Total Maximum Daily Load Restoration Plan for Bacteria

2021 Annual Bacteria TMDL Assessment

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SECTION ONE   INTRODUCTION

1.1   BACKGROUND

Anne Arundel County (the County) currently has 19 waterways with U.S. Environmental Protection Agency (EPA)-approved Total Maximum Daily Loads (TMDLs) associated with bacteria impairments. Fecal coliform is identified as the cause of impairment in the TMDLs for 15 of the 19 waterways. E. coli and Enterococci are identified as the impairments for two TMDLs each. For additional background information, please refer to prior NPDES MS4 Annual Reports and/or Bacteria TMDL Annual Progress Reports submitted by Anne Arundel County.

1.2   OVERVIEW OF PROGRESS REPORT

This report documents the progress made during fiscal year (FY) 21, July 1, 2020 – June 30, 2021, by the County towards achieving the bacteria TMDL goals. This report was prepared in consultation with several County departments, including BWPR, Department of Health, and the Bureau of Engineering - Technical Engineering division, using existing County data and other reports. Progress in this report is reported as progress achieved on Tier Strategies and Tier B Strategies.

1.3   TIER A STRATEGIES

Tier A strategies are those that address potential human sources of bacteria, such as septic system effluent from poorly maintained septic systems, sanitary sewage overflows, and illicit connections that discharge household human wastewater into the MS4. The progress in implementing Tier A strategies during the past year is described below.

1.3.1   Elimination of Household Illicit Connections

Restoration Plan Goal

Under the household illicit connection program, the Bacteria TMDL Restoration Plan(Anne Arundel County. 2017a) states that approximately 150 outfalls are evaluated each year, resulting in detection and elimination of 2 percent of the outfalls that have illicit connections.

Progress

During the FY21 reporting period, the County conducted targeted outfall sampling in a targeted area loosely defined by I-97/Glen Burnie Bypass to the west, Route 100 and Mountain Rd to the north, and US- 50 to the south. The County also inspected outfalls on 31 County-owned properties located throughout the County. In addition, the County revisited 12 outfalls that had shown documented evidence of illicit discharge in prior screening years. In FY21, the County evaluated a total of 210 outfalls and confirmed that two (2) outfalls exhibited illicit discharge. From FY2005 through FY2021, 64 illicit discharges have been detected out of 2,633 outfalls surveyed, as documented in the County's Annual NPDES MS4 reports. Based on this, the countywide illicit

discharge detection and elimination (IDDE) program has resulted in the elimination of illicit dischargers at a rate of 2.43 percent, up from 2.00 percent as identified in the plan,

1.3.2 Abatement of Sanitary Sewer Overflows

Restoration Plan Goal

This strategy proposes to reduce the number of sanitary sewer overflows (SSO), and thereby reduce the discharge of human bacteria to surface water, through wastewater projects that are designed to improve the reliability of the sanitary system. Table 4-2 in the Restoration Plan listed the active sewage pump stations (SPS) upgrade projects.

Progress

The status of specific wastewater projects that are considered sewage pumping station (SPS) upgrades or otherwise designed to improve the reliability of the sanitary system was provided by the Technical Engineering Division (G. Heiner, pers. Communication October 11, 2021) and is listed in Table 1. In addition to including the updated status and budget of the SPS projects listed in Table 4-2 of the Restoration Plan, Table 1 also includes any new sanitary system improvement projects as identified by DPW since that time. Three projects were completed in FY2021. No additional SPS upgrade projects within bacteria TMDL watersheds were started in FY2021

Table 1. Discrete Sewage Pumping Station Upgrade Projects (Active or Completed) in FY21 in Bacteria TMDL Watersheds.

Project	Project Title	Current Status	Description	TMDL Watershed	Qty. of Pump Stations Being Upgraded	Total Budgeted Costs[3]	Expended and/or Encumbered as of October 2021
S797800	Furnace Barn Sewer Replacement[2]	Active	Construct a new sewer line under Sawmill Creek	Patapsco River / Furnace Creek	0	$1,216,500	$62,127
S799200	Mayo Collection Sys Upgrade[2]	Active	Expansion of Mayo Wastewater Collection and Conveyance System to accommodate planned growth within Mayo Sewer service area	Rhode River/Cadle Creek	18	$12,972,829	$8,853,496
S804300	Jennifer Road SPS Upgrade[2]	**COMPLETED in FY21**	Upgrades to Jennifer Rd sewage pump station; pump station force main replacement	Severn River Mainstem	1	$7,380,935	$9,072,241
S805300	Cinder Cove SPS Mods[2]	Active	Pump station reliability improvements necessary to minimize risks of sanitary sewer overflows	Patapsco River / Furnace Creek	1	$7,851,000	$7,823,989
S805400	Marley SPS Improvements[2]	Active	Various upgrades to Marley SPS	Patapsco River/Marley Creek	1	$217,689	$4,250,683
S806203	SPS Fac Gen Replacement[2]	Active	Generator replacement (Design 1 and Phase 6 contracts)	Patapsco River LNB*	2	$48,636,268[4]	$2,647,901
S806204	SPS Fac Gen Replace[2]	Active	Generator replacement (Design 2 and Phase 7 contracts)	West River Mainstem	5	$48,636,268[4]	$1,472,877
S806205	SPS Fac Gen Replace[2]	Active	Design of replacement and installation of generators at SPS throughout the County (Design 1 contract)	Countywide	-	$48,636,268[4]	$3,008,455

Project	Project Title	Current Status	Description	TMDL Watershed	Qty. of Pump Stations Being Upgraded	Total Budgeted Costs[3]	Expended and/or Encumbered as of 8/15/2020
S806206	SPS Fac Gen Replace[2]	Active	Design of replacement and installation of generators at SPS throughout the County (Design 2 contract)	Countywide	-	$48,636,268[4]	$2,372,761
S806208	SPS Fac Gen Replacement[2]	Active	Generator Replacement (Phase 8 contract)	Severn Mainstem	7	$48,636,268[4]	$824,692
S806209	SPS Fac Gen Replacement[2]	Active	Generator Replacement and Installation (Phase 9 contract)	Severn River Mainstem	5	$48,636,268[4]	$2,072,072
S806210	SPS Fac Gen Replacement[2]	**COMPLETED in FY21**	Generator Replacement and Installation (Phase 10 contract)	Severn Mainstem, Parish Creek, Tracy/Rockhold	4	$48,636,268[4]	$1,711,314
S806211	SPS Fac Gen Replacement[2]	**COMPLETED in FY21**	Generator Replacement and Installation (Phase 11 contract)	Magothy River Mainstem, Severn River Mainstem	3	$48,636,268[4]	$1,818,713
S806212	SPS Fac Gen Replacement[2]	Active	Generator Replacement and Installation (Phase 12 contract)	Severn River Mainstem, Marley/Furnace Creeks	5	$48,636,268[4]	$4,035,069
S806213	SPS Fac Gen Replacement[2]	Active	Generator Replacement and Installation (Phase 13 contract)	Severn River Mainstem, Marley/Furnace Creeks	6	$48,636,268[4]	$1,397,924
S806214	SPS Fac Gen Replacement[2]	Active	Generator Evaluation, Replacement, Installation (Phase 14 contract)	Marley/Furnace Creeks, Bear Neck Creek	3	$48,636,268[4]	$2,748,150
S806215	SPS Fac Gen Replacement[2]	**COMPLETED in FY21**	Installation of electrical feeders for back-up power	Severn River Mainstem	4	$48,636,268[4]	$908,597
S806216	SPS Fac Gen Replacement[2]	Active	Installation of portable generators at select pump stations (Phase 15 contract)	Severn River Mainstem	5	$48,636,268[4]	$1,349,848
S806217	SPS Fac Gen Replacement[2]	Active	Design of replacement and installation of generators at SPS throughout the County (Design 2	Countywide	-	$48,636,268[4]	$265,270

Project	Project Title	Current Status	Description	TMDL Watershed	Qty. of Pump Stations Being Upgraded	Total Budgeted Costs[3]	Expended and/or Encumbered as of 8/26/2019
S806700	Cinder Cove FM Rehab[2]	Active	Construction of 10,000 linear feet of 30" force main	Patapsco River / Furnace Creek	0	$12,499,000	$10,230,200
S808100	CATTAIL CREEK FM REPLACEMENT[2]	Active	Construction of the replacement of 17,000 lf of 24" and greater force main (FM) beginning at the Cattail Creek SPS and ending at a gravity manhole in College Parkway. This project will replace aging, at-risk infrastructure to increase the reliability of the conveyance system and reduce risks for spills resulting from infrastructure failures	Magothy River Mainstem	0	$17,461,000	$1,690,146
S808200	GRINDER PUMP REPL/UPGRD PRGM	Active	Multi-year sewer infrastructure investigation, rehabilitation and replacement program to ensure the adequacy of the County's Wastewater Collection System	Countywide	0	$4,000,000[4]	$366,008
X7388000	Sewer Main Replace/Recon[2]	Active	Maintenance and replacement of sewer main lines countywide	Countywide	0	$117,586,795	$79,773,075
				Total	____	**$703,548,436[4]**	**$122,387,235**

[1] Indicates new project.

[2] Data have been updated since being listed in Table 1 of the Total Maximum Daily Load Restoration Plan for Bacteria 2016 Annual Report (Anne Arundel County, 2017b).

[3] Total Budgeted Cost derived from FY2021 Anne Arundel County Approved Capital Budget and Program and includes current and prior appropriation and approved program totals through FY2026

[4] Total Budgeted Cost for this project includes completed and active SPS upgrades countywide; however, the total budget is not broken down at the level of individual projects. Some individual projects may be outside of bacteria TMDL watersheds. Therefore, only the total project cost is listed.

[5] Total budgeted costs for all projects includes only one count of the Countywide upgrades active and completed with a total budget of $48,636,268.

In FY21, there were thirteen (13) SSOs reported in the County's Bacteria TMDL watersheds attributed to the County's infrastructure (Figure 1). The net volume of spilled material in Bacteria TMDL watersheds in FY21 was 102,955 gallons (Figure 2). Sanitary sewer line blockages due to electrical failure/loss of power resulted in spills totaling 82,875 gallons. Anne Arundel County Department of Public Works (DPW) Bureau of Utility Operations maintains a mapping application to track SSOs in the County; The interactive geographic information system (GIS) plots known overflows over the last two years from sanitary sewer collection systems owned and maintained by DPW. The map can be found here:

https://gis.aacounty.org/portal/apps/webappviewer/index.html?id=5df56f6b83cf4314b32edd13c62ba6fd
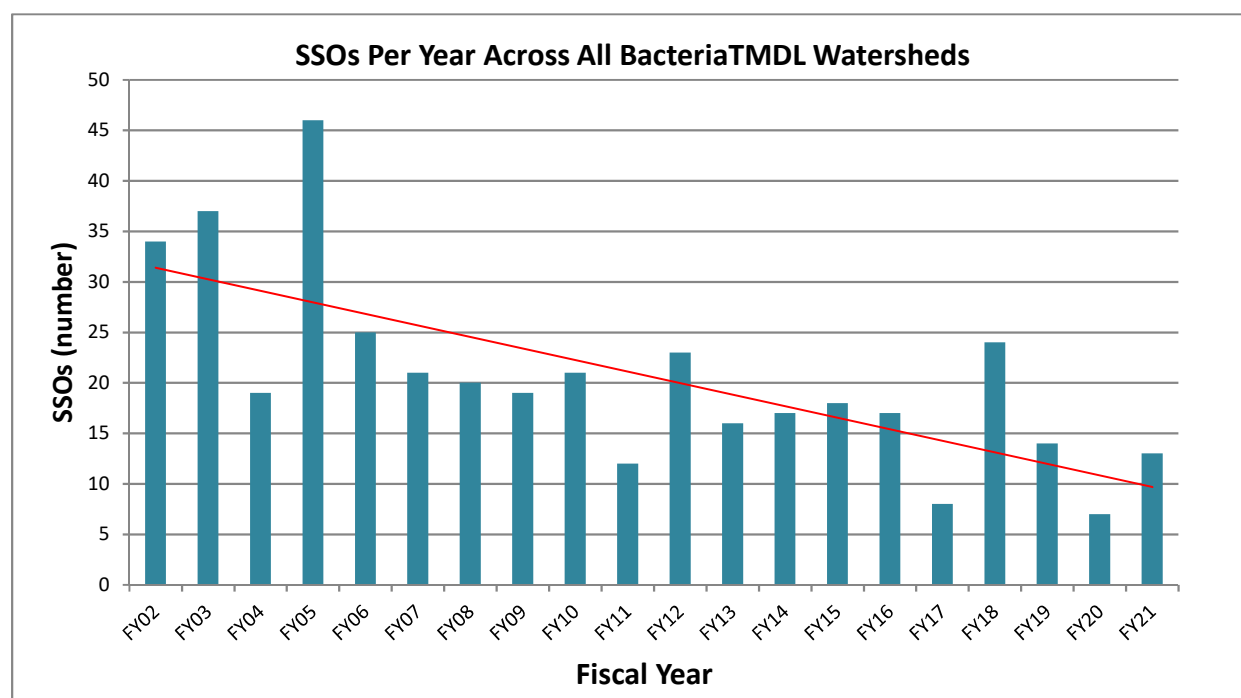
Figure 1. Number of SSOs per year across all Bacteria TMDL watersheds, FY02 – FY21.
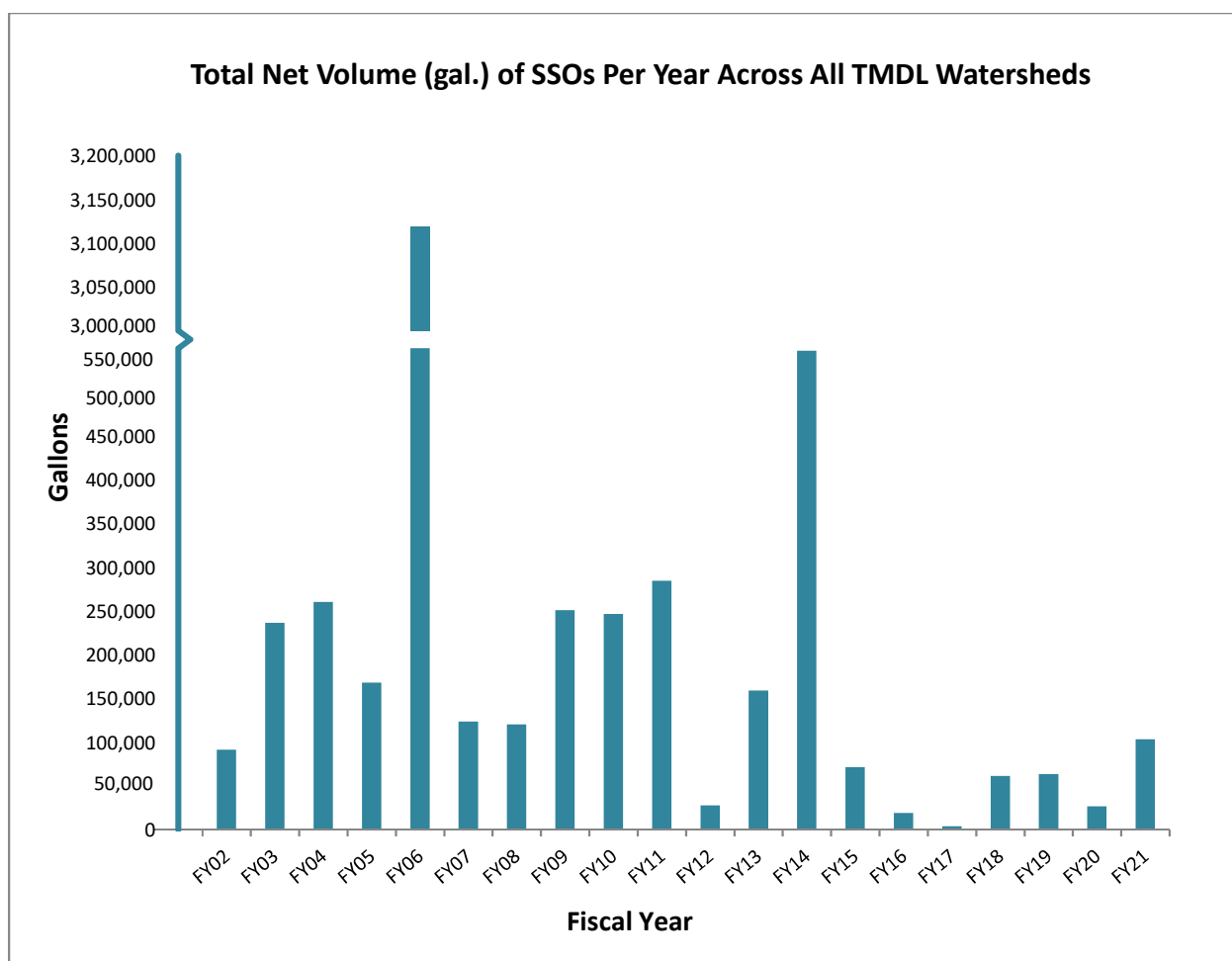
Figure 2. Total Volume (gallons) of SSOs per year across all Bacteria TMDL watersheds, FY02 – FY20.

1.3.3 Retirement of County Septic Systems

Restoration Plan Goal

The Restoration Plan presents the retirement of septic systems at a rate of 20-40 systems per year.

Progress

The County has undertaken the initiative to reduce the number of onsite sewage disposal systems (OSDS). The Bureau of Engineering initiated development of conceptual layouts for large and smaller projects, identifying approximately 20,000 OSDS with the potential to be connected of which 16,000 are located in the bacteria impaired watersheds (Anne Arundel County, 2008). According to the Department of Health, approximately 5,000 of these potential connections are located within Health Department Problem Areas (HDPAs) – areas with poor soils, steep slopes, high groundwater tables, and well set-backs. The cost – approximately $52,000 per connection – along with homeowner participation are identified as the primary constraints for retiring OSDSs and connecting to the public sanitary sewer system.

Septic systems that are "retired" are connected to the County's sanitary sewer system that has the capacity to handle the increased load. In FY21, the County retired 23 OSDS – 18 within bacteria TMDL watersheds, and an additional five (5) in non-TMDL watersheds. Table 2 provides both the estimated number of OSDS that would be retired by 2025 as well as the actual number of OSDS retired between FY 2016 and FY 2021 in each TMDL watershed.

Table 2. Projected Number of OSDS to Be Retired by 2025 and Actual OSDS Retirements to date

in Each TMDL Watershed

Bacteria TMDL Watershed	Projected Septic Systems Retired FY 2016 -2025	Septic Systems Retired in FY 2021	Septic Systems Retired FY 2016-2021
Tracy and Rockhold Creeks	0	0	22
Magothy River/Forked Creek	2	0	1
Magothy River/Magothy River Mainstem	88	3	47
Magothy River/Tar Cove	31	0	0
Patapsco Lower North Branch	3	3	5
Patapsco River/Furnace Creek	5	2	5
Patapsco River/Marley Creek	0	3	23
Severn River/Mill Creek	21	0	0
Severn River/Severn River Mainstem	100	7	49
Severn River/Whitehall/Meredith Creeks	6	0	1
South River/Duvall Creek	0	0	1
South River/Ramsey Lake	0	0	0
South River/Selby Bay	0	0	0
South River/South River Mainstem	31	0	3
Patuxent River Upper	5	0	0
West River and Rhode River/Bear Neck Creek	0	0	1
West River and Rhode River/Cadle Creek	0	0	0
West River and Rhode River/Parish Creek	0	0	2
West River and Rhode River/West River Mainstem	0	0	2
Totals	**292**	**18**	**162**

In February 2017, a Septic Task Force was created, consisting of staff from relevant County departments as well as representatives from the local business and environmental communities. The Septic Task Force's stated goals included developing recommendations that will inform decision making, and identifying short term strategies and long term approaches to reducing septic system loads. Key questions discussed by the group include where and how residents could connect to public sewer systems, how will septic conversion projects be financed, and what policies are required to develop a successful conversion program. The 2018 and 2019 Septic Task Force Final Reports, as well as Septic Task Force meeting minutes can be found at https://www.aacounty.org/departments/public-works/septic-task-force/

Following upon the efforts of the Septic Task Force, DPW developed and requested new legislation to allow septic system connections in eligible areas to be provided with a subsidy, and an option to defer a portion of their assessment. Eligible areas were defined to include areas in the Health Department's Onsite Wastewater Management Problem Areas, and locations within the Critical Area. Four separate pieces of legislation were passed between the end of 2019 and during 2020 to put the elements of the program into place.

In conjunction with the legislative changes, DPW developed the "Our wAAter" initiative to educate the public on strategies and efforts underway to reduce nutrient loads to Anne Arundel County waterways and the Chesapeake Bay. The initiative incorporates five core elements: septic connections, small system upgrades, stormwater, groundwater resiliency, and wastewater treatment enhancements. Within the Our wAAter initiative, a goal of connecting 200 homes per year over a 20-year period has been established. The program was broadly introduced to the public in 2021, providing information and encourage communities to consider applying for the program via a website and community engagement. Septic-to-sewer connections are be voluntary, so specific locations of implementation will be dependent upon community interest. A map of the eligible areas can be found on the Our wAAter program site at https://www.aacounty.org/departments/publicw-orks/ourwaater/images/ProposedEligibleAreas_Basemap.pdf.

In 2017, the County applied for and received a grant to evaluate the feasibility of County take-over of select private minor wastewater treatment facilities to either convey to existing County facilities or to construct new advanced treatment package plants utilizing the same discharge location. Five feasible projects were identified, two of which are located in watersheds with bacteria-related TMDLs (South River Mainstem and Patapsco River Lower North Branch). The study, which assessed cost-benefit aspects and policy outcome impacts of the individual projects, was completed in March 2018. A more detailed evaluation was completed in 2020 as part of the Our wAAter program, which confirmed the feasibility of the proposed consolidation of treatment facilities in the vicinity of Wayson's Corner (not within a bacteria TMDL watershed). In FY21, discussions with private facility owners and MDE were initiated and are in the preliminary stages.

1.4   TIER B STRATEGIES

Tier B strategies are those that address non-human sources of bacteria, such as pet waste, wildlife waste, and livestock waste. The progress of implementation of Tier B strategies is described below.

1.4.1 Implementing New Stormwater Management Projects and Retrofitting Pre-2002 Stormwater Management Facilities to Meet Current MDE Criteria

Restoration Plan Goal

The Restoration Plan presents the goal of restoring 20 percent of currently unmanaged impervious cover through: (i) implementing new stormwater management projects and (ii) retrofitting pre-2002 ponds and other stormwater management facilities to meet current MDE stormwater criteria. This strategy was developed based on the Anne Arundel County's Urban Phase II Watershed Implementation Plan (Anne Arundel County, 2012) and requirements of the current NPDES MS4 Permit (11-DP-3316, MD0068306).

Progress

As of FY21, the County has completed the restoration of 20 percent of currently unmanaged impervious areas though implementing new stormwater management projects and retrofitting existing stormwater management facilities to meet current MDE requirements 191 projects have been completed within the watersheds with bacteria impairment between 2012 and 2021, with six of those projects being completed in FY2021. Projects included Step Pool Storm Conveyance (SPSC), stream restoration, wet ponds, and retention ponds. Furthermore, the County refined data for the impervious area to be treated on previously retrofitted stormwater management facilities. New projects, project status, and updated data are shown in Appendix A.

In addition to including the updated drainage area and treated impervious area of the stormwater management projects listed in Table 4-5 of the Restoration Plan, Appendix A also includes new stormwater management projects planned by the County in the bacteria impaired watersheds. Table 3 lists the number of urban BMP CIP projects completed and planned in the TMDL watersheds, and the associated drainage areas and impervious acres to be treated. The detailed list of projects is provided in Appendix A of this report.

Table 3. Completed and Proposed Urban Stormwater Projects in Bacteria TMDL Watersheds.

TMDL Watershed ID	Number of Urban Retrofit Projects Planned/Completed	Drainage Area Proposed to Be Treated (acres)	Impervious Area Proposed to Be Treated (acres)
Magothy River Mainstem	42	879.2	290.3
Magothy River/Forked Creek	4	65.4	5.3
Magothy River/Tar Cove	1	3.7	0.7
Patapsco River Lower North Branch	28	882.4	457.9
Patapsco River/Furnace Creek	13	303.6	124.6
Patapsco River/Marley Creek	14	263.8	96.9
Patuxent River Upper	0	0	0
Severn River Mainstem	33	1319.8	326.7
Severn River/Mill Creek	7	119.9	15.3
Severn River/Whitehall and Meredith Creeks	3	60.5	8.9
South River Mainstem	34	690.9	280.4
South River/Duval Creek	3	12.6	3.8
South River/Ramsey Lake	0	0	0
South River/Selby Bay	0	0	0
Tracy and Rockhold Creeks	1	7.6	5.9
West & Rhode Rivers/Bear Neck Creek	5	18.8	5.4
West & Rhode Rivers/Bear Cadle Creek	0	0	0
West & Rhode Rivers/Bear Parish Creek	0	0	0
West River Mainstem	3	6.3	2.1

1.4.2 Riparian Buffer Education

Restoration Plan Goal

The Restoration Plan recommends that a riparian buffer education program be implemented in areas where the buffer is reduced, altered, or where private property abuts the waterway.

Progress

Anne Arundel County and the Maryland Department of Natural Resources (MDNR) continue to provide support to the Anne Arundel County Watershed Stewards Academy (WSA), which trains and certifies Master Watershed Stewards to engage in educational outreach and implement water quality improvement projects throughout their community. One such program WSA manages is the Backyard Buffers program, which provides landowners with free native trees and shrubs. The County also partners with WSA on the "Replant Anne Arundel" tree planting initiative in an effort to combat forest canopy loss. WSA programs resulted in the planting of 4,375 native trees in

FY21. Both of these programs will continue in the future. Information on the Backyard Buffers and Replant Anne Arundel programs can be found on the WSA site at http://aawsa.org/

1.4.3 Expanded Pet Waste Education Program

Restoration Plan Goal

The Restoration Plan recommends pet waste education programs such as increasing pet waste stations, increasing signage, developing public service announcements, improving management of pet waste at public parks and providing grants to communities to install pet waste stations.

Progress

Master Watershed Stewards trained through the WSA are given the knowledge and resources needed to teach their communities about the importance of cleaning up pet waste and provide pet waste stations where needed.

In FY21, the community of Parkers Creek (Tracy and Rockhold Creeks TMDL watershed) installed seven pet waste stations which were provided by the County. In addition, one pet waste station was installed in Oyster Harbor (Severn River Mainstem TMDL watershed). While pet waste stations are installed in all County parks that have specific dog park areas, there are several local County parks that do not have pet waste stations installed. Investigation into new potential areas for pet waste station installation will continue in FY22.

In 2020, the County hired a private consultant to develop pet waste outreach messaging to effect behavior change in regards to pet waste disposal. A pilot campaign was launched in two target communities in bacteria TMDL watersheds - Avalon Shores (West River Mainstem TMDL watershed) and Manhattan Beach (Magothy River TMDL Mainstem watershed). Pet Waste Outreach strategy meetings have been held on a bi-weekly basis since May 2020. In Summer 2021, an online survey was developed to further learn about dog owners' attitudes and knowledge regarding pet waste pick-up and disposal. The survey was made available to residents of the pilot communites with 130 residents responding. A focus group was held in September 2021 to further learn about dog owners' behaviors towards pet waste pick-up and disposal, and to test the resonance of education and outreach materials; Four residents participated. To date, the outreach campaign has resulted in the development of a campaign slogan ("Stop POOlution in its Tracks") and logo, and multiple outreach materials such as car magnets, yard signs, and pledge cards. An additional goal of the campaign is to find volunteer "block leaders" in the pilot communites who will serve as neighborhood conduits for disseminating campaign messaging and information to encourage increased frequency of pick up, and proper disposal of, dog waste in back yards. Conversations between neighbors and block leaders will help encourage positive pick-up behavior and increase the health of the water in our communities. In early FY22 The County will hold a contest to name a campaign "spokesdog" to be featured on outreach materials.

In August 2021, the County submitted a $50,000 grant proposal to the Chesapeake Bay Trust (CBT) Outreach & Restoration Grant program to offset costs associated with the County-wide implementation of the pet waste behavior change campaign. Anne Arundel County estimates that County-wide implementation will cost approximately $127,000, including costs for printing and distribution of outreach materials, installation of public signage, social media ad posting, and staff time for managing contracted partnerships. It is anticipated that CBT will announce 2021 Outreach & Restoration funding decisions in December 2021.

1.4.4 Live Stock Fencing (Two TMDL Watersheds Only)

Restoration Plan Goal

The Restoration Plan recommends installation of livestock fencing along streams in pasture areas in Patuxent River Upper and West River Mainstem watersheds.

Progress

Livestock fencing was identified as a low priority restoration strategy as it has limited applicability in only two of the watersheds. No exclusion fencing was reported in the County during FY21. A total of 54,520 linear feet of livestock exclusion fencing has been installed in the West River and Patuxent River watersheds combined since 2002. According to the Anne Arundel County Soil Conservation District, no additional exclusion fencing is expected to be installed within the County (J. Czajkowski, pers. Communication January 2, 2020).

