. Nuisance tides, increased frequency of area flooding, and threat of tropical storm surges all have a significant impact on these locations. Additionally, associated hydrogeologic conditions, in accelerated flux, leave BIP users with limited alternate means of sewage disposal and regulators with limited means of rapid response to abate a public health emergency.

The overall age of BIPs in Dorchester County is another factor in their respective suitability and longevity. The majority of BIPs having been constructed from the mid-1980s to the early 1990s coupled with the long-term lack of adequate maintenance has resulted in an increased rate of system failures.

BIP Work Study Findings

In July 2021, the Department enhanced its involvement with BIPs after identifying performance problems, particularly in association with older and poorly maintained ponds. Considering the multiple environmental and public health risks, including those associated with the effects and impacts of climate change, flooding, surface and groundwater contamination of a failing BIP, the Department developed a Work Study and Action Plan (the Plan) to begin a process of both physical evaluation of BIP conditions, along with an in-depth assessment of five BIPs to include specific surface and groundwater biochemical analysis and specific inspection criteria.

To prioritize the Plan implementation and provide prompt response to stakeholders, the Department partnered with the Maryland Environmental Service (MES) to supplement in-field data collection. Additionally, the Department performed installation of monitoring well networks at the five specific BIPs. To date, over 145 physical BIP inspections have been performed based on comprehensive and consistent criteria. Quarterly groundwater monitoring and surface water sampling from the five BIPs has been collected and analyzed.

General information on each Shared Facility BIP constructed in Dorchester County can be found in the report appendix. For the purpose of adequate representation, the following lists the five Shared Facility BIPs, for enhanced inspection, surface and groundwater monitoring:

- Bogle/Kilmaurie

- 2-Lot Shared Facility No. 5; Hudson Road, Cambridge
- Deep Water No. 1
 - 12-Lot Shared Facility No. 14-1; Deep Water Road, Madison
- Ferry Farms No. 1
 - 6-Lot Shared Facility No. 37-1; Kim Drive, Cambridge
- McKeil Point No. 1
 - 12-Lot Shared Facility No. 21-1; Brooks Road, Madison
- Ruxton Landing
 - 9-Lot Shared Facility No. 23; Heather Lane, Cambridge

BIP INSPECTIONS

Inspections have been conducted to assess the overall physical conditions of 45 BIPs. By assessing and evaluating the following:

- Risk of failure
- Berms properly cleared of woody vegetation (i.e., maintained mowed grasses).
- Presence of signage (i.e., “deep water, sewage disposal, danger”) and fencing barricade.
- Adequate 2 feet of freeboard.
- Location within the Chesapeake Bay Critical Area (CBCA) or other environmentally sensitive area.

The inspections identified from the 45 BIPs the following results.

Inspection category	Number of BIPs	Percentage
Risk of failure	27	60
Lack of berm maintenance	24	53
Lack of signage or fencing	31	68
Less than 2 feet of freeboard	30	66
Within CBCA/sensitive area	42	93

In the report appendix, *Figure No. 1* provides an example inspection form utilized by the Department during the Work Study. Report appendix *Figure No. 2*, lists inspected Shared Facility BIPs that have been identified in either active failure or imminent risk of failure based on lack of freeboard and site conditions. Please note that *Figure No. 2* represents the aforementioned designations in effect at the time of the report. BIP Work Study sample sites are indicated as yellow highlights, that are also identified as failing or at imminent risk of failing. Tan highlights indicate an Environmental Justice screening area of concern.

The following photos illustrate examples of compliant and noncompliant BIPs identified during inspections.



Aerial view of Deep Water 1 and 2 BIPs (left and bottom) near Little Choptank River (upper and lower right). Note proximity to tidal wetland transitions and surface water.



BIP with temporary fencing and adequate gate, signage, and life ring.



BIP with poor vegetation maintenance, lacking adequate fencing, and less than 2 feet of freeboard.



BIP with poor vegetation maintenance and less than 2 feet of freeboard.



BIP with adequate fencing and vegetation maintenance but has inadequate freeboard (less than 2') and at potential risk of discharge in the event of a storm event.