1.4.5 Canada Goose Management (Site-Specific)

Restoration Plan Goal

The Restoration Plan recommends adoption of various techniques for the management of Canada goose population including implementation of exclusion methods, habitat alteration and bird dispersal method.

Progress

Although this strategy was given a low priority at the time of the previous annual update, the County continues to research methods of goose management and possible locations where management would be applicable.

1.4.6 Additional Outreach Opportunities

Restoration Plan Goal

The Restoration Plan recommends additional outreach programs for homeless population, stray animals and expanded outreach programs for marinas.

Progress

Outreach programs for homeless population and stray animals are currently identified as low priority strategies for the County to meet the bacteria TMDL goals; however the County continued to perform outreach via social media targeting boaters as a follow-up to informational brochures

covering proper boat sewage disposal practices and pumpout locations produced during the last reporting period. Arundel Rivers Federation offers a pump-out boat service operating in the West, Rhode, and South Rivers. The pumpout boat operates on Thursday, Friday, Saturday, Sunday and Holidays from Memorial Day weekend through October 1st. The pump-out boat can be hailed by boaters via phone, text, or VHS radio (Arundel Rivers Federation, 2019).

The Maryland Clean Marinas program recognizes marinas that meet standards of pollution prevention established by Maryland Department of Natural Resources and the Maryland Clean Marina Committee, including standards of sewage handling, waste containment and disposal, and stormwater management. Certified Clean Marinas are re-inspected every three years to ensure continued compliance. As of July 1, 2021, 49 marinas in Anne Arundel County are certified Clean Marinas or Clean Marina Partners (Maryland DNR, 2021).

Although the Restoration Plan did not identify the creation of a "No Discharge Zone" as a strategy, the County - in conjunction with the City of Annapolis and the Severn River Association – pursued the establishment of a No Discharge Zone (Severn River Association, 2021). In 2018 a resolution supporting a No Discharge Zone for all waters in Anne Arundel County was introduced to the Anne Arundel County Council. The resolution, which was passed by both the Anne Arundel County Council as well as the City of Annapolis Council in fall 2018, would prohibit the discharge of marine vessel sewage into waters of the County, whether treated or not, and would require all marine vessel sewage to be disposed at designated pump-out stations. Violations would be punishable by civil penalties not to exceed $10,000 per violation. Three meetings were held during August 2019 to solicit public feedback prior to submitting the application for the No Discharge Zone to MDNR and MDE for review in October 2019. In December 2019 the MDNR and MDE jointly submitted the Anne Arundel County No Discharge Zone application to EPA. In January 2020, EPA staff responded with comments and questions, which were addressed in the final version of the pump out application. The final version of the application was resubmitted to EPA in May 2020, followed by an additional public comment period. In May 2021 EPA published an affirmative determination in the Federal Register but requested some refinements to the proposed boundary coordinates. In September 2021 EPA published a Notice of Correction in the Federal Register. The appropriate refinements were made and the application was resubmitted. As of October 2021, MDE is in the process of updating COMAR to include the additional areas of water within the refined boundary.

1.5   POLLUTANT LOAD REDUCTIONS

Bacteria load reductions that would be achieved from the implementation of the proposed restoration strategies were previously quantified using the Center for Watershed Protection's spreadsheet based Watershed Treatment Model and existing literature review.

Monitoring in the pet waste outreach focus areas would be needed to evaluate the progress and quantify the bacteria load reductions from this strategy. The County has not initiated the low

priority strategies of Canada Goose Management and Livestock Fencing, therefore the progress from these strategies are not quantified as well.

SECTION TWO   MONITORING

As noted in the Restoration Plan, there are six different monitoring programs operating in the County including the County's ongoing NPDES MS4 Assessment of Controls monitoring at the Parole Plaza outfall and Church Creek; MDE's shellfish harvesting area monitoring; the County Department of Health's bacteria monitoring of public bathing beaches; the community-sponsored Operation Clearwater, which is (as of summer 2020) monitoring water quality at select locations along the Magothy River, Rock Creek and Severn River; the County's Stream Restoration Project Monitoring; bacteria trend monitoring in the Marley and Furnace Creek watersheds; and pre-outreach bacteria monitoring in two communities in conjunction with a pilot pet waste outreach campaign, all of which monitor bacteria concentration.

2.1   ASSESSMENT OF CONTROLS MONITORING

Effective January 1,2021, the County formally began participation in the Pooled Monitoring Program coordinated through the Chesapeake Bay Trust to meet the Best Management Practice (BMP) effectiveness monitoring and the Watershed Assessment monitoring requirements set forth in the Permit's Assessment of Controls section. Signed Memoranda of Understanding between the County and the Trust, documenting the County's participation in lieu of Assessment of Controls monitoring, was provided to MDE. The effective date by which all monitoring ceased at the Church Creek and Parole Plaza stations was March 18, 2021, providing overlap between the initiation of Pooled Monitoring Program participation and the cessation of Assessment of Controls monitoring.

Prior to March 18, 2021, the County conducted monitoring as required to satisfy conditions outlined in Section F: Assessment of Controls of the County's Permit issued in February 2014. In compliance with County NPDES MS4 permit requirements, the County sampled stormwater runoff in the Church Creek watershed. A variety of parameters were measured, including bacteria (*E. coli*). Church Creek MS4 stormwater sampling was conducted by a private consultant at two different monitoring stations – the upstream Parole Plaza station and the downstream Church Creek station. Church Creek is located in Annapolis, MD within the South River Mainstem bacteria TMDL watershed, which is listed as impaired for Fecal Coliform. Monitoring results for FY21 can be found in the 2020-2021 Church Creek monitoring report (Anne Arundel County, 2021a).

2.2   BACTERIA TREND MONITORING

In July 2019, the County began trend monitoring for bacteria (enterococcus) in the Furnace Creek and Marley Creek bacteria TMDL watersheds. The County identified 12 monitoring stations – six in each TMDL watershed – to be monitored monthly for surface water bacteria (Figure 3). The

County's Bacteria Sampling Plan and QA/QC Protocols document can be found in Appendix B of the Total Maximum Daily Load Restoration Plan for Bacteria – 2020 Annual Bacteria TMDL Assessment (Anne Arundel County, 2021b), while results from the second year of monitoring (July 2020 – June 2021) can be found in Appendix B of this report.
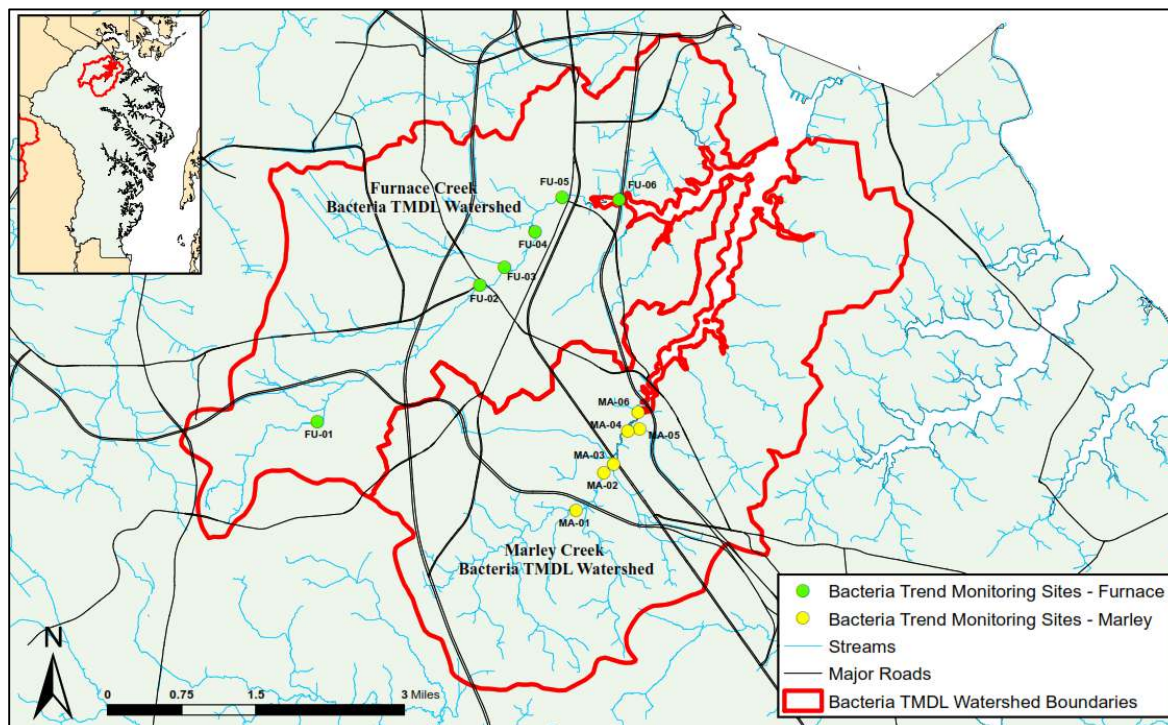
Figure 3. Bacteria trend monitoring sampling locations in the Furnace and Marley Creek TMDL watersheds.

2.3   MDE SHELLFISH HARVESTING AREA MONITORING

MDE uses the monitoring data from the shellfish harvesting area monitoring stations to prepare the Integrated Report for Surface Water Quality which includes a surface water quality assessment of the State waters, and for the development of TMDLs. In order to demonstrate support of the shellfish harvesting designated use, the measured level of fecal coliform in water (expressed as MPN/100 ml) must have a median of less than the MDE criterion level of 14 and a 90th percentile of less than 49, calculated from a minimum of 30 samples taken over a three year period. Monitoring station locations and associated data can be found at https://mdewin64.mde.state.md.us/WSA/Shellfish/index.html

2.4   HEALTH DEPT. MONITORING OF BATHING BEACHES

The Anne Arundel County Department of Health, under State of Maryland regulations, conducts water quality sampling at 81 community bathing beach sites along area creeks and rivers from Memorial Day to Labor Day either weekly or biweekly. The water bodies are tested for levels of

enterococci bacteria. If enterococci counts exceed the acceptable level or when a sewage spill impacts a waterway the Department of Health will issue an advisory against swimming and other direct water contact activities. The advisory remains in effect until test results show enterococci counts are within acceptable levels. The acceptable level for bodies of water sampled is 104 MPN (Most Probable Number) of colonies of organisms per 100 milliliters of water. Recreational water quality reports are available from the County's Department of Health website at https://www.aahealth.org/recreational-water-quality-report/

2.5   OPERATION CLEARWATER AND NGO MONITORING

Several NGOs also conduct water quality monitoring for bacteria within the County's TMDL watersheds. Operation Clearwater has provided regular bacteria monitoring at waterfront recreational areas for 45 years. In FY21, Operation Clearwater conducted weekly monitoring of microbial (Enterococci) water quality at 58 sites throughout the County from Memorial Day through Labor Day. Further information about Operation Clearwater, including monitoring data, can be found online at
https://sites.google.com/view/aaccecoperationclearwater/home?authuser=0 and
http://ola2.aacc.edu/tldomanski/

Arundel Rivers Federation (ARF) also conducted weekly water quality monitoring for Enterococci bacteria from Memorial Day through Labor Day in FY21 at 25 sites. Further information about ARF's bacteria monitoring program, including monitoring data, can be found online at https://arundelrivers.org/how-we-fix-rivers/bacteria-testing/

Partners at the Anne Arundel Community College monitored enterococci weekly at six locations along the Rhode River and its tributaries from May through August 2017 as part of an effort to characterize water quality in the Rhode River prior to the conversion of the Mayo Water Reclamation Facility from a treatment plant to a pumping station. The conversion was completed in October 2017 and the first full season of post-conversion monitoring was accomplished from May through August 2018. Monitoring has been conducted between May and August of each subsequent year, with 2021 being the fourth year of post-conversion monitoring. A full report on the fourth year of monitoring can be found in Appendix C of this annual report.

2.6   CIP RESTORATION PROJECT MONITORING

In 2021 County completed a stream restoration project at Furnace Branch located in Glen Burnie. The project included the removal of an existing concrete floodway to restore a natural stream channel and floodplain. The project lies within the Furnace Creek TMDL watershed, which is listed as impaired for Enterococci. As part of this project, a water quality monitoring program was established to determine what water quality benefits occur due to restoration activity. In summer 2017, the County began collecting pre-restoration bacteria (E. coli) samples under baseflow conditions from locations along the main stem that bracket known sewer crossings, as well as from storm drain outfalls discharging to the reach of interest. Bacteria sampling was suspended with

the initiation of construction in August 2018. Post-construction storm and baseflow water quality monitoring (to include E. coli) at a fixed cross section will begin in late 2021/early 2022.

In 2018 the County completed a stream restoration project at Cowhide Branch in Annapolis. The project included removal of a stone check dam near Admiral Drive and Jennifer Road with the intention of restoring full fish passage to the reach. The impoundment created by the former dam system was converted into a wetland seepage system consisting of a series of low stage weirs above and below the former dam site. The project lies within the Severn River Mainstem TMDL watershed, which is listed as impaired for fecal coliform. In March 2019 the County began post-restoration storm and baseflow water quality monitoring, including E. coli, at a fixed cross section. Information on post restoration monitoring can be found in the *Characterization of post-restoration conditions in the Cowhide Branch subwatershed: year two monitoring report* (Antonio et al, 2021).

2.7   COUNTYWIDE BIOMONITORING

The County has performed biological monitoring in accordance with Maryland Biological Stream Sampling protocols (Stranko et al, 2017) at targeted CIP sites since 2015, with benthic sampling occurring annually and fish sampling occurring biennially. In 2021, benthic sampling occurred at 17 CIP sites within bacteria TMDL watersheds; Table 4 shows the Benthic Index of Biotic Integrity (BIBI) scores at each of these sites for the 2021 monitoring year. Additionally, 2021 was the final year of biological monitoring performed as a component of a separate study at 15 sites along Sawmill Creek and its tributaries within the Furnace Creek bacteria TMDL watershed. BIBI scores from the 15 Sawmill Creek sites in 2021 are shown in Table 5.

Table 4. Benthic Index of Biotic Integrity (BIBI) scores at Targeted CIP Sites in Bacteria TMDL Watersheds, 2021

Site ID	Stream Name	Bacteria TMDL Watershed	2021 BIBI Score
FB-01	Furnace Branch	Furnace Creek	2.14 (Poor)
FB-02	Furnace Branch	Furnace Creek	2.43 (Poor)
CY-02	Cypress Branch	Magothy Mainstem	2.14 (Poor)

DC-01	Dividing Creek	Magothy Mainstem	1.86 (Very Poor)
DC-02	Dividing Creek	Magothy Mainstem	2.43 (Poor)
MC-01	Mill Creek	Magothy Mainstem	2.71 (Poor)
MC-02	Mill Creek	Magothy Mainstem	2.71 (Poor)
MC-03	Mill Creek	Magothy Mainstem	1.00 (Very Poor)
MC-04	Mill Creek	Magothy Mainstem	2.14 (Poor)
SR-01	Sewell Spring Branch	Severn Mainstem	3.57 (Fair)
CB-01	Cowhide Branch	Severn Mainstem	1.86 (Very Poor)
CB-02	Cowhide Branch	Severn Mainstem	2.43 (Poor)
CB-03	Cowhide Branch	Severn Mainstem	1.57 (Very Poor)
CB-04	Cowhide Branch	Severn Mainstem	1.86 (Very Poor)
CB-05	Cowhide Branch	Severn Mainstem	1.86 (Very Poor)
PS-01	Picture Spring Branch	Severn Mainstem	3.00 (Fair)
PS-02	Picture Spring Branch	Severn Mainstem	2.71 (Poor)

Table 5. Benthic Index of Biotic Integrity (BIBI) scores at Sawmill Creek Watershed Sites, 2021

Site ID	Stream Name	Bacteria TMDL Watershed	2021 BIBI Score
SM-01	Sawmill Creek (Mainstem)	Furnace Creek	2.14 (Poor)
SM-02	Sawmill Creek (Mainstem)	Furnace Creek	2.43 (Poor)
SM-03	Sawmill Creek (Mainstem)	Furnace Creek	2.43 (Poor)
SM-04	Sawmill Creek (Mainstem)	Furnace Creek	2.14 (Poor)
SM-05	Sawmill Creek (Mainstem)	Furnace Creek	3.86 (Fair)
SM-06	Sawmill Creek (Mainstem)	Furnace Creek	3.57 (Fair)
SM-07	Sawmill Creek (Mainstem)	Furnace Creek	2.71 (Poor)
QP-01	unnamed tributary	Furnace Creek	3.00 (Fair)
NG-01	North Glen Branch	Furnace Creek	3.00 (Fair)
NF-01	unnamed tributary	Furnace Creek	3.29 (Fair)
MB-01	Muddy Bridge Branch	Furnace Creek	2.43 (Poor)
MB-02	Muddy Bridge Branch	Furnace Creek	1.57 (Very Poor)
FK-01	Fork Branch	Furnace Creek	3.29 (Fair)
FD-01	Ferndale Branch	Furnace Creek	3.29 (Fair)
IB-01	Irving Branch	Furnace Creek	3.57 (Fair)

2.8 PET WASTE OUTREACH MONITORING

In conjunction with the pilot pet waste outreach campaign (see section 1.4.3), the County is conducting pre- and post- outreach surface water bacteria monitoring within the target communities. Bi-weekly bacteria monitoring in the target communities began in October 2020 and will continue until at least October 2022. The first year monitoring report can be found in Appendix D of this report.

SECTION THREE   SUMMARY AND FUTURE ACTIONS

3.1   SUMMARY

Table 10 presents a summary of the County's progress toward achieving the SW-WLAs for Bacteria TMDLs. In Section 7 (Implementation Schedule and Milestone) of the Bacteria TMDL Restoration Plan, programmatic milestone criteria were identified to be achieved by the end of the 2021 milestone year.   Table 6 provides the County's progress towards achieving these programmatic milestones as of the end of FY21.

Table 6. End of NPDES MS4 permit cycle Milestone Programmatic Criteria Status (as of the end of FY21).

Programmatic Criteria	Progress
20% of impervious area managed with SPSC or other high-performing BMP (meet NPDES MS4 Permit/WIP goal).	The County continues to make progress towards completing new and retrofit stormwater management facilities projects in accordance with County goals. For the amount of impervious acres managed within bacteria TMDL watersheds, refer to the geodatabase submitted as part of the County's FY21 NPDES MS4 Annual Report.
Continued triennial inspection and maintenance of constructed BMPs.	During the FY21 reporting period the County continued triennial inspection and maintenance of constructed BMPs to verify functionality.
Pet waste education program continues; implement additional television PSAs, videos, social media, etc. as funds allow.	Throughout FY21 the County continued to highlight proper pet waste management practices through its social media outlets, and at community events and presentations. In 2020, the County hired a private consultant to develop pet waste outreach messaging to effect behavior change in regards to pet waste disposal. A pilot campaign was launched in two target communities in bacteria TMDL watersheds - Avalon Shores (West River Mainstem TMDL watershed) and Manhattan Beach (Magothy River TMDL Mainstem watershed). Pet Waste Outreach strategy meetings have been held on a regular basis since May 2020. In summer 2021, an online survey was developed to further learn about dog owners' attitudes and knowledge regarding pet waste pick-up and disposal; 130 residents responded. A focus group was held in September 2021to get feedback on outreach materials; Four residents participated. To date, the outreach campaign has resulted in the development of a campaign slogan ("Stop POOlution in its Tracks") and logo, and multiple outreach materials such as car magnets, yard signs, and pledge cards. An additional goal of the campaign is to find volunteer "block leaders" in the pilot communites who will serve as neighborhood conduits for disseminating campaign messaging and to encourage increased frequency of pick up, and proper disposal of, dog waste in back yards.

	In conjunction with the pilot outreach campaign, the County is conducting pre- and post- outreach surface water bacteria monitoring within the target communities. Bi-weekly bacteria monitoring in the target communities began in October 2020 and will continue until at least October 2022. In FY21 BWPR continued to make pet waste stations available for interested communities; eight stations were installed in FY21 (all in communities within bacteria TMDL watersheds). Investigation into new potential areas for pet waste station installation, including County parks, will continue in FY22.
50% of planned septic systems connected to sewers, if funding allows.	292 OSDS in bacteria TMDL watersheds have been projected to be retired by FY25. In FY21, 18 OSDS in bacteria TMDL watersheds were retired. Currently, 162 OSDS have been retired – 55% of the projected total. The County successfully secured Chesapeake Bay Trust Funding to advance the County's efforts to connect septic systems to public sewer. This funding enabled the County to prioritize watersheds for septic conversion. The County has developed conceptual layouts and cost estimates for approximately 140 separate projects. Individual tasks have been completed through the use of consultants. In February 2017, a Septic Task Force was created, consisting of representatives from the County, local business, and environmental organizations. The Septic Task Force's stated goals included developing recommendations that will inform decision making, and identifying short term strategies and long term approaches to reducing septic system loads. In September 2018 a private consulting firm was hired to serve as a Conversion Program Manager, and in 2019 the Septic Task Force worked to develop the framework for a new septic connection program. In August 2019, a customer survey was distributed to County residents to gauge citizens' attitudes towards water quality and willingness to pay for a septic-to-sewer conversion program. Nearly 1,500 residents responded to the survey. Following upon the efforts of the Septic Task Force, DPW proposed new legislation to allow septic system connections in eligible areas to be provided with a subsidy, with an option to defer a portion of their assessment. Eligible areas were defined to include areas in the Health Department's Onsite Wastewater Management Problem Areas, and locations within the Critical Area. Four separate pieces of legislation were passed between the end of 2019 and during 2020 to put the elements of the program into place. In conjunction with the legislative changes, DPW has developed the "Our wAAter" initiative to educate the public on strategies and efforts underway to reduce nutrient loads to Anne Arundel County waterways and the Chesapeake Bay. Within the Our wAAter initiative, a goal of connecting 200 residential systems per year over a 20-year period has been set. DPW broadly introduced the program to the public in 2021, providing

	information and encouraging communities to consider applying for the program.

In 2017, the County applied for and received a grant to evaluate the feasibility of County take-over of select private minor wastewater treatment facilities to either convey to existing County facilities or to construct new advanced treatment package plants utilizing the same discharge location. Five feasible projects were identified, two of which are located in watersheds with bacteria-related TMDLs (South River Mainstem and Patapsco River Lower North Branch). The study, which assessed cost-benefit aspects and policy outcome impacts of the individual projects, was completed in March 2018. A more detailed evaluation was completed in 2020 as part of the Our wAAter program, which confirmed the feasibility of the proposed consolidation of treatment facilities in the vicinity of Wayson's Corner (not within a bacteria TMDL watershed). Discussions with private facility owners and MDE are in the preliminary stages. |
| Streamside livestock fencing completed. | No livestock fencing projects were implemented in the Bacteria TMDL watersheds during FY21. Maryland Department of Agriculture does not foresee any additional exclusion fencing being installed in the County. |

3.2   FUTURE ACTIONS

Implementation of a multi-media expanded pet waste outreach program was identified as a strategy that would provide the highest bacteria load reductions among 9 of the 19 TMDL watersheds. The County has continued the development of a robust pet waste outreach program by hiring a consultant to develop a pet waste outreach campaign. A pilot campaign in two communities within bacteria TMDL watersheds was launched in Fall 2021. In conjunction with the pilot outreach campaign, the County conducted pre-outreach bacteria monitoring at each community's public water access area beginning in October 2020; bacteria monitoring continued throughout FY21 and will continue during the implementation of the outreach program.

In July 2019, the County began long-term bacteria trend monitoring at twelve (12) sites within the Marley and Furnace Creek bacteria TMDL watersheds. This monitoring continued throughout FY21. The second year of data from this effort is available in Appendix B of this report. Monitoring at these sites will continue for a third year (July 2021 – June 2022), at the conclusion of which a comprehensive 3-year monitoring report will be developed.

The County remains committed to preventing SSOs by upgrading sewer pump stations and sewer infrastructure; In FY21, four (4) pump station upgrade projects were completed. There are currently 19 active pump station upgrade projects in bacteria TMDL watersheds.

The County continues to make progress towards the retirement of OSDS, passing new legislation designed to reduce the financial burden of private septic system connections in eligible areas. The County's draft General Development Plan (GDP) states that the County intends to implement the recommendations from the Septic Task Force final report to address onsite wastewater

management problem areas. The "Our WAAter" introduced to the public in 2021, further enaging the public regarding the benfits of septic-to-serwer connection. Additionally, the GDP has also set forth goals for the development of a program to ensure individual septic systems are properly maintained, and for the evaluation of the impact of increasing precipitation events and sea-level rise on septic system function (more information on the General Development Plan can be found at https://www.aacounty.org/departments/planning-and-zoning/long-range-planning/general-development-plan/index.html.

Restoration strategies such as Canada Goose Management, and outreach opportunities for management of homeless population and stray animals have not been initiated by the County as these were given a low priority. Evaluation of their effectiveness needs to be conducted if these strategies are to be implemented. The installment of any additional livestock fencing in the County is not anticipated.

Continual monitoring of the effectiveness of implemented strategies is recommended. This is because most restoration techniques require time to produce quantifiable benefits at the watershed level from their implementation time. Data collected by MDE from shellfish harvesting monitoring stations, as well as the Integrated Report for Surface Water Quality, will continue to be reviewed to determine the effectiveness of the implemented restoration strategies as well as to determine if any of the bacteria TMDL water bodies become eligible for removal from the TMDL list through the achievement of water quality standards for bacteria.

Moving forward, the County intends to focus future bacteria reduction efforts in TMDL watersheds in which WLAs have not yet been met, to the greatest extent possible. The County will also continue to collaborate with MDE and other jurisdictions to investigate the effectiveness of BMPs to reduce bacteria where such opportunities exist.

SECTION FOUR   REFERENCES

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Division.

Appendix A

County CIP Urban Stormwater Retrofit Projects Completed and Proposed in Bacteria TMDL Watersheds, 2012 - 2025

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA14RST000098	Magothy River Mainstem	Longfellow Drive Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	17.6	4.4	0.39	2014	
AA14RST000099	Magothy River Mainstem	Copperwood Ct Pond Retrofit #2		Regenerative Step Pool Stormwater Conveyance System	7.6	2.9	0.04	2014	
AA14RST000100	Magothy River Mainstem	Copperwood Ct Pond Retrofit	Wet Pond	Wet Pond	7.6	2.9	0.42	2013	
AA14RST000101	Magothy River Mainstem	Sylvan Ave Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	10.4	4.7	0.48	2014	
AA14RST000102	Magothy River Mainstem	Lahinch Dr SWM Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	35	7.7	0.48	2014	
AA14RST000103	Magothy River Mainstem	Tarks Lane Pond Retrofit	Pond/Wetland System	Wet Pond	25.9	5.5	0.59	2014	
AA14RST000105	Magothy River Mainstem	Collington Court Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	37.4	6.8	0.34	2014	
AA14RST000106	Magothy River Mainstem	Mayfield Rd and Gladnor Rd Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	6.2	2.7	1.2	2014	
AA14RST000107	Magothy River Mainstem	Amesbury Ct. Pond Retrofit	Pond/Wetland System	Wet Pond	35.5	4.9	0.53	2014	
AA14RST000108	Magothy River Mainstem	Longfellow Drive Pond Retrofit #2		Regenerative Step Pool Stormwater Conveyance System	17.6	4.4	0.03	2014	
AA15RST000085	Magothy River Mainstem	Earleigh Heights Rd at B&A Trail Pond Retrofit	Wet ED Pond	Wet Pond	12.9	3.7	2.75	2014	
AA15RST000086	Magothy River Mainstem	Evon Ct Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	8.9	2.9	3.63	2014	
AA15RST000087	Magothy River Mainstem	Colleen Garden/Severndale GST Pond Retrofit	Infiltration Trench	Wet Pond	21.1	5.6	0.15	2015	
AA15RST000088	Magothy River Mainstem	Colleen Garden Ln Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	3	1.1	0.55	2015	
AA15RST000089	Magothy River Mainstem	Waycross Way Pond Retrofit	Pond/Wetland System	Wet Pond	45.5	12.8	0.62	2014	
AA15RST000091	Magothy River Mainstem	244 Kennedy Drive Pond Retrofit	Infiltration Basin	Wet Pond	2.3	0.9	1.33	2015	
AA15RST000094	Magothy River Mainstem	109 Chelsea Grove Ct Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	13.1	2.8	0.39	2015	
AA15RST000096	Magothy River Mainstem	Finnegan Dr Pond Retrofit	Infiltration Basin	Wet Pond	7.2	2.2	1.52	2014	
AA16RST000017	Magothy River Mainstem	8013 Tick Neck Road Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	52.7	23.1	0.13	2015	
AA16RST000018	Magothy River Mainstem	603 Deering Road Pond Retrofit	Wet ED Pond	Wet Pond	50.1	23.1	0.51	2015	
AA16RST000027	Magothy River Mainstem	725 Bridge Drive Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	3.9	1.1	1.46	2016	
AA16RST000031	Magothy River Mainstem	Dividing Creek AACC Pond Retrofit #1	Extended Detention Structure, Dry	Wet Pond	15.1	12.8	1	2016	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA16RST000032	Magothy River Mainstem	Dividing Creek AACC Pond Retrofit #2	Infiltration Trench	Bioretention	7.7	6.6	0.39	2016	
AA16RST000033	Magothy River Mainstem	Grosvenor Lane Bioretention		Bioretention	4.1	0.6	0.32	2015	
AA16RST000085	Magothy River Mainstem	Will O Brooke Drive Outfall Stabilization		Regenerative Step Pool Stormwater Conveyance System	4.7	1.5	8.8	2017	
AA16RST000086	Magothy River Mainstem	Pinewood Road Storm Drain SPSC		Regenerative Step Pool Stormwater Conveyance System	29.7	7.8	1.4	2017	
AA17RST000015	Magothy River Mainstem	Randell Road Bioretention (Round Bay Community)		Rain Garden	1.5	0.4	0.25	2014	
AA17RST000033	Magothy River Mainstem	Cypress Creek Recreation Bioretention		Bioretention	0.8	0.4	1.01	2012	
AA17RST000034	Magothy River Mainstem	Cypress Creek Park and Ride Bioretention		Bioretention	6.5	3.8	1	2012	
AA17RST000049	Magothy River Mainstem	Dunkeld Manor SWM Retrofit	Infiltration Basin	Regenerative Step Pool Stormwater Conveyance System	18.3	7.6	0.5	2013	
AA18RST000020	Magothy River Mainstem	Twin Harbors HOA Bioretention		Bioretention	0.2	0.1	2.29	2018	
AA18RST000035	Magothy River Mainstem	Wee Lad and Lassie Bioretention		Bioretention	1.2	0.2	1.26	2017	
AA18RST000042	Magothy River Mainstem	Berrywood Community Bioretention and Swale		Bio-Swale	3.5	1	2.23	2019	
AA19RST000002	Magothy River Mainstem	Barrensdale Outfall Restoration - SPSC	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	22.5	7.9	3.5	2019	
AA20RST000011	Magothy River Mainstem	14 Linda Lane Infiltration Trench		Infiltration Trench	0.3	0.1	3.7	2018	
AA17RST000024	Magothy River Mainstem	Upper Mill Creek Stream Restoration BMP 824	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	22.6	4.5	1.21		2023
AA18RST000047	Magothy River Mainstem	Harting Farm Pond 1 Retrofit	Wet Pond	Wet ED Pond	59	18.6	0.59		2024
AA18RST000048	Magothy River Mainstem	Harting Farm Pond 2 Retrofit	Wet Pond	Wet ED Pond	23	7.5	9.57		2024
AA18RST000049	Magothy River Mainstem	Harting Farm Pond 3 Retrofit	Wet Pond	Wet ED Pond	1.9	0.2	20.49		2024
AA19RST000013	Magothy River Mainstem	Farmington Village, Schramms, Bell Tower Retrofit	Wet ED Pond	Wet ED Pond	59.4	21.5	2.33		2021
AA19RST000014	Magothy River Mainstem	North Star Drive Pond Retrofit	Wet ED Pond	Wet ED Pond	156.6	46.8	1.72		2021
AA19RST000015	Magothy River Mainstem	Walmart Pond Retrofit - Ritchie Hwy	Detention Structure (Dry Pond)	Wet ED Pond	19.1	14.2	1.06		2021
AA20RST000008	Magothy River/Forked Creek	Ulmstead Community Park Rain Garden A		Rain Garden	0.1	0.1	2.39	2020	
AA20RST000009	Magothy River/Forked Creek	Ulmstead Community Park Rain Garden B		Rain Garden	0.1	0	2.34	2020	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA20RST000010	Magothy River/Forked Creek	Ulmstead Community Park Rain Garden C		Rain Garden	0.1	0.1	2.11	2020	
AA18RST000023	Magothy River/Forked Creek	Forked Creek Outfall Retrofit - U15O002		Regenerative Step Pool Stormwater Conveyance System	65.1	5.1	1.27		2021
AA20RST000012	Magothy River/Tar Cove	Heilman Property SPSC		Regenerative Step Pool Stormwater Conveyance System	3.7	0.7	1.2	2019	
AA16RST000011	Patapsco River Lower North Branch	Jerome Avenue Pond Retrofit	Extended Detention Structure, Dry	Infiltration Basin	4.6	1.5	1.56	2015	
AA16RST000020	Patapsco River Lower North Branch	Musical Way Pond Retrofit	Wet ED Pond	Infiltration Basin	16.8	3.8	0.6	2015	
AA16RST000024	Patapsco River Lower North Branch	Severn Road / Carriage Drive Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	11.2	4.8	0.76	2015	
AA16RST000030	Patapsco River Lower North Branch	806 Central Ave (Linthicum) Pond Retrofit	Wet ED Pond	Wet Pond	1.5	1	0.38	2015	
AA16RST000047	Patapsco River Lower North Branch	Groveland Road Pond Retrofit	Detention Structure (Dry Pond)	Infiltration Basin	12.4	3.8	0.97	2019	
AA16RST000060	Patapsco River Lower North Branch	Gesna Dr Retrofit Harmans Woods #2 BMP 803	Detention Structure (Dry Pond)	Shallow Wetland	30.5	11.8	0.78	2020	
AA16RST000061	Patapsco River Lower North Branch	Tuckerman Dr Retrofit	Detention Structure (Dry Pond)	ED Shallow Wetland	92.6	22.2	1.28	2019	
AA16RST000062	Patapsco River Lower North Branch	Fairbanks Dr Retrofit	Detention Structure (Dry Pond)	Shallow Wetland	14.4	6.3	0.7	2019	
AA16RST000066	Patapsco River Lower North Branch	Ridge Commons Blvd Retrofit	Extended Detention Structure, Dry	Wet ED Pond	24.1	10.6	2.6	2019	
AA16RST000075	Patapsco River Lower North Branch	Northrup Grumman Bioswale 1		Bio-Swale	0.6	0.6	0.65	2016	
AA16RST000078	Patapsco River Lower North Branch	Northrup Grumman Pervious Pavement 1		Permeable Pavement	1	0.8	1.36	2016	
AA16RST000079	Patapsco River Lower North Branch	Northrup Grumman Pervious Pavement 3A-2		Permeable Pavement	1.5	1.2	1.21	2016	
AA16RST000080	Patapsco River Lower North Branch	Northrup Grumman Pervious Pavement 3B		Permeable Pavement	1.3	1.2	1.5	2016	
AA16RST000081	Patapsco River Lower North Branch	Northrup Grumman Pervious Pavement 2		Permeable Pavement	0.5	0.5	0.66	2016	
AA17RST000030	Patapsco River Lower North Branch	Northrop Grumman ESD Pervious Pavement 3A-1		Permeable Pavement	1.5	1.2	2.08	2016	
AA17RST000031	Patapsco River Lower North Branch	Northrop Grumman ESD Raingarden		Rain Garden	0	0	12.9	2016	
AA17RST000035	Patapsco River Lower North Branch	Peach Orchard SWM Retrofit	Wet ED Pond	Wet Pond	43.7	10.9	1	2013	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA18RST000005	Patapsco River Lower North Branch	Walmart Arundel Mills Pond Opti Retrofit	Wet Pond	Wet Pond	33.8	26.8	2.6	2018	
AA18RST000010	Patapsco River Lower North Branch	Arundel Mills Ltd Partnership CMAC Pond Retrofit	Wet Pond	Wet Pond	196.7	159.7	2.6	2018	
AA16RST000064	Patapsco River Lower North Branch	Green Moss Glen Retrofit Andorick Acres	Detention Structure (Dry Pond)	Surface Sand Filter	23.4	7.2	0.66		2022
AA17RST000001	Patapsco River Lower North Branch	Riverside Park Stormwater Management Retrofit		Regenerative Step Pool Stormwater Conveyance System	8.7	4.8	1.01		2021
AA17RST000002	Patapsco River Lower North Branch	Chesapeake Arts Center Stormwater Management Retro		Infiltration Trench	4.1	2.6	1		2021
AA17RST000003	Patapsco River Lower North Branch	Brooklyn Park Stormwater Management Retrofit		Infiltration Trench	7	2.7	1.18		2022
AA17RST000022	Patapsco River Lower North Branch	Maritime Institute (Maritime Blvd) Pond Retrofit	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	17.5	9.2	0.85		2021
AA18RST000017	Patapsco River Lower North Branch	Hock Business Park (Corporate Blvd) Pond Retrofit	Detention Structure (Dry Pond)	Surface Sand Filter	89.2	52.6	1.1		2024
AA18RST000018	Patapsco River Lower North Branch	International Drive Pond Retrofit	Detention Structure (Dry Pond)	Pond/Wetland System	137.3	74.3	0.19		2023
AA18RST000022	Patapsco River Lower North Branch	Concorde Circle Dry Pond Retrofit	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	63.3	15.1	2.22		2022
AA19RST000011	Patapsco River Lower North Branch	601-611 Hammonds Ferry Road North Pond Retrofit	Detention Structure (Dry Pond)	Surface Sand Filter	43.2	20.7	1.09		2022
AA16RST000014	Patapsco River/Furnace Creek	Lochaber Court Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	14.6	3.4	0.85	2015	
AA16RST000025	Patapsco River/Furnace Creek	McNeil Court Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	8.2	3.1	1.15	2015	
AA16RST000041	Patapsco River/Furnace Creek	Chalmers Ave Wistful Vista Pond Retrofit	Detention Structure (Dry Pond)	Infiltration Basin	19	5.3	2.6	2017	
AA16RST000044	Patapsco River/Furnace Creek	Towering Oaks Court Pond Retrofit 874	Detention Structure (Dry Pond)	Wet ED Pond	8	3.2	2.6	2018	
AA16RST000045	Patapsco River/Furnace Creek	Baby Baer Court Pond Retrofit	Detention Structure (Dry Pond)	Infiltration Basin	11.4	3.2	2.5	2016	
AA16RST000072	Patapsco River/Furnace Creek	Juneberry Way Pond Retrofit - SPSC Oakleaf Villa	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	5.4	3.1	0.96	2016	
AA17RST000023	Patapsco River/Furnace Creek	Sawmill Hollins Ferry RD Pond Retrofit BMP 190	Detention Structure (Dry Pond)	Infiltration Basin	32.1	19.4	2.6	2018	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA17RST000005	Patapsco River/Furnace Creek	Heritage Hills Back Creek Phase 2 Retrofits	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	9.5	4.1	1.41		2021
AA17RST000007	Patapsco River/Furnace Creek	Heritage Hills Back Creek Phase 2 Retrofits		Infiltration Berm	8.7	5.1	1.46		2021
AA18RST000028	Patapsco River/Furnace Creek	Sawmill Creek Cromwell Elementary Bioretention #1		Bioretention	10	3.8	1		2021
AA18RST000030	Patapsco River/Furnace Creek	Sawmill Creek Cromwell Elementary Vortechs Unit #1		Other	9.2	3.6	0		2021
AA19RST000001	Patapsco River/Furnace Creek	Sawmill Creek Phase I Muddy Bridge Branch SPSC		Regenerative Step Pool Stormwater Conveyance System	105.1	34.7	0.07		2022
AA19RST000010	Patapsco River/Furnace Creek	Cromwell Fountain Pond Repair	Wet ED Pond	Wet ED Pond	62.4	32.6	2.62		2021
AA16RST000016	Patapsco River/Marley Creek	Hospital Drive Pond #3 SWM Retrofit SPSC	Extended Detention Structure, Dry	Regenerative Step Pool Stormwater Conveyance System	31.7	15.8	0.93	2015	
AA16RST000034	Patapsco River/Marley Creek	Sun Valley Condos Pond Retrofit	Extended Detention Structure, Dry	Regenerative Step Pool Stormwater Conveyance System	5.5	1.8	0.42	2016	
AA16RST000054	Patapsco River/Marley Creek	Hospital Drive / Foxwell Bend Pond Retrofit 2595	Extended Detention Structure, Dry	Wet ED Pond	30.1	11.3	1.84	2017	
AA16RST000055	Patapsco River/Marley Creek	Fox Cub Court Pond Retrofit	Wet ED Pond	Wet ED Pond	16.2	6.7	2.34	2017	
AA16RST000082	Patapsco River/Marley Creek	Hospital Drive Pond 2 Retrofit SPSC	Extended Detention Structure, Dry	Regenerative Step Pool Stormwater Conveyance System	13	5.8	0.67	2017	
AA17RST000010	Patapsco River/Marley Creek	Mill Race Pond Retrofit	Detention Structure (Dry Pond)	Pond/Wetland System	46.8	14.5	2.14	2019	
AA17RST000012	Patapsco River/Marley Creek	Empowering Believers Church Rain Garden 6		Rain Garden	0.2	0.2	2.48	2016	
AA17RST000013	Patapsco River/Marley Creek	Empowering Believers Church Rain Garden 2		Rain Garden	0.5	0.5	1	2016	
AA17RST000014	Patapsco River/Marley Creek	Empowering Believers Church Rain Garden 1		Rain Garden	0.3	0.3	0.99	2016	
AA17RST000050	Patapsco River/Marley Creek	Grays Luck SWMP Retrofit	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	41.9	8.4	0.5	2017	
AA19RST000012	Patapsco River/Marley Creek	Mill Pond Stormwater Management Retrofit	Detention Structure (Dry Pond)	ED Shallow Wetland	21.8	9.1	1.06		2022

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA21RST000007	Patapsco River/Marley Creek	Marley Creek Strm Rstn - Supp. Reach 2 - SPSC		Regenerative Step Pool Stormwater Conveyance System	13.1	5	3.73		2024
AA21RST000008	Patapsco River/Marley Creek	R.P. Eason School Extended Detention Wetland		ED Shallow Wetland	20.5	8.9	1		2022
AA21RST000009	Patapsco River/Marley Creek	Marley Creek - Old Mill Branch (4842)	Detention Structure (Dry Pond)	ED Shallow Wetland	22.2	8.6	1.22		2022
AA15RST000092	Severn River Mainstem	Knollwood Road Outfall		Regenerative Step Pool Stormwater Conveyance System	9.5	2.5	1.04	2016	
AA15RST000093	Severn River Mainstem	Western District Police Station	Detention Structure (Dry Pond)	Wet Pond	2.3	1.4	1.71	2015	
AA15RST000097	Severn River Mainstem	Wetherfield Pond SWM Retrofit	Detention Structure (Dry Pond)	Wet Pond	16.5	4.8	1	2014	
AA15RST000098	Severn River Mainstem	Denington Lane Outfall		Regenerative Step Pool Stormwater Conveyance System	122.4	38.2	0.5	2016	
AA15RST000101	Severn River Mainstem	Old Bay Ridge Rd/Abandoned RR Embankment Sinkhole		Regenerative Step Pool Stormwater Conveyance System	126.6	20.1	0.03	2015	
AA15RST000102	Severn River Mainstem	Olde Severna Park Outfall Retrofit Birch Court		Regenerative Step Pool Stormwater Conveyance System	37.8	15.9	0.5	2015	
AA16RST000012	Severn River Mainstem	1275 Odenton Road Retrofit O'Malley Senior Center	Detention Structure (Dry Pond)	Wet Pond	3.4	1	0.92	2016	
AA16RST000040	Severn River Mainstem	Valentine Creek SWM Retrofit	Detention Structure (Dry Pond)	ED Shallow Wetland	34.9	3.3	1.65	2017	
AA16RST000067	Severn River Mainstem	Pasture Brook Rd Retrofit New Cut Farms	Detention Structure (Dry Pond)	ED Shallow Wetland	49.4	13	1.01	2017	
AA16RST000073	Severn River Mainstem	Maryland Theraputic Riding Center SPSC		Regenerative Step Pool Stormwater Conveyance System	26.6	2.4	2.49	2015	
AA16RST000088	Severn River Mainstem	Buttonwood Trail Outfall Repair SPSC		Regenerative Step Pool Stormwater Conveyance System	8.5	3.3	0.49	2015	
AA16RST000090	Severn River Mainstem	Picture Spring Branch Outfall Restoration		Regenerative Step Pool Stormwater Conveyance System	24.3	1.7	0.5	2016	
AA17RST000016	Severn River Mainstem	Coventry Court Dry Channel RSC- Category 2		Regenerative Step Pool Stormwater Conveyance System	2.4	1.5	0.29	2017	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA17RST000017	Severn River Mainstem	Herald Harbor Bonaparte RD #2 CPO		Regenerative Step Pool Stormwater Conveyance System	17.6	4.9	0.05	2016	
AA17RST000018	Severn River Mainstem	Winchester on the Severn Dry Channel RSC		Regenerative Step Pool Stormwater Conveyance System	18.1	4.4	0.35	2017	
AA17RST000025	Severn River Mainstem	Sappington Hill Pond Retrofit	Wet ED Pond	Wet Pond	15.3	3.7	1.83	2016	
AA17RST000026	Severn River Mainstem	Fairfield Drive Pond Retrofit Patuxent Glen	Wet Pond	Wet ED Pond	25.3	7.6	0.44	2016	
AA17RST000027	Severn River Mainstem	Dellwood Court Outfall Sand Filter		Surface Sand Filter	1.3	0.3	1.59	2017	
AA17RST000028	Severn River Mainstem	Dellwood Court Outfall Bioretention		Bioretention	3.9	0.5	0.45	2016	
AA17RST000029	Severn River Mainstem	Dellwood Court Infiltration Trench		Infiltration Trench	0.6	0.3	0.7	2017	
AA17RST000051	Severn River Mainstem	Windswept Estates Pond Retrofit	Infiltration Basin	Regenerative Step Pool Stormwater Conveyance System	15.5	6	1.79	2014	
AA18RST000001	Severn River Mainstem	Jabez SWM BMP 33 Retrofit	Shallow Wetland	Shallow Wetland	119	12.6	1	2018	
AA18RST000019	Severn River Mainstem	Sappington Hill BMP 1280 Pond Retrofit	Wet ED Pond	Wet Pond	31.3	7.9	1.14	2019	
AA18RST000053	Severn River Mainstem	Seven Oaks BMP 341	Wet ED Pond	Wet ED Pond	438	99.6	0.5	2018	
AA19RST000018	Severn River Mainstem	Epping Forest Stormwater BMPs - Gravel Wetland 1		Submerged Gravel Wetland	0.5	0.3	0.9	2020	
AA19RST000019	Severn River Mainstem	Epping Forest Stormwater BMPs - Gravel Wetland 2		Submerged Gravel Wetland	3.8	1.6	0.44	2020	
AA20RST000004	Severn River Mainstem	Circle Drive Dry Channel RSC		Regenerative Step Pool Stormwater Conveyance System	9.1	2.3	2.35	2020	
AA21RST000012	Severn River Mainstem	Mayapple ARPOA Infiltration Berm 1		Infiltration Berm	1.2	0.1	1	2021	
AA21RST000013	Severn River Mainstem	Mayapple ARPOA Infiltration Berm 2		Infiltration Berm	0.4	0.1	1	2021	
AA21RST000014	Severn River Mainstem	Mayapple ARPOA Infiltration Berm 3		Infiltration Berm	1	0.2	1	2021	
AA17RST000011	Severn River Mainstem	Lakeland Road Outfall Stabilization	Dry Swale	Regenerative Step Pool Stormwater Conveyance System	44.9	13.1	2.17		2022
AA20RST000002	Severn River Mainstem	Millersville Post Office Pond Retrofit		Wet ED Pond	90.2	46.4	1.01		2023
AA21RST000010	Severn River Mainstem	North Fork Bear Branch Stream Rest SPSC (M11O019)		Regenerative Step Pool Stormwater Conveyance System	18.2	5.7	1.62		2025
AA16RST000019	Severn River/Mill Creek	Comanche Rd Retrofit Glen Eden 763	Infiltration Basin	Wet Pond	13	2.6	0.66	2015	
AA16RST000021	Severn River/Mill Creek	Old Sturbridge Rd Retrofit 866	Infiltration Basin	Wet Pond	7.7	1.5	0.81	2015	
AA16RST000022	Severn River/Mill Creek	Nickerson Way Retrofit 867	Infiltration Basin	Wet Pond	3.7	0.8	1.1	2015	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA19RST000007	Severn River/Mill Creek	Kingsberry Drive SPSC 1		Regenerative Step Pool Stormwater Conveyance System	32.1	4.9	0.2	2020	
AA19RST000009	Severn River/Mill Creek	Kingsberry Drive Wetlands		ED Shallow Wetland	46	4	0.45	2020	
AA20RST000006	Severn River/Mill Creek	Burley Creek Community Rain Garden		Rain Garden	3.3	0.8	0.02	2016	
AA19RST000008	Severn River/Mill Creek	Kingsberry Drive SPSC 2		Regenerative Step Pool Stormwater Conveyance System	14.1	0.7	3.89		2021
AA16RST000058	Severn River/Whitehall and Meredith Creeks	Pennington Ln South Retrofit	Extended Detention Structure, Dry	Regenerative Step Pool Stormwater Conveyance System	24.2	4.7	1	2017	
AA18RST000044	Severn River/Whitehall and Meredith Creeks	Asbury Broadneck United Methodist Church - SPSC		Regenerative Step Pool Stormwater Conveyance System	21.2	3.5	0.14	2019	
AA20RST000007	Severn River/Whitehall and Meredith Creeks	St Dixon Farm SPSC		Regenerative Step Pool Stormwater Conveyance System	15.1	0.7	3.18	2021	
AA15RST000095	South River Mainstem	Dillon Court Pond Retrofit	Detention Structure (Dry Pond)	Wet Pond	15.2	2.8	1.25	2015	
AA16RST000001	South River Mainstem	Preserve at Broad Creek Pond Retrofit - SPSC	Extended Detention Structure, Dry	Regenerative Step Pool Stormwater Conveyance System	11	4.6	0.74	2015	
AA16RST000008	South River Mainstem	Historic London Town Step Pools and Rain Garden		Rain Garden	0.7	0.5	0.99	2013	
AA16RST000013	South River Mainstem	St Andrews Pond Retrofit	Extended Detention Structure, Dry	Multiple Pond	8	2.5	2.5	2016	
AA16RST000028	South River Mainstem	Loch Haven Manor Pond	Extended Detention Structure, Dry	Wet Pond	8.3	2.2	1.56	2015	
AA16RST000035	South River Mainstem	Wordsworth Dr Retrofit 641	Wet Pond	Wet Pond	69.7	27.1	2.46	2017	
AA16RST000038	South River Mainstem	Sharpsburg Dr Retrofit	Detention Structure (Dry Pond)	Wet Pond	33	4	1.7	2016	
AA16RST000039	South River Mainstem	Annapolis Harbour Center Pond Retrofit	Wet Pond	Wet ED Pond	36.3	27.1	1.93	2017	
AA16RST000089	South River Mainstem	Cinnamon Lane Outfall Rehabilitation		Regenerative Step Pool Stormwater Conveyance System	20.9	4.9	0.5	2016	
AA16RST000091	South River Mainstem	Annapolis Corporate Park SPSC #1		Regenerative Step Pool Stormwater Conveyance System	18.8	8.7	0.05	2015	
AA16RST000092	South River Mainstem	Annapolis Corporate Park SPSC #2		Regenerative Step Pool Stormwater Conveyance System	15.8	4.4	0.5	2015	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA16RST000093	South River Mainstem	Camp Woodlands Pre-Treatment		Regenerative Step Pool Stormwater Conveyance System	7.8	2.1	0.5	2015	
AA16RST000094	South River Mainstem	Annapolis Harbour Center SPSC		Regenerative Step Pool Stormwater Conveyance System	50.3	31.4	0.25	2016	
AA18RST000021	South River Mainstem	Broad Creek Headwaters Phase I Dept of Health SPSC		Regenerative Step Pool Stormwater Conveyance System	7	1.1	0.53	2018	
AA18RST000024	South River Mainstem	Killarney House, Neighbors Beards Creek Community		Regenerative Step Pool Stormwater Conveyance System	20.6	3.8	2.88	2017	
AA18RST000025	South River Mainstem	Sylvan Shores Stormwater Upgrade Bioretention #1		Bioretention	0.3	0.2	0.34	2016	
AA18RST000026	South River Mainstem	Sylvan Shores Stormwater Upgrade Bioretention #2		Bioretention	0.8	0.3	0.47	2016	
AA18RST000027	South River Mainstem	Sylvan Shores Stormwater Upgrade Bioretention #3		Bioretention	0.8	0.2	0.99	2016	
AA18RST000031	South River Mainstem	Edgewater Beach Grass Swale		Grass Swale	0.9	0	0.09	2017	
AA18RST000032	South River Mainstem	Edgewater Beach Bioswale		Bio-Swale	0.9	0.4	0.49	2017	
AA18RST000033	South River Mainstem	Broad Creek Health Department StormTech BMP		Other	1.1	1.1	0.85	2018	
AA18RST000036	South River Mainstem	United Church of Christ Pond Retrofit	Extended Detention Structure, Dry	Wet Pond	0.6	0.3	0.99	2018	
AA18RST000043	South River Mainstem	Center for Applied Technology South - Bioretention		Submerged Gravel Wetland	1.9	0.8	0.2	2018	
AA18RST000051	South River Mainstem	32 Wilelinor Drive SPSC		Regenerative Step Pool Stormwater Conveyance System	1.7	0.6	0.4	2014	
AA18RST000052	South River Mainstem	Edgewater Beach Pervious Concrete		Permeable Pavement	0.3	0.1	1.58	2017	
AA19RST000005	South River Mainstem	Broad Creek Headwaters Ph II Dept of Health SPSC		Regenerative Step Pool Stormwater Conveyance System	6.6	2.7	0.57	2019	
AA19RST000006	South River Mainstem	Broad Creek Ph II Dept of Health Inf Trench		Infiltration Trench	0.8	0.7	1	2019	
AA19RST000025	South River Mainstem	Central Services Garage Pond 4098 Opti Upgrade	Wet ED Pond	Wet ED Pond	13.6	7.3	1.97	2019	
AA19RST000026	South River Mainstem	South River Colony Pond 4063 Opti Upgrade	Wet ED Pond	Wet ED Pond	267.4	127.2	3.82	2019	
AA20RST000005	South River Mainstem	Beechnut Kennels BMP		Bioretention	1.2	0.5	1.06	2020	
AA21RST000004	South River Mainstem	First Christian Community Church Bioretention		Micro-Bioretention	1	0.7	0.37	2021	

Restoration BMP ID	TMDL Watershed	Project Description	Existing Project Type	Proposed Project Type	Drainage Area (Acres)	Impervious Area (Acres)	Rainfall Depth (Inches)	Year of Completion	Projected Year of Completion
AA16RST000069	South River Mainstem	2662 Riva Rd Retrofit Heritage Office Park	Detention Structure (Dry Pond)	Regenerative Step Pool Stormwater Conveyance System	8.2	3.6	2.62		2021
AA19RST000003	South River Mainstem	Broad Creek Retrofit - SPSC at Camp Woodlands		Regenerative Step Pool Stormwater Conveyance System	14.4	1.5	0.63		2021
AA21RST000001	South River Mainstem	Broad Creek Valley West RSC		Regenerative Step Pool Stormwater Conveyance System	45	5	0.16		2021
AA15RST000090	South River/Duval Creek	Old Annapolis Neck Road	Detention Structure (Dry Pond)	Wet Pond	3	0.9	2.57	2016	
AA16RST000007	South River/Duval Creek	Hillsmere Beach Road Kayak Area CPO / Bioretention		Bioretention	9	2.5	0.23	2015	
AA17RST000019	South River/Duval Creek	St. Anne School of Annapolis Rain Garden		Rain Garden	0.6	0.4	1	2017	
AA21RST000015	Tracy and Rockhold Creeks	Herrington Harbor SPSC		Regenerative Step Pool Stormwater Conveyance System	7.6	5.9	0.16	2021	
AA18RST000037	West & Rhode Rivers/Bear Neck Creek	Holly Hill Harbor Community Park Wetland A		ED Shallow Wetland	1.1	0.4	0.24	2018	
AA18RST000038	West & Rhode Rivers/Bear Neck Creek	Holly Hill Harbor Community Park Wetland B		ED Shallow Wetland	1.1	0.4	0.27	2018	
AA18RST000039	West & Rhode Rivers/Bear Neck Creek	Holly Hill Harbor Community Park Wetland C		ED Shallow Wetland	2.1	0.5	0.35	2018	
AA18RST000040	West & Rhode Rivers/Bear Neck Creek	Holly Hill Harbor Community Park Wetland D		ED Shallow Wetland	7.2	2	0.03	2018	
AA18RST000041	West & Rhode Rivers/Bear Neck Creek	Holly Hill Harbor Community Park Wetland E		ED Shallow Wetland	7.3	2.1	0.05	2018	
AA17RST000020	West River Mainstem	Avalon Shores Fire Dept Stormwater Wetland		Bio-Swale	1.4	0.9	0.71	2016	
AA21RST000005	West River Mainstem	West River United Meth. Church Camp - SPSC (East)		Regenerative Step Pool Stormwater Conveyance System	2.1	0.8	0.89		2021
AA21RST000006	West River Mainstem	West River United Meth. Church Camp - SPSC (West)		Regenerative Step Pool Stormwater Conveyance System	2.8	0.4	6.49		2021

Appendix B

Bacteria Trend Monitoring, Marley and Furnace Creek Watersheds - Year Two Report

Bacteria Total Maximum Daily Load Trend Monitoring Annual Report (FINAL)

Marley Creek and Furnace Creek Watersheds, Anne Arundel County

Year 2 Progress (July 2020 – June 2021)

Task Order 02: Bacteria TMDL Trend Monitoring – Furnace and Marley Creek Watersheds

Contract No. 10478, Category 14

November 2021

Prepared for:

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Task Order 02: Bacteria TMDL Trend Monitoring – Furnace and Marley Creek Watersheds
Contract No. 10478, Category 14

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November 2021 (FINAL)

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Appendices

Figures

Tables

Acronyms and Abbreviations

°C – degrees Celsius

BWI – Baltimore/Washington Thurgood Marshall International Airport

cfs – cubic feet per second

cfu/mL – Colony-forming units per milliliter

COC – Chain of Custody

CWA – Clean Water Act

DO – dissolved oxygen

EPA – U.S. Environmental Protection Agency

FU – Furnace Creek

GIS – geographic information system

MA – Marley Creek

MBSS – Maryland Biological Stream Survey

MDE – Maryland Department of the Environment

mg/L – Milligram per liter

mL – milliliter

MPN – most probable number

mS/cm – Millisiemens per centimeter

MS4 – Municipal Separate Storm Sewer System

NOAA – National Oceanic and Atmospheric Administration

NPDES – National Pollutant Discharge Elimination System

NTU – Nephelometric turbidity units

NWS – National Weather Service

OSDS – Onsite Sewage Disposal System

PFD – Personal Floatation Device

PPE – Personal Protective Equipment

QA/QC – Quality Assurance/Quality Control

TMDL – Total Maximum Daily Load

USGS – United States Geological Survey

WLA – Waste Load Allocation

1. Introduction

Anne Arundel County's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (11-DP-3316 MD0068306) requires the County to develop restoration plans to address the stormwater Waste Load Allocations (WLAs) for various water quality impairments with Maryland Department of the Environment (MDE)-issued and U.S. Environmental Protection Agency (EPA)-approved Total Maximum Daily Loads (TMDLs). A TMDL is the calculated maximum pollutant amount a waterbody can receive and continue to meet water quality standards for that pollutant. Both Marley Creek and Furnace Creek watersheds were listed as impaired for bacteria according to the Maryland Final 2010 Integrated Report of Surface Water Quality (MDE 2010a). The federal Clean Water Act (CWA) requires MDE to develop a TMDL for improving the water quality of impaired water bodies by establishing pollutant goals and control targets.