WATER QUALITY ANALYSIS & DATA COLLECTION IN PROGRESS

A component of the study included water quality sample collection and analysis at the five selected Work Study sample sites. Samples were collected from groundwater monitoring wells and from the surface water within the BIP. If a surface discharge was observed, samples were collected from the ground surface or nearby watercourse. The samples were analyzed for the following parameters:

- Nitrates
- Chemical-Biological Oxygen Demand
- pH
- E. Coli bacteria
- Total Coliform Bacteria
- Fecal Coliform Bacteria
- Dissolved Oxygen
- Methylene Blue Substances

WATER ANALYSIS RESULTS & EXTENDED PROJECT SCOPE

Water quality data collection was undertaken with the aforementioned analytes to assess risk to public health and the environment, and to determine the overall health/functionality of the pond ecosystem. Given the proximity of many BIPs in relation to tidal waters of the state, fecal coliform bacteria sampling would aid in determining risks to shellfish harvesting areas, and collectively, all bacteriological sampling would aid in risk assessment for public exposure pathways such as ingestion or contact with BIP water.

Beginning in January 2022, an initial round of water quality testing was performed at the five Work Study sample sites, which included one BIP surface water sample and one monitoring well sample to provide a limited baseline. Results varied however notably, total coliform bacteria was identified in all five surface samples at values up to, >200.5 most probable number (MPN), or greater than 200.5 MPN or viable bacteria in a given 100 milliliter volume of water. Furthermore, fecal coliform and E. Coli were also detected in all five BIP surface water samples ranging from as low as 1 and 4.2 MPN respectively, to values of >200.5 MPN.

The initial round of monitoring well sampling also detected bacteriological concentrations in groundwater around these BIPs, notably with Total Coliform values of >200.5 MPN with the sole exception of the *Deep Water No. 1* sample site. At the time of this report, the second quarterly round of sample site data collection has been reported and can be found in the report appendix as *Figure No. 3*.

At the time of sample collection in April 2022, *McKeil Point No. 1* was also identified in active hydraulic failure, prompting the collection of a supplemental surface water sample from the

ground surface outside of the berm. Notably, data collected from *McKeil Point No. 1* reported in May 2022, and supplemented with additional ditch/stream sampling in June 2022, which confirmed direct risk of impact to nearby shellfish harvest areas. According to the *Listing Methodology for Identifying Waters Impaired by Bacteria in Maryland's Integrated Report*, revised February 25, 2020, criteria for shellfish harvesting waters are set by the National Shellfish Sanitation Program and given regulatory authority in Maryland in the Code of Maryland Regulations (COMAR) 26.08.02.03-3. Although measured levels of fecal coliform for specific use designations are usually based on a 3-year monitoring period, including a total of 30 individual samples, at minimum a sample population median less than 14 MPN is required. While dilution factors based on area of water are considered, the levels currently recorded at *McKeil Point No. 1* are cause for concern.

Based on these assessments conditional closure/restrictions have been placed on Fishing Creek and the Little Choptank at this time. Additional information concerning Shellfish Harvest Areas and the current restrictions and additional actions taken by the Department can be found at mde.maryland.gov/programs/Marylander/fishandshellfish/Pages/index.aspx.

Additional information from MES is included in the June 2022 PowerPoint presentation (*see Appendix*), which provides ongoing time-series biochemical analysis data. Ongoing assessment and data gathered will be presented in the forthcoming *Addendum*.

McKeil Point No. 1

In the process of conducting this study *McKeil Point No. 1* BIP was the first active failure identified. The Department has attempted to facilitate connection to public sewer via the public sewer pump station located less than one and a half miles from the BIP.

While in the sewer connection process, an active discharge was discovered. Sample collections revealed actionable levels of E. coli, Fecal coliform, and MBA (anionic surfactants). A physical examination of the site determined that the discharge was occurring over the top of the BIP's berm. Further investigation also determined the risk of contamination to a section of Fishing Creek in the Little Choptank River.

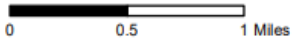
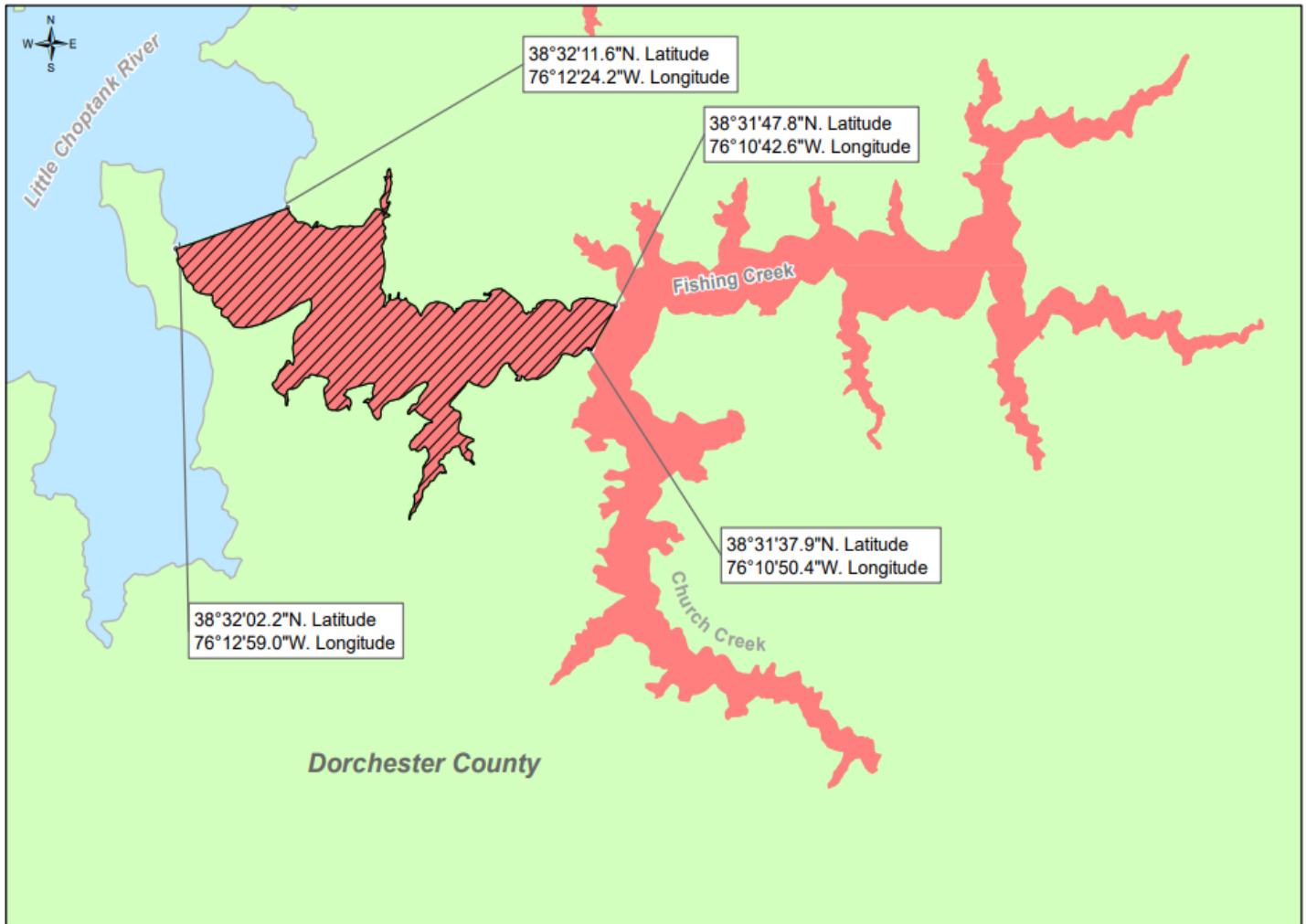
In response to the findings, the Department coordinated with DNR, the Sanitary District, county government, City of Cambridge, and the Dorchester County Health Department to take the following actions:

- Immediate pumping and hauling from the BIP to achieve a 2-foot freeboard from the top of the berm and ongoing pumping and hauling as needed to maintain that freeboard. The pumped effluent is being accepted and treated at the Cambridge wastewater treatment plant.

- Posting of warning signage around the BIP by the Health Department.
- Temporary closure of the section of Fishing Creek to shellfish harvesting (see *Notice of Changes to Shellfish Waters* below).

In response to this surface discharge the Department correlated data to identify BIPs that could potentially affect other shellfish harvesting areas in the county. *Figure No. 4* located in the report appendix provides location of the 27 Shared Facilities failing or at risk of failure in relationship to adjacent shellfish harvest waters and their status designation according to shellfish harvesting waters of the state. The image below shows initial Shellfish Water conditional closure following the *McKeil Point No. 1* discharge.

Notice of Changes to Shellfish Waters



Fishing Creek, Little Choptank River, Dorchester County
 Prohibited Shellfish Area Map 39A
 June 2022

- Restricted By This Letter
- Remains Approved By This Letter
- Remains Restricted By This Letter



Lawrence J. Hogan, Jr., Governor
 Boyd K. Rutherford, Lieutenant Governor
 Horacio Tablada, Secretary

Challenges to BIP Repair

Given the typical site conditions, which would have led to the construction of a BIP on a given site, these same hydrogeologic circumstances are usually prohibitive of most other conventional septic system designs and in some cases, are further exacerbated by the present impact of climate change and sea level rise greater beyond those realized at the time of original construction. The concepts and practice of BIP rejuvenation, expansion or deepening to revitalize an infiltrative zone, and/or expanding available surface/storage is cost-prohibitive and would typically require further encroachment of non-tidal wetlands and burden the user’s property.