Marley and Furnace Creeks are Maryland Use Class I waters with designated uses that include water contact recreation and protection of nontidal warmwater aquatic life. A TMDL for enterococci was issued in 2010 for Marley Creek and Furnace Creek as a method of reducing the amount of bacterial pollutants entering the water bodies. Enterococci is used as a bacteria water quality indicator for Maryland Use Class I waters. The enterococci TMDL allocations developed for Marley Creek and Furnace Creek watersheds for enterococci are shown below in **Table 1-1**.

Table 1-1: Enterococci TMDLs per Watershed (MDE, 2010b)

Waterbody	Enterococci TMDL (counts per day)
Furnace Creek	8.14×10^{11}
Marley Creek	1.50×10^{12}

In compliance with MDE and EPA regulatory guidelines, Anne Arundel County developed a County-wide TMDL Restoration Plan for Bacteria (January 2017) that included restoration strategies for the Marley Creek and Furnace Creek watersheds as well as other bacteria-impaired watersheds. To measure progress toward achieving the enterococci TMDLs for the Marley Creek and Furnace Creek watersheds, the County initiated a Bacteria TMDL Trend Monitoring Program. This report presents the results from the second fiscal year (FY) from July 2020 - June 2021 of the monitoring program.

The County identified 12 monitoring stations to be sampled monthly, six each in the Marley Creek and Furnace Creek watersheds. Each station was sampled once per month, on the second Wednesday and Thursday of the month, by AECOM scientists. During the FY 2021 sampling period, samples were successfully collected monthly at each monitoring station.

This report presents an analysis of the sample data collected from the 12 monitoring stations for the 12-month sampling period in FY 2021 and identifies trends, correlations with potential sources (sanitary sewer overflows, established transient encampments, avian congregation locations, etc.), and seasonal variations. Along with the quantitative data, anecdotal observations of each sampling location are included in the report. A composite report of data from all monitoring years will be developed following the last year of sampling.

2. Monitoring Locations

The County identified 12 monitoring stations within the project area to be sampled monthly: six each in the Furnace Creek (FU) and Marley Creek (MA) watersheds. The sampling areas are in shallow surface waters, streams, and tidal waters, and are accessible by foot. Based on an initial field reconnaissance conducted in FY 2020, the original location proposed by the County for site FU-06 was deemed inaccessible for sample collection. Therefore, an alternative location for FU-06 was proposed by AECOM and approved by the County in emails dated April 12, 2019.

During the first FY of the monitoring program, the contributing drainage areas to each of the 12 monitoring stations were delineated and a field reconnaissance was conducted to observe land use conditions in the drainage areas to the monitoring stations. AECOM obtained the geographic information system (GIS) data of watershed boundaries for Furnace Creek and Marley Creek watersheds from MDE's TMDL Data Center. The drainage area to each monitoring point was delineated using the 2-foot topographic GIS data downloaded from the County's open data website (https://opendata.aacounty.org/). The 2017 land use GIS data obtained from the County's open data website was used to evaluate overall land use conditions in the Marley and Furnace Creek watersheds as well as the land use conditions within the drainage area to each monitoring point. Additionally, GIS data for most up to date onsite sewage disposal systems (OSDS) obtained from the County in FY 2021 and sanitary sewer system and pump station GIS data also obtained from the County's open data website in FY2020 was used to conduct a spatial analysis to identify proximity of OSDS, sewer infrastructure, pumping stations to the monitoring stations.

Table 2-1 provides the site identification numbers, geographic coordinates, and drainage areas for each of the sampling locations. A map and photographs depicting the locations of the 12 monitoring stations, and a map with delineated drainage areas to monitoring stations are provided in **Appendix A.**

Table 2-1: Bacteria Sampling Site IDs and Locations

Site ID	Latitude	Longitude	Drainage Area (acres)
FU-01	39.15013	-76.66172	606
FU-02	39.16994	-76.63152	2,148
FU-03	39.17252	-76.62697	1,007
FU-04	39.17770	-76.62106	628
FU-05	39.18275	-76.61593	978
FU-06	39.18181	-76.60700	255
MA-01	39.13693	-76.61356	2,106
MA-02	39.14233	-76.60846	675
MA-03	39.14378	-76.60640	519
MA-04	39.14841	-76.60388	1,358
MA-05	39.148820	-76.60143	311
MA-06	39.15116	-76.60172	39

2.1 Furnace Creek

The drainage area for Furnace Creek is approximately 13.41 square miles, and is composed primarily of residential (34%), commercial (12%), industrial (6%), and undeveloped or open areas (34%). A portion of Baltimore/Washington International Thurgood Marshall (BWI) Airport and the surrounding open space is also part of this watershed. Based on review of County's GIS data, there are approximately 691 OSDS located primarily in the upstream portion of the watershed. Two septic conversions and one septic addition have occurred since FY20. A map of the land use in Furnace Creek is included as **Figure 2-1** and a map of OSDS and sanitary sewer system in Furnace Creek is included as **Figure 2-2.**

AECOM conducted field reconnaissance of the Furnace Creek watershed on August 13, 2020, to observe watershed conditions and identify any potential bacteria-contributing sources. The sections below describe the monitoring locations, land use conditions within the drainage area to the monitoring location, and any notable observations identified from the field reconnaissance. **Table 2-2** shows the land use distribution in the drainage area of each monitoring point within Furnace Creek based on the County's 2017 GIS land use data.

Table 2-2: Land Use Distribution in the Furnace Creek Watershed Monitoring Location Drainage Areas

	FU-01	FU-02	FU-03	FU-04	FU-05	FU-06
Commercial (%)	3	6	6	22	6	35
Industrial (%)	1	6	10	9	3	4
Open Space (%)	16	17	20	18	5	7
Pasture and Row Crops (%)	6	-	-	-	-	-
Transportation and Utilities (%)	4	9	4	9	8	12
Water (%)	-	1	0	0	0	1
Airport (%)	-	5	37	5	-	-
Wetland (%)	1	1	2	2	0	2
Residential (%)	36	26	14	21	68	32
Woods (%)	33	29	7	14	10	7
Total	100	100	100	100	100	100

AECOM calculated the proximity of nearby pump stations to each sampling location within the Furnace Creek Watershed. **Table 2-3** displays the distance between each Furnace Creek Monitoring Location to the nearest pump station and identifies if the pump station is located upstream or downstream of the monitoring station.

Table 2-3: Distance Between Furnace Creek Watershed Monitoring Location and Nearest Pump Station

Monitoring Point	Nearest Pump Station	Distance
FU-01	Quarterfield Crossing	3,029 ft (0.57 mi) downstream from FU-01
FU-02	Quarterfield Crossing	8, 395 ft (1.59 mi) upstream from FU-02
FU-03	Cinder Cove	7,234 ft (1.37 mi) downstream from FU-03
FU-04	Holsum Way (Private)	5,109 ft (0.97 mi) downstream from FU-04
	Cinder Cover	5,171 ft (0.97 mi) downstream from FU-04

Monitoring Point	Nearest Pump Station	Distance
FU-05	Holsum Way (Private)	2,743 ft (0.51 mi) downstream from FU-05
	Cinder Cover	3,899 ft (0.74 mi) downstream from FU-05
FU-06	Cinder Cove	1,451 ft (0.27 mi) downstream from FU-06
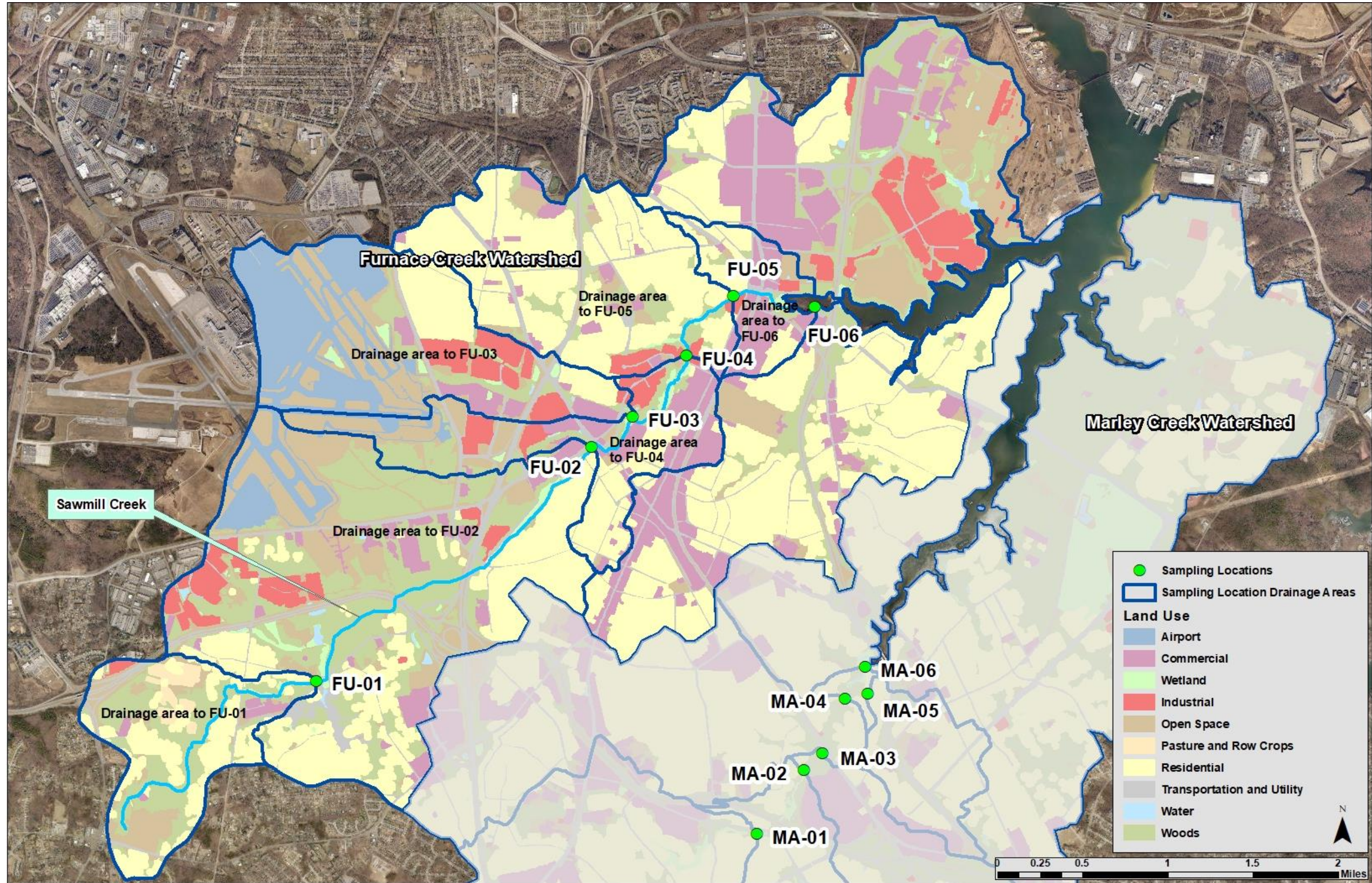
Figure 2-1: Land Use Distribution in Furnace Creek Watershed
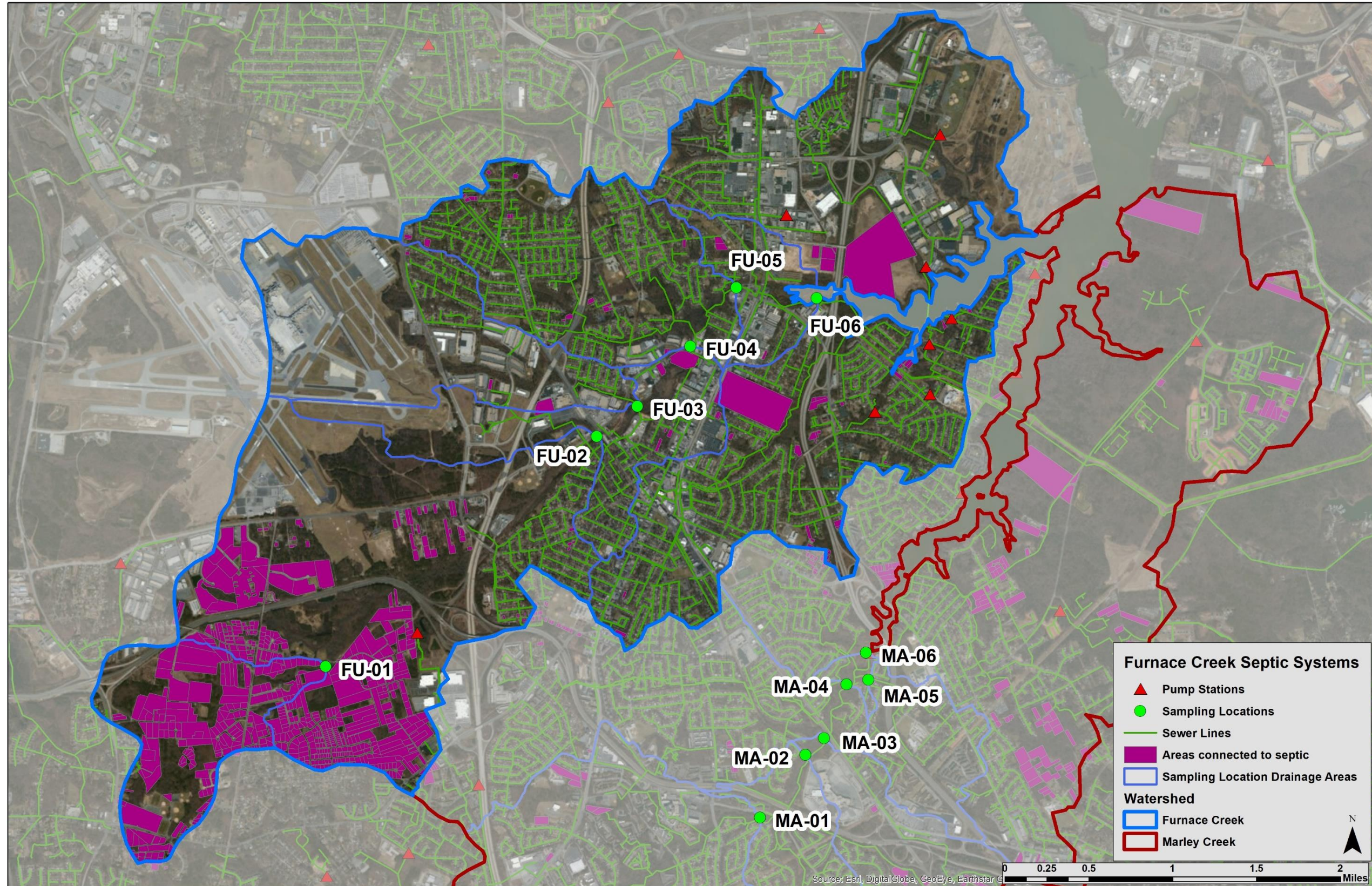
Figure 2-2 : Location of OSDS and Sewer System in Furnace Creek

2.1.1 FU-01

FU-01 is located across from Queenstown Park, along a driveway off Queenstown Road. The stream is fed by the headwaters of Sawmill Creek, originating in the Severn Danza Park area of Severn, MD. The sampling area resembles a wetland, with saturated ground and aquatic plants in the area.

Within the drainage area to FU-01, there are mainly residential, wooded, or open areas, comprising 36%, 33%, and 16% of the drainage area, respectively. The few commercial areas (3%) appear to be automobile or large-scale storage related. There is also pastureland (6%) along Sandy Farm Road, though no livestock or other animals were observed at the time of 2020 field reconnaissance. Other land uses in the drainage area include transportation and utilities (4%), industrial (1%) and wetland (1%). Most areas that drain to this monitoring location are connected to septic sewer systems.

2.1.2 FU-02

FU-02 is located along Dorsey Road in Glen Burnie, MD, across the street from the Maryland Military Department First Regiment Armory, next to the Baltimore & Annapolis Trail. The sampling area itself is part of Sawmill Creek; the collection point is located after the confluence with Irving Branch. The streambank growth consists mostly of cattails, and the streambed is rocky and sandy. The sampling location is near a busy intersection with heavy automobile and pedestrian traffic.

Within the drainage area to this sampling point, residential areas comprise 26% of the total land use. The non-residential developed areas include BWI airport (5%), industrial areas south of BWI airport (6%), and commercial areas (6%) that are largely construction and automobile related. One notable business in this area is United Site Services on Glenbrook Road, which is a supplier of portable toilets. This business backs up to Sawmill Creek. The rest of the drainage area is primarily wooded (29%) or open space (17%). Other minor land uses include transportation and utilities (9%), water (1%) and wetland (1%). FU-02 also receives drainage from FU-01. Several areas in the south and southwest of this drainage area are connected to septic systems.

2.1.3 FU-03

FU-03 is located off 8th Avenue NW, at the location of the old 8th Avenue Flea Market. The sampling area is part of Sawmill Creek and has transient encampments present year-round. The streambed is sandy and often has sunken debris. There is a sewer line that runs adjacent to the upstream branch of the stream.

The drainage area to the monitoring point partially consists of residential neighborhoods, which comprise 14% of the drainage area. The non-residential land use is largely open space (20%), industrial (10%), and commercial (6%). These areas contain automobile and construction related businesses, as well as a retail area adjacent to the monitoring location. The northeast portion of BWI Airport also occupies 37% of this drainage area. Other minor land uses include transportation and utilities (4%), wetland (2%) and woods (7%). Two small industrial and commercial areas in this watershed are connected to septic systems.

2.1.4 FU-04

FU-04 is located off 8th Avenue NW, adjacent to Maisel Brothers, a commercial landscaping facility and is surrounded by commercial areas on all sides. The sampling area is before Ferndale Branch, in the leg of Sawmill Creek running alongside the west fence of Maisel Brothers. The sampling area has remnants of transient encampments, including abandoned bedding, clothing, shopping carts, and debris in the path leading to the sampling location. The stream is part of Sawmill Creek, and the sampling location captures the drainage from FU-01 through 03.

Drainage to this location comes from a portion of BWI airport (5% of the drainage area), wooded and residential areas (14% and 21% of the drainage area, respectively), and developed commercial and industrial areas (22% and 9% of the drainage area, respectively). The commercial and industrial areas appear to be largely automobile and construction related. The adjacent area south of the monitoring location is connected to a septic system. There are a few small residential areas in the central part of the watershed that are also connected to septic. Other land uses in

the drainage area include open space (18%), transportation and utilities (9%) and wetland (2%). FU-04 receives drainage from upstream drainage areas to monitoring locations FU-01 through FU-03.

2.1.5 FU-05

FU-05 is near the intersection of Crain Highway and East Furnace Branch Road, adjacent to Dave's Trim Shop. The sampling area is adjacent to commercial businesses and multiple parking lots. The stream is part of Sawmill Creek, and is fed by the main trunk as well as tributaries originating from neighborhoods located around North Glen Park in Glen Burnie, MD. This sampling location receives the downstream drainage from FU-01 through 04.

The drainage area to this sampling location is primarily residential (68%), with a few areas comprising commercial (6%), industrial (3%), and wooded (10%) land use. During FY 2020 field reconnaissance, it was noted that many of the homes had boats parked nearby. There are a few residential areas in this drainage area that are connected to septic systems. Other land uses in the watershed include open space (5%) and transportation and utilities (8%). FU-05 receives drainage from drainage areas of upstream monitoring locations FU-01 through FU-04.

2.1.6 FU-06

FU-06 is the tidal site for Furnace Creek, fed primarily by Sawmill Creek. It is located off East Furnace Branch Road, adjacent to 120 North Langley Road. The sampling location is surrounded by commercial businesses and is adjacent to transient encampments year-round. This sampling location experiences substantial variation in tide level compared to other monitoring sites which can lead to the streambed being exposed during routine sampling activities.

The drainage area to this location is primarily occupied by commercial and residential land use types. Residential areas comprise 32% of the drainage area. The commercial areas, which comprise 35% of the drainage area, are mostly automobile related, though the area immediately around the monitoring location is an industrial supply warehouse. Other land uses in the drainage area include industrial (4%), open space (7%), transportation and utilities (12%), water (1%), wetland (2%) and woods (7%). Since this location is the terminal sampling point for Furnace Creek, it receives drainage from all upstream areas, including drainage that reaches FU-01 through FU-05. There are two small residential areas in the drainage area that are connected to septic systems.

2.2 Marley Creek

The drainage area of Marley Creek is approximately 13.65 square miles, and is primarily composed of residential (51%), commercial (10%), and undeveloped or open areas (31%). Based on review of County's GIS data, Marley Creek watershed has approximately 384 OSDS that are located throughout the watershed. Three septic conversions and one septic addition has occurred since FY20. A map of the land use in Marley Creek is included as **Figure 2-3** and a map of OSDS and sanitary sewer system in Marley Creek is included as **Figure 2-3.**

AECOM conducted field reconnaissance of Marley Creek watershed on August 13, 2020, to observe watershed conditions and to identify any potential bacteria-contributing sources. The sections below describe the monitoring locations, land use conditions within the drainage area to the monitoring location, and any notable observations identified from the field reconnaissance. **Table 2-4** shows the land use distribution in the drainage area of each monitoring point within Marley Creek based on the County's 2017 GIS land use data.

Table 2-4: Land Use Distribution in Marley Creek Watershed Monitoring Location Drainage Areas

	MA-01	MA-02	MA-03	MA-04	MA-05	MA-06
Commercial (%)	14	5	27	15	14	-
Industrial (%)	0	-	0	0	-	-
Open Space (%)	6	8	3	5	5	-
Pasture and Row Crops (%)	2	2	-	-	-	-

	MA-01	MA-02	MA-03	MA-04	MA-05	MA-06
Transportation and Utilities (%)	9	6	12	9	13	-
Water (%)	0	0	0	0	0	3
Airport (%)	-	-	-	-	-	-
Wetland (%)	1	2	0	1	0	4
Residential (%)	56	53	33	62	58	64
Woods (%)	12	24	25	8	10	29
Total	**100**	**100**	**100**	**100**	**100**	**100**

AECOM also determined the proximity of nearby pump stations to each sampling location within the Marley Creek Watershed. **Table 2-5** displays the distance between each Marley Creek Monitoring Point to the nearest pump station also identifies if the pump station is located upstream or downstream of the monitoring station.

Table 2-5: Distance Between Marley Creek Watershed Monitoring Locations and Nearest Pump Station

Monitoring Point	Nearest Pump Station	Distance
MA-01	Marley	8,976 ft (1.17 mi) downstream from MA-01
MA-02	Marley	3,740 ft (0.70 mi) downstream from MA-02
MA-03	Marley	3,076 ft (0.58 mi) downstream from MA-03
MA-04	Marley	1,204 ft (0.22 mi) downstream from MA-04
MA-05	Marley	839 ft (0.15 mi) downstream from MA-05
MA-06	Marley	135 ft (0.02 mi) upstream from MA-06
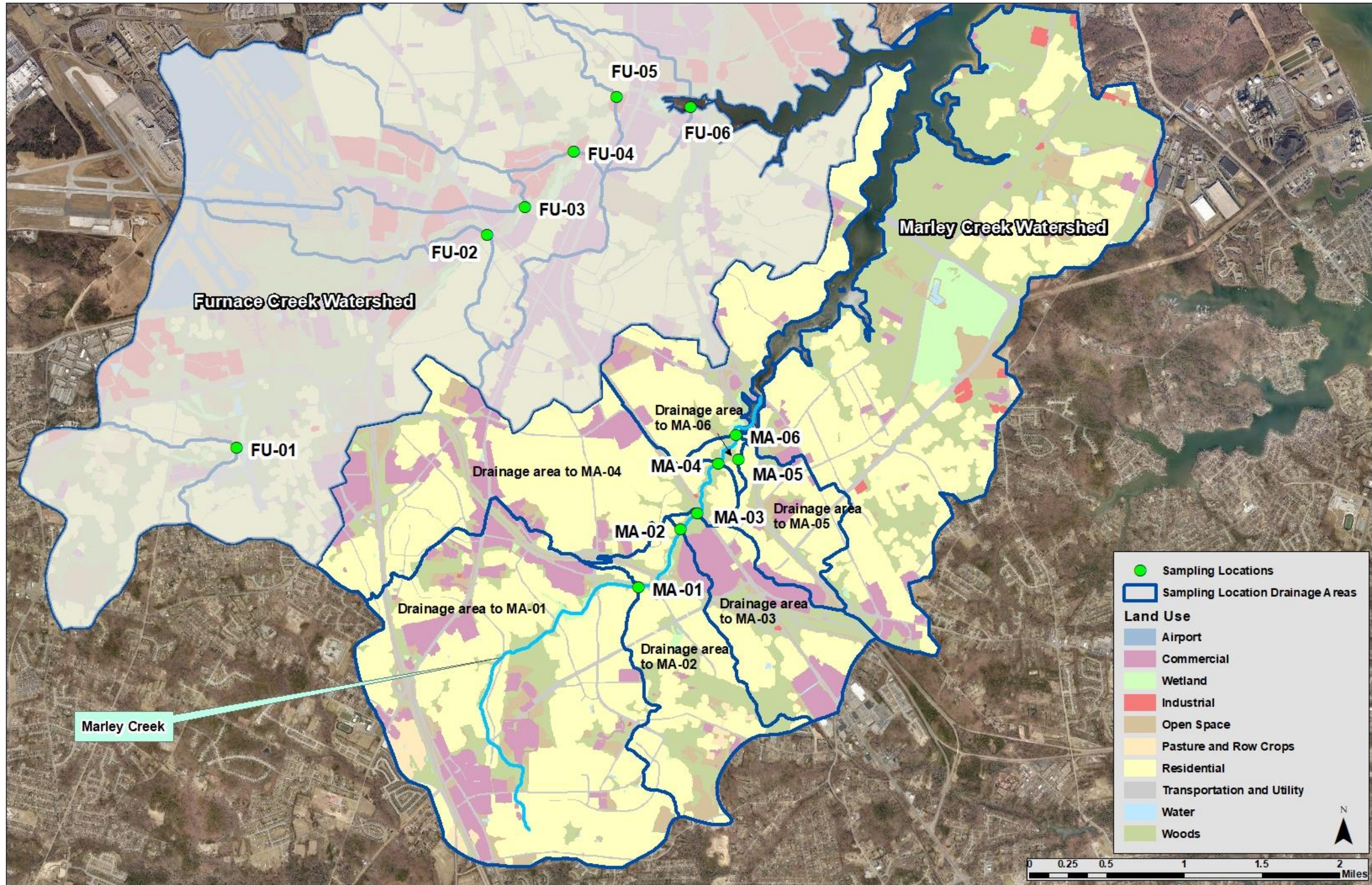
Figure 2-3: Land Use Distribution in Marley Creek Watershed
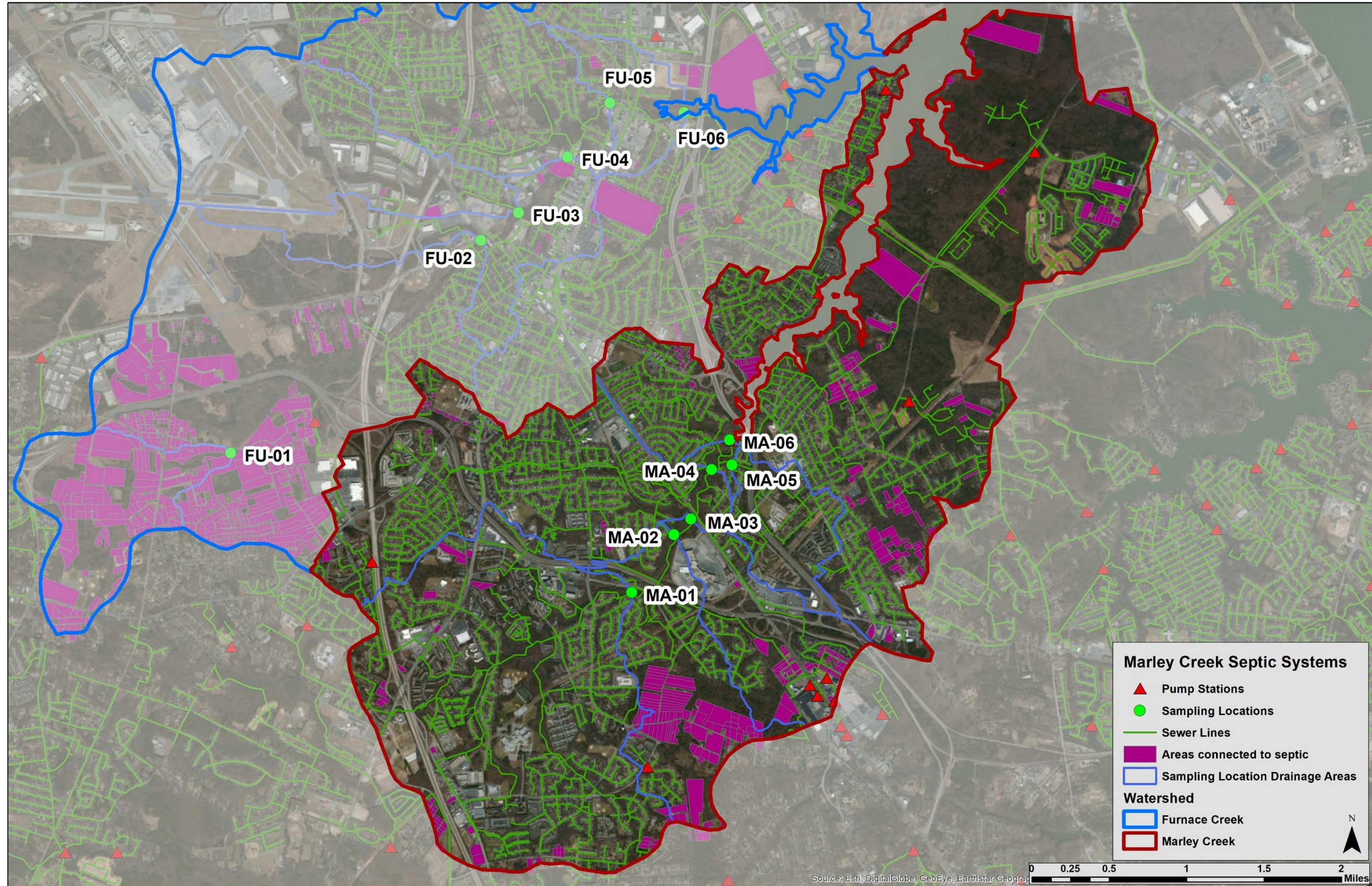
Figure 2-4: Location of OSDS and Sewer System in Marley Creek

2.2.1 MA-01

MA-01 is located between Cross Creek Drive and Hospital Drive in Glen Burnie, MD. The stream is fed by the headwaters of Marley Creek, originating in the west part of the Southgate area in Glen Burnie, MD. The sampling area is generally overgrown but otherwise healthy. A sewer line runs adjacent to much of the upstream portion of Marley Creek.

The drainage area to this sampling point is composed of primarily residential communities (56% of the drainage area), interspersed with several larger commercial areas, which comprise 14% of the drainage area. Northwest of the monitoring location is the University of Baltimore Washington Medical Center. The other commercial areas beyond the hospital are also largely medical and healthcare related. To the east and southeast of MA-01 are several shopping centers with mainly retail businesses. A few residential and commercial areas to the southwest and west of the monitoring location are connected to septic sewer systems. Other land uses in the drainage area include woods (12%), open space (6%), pasture and row crops (2%), transportation and utilities (9%), and wetland (1%).

2.2.2 MA-02

MA-02 is located underneath the Marley Creek Trussle Bridge, which is located along the Baltimore & Annapolis Trail next to Marley Station Mall. The sampling location is wooded and is adjacent to both a large residential neighborhood and the Marley Station shopping mall.

The monitoring location captures the upstream portions of Marley Creek that run through MA-01 as well as additional headwaters that originate in the neighborhoods off Foxwell Road in Glen Burnie and Elvaton Road in Pasadena. Areas in the immediate vicinity of the monitoring station are served by public sewer system. Neighborhoods in upper reaches of the drainage area are primarily connected to septic systems. Residential areas comprise 53% of the drainage area. During the 2020 field reconnaissance, it was noted that the neighborhood to the southwest had a lot of litter and loose trash. Some houses had boats parked nearby. The majority of the remaining drainage area is largely wooded (24% of the drainage area). Other land uses in the drainage area include commercial (5%), open space (8%), pasture and row crops (2%), transportation and utilities (6%), and wetland (2%).

2.2.3 MA-03

MA-03 is located approximately 250 yards downstream from MA-02. It can be accessed from Governor Ritchie Highway near the Marley Station shopping mall. The sampling location is located after Marley Creek is intersected by storm drain outfalls that flow from Marley Station Mall. These outfalls appear to be connected to tributaries that originate in the Woodholme neighborhood of Pasadena, MD. This neighborhood, in the southern part of the drainage area, is primarily connected to septic systems.

This sampling location captures drainage from the upstream areas that reach MA-01 and 02, as well as the Marley Station Mall and adjacent retail center, another retail center to the southeast, residential neighborhoods, and wooded areas. The southeast retail center includes PPT Porta Potty Rentals off Jumpers Hole Road. Commercial, residential, and wooded areas comprise 27%, 33%, and 25% of the drainage area to MA-03, respectively. Open space and transportation and utilities occupy 3% and 12% of the drainage area, respectively.

2.2.4 MA-04

MA-04 is located in the wooded area between Tower Road and Dixon Drive in Glen Burnie. The monitoring location captures the main stem of Marley Creek, including drainage from upstream monitoring locations MA-01 through MA-03, as well as additional flow from sources in adjacent neighborhoods along Ritchie Highway and nearby commercial areas. A sewer line runs adjacent to the upstream length of the stream.

Residential areas cover 62% of the land use draining to MA-04. Commercial areas, which comprise 15% of the drainage area, are primarily medical, retail, and automobile industry businesses. One notable business in the drainage area is Premier Porta Potty Rental off Landmark Drive. Other land uses in the drainage area include open space (5%), transportation and utilities (9%), and woods (8%). Only one small area at the upstream point of the drainage area appears to be connected to septic sewer systems.

2.2.5 MA-05

MA-05 is located off Norman Avenue between Phelps Avenue and Mueller Drive in Glen Burnie. The sampling location captures flow from tributaries originating near Marley Elementary School and several neighborhoods and apartment buildings before connecting to the main stem of Marley Creek. During field reconnaissance, it was noted that the neighborhoods in this drainage area had very little trash and debris. Yards are large and grassy, with boats parked at many homes.

Residential communities make up 58% of the land use, while commercial areas comprise 14% of the drainage area. Other land uses in the drainage include transportation and utilities (13%), open space (5%), and woods (10%). A sewer line runs adjacent to the stream, and a pumping station is located less than 1,000 feet from the sampling location. No areas within the drainage area to MA-05 appear to be connected to septic systems.

2.2.6 MA-06

MA-06 is the tidal site for Marley Creek. It is found behind the sewer transfer station located at 521 Norman Avenue in Glen Burnie. It is fed primarily by Marley Creek tributaries, including all tributaries captured by upstream Marley Creek monitoring locations. MA-06 does not capture Marley Creek tributaries north and east of Maryland Route 10 (Arundel Expressway). The sampling location is generally silty with heavy cattail growth in the shallow waters. A sewage-like odor was evident during the 2020 field reconnaissance that could be related to the nearby Marley Pump Station and /or marshy conditions at the sampling location.

The drainage area to this monitoring station is largely residential (64%) and wooded (29%). Other land uses in the drainage area include water (3%) and wetlands (4%). No areas within the drainage area to MA-06 appear to be connected to septic systems.

3. Sampling Methodology

AECOM performed bacteria trend monitoring sampling activities for the 12-month sampling period beginning in July 2020 and ending in June 2021. Sampling was conducted on the second Wednesday and Thursday for all months except August and September 2020 and February 2021. During the months of August and September 2020, Furnace Creek was sampled on the second Wednesday but Marley Creek sampling on the following Thursday had to be abandoned due to electrical storms. In both cases the Marley Creek sampling was conducted on the following Friday. Sampling for February 2021 was conducted on the second Monday and Tuesday of the month because heavy snowstorms were predicted for Wednesday and Thursday. AECOM provided a two-person sampling team to perform the bacteria trend monitoring sampling activities in the project area, in accordance with the Bacteria Sampling Plan and Quality Assurance/Quality Control Protocols (July 2019, revised August 2020), and EPA sampling protocols. In addition to AECOM's sampling, Anne Arundel County conducted sampling of MA-02, MA-03, and 12 additional sites between MA-02 and MA-03 in November 2020 and April 2021. This additional sampling was conducted by the County to investigate the consistent high bacteria count observed at MA-02 and MA-03.

3.1 Field Sampling Preparation

One week before a scheduled sampling event, bottles and an insulated cooler were ordered. One day prior to a sampling event, the multi-parameter sonde was checked to confirm it was functioning properly, and if necessary, a replacement sonde or parts were obtained. At least one day prior to a scheduled sampling event, field equipment was assembled and prepared for use, and the necessary field forms and safety sheets were printed.

3.2 Sample Collection and Field Measurements

The sampling team consisted of one team member collecting the sample and one team member recording data using the field form. The field team mobilized to the site on two consecutive days: Furnace Creek on the second Wednesday of each month and Marley Creek on the second Thursday of each month. The team conducted sampling at each watershed starting with the most downstream location as follows:

Except as noted above, monitoring stations in Furnace Creek watershed were sampled on the second Wednesday of every month in the following order:

- – FU-06 (tidal site)
- – FU-05
- – FU-04
- – FU-03
- – FU-02
- – FU-01

Except as noted above, monitoring stations in the Marley Creek watershed were sampled on the second Thursday of every month in the following order:

- – MA-06 (tidal site)
- – MA-05
- – MA-04
- – MA-03
- – MA-02
- – MA-01

3.2.1 Bacteria Sampling

A grab sample was collected at each monitoring site for bacteria analysis. Prior to collecting the sample, the team member handling the sampling container donned a clean pair of nitrile gloves and collected the sample directly into the laboratory-supplied sterile sample container.

Collecting Samples

The sampler entered the stream from a downstream location and waded slowly to the collection point, taking care not to disturb the stream bed or the collection point. In order to collect the sample, the sampler removed the sample container lid and removed the preservative tablet, taking care not to contaminate the inner surface or underside of the cap or the neck of the bottle. The person collecting the samples was positioned facing upstream, and the sample was collected from the incoming flow by holding the container at the base and angling the neck and mouth of the bottle toward the water. The bottle was then plunged neck-down into the water, avoiding any debris or surface scum, and positioned into the current until the neck faced slightly upward and the mouth of the container was facing the current, in order to allow air to escape and the container to fill. If there was no current, one was created by moving the bottle forward horizontally away from the sampler.

Samples were collected from a point that is representative of the site, with the sampler taking care not to collect the sample too near the bank or too far from the point of drawoff, or at a depth above or below the drawoff. For tidal sites FU-06 and MA-06, the sample was taken at a location approximately 0.5-meter deep, and for the other sites, the sample was taken at a location approximately 0.1 meter below the surface. The sampler allowed the container to fill but left approximately 1 to 2 centimeters of air space to allow mixing by shaking before examination. The sampler then carefully placed the preservative tablet back into the container before replacing the cap and locking the lid in place.

During the FY 2021 sampling year, all samples were collected directly in the sampling containers, and none required a piece of sampling equipment (e.g., telescopic dipper) to collect the sample.

Logging Samples

Once the sample was collected, the container was sealed and labeled appropriately with sample ID, date, and time, then the same information entered onto the Chain-of-Custody (COC) form. The sample was then placed in an insulated cooler for transportation to the analysis laboratory. Samples were put on ice and maintained between 1 and 10 degrees Celsius (°C) during transit. In order to keep the samples dry, they were placed in a waterproof storage bag prior to being placed in the cooler. The 8-hour hold time for enterococci analysis was not exceeded for any of the sampling events.

3.2.2 Field Measurements and Observations

The field team member responsible for collecting data noted field observations and conditions, including equipment information, field measurements, high/low flow determination, tidal characteristics, and other observations of the sites and surrounding areas in a field log. The field log consists of field data sheets and calibration sheets. Field observations and other pertinent anecdotal information was recorded, including:

- Date and time of sample collection
- Depth of sample collection
- Ambient air temperature
- Extreme conditions (weather, flooding, extreme temperatures, high winds)
- Unusual sampling/environment (possible sources of contamination, unusual inflow/outflow, algal blooms, significant changes to historical field results, etc.)
- Presence of transient encampments, congregations of evidence of avian or other wildlife, accumulated debris, etc.
- Presence of invasive species (snakeheads, phragmites, etc.)

- Precipitation amount for 3 days prior to sampling and at the time of sampling
- Tide characteristics (high/low or ebb/flood/slack) obtained from the National Oceanic and Atmospheric Administration's (NOAA's) Ft. McHenry tidal monitoring station 8574680
- Water characteristics
- Water color
- Visual turbidity
- Odor
- Flow characteristics (still, fast, dam, etc.)

At each site, sampling team members donned personal protective equipment (PPE) and prepared the sampling equipment. A multi-parameter sonde was used to collect the following physical water quality data for each sample:

- Temperature (°C)
- Dissolved Oxygen (milligrams per liter [mg/L])
- Specific Conductivity (millisiemens per centimeter [mS/cm])

- Turbidity (Nephelometric turbidity units [NTUs])
- pH

Prior to use, the multi-parameter sonde probe was examined to ensure that any antifouling components or probe protective attachments were equipped and the probe was securely attached to the cable. The sampling team member submerged the sonde probe in the stream flow and read results directly from the probe. The probe was placed in the stream with the sampler facing upstream and submerged at least 0.1 meter below the water surface in full contact with the flow. The reading was taken from approximately the same depth as the bacteria sample. The probe was held in place for at least 30 seconds to allow readings to stabilize before results were recorded in the field log. The team member responsible for taking notes compared the results to a field measurement reading guide to ensure the readings are all in range. If a reading is unreasonable/out-of-range, the YSI probe is recalibrated for the out-of-range parameter.

Field data sheets, calibration logs, and field measurement reading guides are provided as **Appendix B**.

3.2.3 Cleanup and Decontamination

Proper decontamination procedures were followed while sampling at each location to prevent bacteria and nuisance organism/pathogen cross-contamination and to prevent the introduction and spread of nuisance organisms and pathogens to other locations. The sampling team followed the Maryland Biological Stream Survey (MBSS) *Decontamination Procedures for Boots and Equipment* (MDNR n.d.).

The decontamination area was set up at least 50 yards from the stream. After samples were collected from a station, the field members wiped their hands with disinfectant wipes or lotion or washed with soap and water to reduce exposure to potentially harmful bacteria or other microorganisms. The sample team then followed the following protocols to decontaminate the field equipment:

For the multiparameter sonde:

- Don a clean pair of nitrile gloves
- Clean sonde, exposed cable, and sample container by removing visible contamination with a brush or wipes and rinse with distilled/deionized water
- Submerge sonde, exposed cable, and sample collection contained (if used) in a 5% salt solution for at least 10 minutes
- Thoroughly dry with paper towels

For the boots and waders:

- Remove boots/waders
- Using sprayer filled with 1& Virkon Aquatic solution, thoroughly spray any area of boots/waders that came into contact with stream water
- Place boots/waders in a clean plastic trash bag for transportation to next sampling location

The team properly disposed the wash water, rinse water, rinsates, and other sampling wastes (disposable PPE, plastic sheeting, paper towels, etc.) in properly marked, sealable containers or bags.

3.2.4 Data Collection/Recordkeeping Procedures

Information provided by NOAA's National Weather Service (NWS) for BWI was used to collect precipitation data for 72 hours prior to the sampling event and on the date of sampling. Outside temperature and weather were recorded at the time of sample collection.

AECOM used data from United States Geological Survey (USGS) Gauge Station 01589500 (Sawmill Creek, Glen Burnie, MD) to determine the cutoff flow rates for high/low flows and make a high/low flow determination for each sample collected from monitoring sites. For the two tidal sites, FU-06 and MA-06, AECOM used data from NOAA tidal monitoring station 8574680 (Fort McHenry). Prior to sampling, the sampling team recorded field observations and other details pertinent to site characterization in the field data sheets.

The sampling team recorded field observations and other pertinent anecdotal information for each monitoring station in the field data sheets as described in Section 3.2.2. Field observations and conditions, including equipment information, water quality data, high/low flow determination, tidal characteristics, and other observations of the site and surrounding area were recorded in the field data sheets.

3.3 Laboratory Analysis

Martel Laboratories JDS, Inc., a Maryland State-certified water quality laboratory, analyzed the water samples using IDEXX Enterolert (ASTM Method #D6503-99) for the presence of enterococci bacteria. The sampling team delivered the bacteria monitoring samples to the laboratory no later than 6 hours after the initial collection. The hold time for enterococci is 8 hours. Delivering the samples to the lab within 6 hours of collection ensured adequate time for pre-processing and analysis of the samples within the hold time limit. Results were reported in Most Probable Number (MPN) per 100 milliliters (mL). Beginning with the Marley Creek sampling event in October 2020, extended dilutions were performed on the samples. Extended dilutions were continued for all future events in FY 2021. The highest bacteria count recorded for all samples prior to the Marley Creek sampling event on October 2020 was " $\geq$ 2420." Laboratory reports are provided in **Appendix C**.

3.4 Field Note Package

Upon receiving laboratory analytical results after each sampling event, AECOM sent an email to the County's Project Manager with a PDF file summarizing field activities and results. The file included the calibration logs for the sonde, water quality data field data sheets, sampling event field notes, laboratory analytical results, and COC forms.

3.5 Quality Assurance/Quality Control (QA/QC) Protocols

3.5.1 Field Sampling QA/QC

Samples were collected at approximately the same time and day each month to provide consistently gathered data. A field test at each monitoring site was performed during July 2019, the first sampling event of FY 2020 monitoring, to confirm the presence or absence of residual halogens (free chlorine) that could affect analytical results. The results showed that the Marley Creek and Furnace Creek monitoring locations were not affected by chlorination sources.

The sampling team exercised aseptic sample techniques to avoid the potential for contamination during routine sampling. Sample equipment remained sealed and sterile until ready for use. Samples for laboratory analysis were collected directly into the sterile, laboratory-supplied container.

All sampling activities were conducted from the most downstream point to the most upstream site to prevent initial sampling activities from impacting results of subsequent samples. Samples were collected facing upstream, away from the sampler and into the current, to prevent contamination from the sampler. If no current was present, one was generated artificially by sampling horizontally in a forward motion. The sampler entered the stream downstream of the sample collection point. If wading, the sampler moved carefully to avoid significant fouling of the water.

Beginning in April 2021, field measurements collected with the multi-parameter sonde probe were compared against a field measurement guide that AECOM developed and identifies expected ranges for the monitored parameters. The guide contains procedures to follow such as confirmation readings and recalibration in the event erroneous readings or probe malfunction are suspected.

After all of the samples were collected from a monitoring station, the sampling team used soap and water, alcohol wipes, or a disinfectant lotion to wash and dry their hands and any reusable PPE to reduce exposure to harmful bacteria and to prevent cross-contamination of sites. Field equipment was cleaned/decontaminated according to the procedures specified in Section 3.2.3.

The field team collected one field blank sample per every third sampling event. The field blank was collected first by pouring a sample of analyte-free water into a sterile sample container in the field. The field team collected one

duplicate sample per sampling event. The duplicate sample was collected following the same procedures as regular sample collection.

Samples were transferred upon collection to a cooler maintained at 1°C to 10°C until delivered to the laboratory for analysis. To keep containers dry, the samples were placed in a sealable waterproof storage bag prior to being placed in the cooler. The sampling team delivered samples to the laboratory no later than 6 hours after initial collection time. This allowed for 2 hours of processing time from when samples were delivered to when they were analyzed.

3.5.2 Database QA/QC

A Microsoft Access database was developed to compile the monthly sample collection data from the water quality field data sheets and laboratory analytical results for the 12 sites. The database includes data from monitoring conducted by AECOM in FY 2020, FY 2021, and monitoring data received from County for FY 2021. However, the report includes analysis of FY 2021 monitoring data collected by AECOM and November 2020 and April 2021 data for MA-02 and MA-03 collected by the County. The database schema includes the following fields:

- Site ID
- Location
- Date and time of sample collection
- Tide characteristics
- Field measurements

  - Temperature (°C)
  - Dissolved Oxygen (mg/L)
  - Specific Conductivity (mS/cm)
  - Turbidity (NTUs)
  - pH
  - Depth of sample collection
- Laboratory analysis results

  - Enterococcus (MPN/100 mL)
- Notes

In order to maintain quality control and verify that the data entered in the database accurately represent the results obtained from the lab analysis and parameters measured at the monitoring site, all database entries were checked by a second AECOM staff member. Additionally, a histogram of the collected data was visually inspected to detect any outliers. Outliers were investigated to determine the cause and are documented in Section 4. This database is attached in **Appendix D**.

4. Monitoring Results

The TMDLs established by MDE require a reduction of enterococci bacteria by 75.75% for Marley Creek and 77.79% for Furnace Creek. The water quality criterion for Marley Creek and Furnace Creek watersheds states that the mean density of enterococci in a sampling event shall not exceed 35 colony-forming units per 100 milliliters (cfu/100 mL). The water quality criterion is designed to protect the Use Class I waters of Marley Creek and Furnace Creek. MDE's *Guidance for County Recreational Water Quality Monitoring and Notification Programs 2020* uses Beach Action Values for Indicator Organism Densities adapted from US EPA 2002 *EPA-823-B-02-004*. The Beach Action Value is not being met if the geometric mean of a sampling event's results for enterococci exceeds 104 cfu/100 mL. The data collected for this report are reported in most probable number per 100 mL (MPN/100 mL) and are directly comparable to the water quality standards presented in cfu/100 mL.

Because the Use Class I and Beach Action Value criteria are for means of sampling events, the data provided below was compared to the single sample water quality criterion of 61 MPN/100 mL for freshwater and single sample water quality criterion of 104 MPN/100 mL for estuarine waters. Though both creeks are considered estuary water types, they are impaired by both tidal and freshwater input. Therefore, both the single sample water quality criterion for fresh water and the single sample estuarine water quality criterion is used for comparison at all sites.

Laboratory reporting for enterococci counts exceeding 2,420 MPN/100 mL changed in October 2020 for Marley Creek and in November 2020 for Furnace Creek, as actual counts were reported. Prior to this date, any sample with more than 2,420 MPN/100 mL enterococci was reported as 2,420 MPN/100 mL. This change in protocol in the lab analysis of samples and the subsequent results exaggerate the trend in plots shown in sections below with extreme dips or spikes which in reality may not be the case with the enterococci counts.

4.1 Furnace Creek

The data collected for Furnace Creek show bacteria trends to be generally higher during the summer months and lower during the winter and spring months. The highest values were typically seen at FU-06 (the tidal site). From December through March, all sites met the single sample water quality criterion for estuarine water (104 MPN/100 mL). From January through March, all sites met the single sample water quality criterion for fresh water of 61 MPN/100 mL. FU-01 met the single sample water quality criterion for estuarine water (104 MPN/100 mL) in all months except for July and August 2020, and June 2021. **Figure 4-1** shows the data for all Furnace Creek monitoring sites. The sections below discuss results for each sampling site.

Furnace Creek
July 2020 - June 2021

	Jul-20	Aug-20	Sept-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
FU-01	770	326	56	14	74	8	41	24	4	11	2	461
FU-02	1550	1050	326	75	96	15	39	20	14	24	86	517
FU-03	613	345	206	64	150	19	19	22	4	44	51	816
FU-04	1120	921	461	248	133	60	29	19	2	73	184	1730
FU-05	1050	866	517	228	143	57	26	29	4	84	291	1550
FU-06	548	866	727	980	548	63	23	31	50	127	276	2160

MD Single Sample Water Quality Criterion for Freshwater (61 cfu/100 mL)

MD Single Sample Water Quality Criterion for Estuarine Waters (104 cfu/100 mL)

Figure 4-1: Furnace Creek Bacteria Data from July 2020 to June 2021

4.1.1 FU-01

FU-01 experienced its highest enterococcus concentration of 770 MPN/100 mL in July, as shown in **Figure 4-2**. Enterococcus levels remained below the single sample estuarine water criterion (104 MPN/100 mL) from September through May. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) in September, October, December through May. Levels exceeded the single sample freshwater quality criterion in July, August, November, and June.
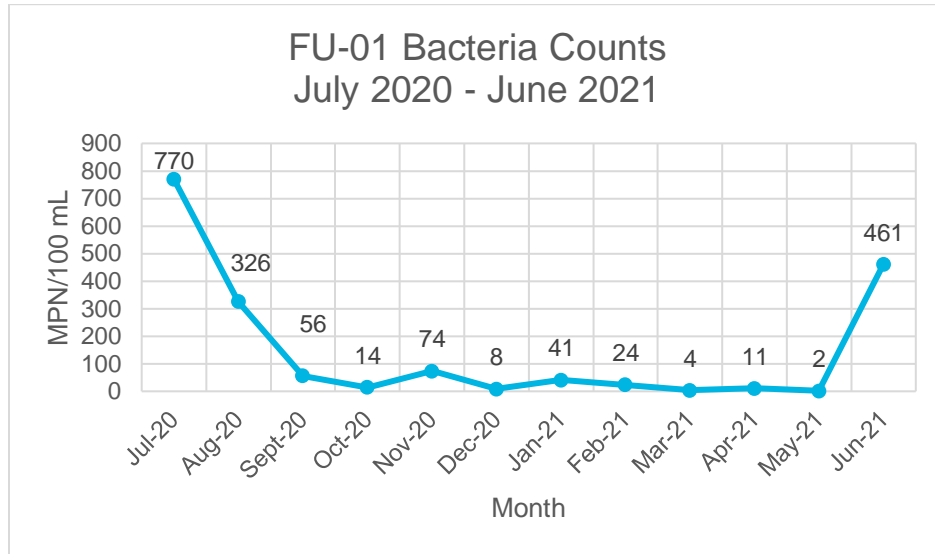
Figure 4-2: FU-01 Bacteria Trend

4.1.2 FU-02

FU-02 experienced its highest enterococcus concentrations of 1,550 MPN/100 mL in July, shown in **Figure 4-3**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) from October through May. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) from December through April. Elevated concentrations above the single sample freshwater quality criterion occurred in July through November, May, and June.
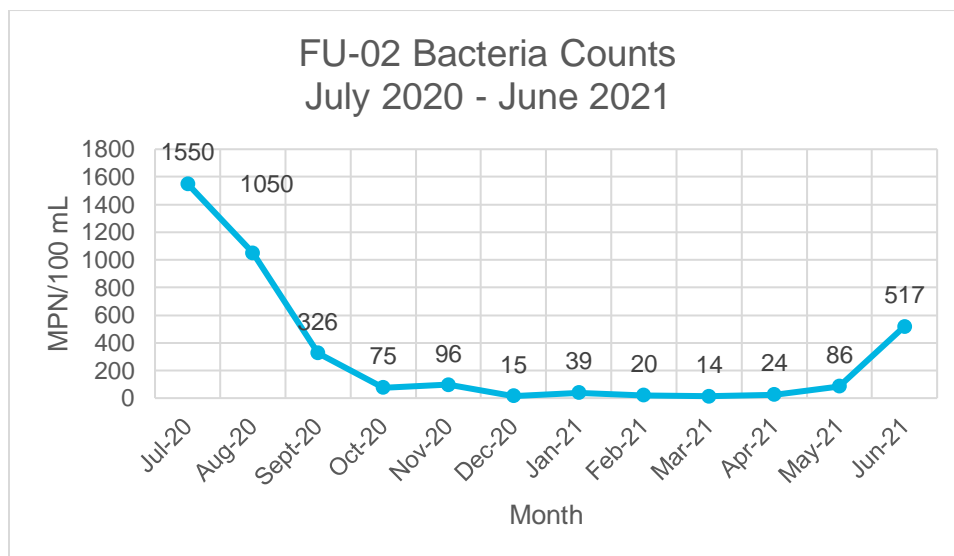
Figure 4-3: FU-02 Bacteria Trend