Furthermore, at the time of a discovery of BIP failure the options for abatement are limited, time consuming and costly. The removal of wastewater from a BIP to lower freeboard may be considered. However, significant gallonage at high cost to the owner/operator will be incurred. Coordination between stakeholders, including property owners, the Sanitary District, Dorchester County government, affected municipal governments, and health department representatives is paramount to shift action to prevent or abate impending or realized public health impacts or emergencies posed by failing BIPs.

Sea Level Rise & BIP Vulnerability

In addition to obvious impacts associated with BIPs, especially during storm events, which could pose risk of catastrophic berm failure and release of significant volumes of wastewater to nearby waterways, other factors should not be overlooked, such as: erosion, land and infrastructure inundation, property damage, drinking water well impacts, and enhanced risks to public health as time progresses. With regard to the suitability of BIP connection, construction, abandonment and or provision of municipal services, stakeholders should thoroughly evaluate these factors in all decision making.

Developing a plan and evaluating policy options for existing BIPs susceptible to sea level rise is a necessary task. According to a *Sea Level Rise: Technical Guidance for Dorchester County* provided by DNR in fall 2008, nearly 60% of the county is situated within the 100-year floodplain with the majority of that land subject to tidal flooding. Furthermore, the majority of areas served by BIPs are associated with hydrogeologic conditions that further exacerbate the effects of nuisance flooding and sea level rise such as poorly drained soil and water table elevation very near ground surface.

Assessments of nuisance tidal flooding and sea level rise vulnerability have to be taken into consideration with regard to not only Shared Facility BIPs, but all BIPs located in areas of the lower Eastern Shore that are susceptible to their collective impacts. During the ongoing BIP Work Study, the Department has performed a more focused review of data generated by the National Oceanographic and Atmospheric Administration, DNR, MDE, and specifically by Dorchester County, including the *2017 Dorchester County Hazard Mitigation Plan Update (updated every 5 years)*.

Recommendations

Of the current 47 existing permitted Shared Facility BIPs in Dorchester County, 45 have been regularly inspected by the Department since 2020; culminating in nearly 141 individual inspections conducted by the Department and project partners from the MES. Twenty-seven of these facilities have been identified as at-risk for hydraulic failure based on specific inspection criteria, most notably those with a lack of adequate freeboard. Of these at-risk sites, seven have

been observed in various states of active hydraulic failure wherein a hydraulic discharge of sewage effluent has been observed as cresting or seeping from their respective berms.

Notably, actions regarding any active failures are addressed on a site-specific basis. Based on the nature of BIPs to show freeboard fluctuation with seasonal groundwater, precipitation influx, and other factors, not all critical or failing BIPs have continued to show active hydraulic failure during this study period. Active hydraulic failures are those that have been identified as seepage or overtopping of effluent outside of the BIP berm onto the surrounding environment. However, it should be noted that this phenomenon accentuates the unpredictability with regard to when a BIP will actively overflow, or worse suffer catastrophic berm failure.

In addition to these at-risk and active failures, the Department has compiled a cumulative list of facilities and their overall condition with regard to key operation and maintenance criteria. At present, the sample inspection population of BIPs has identified conditions that have been documented for the following: lack of adequate freeboard, lack of or disrepair of fencing/signage and life-saving apparatus, and the lack of proper vegetation control. In an effort to determine suitability of any given BIP disposition for future use or abandonment, the Department will continue to monitor sites and evaluate risks to public health and the environment as warranted. Monitoring criteria will be set on a case-by-case basis depending on site observed site conditions and include, but not limited to; set frequency of inspection, reporting to appropriate authorities, climatological triggers for enhanced monitoring and the addition of facility ancillary equipment to determine freeboard accurately.

To date, the Department has identified various risks associated with the use of BIPs namely in Dorchester County but can also be extrapolated to other regions of the state in which they have been historically approved. In addition to the common operation and maintenance concerns that have plagued BIPs, the use of BIPs in environmentally sensitive areas of the state has placed additional burdens on citizens and regulatory custodians alike. BIP failure and/or potential catastrophic failure of a berm not only significantly increases risk exposure to the public to sewage effluent, but the potential volume of discharge in these scenarios in close proximity to waters of the state has the potential for far reaching impacts, including water quality, water sports/recreation, and the seafood industry.