4.1.3 FU-03

FU-03 experienced its highest enterococcus level of 816 MPN/100 mL in June, shown in **Figure 4-4**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) in October and from December through May. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) in December through May. Elevated concentrations above the single sample freshwater quality criterion occurred in July through November and June.
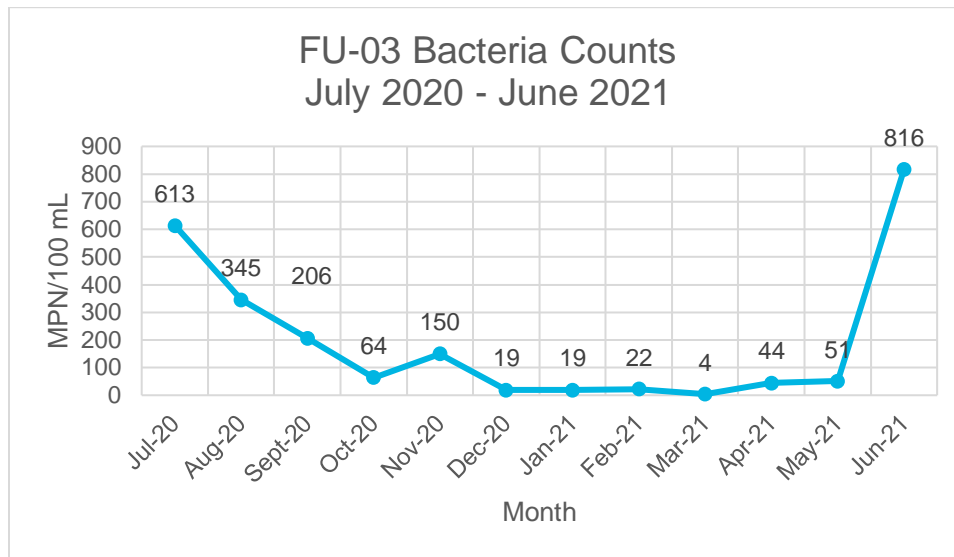
Figure 4-4: FU-03 Bacteria Trend

4.1.4 FU-04

FU-04 experienced its highest enterococcus concentration of 1,730 MPN/100 mL in June, shown in **Figure 4-5**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) from December through April. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) from January through March. Elevated concentrations above the single sample freshwater quality criterion occurred in July through November and April through June.
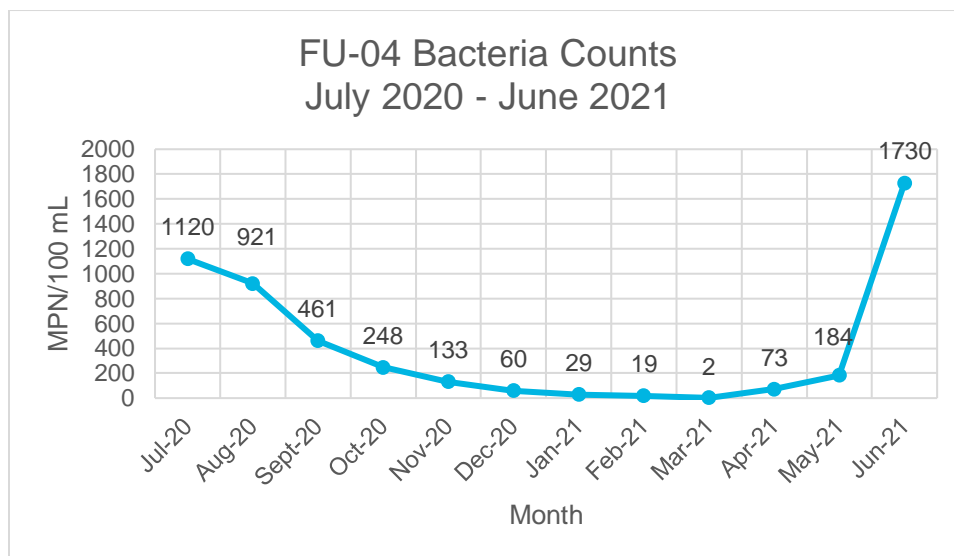
Figure 4-5: FU-04 Bacteria Trend

4.1.5 FU-05

FU-05 experienced its highest enterococcus concentration of 1,550 MPN/100 mL in June, shown in **Figure 4-6**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) from December through April. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) from December through March. Elevated concentrations above the single sample freshwater quality criterion occurred in July through November and April through June.
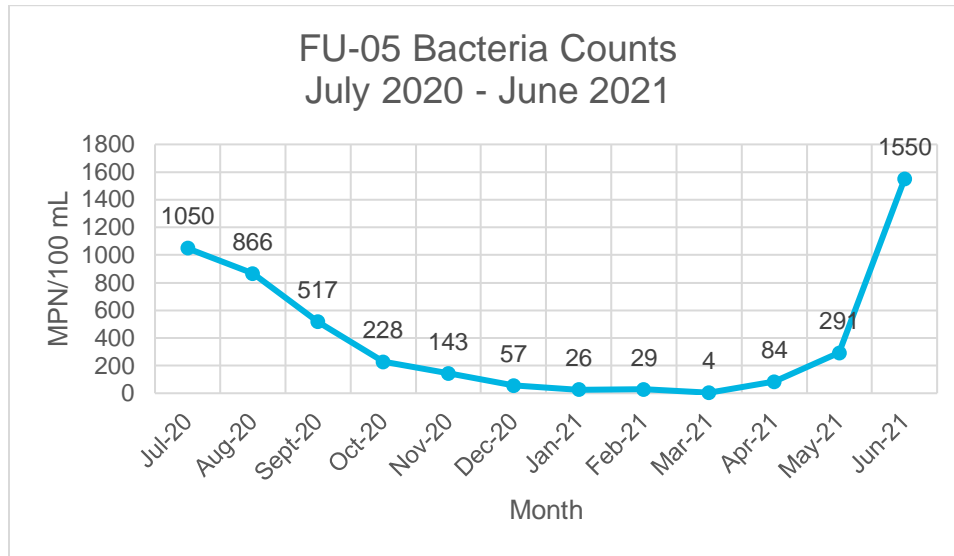
Figure 4-6: FU-05 Bacteria Trend

4.1.6 FU-06

FU-06 experienced its highest enterococcus concentration of 2,160 MPN/100 mL in June, shown in **Figure 4-7.** Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) from December through March. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) from January through March.
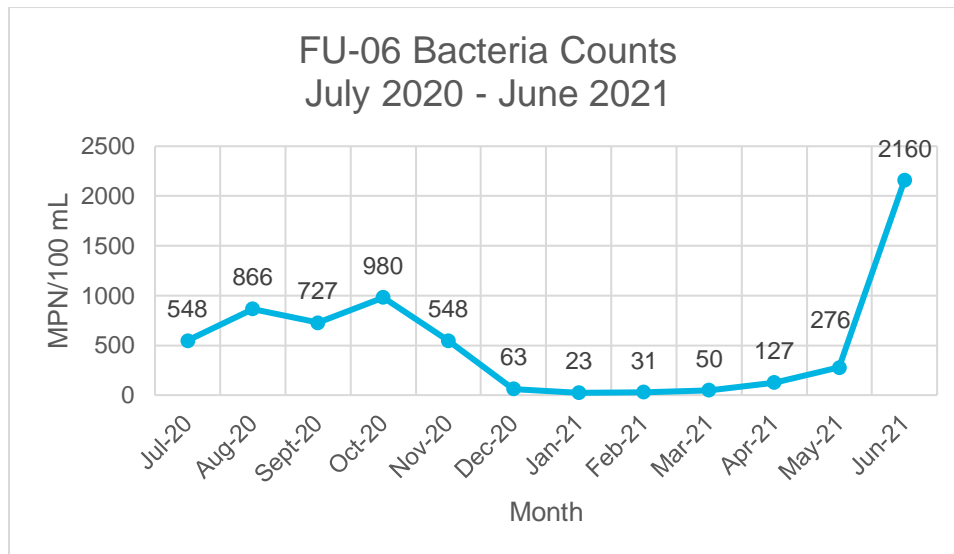
Figure 4-7: FU-06 Bacteria Trend

4.2 Marley Creek

Results for Marley Creek are skewed due to the change in laboratory reporting for bacteria counts above 2,420 MPN/100 mL starting in October. Though the highest bacteria counts are recorded as beginning in November, counts greater than or equal to 2,420 MPN/100 mL were recorded in July, August, and September. It is possible that bacteria counts in these months were significantly higher than 2,420 MPN/100 mL, as warmer months appeared to signal higher bacteria counts in Furnace Creek and for both watersheds during Year 1 sampling. Generally, Marley Creek results show bacteria trends for most sites to be highest during November when Marley Creek was experiencing extremely high flow due to significant rainfall. However, stations MA-02 and MA-03 also experienced significantly elevated bacteria levels during May and June. MA-06 exceeded single sample estuarine water criterion (104 MPN/mL) during every month of the sampling period except for January and March. No sites met the single sample estuarine water criterion during the months of July, August, September, November, February, or April through June. Five sites met the single sample criterion for freshwaters of 61 MPN/100 mL during the month of January (MA-01, 03, 04, 05, and 06) and all six sites in March. MA-02 and MA-05 met the freshwater standard in October and December, respectively. **Figure 4-8** shows the data for all Marley Creek monitoring sites. The sections below discuss results for each sampling site, including the additional sampling events collected by the County at MA-02 and MA-03 in November and April.
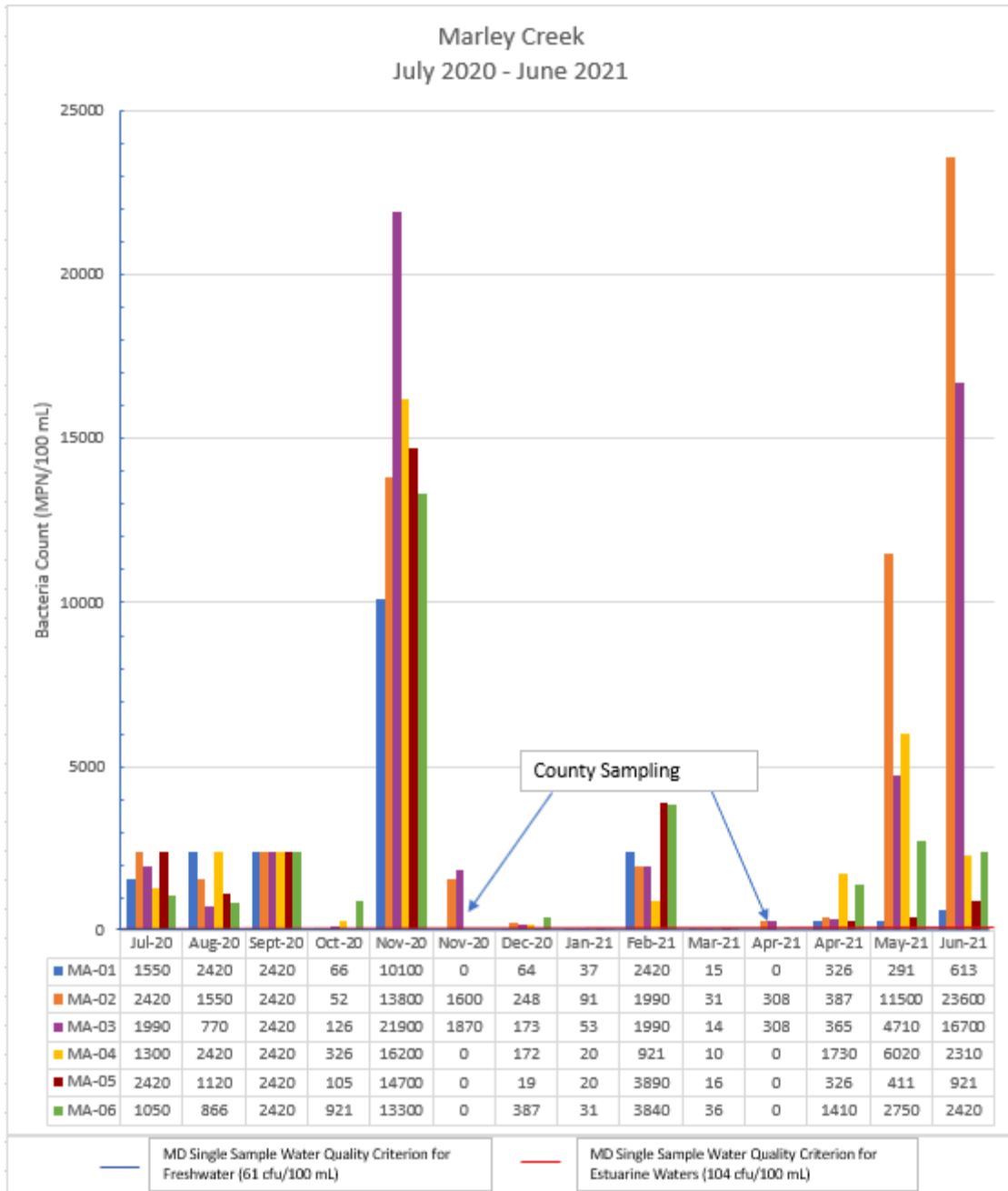
Figure 4-8: Marley Creek Sampling Data from July 2020 to June 2021

	Jul-20	Aug-20	Sept-20	Oct-20	Nov-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	Apr-21	May-21	Jun-21
MA-01	1550	2420	2420	66	10100	0	64	37	2420	15	0	326	291	613
MA-02	2420	1550	2420	52	13800	1600	248	91	1990	31	308	387	11500	23600
MA-03	1990	770	2420	126	21900	1870	173	53	1990	14	308	365	4710	16700
MA-04	1300	2420	2420	326	16200	0	172	20	921	10	0	1730	6020	2310
MA-05	2420	1120	2420	105	14700	0	19	20	3890	16	0	326	411	921
MA-06	1050	866	2420	921	13300	0	387	31	3840	36	0	1410	2750	2420

4.2.1 MA-01

MA-01 experienced its highest concentration of enterococci 10,100 MPN/100 mL in November, shown in **Figure 4-9**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) in October, December, January, and March. Levels met the single sample freshwater water criterion (61 MPN/100 mL) only in January and March. Significantly elevated concentrations of ≥ 2,420 MPN/mL occurred in August, September, November, and February.

**MA-01 Bacteria Counts
July 2020 - June 2021**
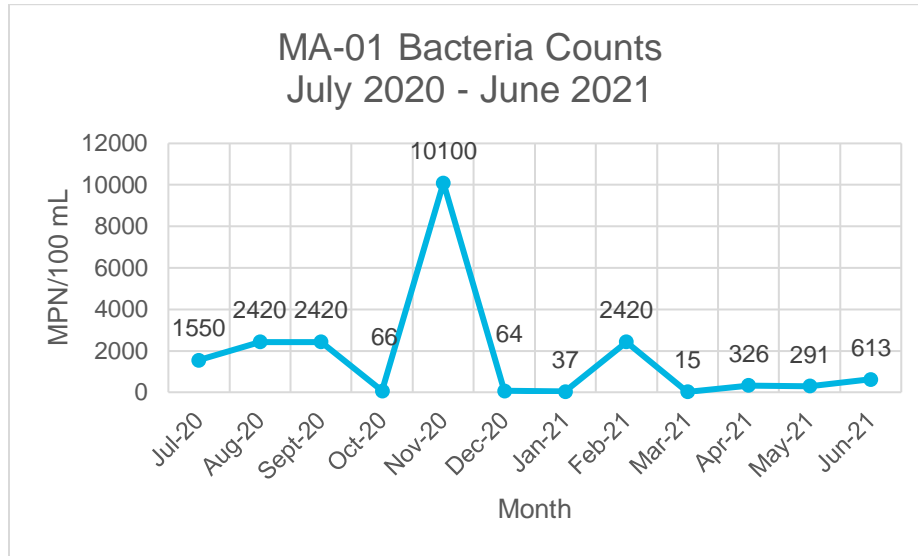
Figure 4-9: MA-01 Bacteria Trend

4.2.2 MA-02

MA-02 experienced its highest enterococcus concentration of 23,600 MPN/100 mL in June, shown in **Figure 4-10**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) in October, January, and March. Levels met the single sample freshwater criterion (61 MPN/100 mL) only in October and March. Significantly elevated concentrations of ≥ 2,420 MPN/100 mL occurred in July, September, November, May, and June. The sampling event conducted by the County in November registered significantly lower bacteria counts than the sampling event conducted by AECOM the day prior, while the County sampling event in April registered similar bacteria counts to the AECOM sampling event in the same month.
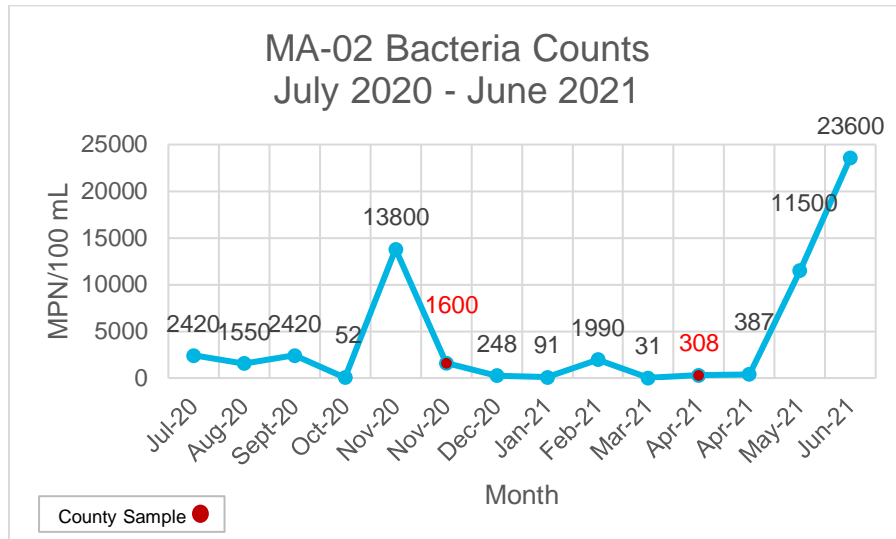
Figure 4-10: MA-02 Bacteria Trend

4.2.3 MA-03

MA-03 experienced its highest enterococcus concentration of 21,900 MPN/100 mL in November, as shown in **Figure 4-11**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) in January and March and below the single sample freshwater criterion (61 MPN/100 mL) only in January and March. Significantly elevated concentrations of ≥ 2,420 MPN/100 mL occurred in September, November, May, and June. The sampling event conducted by the County in November registered significantly lower bacteria counts than the sampling event conducted by AECOM the day prior, while the County sampling event in April registered similar bacteria counts to the AECOM sampling event in the same month.
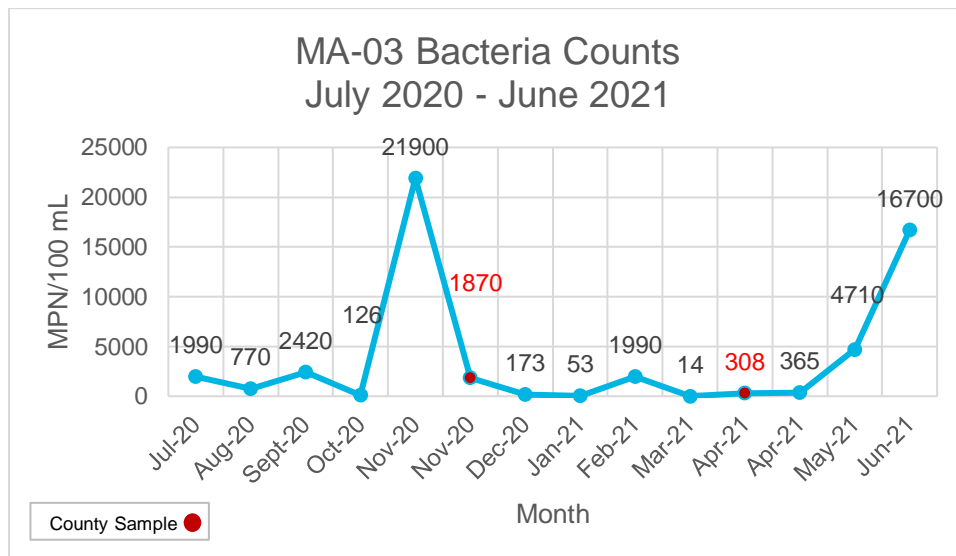
Figure 4-11: MA-03 Bacteria Trend

4.2.4 MA-04

MA-04 experienced its highest enterococcus concentration of 16,200 MPN/100 mL in November, shown in **Figure 4-12**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) and single sample freshwater criterion (61 MPN/mL) in January and March. Significantly elevated concentrations of ≥ 2,420 MPN/100 mL occurred in August, September, November, May, and June.
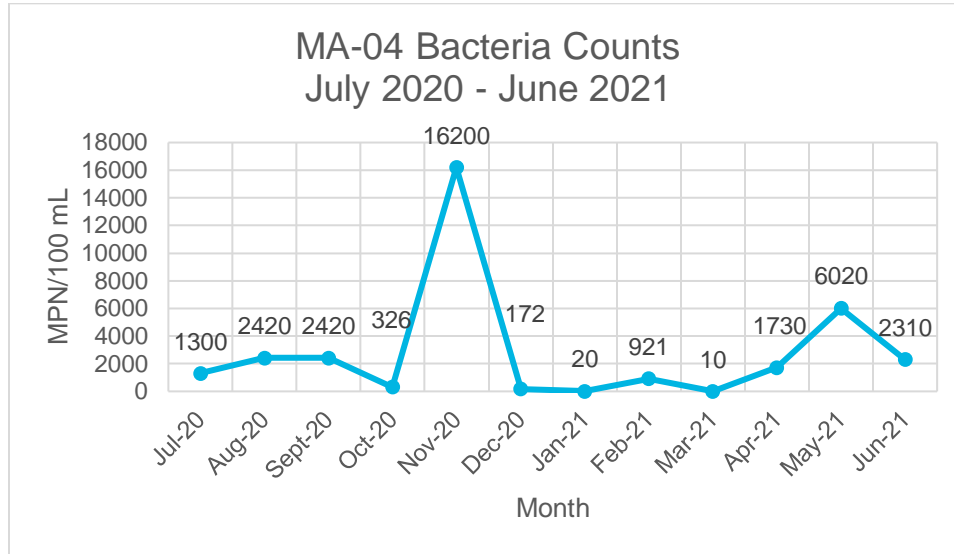
Figure 4-12: MA-04 Bacteria Trend

4.2.5 MA-05

MA-05 experienced its highest enterococcus concentration of 14,700 MPN/100 mL in November, shown in **Figure 4-13**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) and single sample freshwater criterion (61 MPN/100 mL) in December, January, and March. Significantly elevated concentrations of ≥ 2,420 MPN/100 mL occurred in July, September, November, and February.
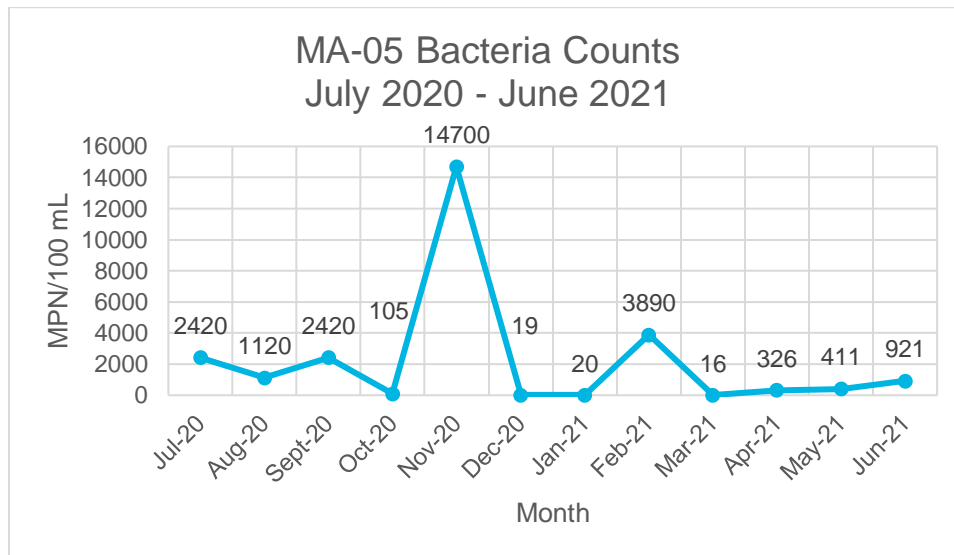
Figure 4-13: MA-05 Bacteria Trend

4.2.6 MA-06

Like all sites except for MA-02, MA-06 experienced its highest enterococcus concentration of 13,300 MPN/100 mL in November, shown in **Figure 4-14**. Bacteria levels were below the single sample estuarine water criterion (104 MPN/100 mL) in January and March. Levels met the single sample freshwater quality criterion (61 MPN/100 mL) only in January and March. Significantly elevated concentrations of ≥ 2,420 MPN/100 mL occurred in September, November, February, May, and June.
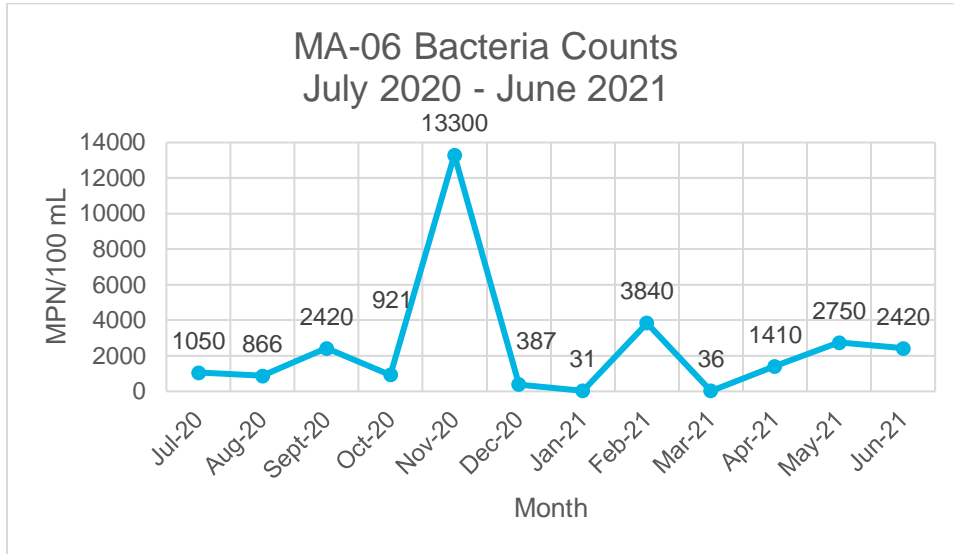
Figure 4-14: MA-06 Bacteria Trend

5. Data Correlation and Statistical Analysis

5.1 Data Correlation

As discussed, reporting for bacteria counts over 2,420 MPN/100 mL changed in November 2020 for Furnace Creek and October 2020 for Marley Creek, meaning that samples with counts above this value prior to these dates appear artificially low in the statistical analysis. Regardless, the data analysis was carried out using the reported values for bacteria count from each month.

The tidal sites (FU-06 and MA-06) generally experienced heightened levels of enterococci concurrently with other upstream monitoring sites. However, bacteria counts in May and June were significantly elevated for MA-02 and MA-03, while they were only slightly elevated for MA-06. As a part of this project, County-wide sanitary sewer overflows and force main break data for FY 2021 was obtained from the County to identify any correlation between sewer overflows in the drainage areas to the monitoring stations with elevated bacteria concentrations. Any sewer overflows would likely result in elevated enterococci counts at downstream monitoring stations except for tidal areas where sewer contamination can travel upstream via tidal flows. No overflows were reported at any of the pump stations in the watersheds.

Marley Creek stations experienced highly elevated levels of enterococci starting in July for stations MA-02 and MA-05. By September, all samples from all stations registered enterococci counts of 2,420 MPN/100 mL or greater. These elevated levels continued through most of the sampling period, spiking particularly during the November AECOM sampling event, which occurred during a high flow event, and dropping to low-normal levels in January and March. MA-06 is a tidal site and the most downstream site, and it is not unexpected for it to have elevated levels when other stations experience elevated levels.

Stations MA-02 and MA-03 are located further upstream in the watershed than half of the monitoring locations. These locations are located more than 3,000 feet from the nearest pump station (Marley Pump Station). They are the only two monitoring points fed directly by tributaries around the Marley Station Mall and surrounding neighborhoods. There are several conditions present in the drainage areas for these monitoring stations that could potentially be related to the elevated bacteria results:

- Neighborhoods in the upper reaches of the drainage areas for MA-02 and MA-03 are primarily connected to septic systems. Failing septic systems and their associated drain fields have been identified as one of the sources of bacteria in the watersheds by MDE (MDE 2010b).
- As shown on Figure 2-4, there is a sewer line running south to north that crosses in proximity to MA-02 and MA-03; AECOM field teams noticed raised sewer manholes near both sampling locations.
- Pet waste may be a factor influencing the elevated enterococci levels because the drainage areas to these monitoring locations are primarily residential.