Furthermore, the pumping and hauling costs to reduce the freeboard in a BIP equates to \$30,000 - 45,000 to reduce the freeboard by 1 inch, and legal ramifications associated with solutions and abatement for existing facilities to be provided an alternate means of sewage disposal are considerable. As such and being the duty of the Department to ensure that all scenarios are properly evaluated and vetted to provide safe and adequate sewage disposal and public health/environmental protection, the Department has identified potential solutions for Shared Facility BIPs in light of information gathered during the ongoing BIP Work Study. Namely, with the exception of physical maintenance criteria such as fencing, signing, lifesaving equipment, and vegetation control, which can be accommodated for most sites, a lack of adequate freeboard presents the most significant challenge. Lack of adequate freeboard is caused by hydraulic overload due to many factors such as, increased seasonal wetness/water table/tidal factors, a clogged infiltrative surface within the BIP, eutrophication, a BIP being under-designed and other

factors. Resolving a hydraulically overloaded BIP has so far proven both resource-intensive and cost-prohibitive, specifically with regard to *McKeil Point No. 1*.

The Department recommends development of facility-specific action plans that should be addressed on a site specific basis. As such, the Department presents the following general recommendations concerning existing Shared Facility BIPs per category:

Policy Recommendations for Existing Failing BIPs

- A.** For any existing BIP identified as actively failing or at imminent risk of failure **within** a public sewer service area the Department recommends the following actions.

Recommendation A.1: Connect BIPs located in sewer service areas to a public sewer system.

Example: Dorchester County Sanitary District's District No. 7 nearest the Madison-Woolford Sewer Service line is the home to eight Shared Facility BIPs requested for Priority Funding Area (PFA) consideration as of January 30, 2019. These eight BIPs serve 69 developed lots, and nine undeveloped lots.

The Department recommends that efforts by the Dorchester County Sanitary Commission and Department of Public Works be bolstered by appropriate application to the state, and local partners and stakeholders to move forward with connection of all District No. 7 BIPs named in the 2019 PFA Exemption Request with the priority on Shared Facilities 21-1, 2 and 3, and 14-1 and 2 followed by the remaining located on Brooks Road and Deep Point Road.

Recommendation A.2: During the interim period prior to connection to municipal sewers, all BIPs should maintain a 2-foot freeboard within the BIP to prevent surface discharges.

To affirm this requirement, the Department should execute a consent order to all Shared facility BIPs subject to a Groundwater Discharge permit to outline compliance criteria. Updated Groundwater Discharge permits via addition, amendment and/or modification of state Groundwater Discharge Permits to include, but not limited to, enhanced monitoring and regular compliance inspection frequency, installation of advanced treatment units, and development of a catastrophic failure plan.

Recommendation A.3: New connections to failing BIPs should only be approved upon successful completion of municipal sewer service connections. At that time appropriate abandonment and decommission of BIP will be required.

The Department should assist Dorchester County Sanitary Commission and Department of Public Works to secure any available funding opportunities for completion of these projects.

- B.** For any existing BIP identified as actively failing or at imminent risk of failure **outside** of a public sewer service area the Department recommends the following actions.

Recommendation B.1: The Department should execute a consent order to outline compliance criteria for all Groundwater Discharge Permitted Shared Facility BIPs in this category. The addition, amendment and/or modification of state Groundwater Discharge Permits may include enhanced monitoring and regular compliance inspection frequency, installation of advanced treatment units, and development of a catastrophic failure plan.

Recommendation B.2: The Department should recommend, when applicable, to upgrade individual dwellings septic tanks to pretreatment best available technology (BAT) units via standard permitting process through the Department and local Health Department procedure/procurement. The installation of BAT units would be eligible for funding through the Bay Restoration Fund program criteria.

Recommendation B.3: All BIP users should ensure that all preventable water infiltration and inflow controls are considered to prevent additional flow into the BIP system. Basic prevention such as directing drainage away from septic tanks, including downspouts and other surface features. Install risers on any access port of a septic tank, BAT unit or pump chamber to a minimum of 6 inches above grade. Perform regular pumping of septic tanks, which should include a visual inspection related to the integrity of the tank identifying any seams for potential leakage and condition of sealants around piping. Perform annual inspections of any BAT unit. The Department will consider interim measures to promote aeration or mitigate other eutrophication factors through physical and biochemical processes.

Recommendation B.4: New connections to BIPs within this category should only be approved when a final solution is determined and implemented. In determining a final solution consideration should include all suitable conventional and non-conventional sewage disposal designs such as elevated sand-lined trench, sand mound, drip dispersal, bottomless sand filter and peat/biofilter systems or any combination thereof as warranted. To begin the process for exploring alternative repairs individual site evaluations should be conducted in cooperation with the local Health Department and the Department.

Policy Recommendations for Existing Non-Failing BIPS

- C.** For any existing BIP currently not identified as failing and is maintained in a compliant and serviceable condition, the Department recommends the following.