Furnace Creek generally had heightened levels of enterococci in July, August, and June. Two outlier enterococci counts of 980 and 548 occurred during the months of October and November at monitoring station FU-06 while other stations experienced significantly lower bacteria counts. Many residential areas in Furnace Creek are connected to septic systems and as discussed above, failing septic systems and their associated drain fields could be a potential cause for elevated enterococci concentrations. The highest enterococci counts at monitoring location FU-06 were observed during October and June. This tidal area of the stream likely experiences recreational boating use, which would be expected to be highest in the summer months. Raw and poorly managed sewage from boats contain bacteria and could be one of the contributors of elevated bacteria concentrations in tidal areas.

5.2 Statistical Analysis

Temperature, dissolved oxygen, specific conductivity, turbidity, and pH data were collected at each monitoring location during bacteria sampling, and a Pearson Correlation Coefficient (r) was estimated for a combination of enterococci counts with each parameter. A correlation coefficient was also estimated for the combination of enterococci counts with air temperature, USGS gage flow, and tide levels. In general, correlation coefficients range between "-1" and "+1," with "-1" indicating strong negative correlation and "+1" indicating strong positive correlation. A value for "r" close to "0" indicates no correlation. **Figure 5-1** shows the correlation coefficient heat map developed for the parameters and the enterococci counts.

	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (mS/cm)	Turbidity (NTU)	pH	Enterococci (MPN/100 mL)	Air Temperature (°F)	USGS Gage Flow (cfs)	Tide Level (ft)	Precipitation (in)
Temperature (°C)	1.000									
Dissolved Oxygen (mg/L)	-0.639	1.000								
Specific Conductivity (mS/cm)	0.146	-0.455	1.000							
Turbidity (NTU)	0.001	0.218	-0.014	1.000						
pH	-0.033	0.150	-0.045	0.056	1.000					
Enterococci (MPN/100 mL)	0.173	0.067	-0.059	0.512	0.248	1.000				
Air Temperature (°F)	0.903	-0.496	-0.027	-0.060	-0.082	0.147	1.000			
USGS Gage Flow (cfs)	-0.083	0.460	-0.088	0.772	0.238	0.684	-0.127	1.000		
Tide Level (ft)	0.329	-0.305	0.197	0.070	-0.030	-0.010	0.262	-0.037	1.000	
Precipitation (in)	0.465	-0.194	0.030	0.326	0.061	0.223	0.308	0.308	0.074	1.000

Figure 5-1: Correlation Map for Enterococci Count vs. Sample Parameters

The bolded blue row and column in this map show the correlation coefficient (r) for each of the sampling parameters against the enterococci count. Based on the data shown in **Figure 5-1**, none of the parameters stand out as having a strong correlation, though USGS gage flow rate and turbidity appears to have moderate positive correlation to enterococci count, with an "r" value of approximately 0.68 and 0.51 respectively.

Each sampling parameter along with air temperature, USGS gage flow rate, and tide levels were also plotted against enterococci count individually to determine a graphical relationship with the parameters. A coefficient of determination (R^2) value was also calculated to determine the strength of the relationship.

Due to the change in bacteria count reporting starting in October for Marley Creek and November for Furnace Creek, the data was also analyzed as two separate sets with Furnace Creek data from June 2020 – October 2020 and Marley Creek data from June 2020 – September 2020 in one set and Furnace Creek data from November 2020 – June 2021 and Marley Creek data from October 2020 – June 2021 in the other set. The R^2 values calculated for the split datasets are discussed in comparison to each other and the full dataset in the sections following.

Given the dataset includes only one year of sampling data with 144 sampling events in addition to four sampling events conducted by the County, it is a comparatively small dataset to identify the strength of parameters as predictors for enterococci count. With more sampling, it is possible that trends will emerge as the sample size increases.

Sample Temperature

The sample temperature from July 2020 to June 2021 ranged between 4.1°C and 25.5°C. No apparent trend appears as temperature changes, shown by the high enterococci counts at temperatures as low as 4.2°C and as high as 24°C. An exponential function fit to this dataset produced the highest R^2 value at 0.32, indicating a weak relationship between the two variables. **Figure 5-2** shows a scatter plot of sample temperature and Enterococci counts.
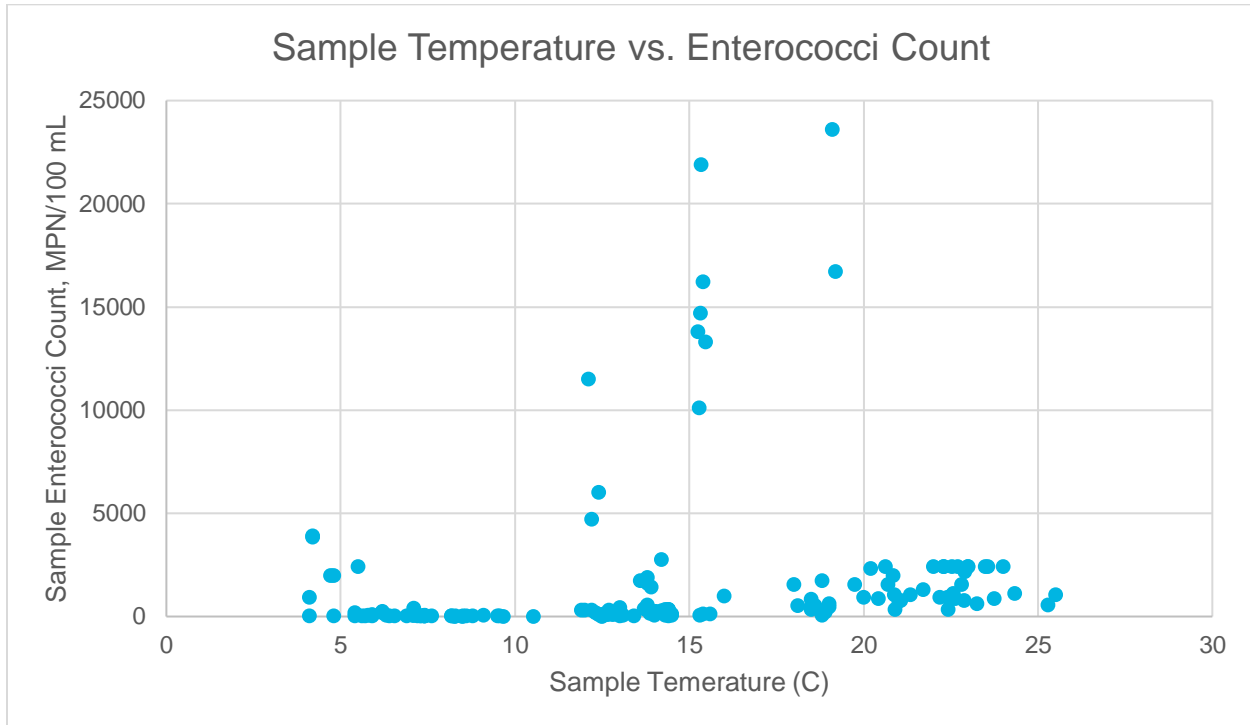
Figure 5-2: Plot of Sample Temperature vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.5 (power) and 0.25 (exponential), respectively. These values are not dramatically different from the R^2 value for the whole dataset, though the pre-reporting change set exhibits the strongest correlation.

Dissolved Oxygen

Dissolved oxygen (DO) generally ranged between 0.7 and 14.4 mg/L. A polynomial function fit to these data produced the highest R^2 value of 0.17, which does not indicate a strong correlation between this parameter and enterococci count. **Figure 5-3** shows a plot of DO vs. enterococci counts. When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.21 (polynomial) and 0.22 (polynomial), respectively. These R^2 values are slightly higher than the R^2 value for the entire dataset.
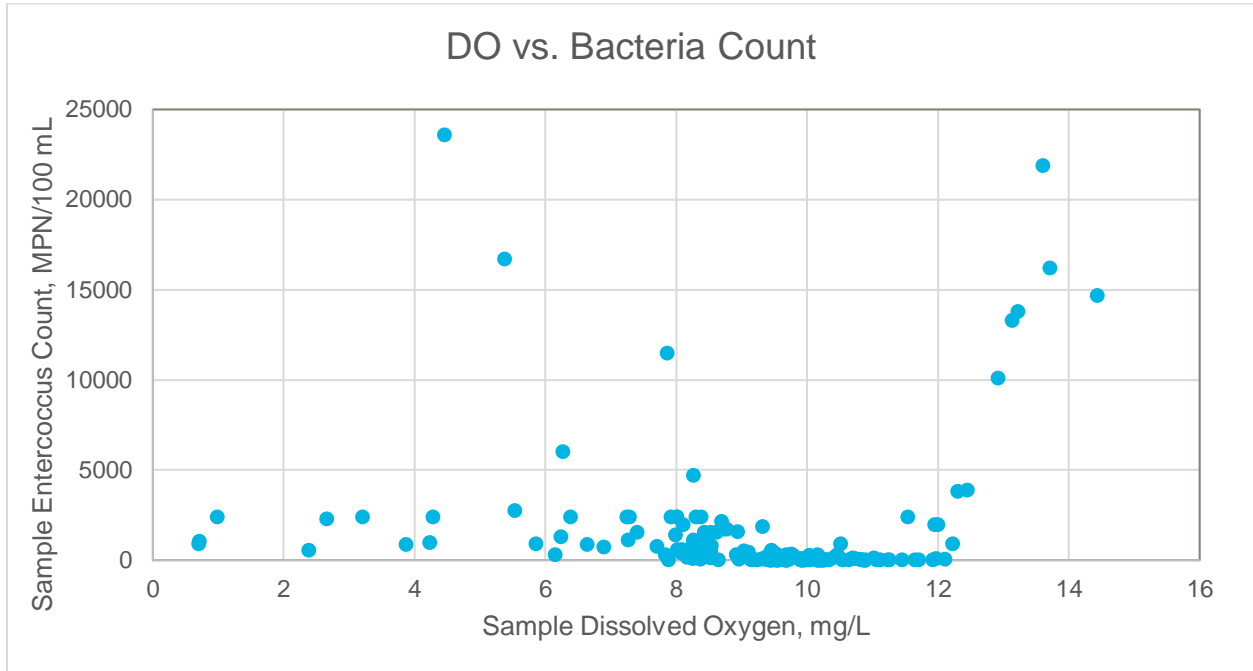
Figure 5-3: Plot of Sample DO vs. Bacteria Count

Specific Conductivity

Most samples collected between July 2020 and June 2021 had specific conductivities between 0.1 and 6.7 mS/cm, with some readings as high as 20.21 mS/cm. Though quite a few readings were statistically considered outliers, eliminating these values did not significantly strengthen the correlation between specific conductivity and bacteria counts. These data best fit a logarithmic function, producing an R^2 value of 0.07. This extremely low value indicates that specific conductivity is not a strong predictor for enterococci count. Samples with both high and low values of specific conductivity had high counts of bacteria. **Figure 5-4** shows a plot of these data.
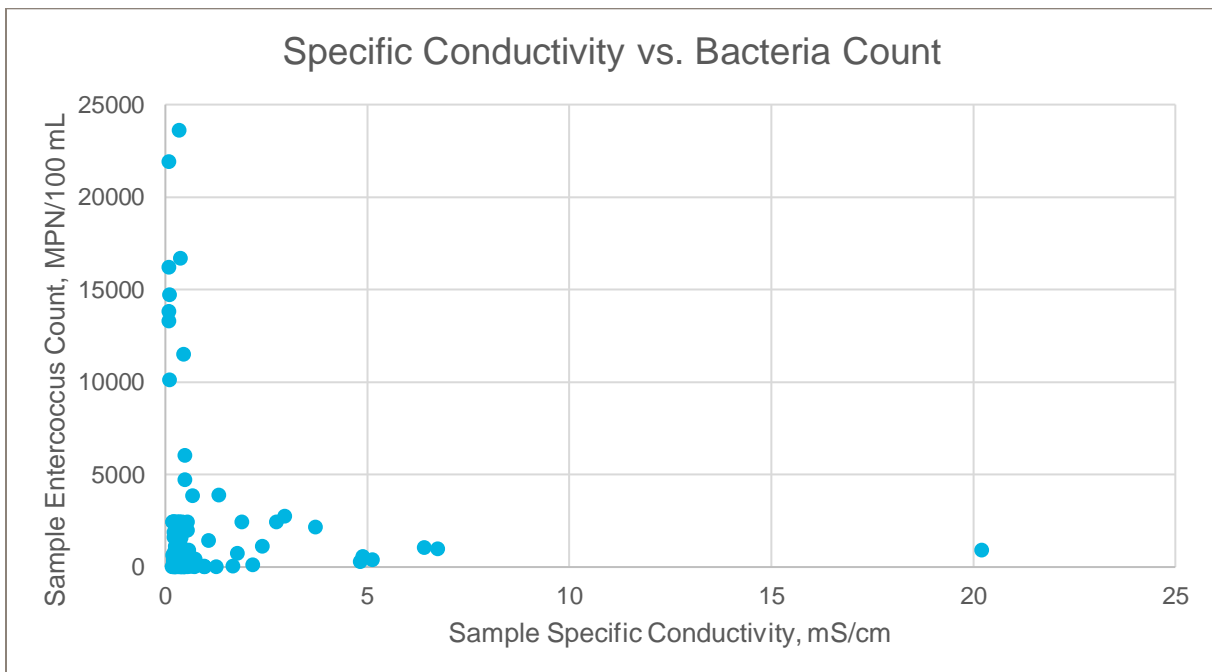
Figure 5-4: Plot of Sample Specific Conductivity vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.01 (power) and 0.1 (logarithmic), respectively. These R^2 values are similar to the R^2 value for the entire dataset.

Turbidity

Turbidity of samples generally fell between 0.5 and 55 NTU, though turbidity values ranged as high as 95.4 NTU. A polynomial function best fits this dataset with an R^2 value of 0.28, indicating a weak relationship between the two variables. Turbidity was not measured during the County sampling events. **Figure 5-5** shows the plot of this turbidity vs. enterococci counts.
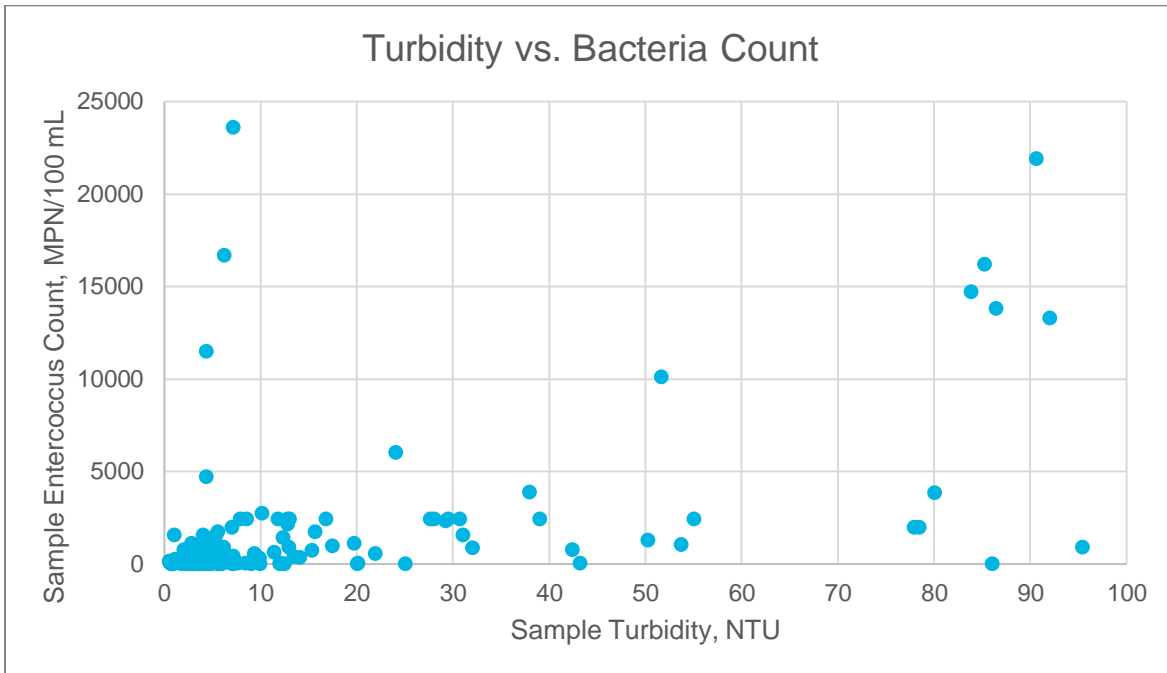
Figure 5-5: Plot of Sample Turbidity vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.35 (power) and 0.29 (polynomial), respectively. These R^2 values are similar to the R^2 value for the entire dataset.

pH

The pH values of samples generally ranged from 5.5 to 8.4, though two pH values measured were around 3.3. A polynomial function best fit these data with an R^2 value of 0.11. No clear trends emerged from these data, shown by the low R^2 and the fact that both samples with lower and higher pH values had high enterococci counts. **Figure 5-6** shows the plot of this dataset.
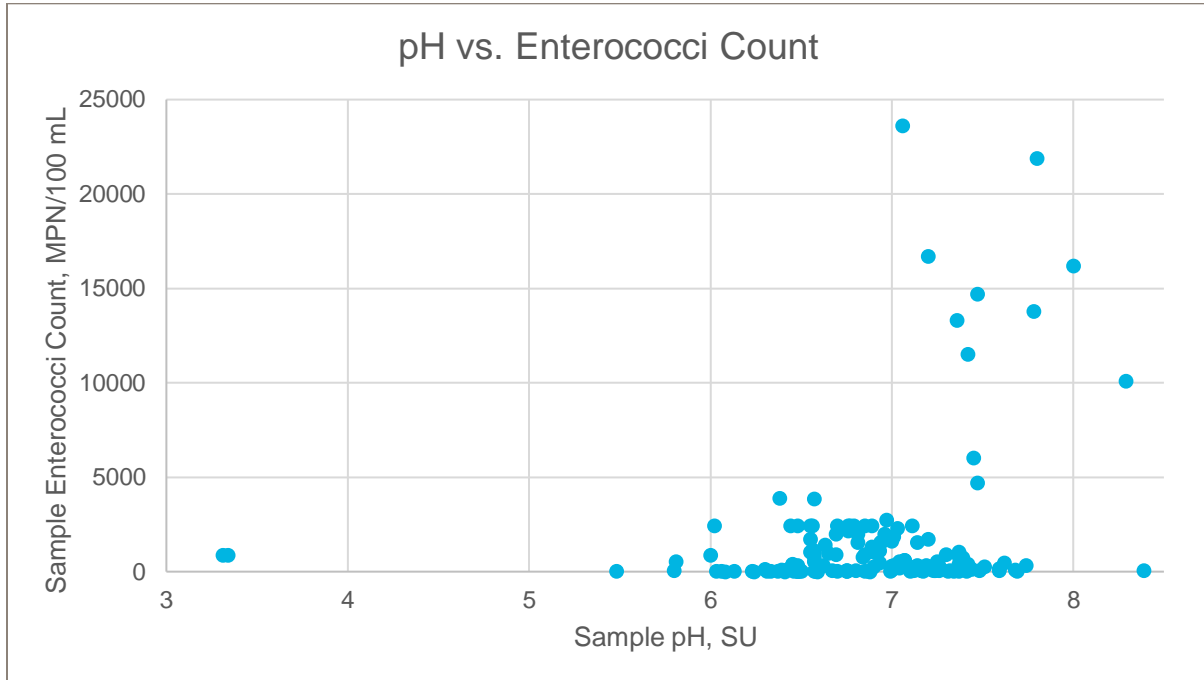
Figure 5-6: Plot of Sample pH vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.24 (polynomial) and 0.15 (polynomial), respectively. These R^2 values are similar to but slightly higher than the R^2 value for the entire dataset.

Air Temperature

The air temperature at the time of sample collection ranged from 28°F to 92°F. Samples with high enterococci counts were found year-round, indicating that this parameter is not strongly correlated with bacteria count. An exponential function best fit this dataset with an R^2 value of 0.23. **Figure 5-7** shows a plot of this dataset.
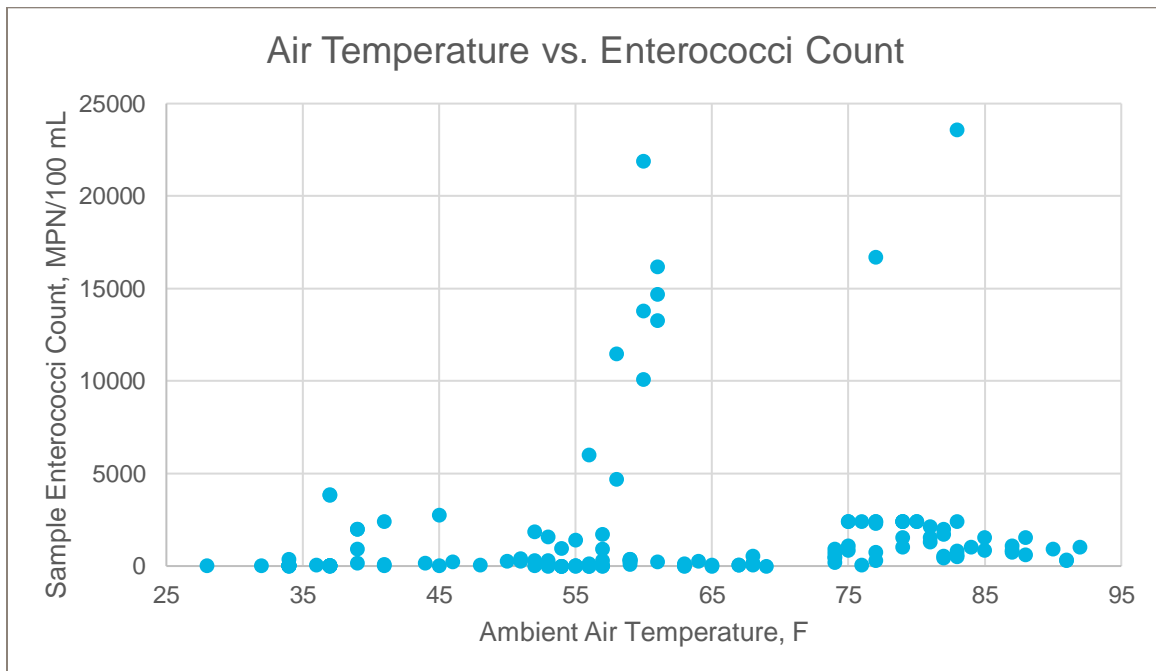
Figure 5-7: Plot of Air Temperature vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.14 (power) and 0.16 (exponential), respectively. These R^2 values are similar to but slightly lower than the R^2 value for the entire dataset.

USGS Gage Flow Rate

The USGS flow gages at each of the 12 sampling locations displayed values between 4.7 and 74 cubic feet per second (cfs), with most values falling between 4.7 and 9.6 cfs. Fit to a polynomial function, this dataset produced an R^2 value of 0.51, which indicates a moderate positive correlation between flow rate and enterococci count in the sample. This parameter appears to have the strongest relation with enterococci among all parameters. **Figure 5-8** shows a plot of these data.
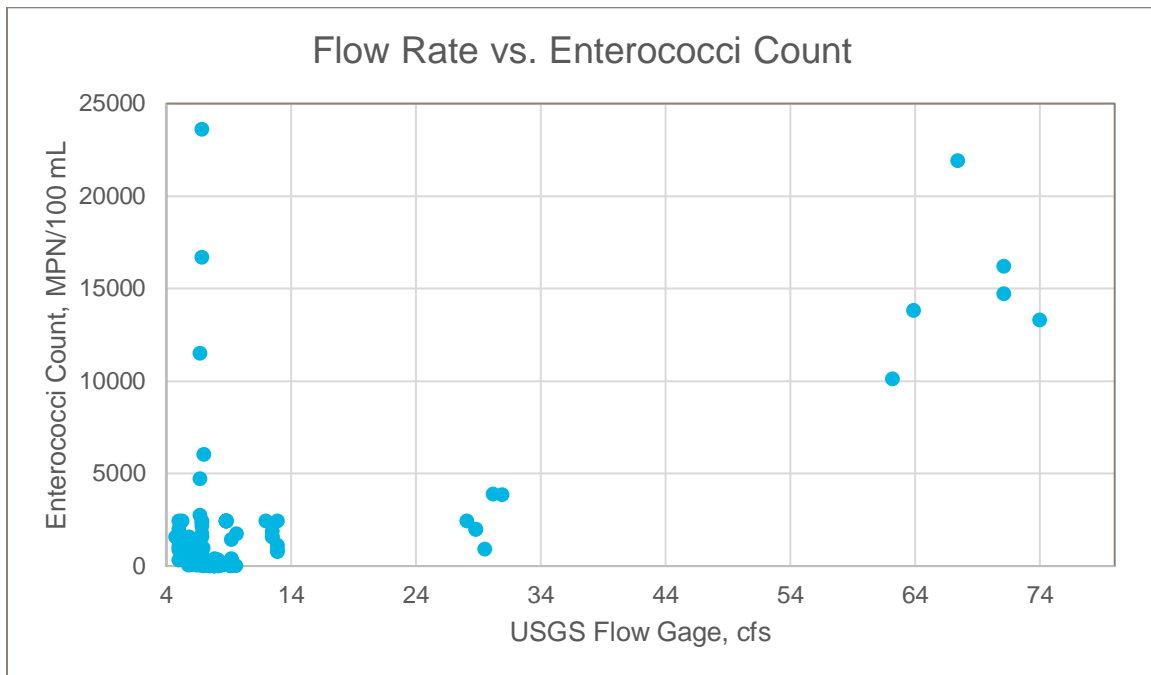
Figure 5-8: Plot of Flow Rate vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.1 (polynomial) and 0.51 (polynomial), respectively. The R^2 value for the entire data set is very similar to the R^2 value after the reporting change.

Tide Level

The tide levels at the time of sampling fell between -0.4 and 9.1 feet, with most sampling events 0.4 feet 3. The most variability in enterococci count appears to be between 0.7 and 1.6 feet of tide. Fitting these data to an exponential function yielded the highest R^2 value of 0.09, which indicates a weak correlation between tide level and enterococci count. **Figure 5-9** shows a plot of these data.
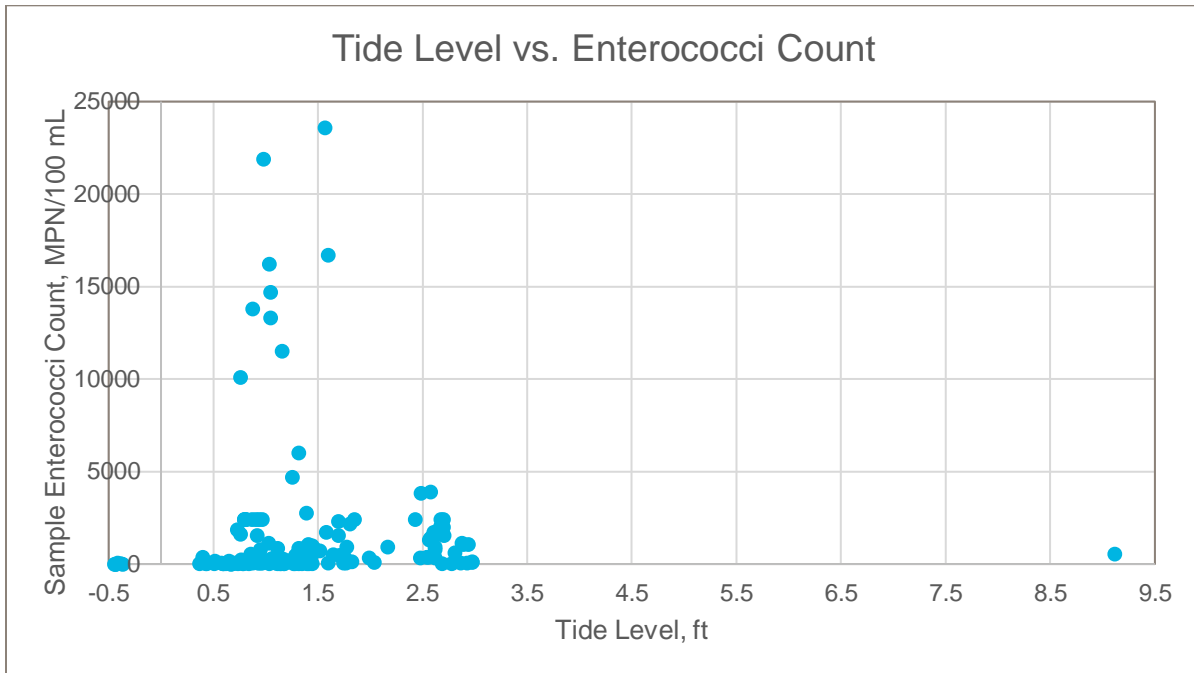
Figure 5-9: Plot of Tide Level vs. Bacteria Count

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.06 (logarithmic) and 0.04 (polynomial), respectively. The R^2 value for the entire data set, thought slightly higher, is very similar to the R^2 values from the split datasets.