Recommendation C.1 Any existing BIP that is not identified as failing should continue with regular operation and maintenance conditions. Berms should remain intact and properly equipped with all required fencing signage and lifesaving apparatuses to limit access and prevent undue risk to unauthorized personnel. Regular maintenance of berm vegetation must be continued to prevent further degradation of water quality due to additional nutrient and organic loading.

Routine pumping of septic tanks should occur in accordance with recommended practices of every 3-5 years and for BAT units service must be performed annually. Minimize seepage to the extent practicable, direct any downspouts away from septic tank locations while complying with stormwater management requirements. Provide positive drainage in the yard, if able to direct surface water away from septic tank locations. Add, or bring risers on tank access ports to a minimum of 6” inches above grade to prevent infiltration and inflow of excess water.

Recommendation C.2: Update Groundwater Discharge Permits for Shared Facility BIPs in this category. The addition, amendment and/or modification of state Groundwater Discharge Permits to include, but not limited to, enhanced monitoring and regular compliance inspection frequency, installation of advanced treatment units, and development of a catastrophic failure plan.

Recommendation C.3: Prepare for the future, if the BIP is located in or near to sewer service areas explore public sewer service where applicable. Areas outside of sewer service should explore alternative methods for future repairs such as elevated sand-lined trench, sand mound, drip dispersal, bottomless sand filter and peat/biofilter systems or any combination thereof as warranted by site conditions.

Recommendation C.4: Undesignated sewer service areas with non-failing BIPs should be considered for potential service were prudent to account for future system failure due to a variety of factors. Local municipal authorities and custodians should consider and develop strategies to incorporate outlying regions not currently listed in a Comprehensive Plan. If an area within a S-1 through S-4 designation is known to have BIPs, certain factors including, but not limited to, number of users, age of systems, sea level rise, and nuisance tide vulnerability should be fully vetted and Comprehensive Plans revised to reflect immediate needs versus long term solutions. The Department fully supports the extension and designation of additional sewer service areas to accommodate high BIP density areas of the county.

Procedure for Abatement of Catastrophic Failure

In the event or risk of catastrophic failure of a BIP berm, the Department recommends that all reasonable efforts be made to prevent undue harm to public health and the environment, including to recreational waters and shellfish harvesting waters, including, but not limited to:

- Disconnection and temporary pump and haul of wastewater for all affected BIP users.
- Emergency earthen berm support.
- Emergency draw-down of BIP contents with proper treatment and disposition.
- Public outreach and posting.
- Identification of all sensitive receptors associated with the nearest waterways for Shellfish Harvest Areas, notification to owners with any unconfirmed potable supply wells, and evaluation of recreational areas such as bathing beaches.

Policy Recommendations for New BIPs

Recommendation D.1: The Department should seek to suspend construction for any new BIPs for 2 years. Based on the findings in this study the On-Site Systems Division (OSSD) recommends that this temporary suspension be extended for a period of 2 years, and in the interim the Department will determine the remaining inventory of properties previously approved for construction of a BIP that remain incomplete.

Recommendation D.2: Establish a maximum size for any new BIP:

- No new BIPs requiring a groundwater discharge permit (>5000 gpd).
- Withdrawal of the *1992 Design and Construction Manual for BIPs*.

Recommendation D.3 Develop new design criteria that considers:

- Sea level rise
- Maintenance
- Environmental performance
- Also provide formal guidance and interpretation to applicable Approving Authority jurisdictions for updates and warranted modifications/redactions to Master Water and Sewer Plans and applicable GPRs and that concern Shared Facility BIPs and applicability with regard to COMAR 26.04.05.

Further Legal Analysis

The policy recommendations contained in this study may require additional legal analysis to determine how to best implement the recommendations and whether any statutory or regulatory changes may need to occur.

Key legal issues include:

- liability under the BIP discharge permits and shared facilities agreements;
- steps needed to decommission a non-functional BIP;
- removal of a non-functional BIP from a county GPR; and
- potential prohibitions on future BIPs.

The Department anticipates including an analysis of these legal issues in an *addendum* to the study, as noted below.

Forthcoming Addendum

As the Department continues to collect and analyze data on the condition and functionality of BIPs, the Department's understanding of the situation in Dorchester County and BIPs in general will continue to evolve. Given the continuing inflow of sampling data, the ongoing work to decommission *McKeil Point No. 1* and connect the BIP's former users to public sewer, and the legal analysis needed to carry out the policy recommendations of this study, the Department plans to issue an *addendum* to this study in June 2023.

Conclusion

The current state and use of BIPs as multi-user shared facilities in Maryland has been identified as posing undue significant risk to public health, the environment, and is associated with other far-reaching impacts with both financial and legal ramifications. Based on the findings of this report and those metrics to be gathered in the ongoing study of BIPs, it is the Department's position that future processes for the new consideration, evaluation, and construction of Shared Facility BIPs will be carefully considered moving forward in the state.

The Department will continue to work cooperatively with partners at the local, municipal, and state levels along with other appropriate regulatory agents, citizens, and stakeholders to transition toward viable solutions for BIP users in Maryland.

Appendix

Figure 1: Inspection Report Form

Figure 2: Shared Facilities at Active or Imminent Risk of Failure

Figure 3: MES Water Quality Analysis

Figure 4: Critical Shared Facility BIPs and Shellfish Areas

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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 WATER & SCIENCE ADMINISTRATION

**WASTE WATER PERMITS PROGRAM
 ON-SITE SYSTEMS DIVISION**

Report of Observations

Bermed Infiltration Pond Condition Assessment	Date: Permit DP# (if applicable): N/A NOTE: SDSHFc #
Site/Facility Name:	
Address:	
City / County:	

This report details current basic visual / physical site conditions of the aforementioned bermed infiltration pond (BIP) in the following:

Overall condition(s): (if "NO" to following questions explain below)

- **Berm currently intact with no exterior discharge to ground surface:**
- **Properly cleared of significant woody vegetation:**
- **Water surface free of significant aquatic vegetation:**
- **Signage present:**
- **Fencing present:**

Current available free board (approx):

Potential for sewerage connection (proximity or other):

If near sewer, note approx. distance:

Potential for on-site individual lot evaluation: INDIVIDUAL OSDS EVALUATION NEEDED

Potential for advanced treatment: CRITICAL AREA (YES / NO)

Active discharge or system failure identified:

Comments:

Photo No. 1;

Revised: 12/27/17

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Figure 1 Inspection Report Form Page 1 of 2

**MDE/WSA/WSA/OSD
Report of Observation**

MDE Representative:	MES Representative:
Signature:	Signature:
Date:	Date:
Dorchester County HD Representative:	Person Interviewed:
Signature:	Signature:
Date:	Date:

Figure 1 Inspection Report Form Page 2 of 2

Subdivision Name	Original Construction	Constructed Lots	Unimproved Lots
Adams/Jennings	5/9/1989	2	0
Antioch Acres	5/13/1993	8	0
Brad Vern	9/14/1993	2	2
Bromwells Adv#1	6/22/1989	8	0
Bromwells Adv#2	3/31/1992	6	2
Budd/Hales	2/16/1994	3	0
Deep Harbor	9/15/1986	3	1
Deep Water 1	11/1/1988	12	2
Deep Water 2	9/4/1991	13	1
Heron Harbor #1	4/24/1989	7	7
Heron Harbor #2	4/24/1989	9	5
Hughes	10/5/1989	2	0
James Engel	6/18/1993	1	1
Jordon	7/19/1988	2	0
Bogle/Kilmaurie	12/12/1986	2	0
Linkous & Dorworth	6/13/2008	1	0
Marquess	12/26/1991	1	1
McKeil Point #1	5/17/1989	12	2
McKeil Point #2	11/27/1990	3	1
McKiel Point #3	5/15/1990	14	0
Meridith	6/18/1985	2	0
Rienhoff	4/15/1994	2	0
Tieder Sub	2/8/1996	4	0
Unangst	1/26/1989	2	0
Vaughan #1	3/31/1992	2	0
Vaughan #2	8/5/1992	1	1

Figure 2 Shared Facilities at Active or Imminent Risk of Failure

MDE BIP Lab Results: April 19th & 20th, 2022					
Surface Waters	Bogle-Kilmaurie	Deepwater	Ferry Farms	McKeil	Ruxton
Nitrate	0.29	0.24	0	1.2	0
CBOD	14.6	13.6	16.2	14.5	11.1
pH	8	7.5	6.7	7.2	7.4
e. Coli	47.8	200.5	<1.0	17.8	42.9
Total Coliform	>200.5	>200.5	165.2	>200.5	>200.5
Fecal	56	88.5	2	19.2	1
DO	6.6	3.6	4.2	8.8	3.5
MBA's	ND	ND	ND	0.269	ND
Monitoring Well #1	Bogle-Kilmaurie	Deepwater	Ferry Farms	McKeil	Ruxton
Nitrate	0	0	0.27	1.2	0
CBOD	117	3.1	19.2	13.3	13.4
pH	6.4	4.9	5.9	5.7	6.3
e. Coli	<1.0	<1.0	5.3	2	<1.0
Total Coliform	>200.5	8.7	>200.5	>200.5	>200.5
Fecal	<1.0	<1.0	1	1	<1.0
DO	2	4.7	4.1	4.5	3.2
MBA's	ND	ND	0.18	ND	ND
Monitoring Well #2	Bogle-Kilmaurie	Deepwater	Ferry Farms	McKeil	Ruxton
Nitrate	0	0.24	0.27	0	0.26
CBOD	5.8	2.9	15.7	9.9	6.6
pH	5.7	5.6	5.8	6.4	6.4
e. Coli	<1.0	15	<1.0	1	<1.0
Total Coliform	>200.5	>200.5	129.8	>200.5	>200.5
Fecal	<1.0	1	<1.0	2	1
DO	3.6	3.6	5.9	4.2	2.7
MBA's	ND	ND	0.18	ND	ND
Monitoring Well #3	Bogle-Kilmaurie	Deepwater	Ferry Farms	McKeil	Ruxton
Nitrate	0.27	0.24	0.27	0	0
CBOD	8.5	ND	6.4	37.9	7.3
pH	6.3	4.8	6.4	6.4	5.9
e. Coli	<1.0	1	2	65.9	<1.0
Total Coliform	>200.5	34.4	>200.5	118.4	>200.5
Fecal	<1.0	1	3.1	8.7	<1.0
DO	2.7	5.4	4.4	3.7	3.7
MBA's	ND	ND	0.18	ND	0.3
Overflow	Bogle-Kilmaurie	Deepwater	Ferry Farms	McKeil	Ruxton
Nitrate	X	X	X	1.2	X
CBOD	X	X	X	ND	X
pH	X	X	X	7.8	X
e. Coli	X	X	X	>200.5	X
Total Coliform	X	X	X	>200.5	X
Fecal	X	X	X	36.4	X
DO	X	X	X	6.5	X
MBA's	X	X	X	0.194	X

Figure 3 MES Water Quality Analysis

Site Information					Overburdened / Underserved Area	Adjacent Waters
Subdivision Name	Original Construction	Latitude	Longitude	Critical Risk of Failure		Status
Adams/Jennings	5/9/1989	38.5611	-76.260866	Yes		Conditionally Approved
Antioch Acres	5/13/1993	38.5501	-76.1440449	Yes		Restricted
Brad Vern	9/14/1993	38.50912	-76.1870335	Yes		Restricted
Bromwells #1	6/22/1989	38.51185	-76.209602	Yes		Approved
Bromwells #2	3/31/1992	38.51709	-76.2098104	Yes		Approved
Budd/Hales	2/16/1994	38.53708	-76.084425	Yes	Yes	Non-shellfish
Deep Harbor	9/15/1986	38.52514	-76.1668702	Yes		Restricted
Deep Water 1	11/1/1988	38.51895	-76.182728	Yes		Conditional / Restricted
Deep Water 2	9/4/1991	38.51963	-76.1863617	Yes		Conditional / Restricted
Heron Harbor #1	4/24/1989	38.53557	-76.1844552	Yes		Restricted
Heron Harbor #2	4/24/1989	38.53973	-76.183657	Yes		Restricted
Hughes	10/5/1989	38.56316	-76.1452061	Yes	Yes	Restricted
James Engel	6/18/1993	38.55052	-76.2581242	Yes		Conditionally Approved
Jordon	7/19/1988	38.54735	-76.2723554	Yes		Conditionally Approved
Kilmaurie	12/12/1986	38.60867	-76.2180681	Yes		Approved
Linkous & Dorworth	6/13/2008	38.59566	-76.214548	Yes		Approved
Marquess	12/26/1991	38.53187	-76.138171	Yes		Restricted
McKiel Point #1	5/17/1989	38.52685	-76.2102672	Yes		Approved / Conditional
McKiel Point #2	11/27/1990	38.52923	-76.214738	Yes		Approved / Conditional
McKiel Point #3	5/15/1990	38.53299	-76.2191279	Yes		Approved / Conditional
Meridith	6/18/1985	38.55871	-76.26072	Yes		Conditionally Approved
Rienhoff	4/15/1994	38.31987	-76.2235919	Yes		Restricted
Tieder Sub	2/8/1996	38.34419	-76.2273228	Yes		Conditionally Approved
Unangst	1/26/1989	38.57127	-76.2174458	Yes		Conditionally Approved
Vaughan #1	3/31/1992	38.54592	-76.1747567	Yes		Restricted
Vaughan #2	8/5/1992	38.54613	-76.1770579	Yes		Restricted

Figure 4 Critical Shared Facility BIPs and Shellfish Areas