Precipitation

Precipitation within 72 hours prior to sampling ranged from 0 inch to 4.1 inches, with most events producing less than 0.21 inch of precipitation. For sampling days with precipitation in the prior 72 hours, the precipitation type was rainfall on all but one day. The sampling event in February 2020 experienced mixed snowfall, which was converted to equivalent snowmelt. Fitting these data to an exponential function yielded the highest R^2 value of 0.14, which indicates a weak correlation between precipitation and enterococci count. **Figure 5-10** shows a plot of these data.

When split, the datasets prior to the change in reporting and after the change in reporting fit R^2 values of 0.08 (polynomial) and 0.24 (polynomial), respectively. The R^2 value for the entire data set falls in between the R^2 values when the dataset is split.
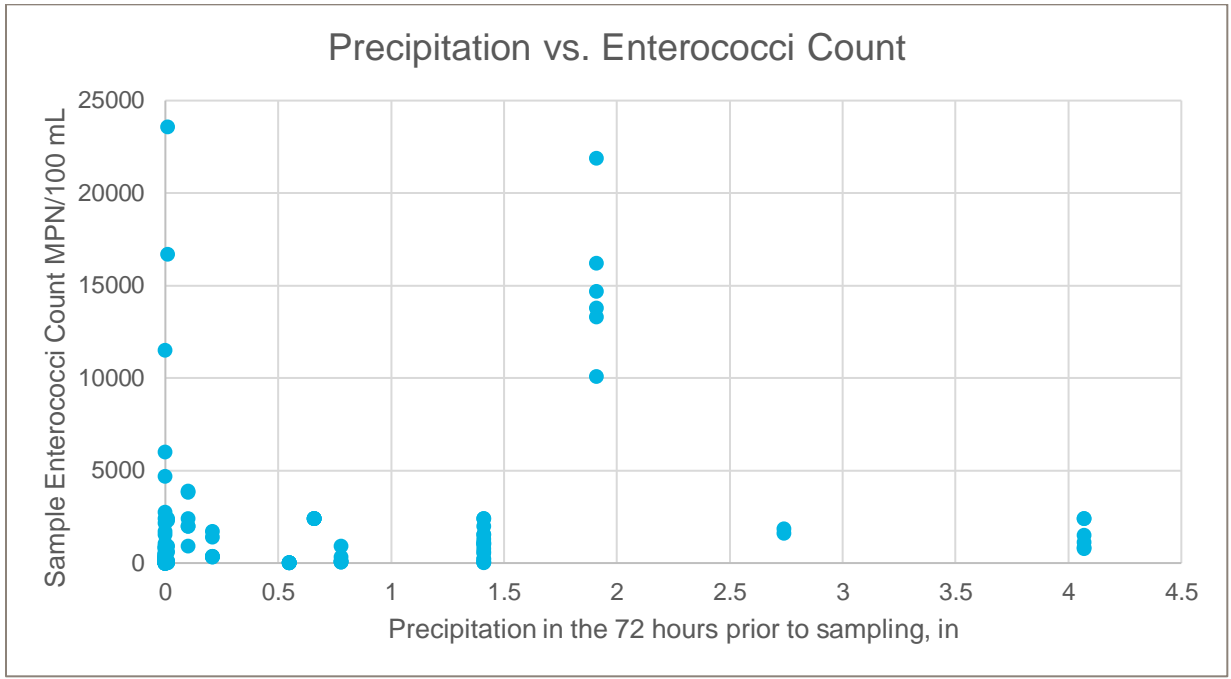
Figure 5-10: Plot of Precipitation vs. Bacteria Count

6. Summary and Conclusions

Because data analyzed is from sampling conducted for only one year, elevated values of the indicator enterococci that were observed may or may not be indicative of impairment in the watershed. It will be necessary to evaluate the results from indicator organisms from multiple sampling events over time to adequately quantify water quality conditions. One year of sampling data will show changes in trends on a monthly scale, but seasonal trends will not be verifiable until more data are collected and data from the three years of sampling planned are combined as one dataset. Still, some trends are apparent after a second year of sampling.

Results of the Year 2 sampling in Furnace Creek have shown a general upward trend in bacteria levels during warmer months, and a downward trend during colder months. Results for Marley Creek have shown somewhat of the same trends for some areas of the watershed, but other areas are exhibiting levels of bacteria that exceed seasonal patterns.

Enterococci count does not appear to be statistically correlated with any of the sampling parameters (sample temperature, dissolved oxygen, specific conductivity, turbidity, pH, air temperature, flow rate, tide level, and precipitation), though the dataset is too small to draw conclusions at this time. USGS flow rate appears to be the parameter with the strongest statistical correlation with enterococci count, though the coefficient of determination is only 0.5, indicating a moderate correlation. Even when the dataset is analyzed in two parts that are split based on the reporting for enterococci counts over 2,420 MPN/100 mL, no clear trends emerge. There is insufficient data at this point to statistically correlate any potential sources of bacteria with the elevated enterococci counts that have been observed. As more sampling occurs and the dataset increases in size, trends may emerge to indicate relationships between sampling parameters and enterococci counts. Any future trends can be used to identify the source of the bacteria impairment and improve the quality of the water in the Furnace Creek and Marley Creek watersheds.

Bacteria counts from samples collected by AECOM in November in Marley Creek were extremely elevated at all sampling locations. Field teams noted that heavy rain had occurred the day before during Marley Creek sampling, and that water levels and turbidity were extremely high. However, bacteria counts from samples collected the next day by the County were significantly lower not elevated above the 2,420 MPN/100 mL level.

7. References

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MDE. 2010a. Maryland's Final 2010 Integrated Report of Surface Water Quality. Maryland Department of the Environment, Environmental Assessment & Standards Program, Water and Science Administration, Baltimore, MD. Approved by EPA March 18, 2011.

MDE. 2010b. Total Maximum Daily Loads of Bacteria for Impaired Recreational Areas in Marley Creek and Furnace Creek of Baltimore Harbor Basin in Anne Arundel County, Maryland. July 2010.

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MDNR. 2010. Total Maximum Daily Loads of Bacteria Impaired Recreational Areas in Marley Creek and Furnace Creek of Baltimore Harbor Basin in Anne Arundel County, Maryland. Approved by EPA March 10, 2011.

Appendix A

Site Maps and Monitoring Station Photographs
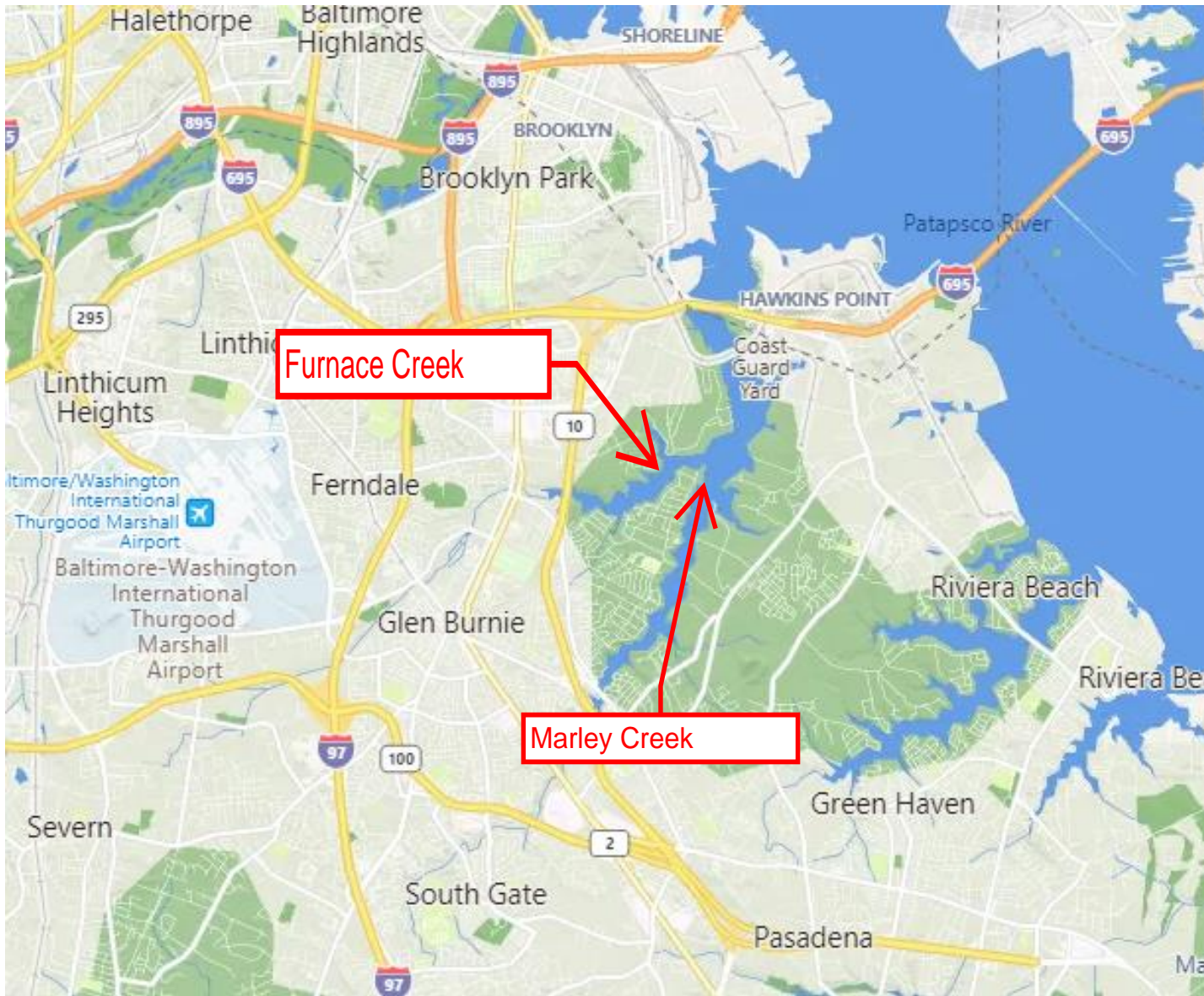
Figure A-1: General Location Map - Marley and Furnace Creeks, Anne Arundel County, Maryland
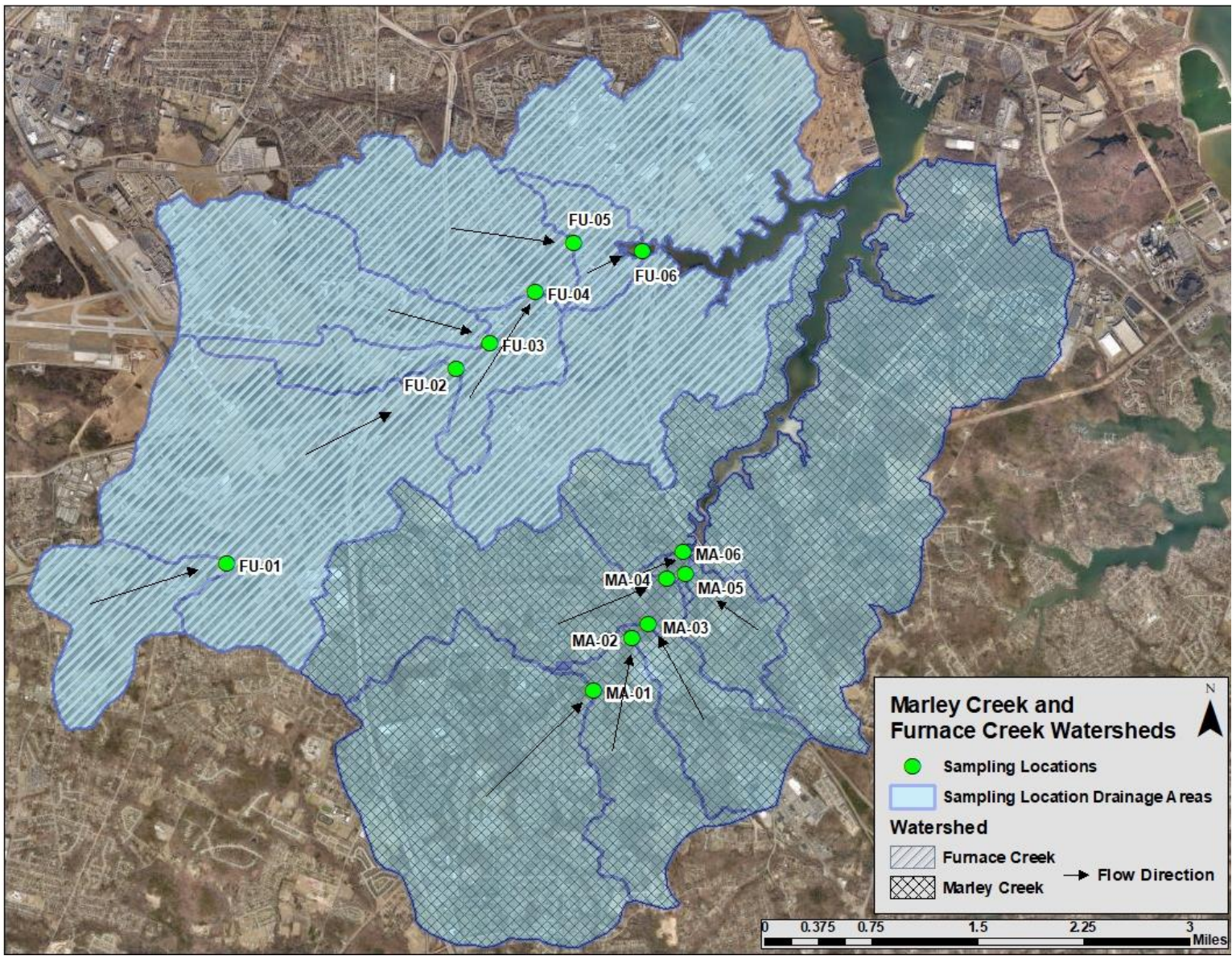
Figure A-2: Marley Creek and Furnace Creek Sampling Location and Watershed Map

Figure A-3: FU-01 Sampling Location

Figure A-4: FU-02 Sampling Location

Figure A-5: FU-03 Sampling Location

Figure A-6: FU-04 Sampling Location

Figure A-7: FU-05 Sampling Location

Figure A-8: FU-06 Sampling Location

Figure A-9: MA-01 Sampling Location

Figure A-10: MA-02 Sampling Location

Figure A-11: MA-03 Sampling Location

Figure A-12: MA-04 Sampling Location

Figure A-13: MA-05 Sampling Location

Figure A-14: MA-06 Sampling Location

Appendix B

Field Data

Sampling Station ID: FU-01   **Date:** 7/8/2020   **Time:** 1140

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 87   °F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.55   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.62 feet   __X__ High _____ Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear water; strong flow; floating organic matter; frogs and birds; no odor.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	21.07	8.24	0.206	2.0	6.57	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20200708   **Time Collected:** 1145 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

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Field Data Sheet

Sampling Station ID: FU-02   **Date:** 7/8/2020   **Time:** 1120

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 88_____ ºF Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____1.41__ inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: _____0.00__ inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____5.84___ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___2.71_ feet   __X__ High ____ Low ___ ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear water; fast flow; no odor._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	19.75	8.53	0.308	1.0	6.81	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20200708   **Time Collected:** 1125 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03　　　　　　　　　　　　　　**Date:** 7/8/2020　　　　**Time:** 1050

Field Personnel: John Pellegrino and Rona Durborow　　　　**GPS Coordinates: 39.17252 (Lat.) -76.62697 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　88　　　°F　Weather: Sunny & hot

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.41　inches　　Type: __X__ Rain　　_____ Snow　　_____ Mix

　　Day of Sampling:　　　　　0.00　inches　　Type: ___ Rain　　_____ Snow　　_____ Mix

Flow Determination:

　　USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　5.84　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　2.81 feet　__X__ High　____ Low　____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear water with fast flow; bird activity; less transient encampment activity than usual; can hear frogs nearby.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	23.25	8.02	0.179	11.4	7.07	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　FU03-20200708　　　　**Time Collected:** 1100 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID __N/A__　　　Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04　　　　　　　　　　　　　　　　**Date:** 7/8/2020　　　　**Time:** 1030

Field Personnel: John Pellegrino and Rona Durborow　　　　**GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　87　　　　ºF　Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.41　inches　　Type: __X__ Rain　　_____ Snow　　_____ Mix

　　Day of Sampling:　　　　　　0.00　inches　　Type: ___ Rain　　_____ Snow　　_____ Mix

Flow Determination:

　　USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　5.84　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　2.88 feet　　__X__ High　____ Low　___ Ebb

　　(Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear water; fast flow; no odor; dragonflies present. A lot of trash in the woods nearby.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	22.57	8.26	0.251	2.8	6.93	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　FU04-20200708　　　　**Time Collected:** 1040 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___Yes___ Sample ID _FUDUP-20200708_　　　Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05   **Date:** 7/8/2020   **Time:** 0930

Field Personnel: John Pellegrino and Rona Durborow   GPS Coordinates: **39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 84   ºF   Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: __X__ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.14   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.94 feet   __X__ High   ____ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water; trash along shore; bird activity.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	21.33	8.33	0.254	4.6	6.90	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU05-20200708**   **Time Collected:** 0940 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _Yes_____   Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06　　　　　　　　　　　　　　　　　**Date:** 7/8/2020　　　　**Time:** 0900

Field Personnel: John Pellegrino and Rona Durborow　　　　　**GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　82　　　ºF　Weather: Sunny with clear skies

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.41　inches　　　Type: _X_ Rain　_____ Snow　_____ Mix

　　Day of Sampling:　　　　　　0.00　inches　　　Type: ___ Rain　_____ Snow　_____ Mix

Flow Determination:

　　USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　6.14　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　9.12 feet　　_X_ High　____ Low　____ Ebb

　　(Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Transient encampment not observed this time, but area very overgrown. Less trash than usual on bank; water is high. A lot of bird activity and

floating organic matter; no odor; murky water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/8/2020 0854	25.28	2.38	4.884	21.9	6.57	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20200708　　　　**Time Collected:** 0915 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____　　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01　　　　　　　　　　　　　　　　**Date:** 7/9/2020　　　**Time:** 1100

Field Personnel: John Pellegrino and Rona Durborow　　　　　**GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　85　　　°F　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.41　inches　　Type: _X_ Rain　_____ Snow　_____ Mix

　　Day of Sampling:　　　　　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

Flow Determination:

　　USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　4.74　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　2.62 feet　_X_ High　____ Low　____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water; tires in water; birds in area (a lot of them).

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	20.69	8.43	0.362	4.0	6.94	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20200709　　　　**Time Collected:** 1120 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: MA-02   **Date:** 7/9/2020   **Time:** 1020

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 83   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.01   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.7 feet   _X_ High _____ Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fecal odor, cloudy water, moderate flow. Birds and frogs in the area.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	20.62	7.92	0.344	8.5	6.89	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20200709   **Time Collected:** 1030 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 7/9/2020   **Time:** 1005

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 82   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.01   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.7 feet   _X_ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water slightly cloudy and slow moving; birds in the area.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	20.85	8.11	0.373	7.0	6.96	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20200709   **Time Collected:** 1015 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) __No__ Sample ID N/A   Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 7/9/2020   **Time:** 0920

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 81   ºF   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.27   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.57 feet   __X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is deep, murky, and slow moving; birds in the area.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	21.71	6.24	0.352	50.2	6.89	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20200709   **Time Collected:** 0928 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-05   **Date:** 7/9/2020   **Time:** 9:00

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.14881 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 80   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41   inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00   inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.27   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 2.43 feet   _X_ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is low, cloudy, and slow moving; organic matter and trash in stream bed.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	23.49	6.38	0.362	11.8	7.11	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA05-20200709   **Time Collected:** 0910 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 7/9/2020   **Time:** 0840

Field Personnel: John Pellegrino and Rona Durborow   **GPS Coordinates: 39.14881 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 79   ℉ Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.27   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.89 feet   _X_ High _____ Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fecal odor; water is murky and slow moving; bird activity in the area.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #12014	7/9/2020 0836	25.50	0.71	6.413	53.7	6.55	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20200709   **Time Collected:** 0850 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A___   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

7/8/2020, Wednesday
John + Rona

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
0835		4	DGA042	3.44	3.98		1201	4.03
0840		7	DGA693	7.25	6.99		1200	7.06
0845		10	9GL648	10.17	10.03		1159	10.04

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
0847		1.413	9GL177	1.394	1.414		1203	1.375

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
0850		0	19130178	4.8	0.0		1204	-0.2
0854		126	20B2005	143.9	126.0		1205	122.1
				0054				

Model: _____

Rental ID: _____

Calibration Location: parking lot of FU-06

End of day bump test performed at FU-01 parking spot

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: Calibrated turbidity in the Seen

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

7/9/2020 Thursday
John + Rora

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
				3.88	4.00			
0825 ~~0820~~		4		~~7.12~~	~~7.00~~		1138	4.05
0828 ~~0823~~		7	Same as yesterday	6.96	7.00		1137	7.05
0830		10		10.08	10.01		1135	10.00

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
0832		1.413	Same as yesterday	1.381	1.413		1139	1.412

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
0835		0	Same as yesterday	-1.1	0.0		1141	1.3
0836		126		124.2	126.0		1142	122.4

Model: YSI 650 MDS + YSI 6920 V2   Calibration Location: MAO6 parking area
Rental ID: AO3722 + 12014

Bump test performed at MAO1 parking area

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: YSI froze - had to redo pH 4 calibration.

Sampling Station ID: **FU-01**   Date: 8/12/2020   Time: ___1330___

Field Personnel: **Rona Durborow and Grace Dai**   GPS Coordinates: **39.15013**   (Lat.) **-76.66172**   (Long.)

Weather Conditions:

Ambient Air Temperature: 91   °F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00   inches   Type: _x_ Rain _____ Snow _____ Mix

Day of Sampling: 3.51   inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 5.01   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 1.42 feet   ____ High ____ Low _x_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear, flow is moderate, no odor, no bird or insect activity observed, cattails observed along stream.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1204	22.42	7.83	0.202	4.1	7.14	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU01-20200812**   Time Collected: 1335 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: __FU-02__   Date: 8/12/2020   Time: __1300__

Field Personnel: __Rona Durborow and Grace Dai__   GPS Coordinates: __39.16994__ (Lat.) __-76.63152__ (Long.)

Weather Conditions:

     Ambient Air Temperature: __92__   °F   Weather: __Sunny__

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

     Past 72 hours prior to sampling: 0.00   inches   Type: _x_ Rain _____ Snow _____ Mix

     Day of Sampling: __3.51__   inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

     USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): __5.01__   cfs

     Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __1.41__ feet   ____ High ____ Low _X_ Ebb

     [Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear, flow is moderate, no odor, no bird or insect activity observed, aquatic grass observed in stream bed.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1204	20.88	8.48	0.291	5.3	7.37	N/A
pm							

BACTERIA SAMPLE COLLECTION

Sample ID: __FU02-20200812__   Time Collected: __1312 / 0.3 meters__

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_   Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: **FU-03**

Date: 8/12/2020   Time: 1235

Field Personnel: **Rona Durborow and Grace Dai**

GPS Coordinates: **39.17252** (Lat.) **-76.62697** (Long.)

Weather Conditions:

Ambient Air Temperature: 91 °F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: _x_ Rain _____ Snow _____ Mix

Day of Sampling: 3.51 inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 5.27 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 1.4 feet _____ High _____ Low _x_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear, flow is moderate, no odor, some trash observed along the shoreline, no bird or insect activity observed.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1204	20.90	8.48	0.406	4.4	7.74	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU03-20200812**   Time Collected: 1250 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: __**FU-04**__   Date: __8/12/2020__   Time: ___1213___

Field Personnel: __**Rona Durborow and Grace Dai**__   GPS Coordinates: **39.17770**   (Lat.) __**-76.62106**__   (Long.)

Weather Conditions:

     Ambient Air Temperature: ___90___ ºF Weather: _Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

     Past 72 hours prior to sampling: _0.00___ inches   Type: _x_ Rain _____ Snow _____ Mix

     Day of Sampling: ___3.51___ inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

     USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): __5.27___ cfs

     Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): _1.4___ feet   ____ High ____ Low _X_ Ebb

     Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear, flow is moderate, usual amount of trash along the shoreline, no odor observed, no bird or insect activity observed.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1204	22.18	10.51	0.362	4.0	7.30	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __**FU04-20200812**__   Time Collected: _1225 / 0.2 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _No_____ Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: **FU-05**   Date: 8/12/2020   Time: 1135

Field Personnel: **Rona Durborow and Grace Dai**   GPS Coordinates: **39.18275**   (Lat.) **-76.61593**   (Long.)

Weather Conditions:

Ambient Air Temperature: 87   °F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00   inches   Type: _x_ Rain _____ Snow _____ Mix

Day of Sampling: 3.51   inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   5.27   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 1.37   feet   ____ High ____ Low _x_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Less trash along the shore than is usual, water appears relatively clear, moderate flow, a lot of mosquito activity, no odor, less bird activity than is usual.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1013	20.42	8.41	0.332	3.0	3.34	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU05-20200812**   Time Collected: 1140 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: ____**FU-06**____   Date: _8/12/2020_   Time: ___1100___

Field Personnel: **Rona Durborow and Grace Dai** _____ GPS Coordinates: **39.18181** _____ (Lat.) **-76.60700** _____ (Long.)

Weather Conditions:

     Ambient Air Temperature: ___85_____ °F   Weather: _Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

     Past 72 hours prior to sampling: _0.00_____ inches   Type: __x__ Rain   _____ Snow   _____ Mix

     Day of Sampling: _3.51_____ inches   Type: __x__ Rain   _____ Snow   _____ Mix

Flow Determination:

     USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _5.01_____ cfs

     Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): _1.32_ feet   ____ High ____ Low __x__ Ebb

     [Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Trash observed along shoreline, homeless encampment is not present, no odor, water appears murky, flow is slow, no bird or insect activity observed. _____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/12/2020 1013	22.64	3.87	0.517	2.6	3.31	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU06-20200812**_____   Time Collected: _1120 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _No_____   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: __**MA-01**__   Date: __8/14/2020__   Time: __1104__

Field Personnel: __**Agrima Poudel and Rona Durborow**__   GPS Coordinates: __**39.13693**__ (Lat.) __**-76.61356**__ (Long.)

Weather Conditions:

  Ambient Air Temperature: __79__ °F Weather: __Mostly cloudy__

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

  Past 72 hours prior to sampling: __4.07__ inches   Type: _x_ Rain ____ Snow ____ Mix

  Day of Sampling: __0.49__ inches   Type: _x_ Rain ____ Snow ____ Mix

Flow Determination:

  USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): __12.0__ cfs

  Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __0.94__ feet ____ High ____ Low _x_ Ebb

  [Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

 Water is murky and fast moving, trash in water (tire), area is highly overgrown.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	22.54	7.28	0.418	16.8	6.55	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __**MA01-20200814**__   Time Collected: __1117 / 0.3 meters__

QA/QC samples: Duplicate Sample (Yes/No) __No__ Sample ID __N/A__   Field Blank (Yes/No) __No__

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: **MA-02**   Date: 8/14/2020   Time: 1027

Field Personnel: **Agrima Poudel and Rona Durborow**   GPS Coordinates: **39.14233**   (Lat.) **-76.60846**   (Long.)

Weather Conditions:

Ambient Air Temperature: 79   ºF Weather: Mostly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 4.07   inches   Type: _x__ Rain _____ Snow _____ Mix

Day of Sampling: 0.49   inches   Type: _x__ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   12.5   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 0.92   feet   ____ High ____ Low _x_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

 Water is slow flowing and murky.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	22.80	7.40	0.382	31.0	6.94	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA02-20200814**   Time Collected: 1038 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: **MA-03**   Date: 8/14/2020   Time: 1010

Field Personnel: **Agrima Poudel and Rona Durborow**   GPS Coordinates: **39.14378**   (Lat.) **-76.60640**   (Long.)

Weather Conditions:

    Ambient Air Temperature: 77   °F Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: 4.07   inches   Type: _x_ Rain _____ Snow _____ Mix

    Day of Sampling: 0.49   inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   12.9   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 0.95   feet   ____ High ____ Low _x_ Ebb

    [Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water appears murky and slow moving, area is highly vegetated.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	22.88	7.70	0.412	42.4	6.84	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA03-20200814**   Time Collected: 1017 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No_____ Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: __MA-04__   Date: __8/14/2020__ Time: __0943__

Field Personnel: __Agrima Poudel and Rona Durborow__   GPS Coordinates: __39.14841__ (Lat.) __-76.60388__ (Long.)

Weather Conditions:

Ambient Air Temperature: __77__ °F Weather: __Cloudy__

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: __4.07__ inches   Type: _x_ Rain _____ Snow _____ Mix

Day of Sampling: __0.49__ inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): __12.9__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __0.97__ feet   ____ High ____ Low _x_ Ebb

[Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is slow flowing, no odor, stream bed is sandy, water appears copper in color.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	23.56	3.20	0.298	27.6	6.85	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __MA04-20200814__   Time Collected: __0958 / 0.3 meters__

QA/QC samples: Duplicate Sample (Yes/No) __No__   Sample ID __N/A__   Field Blank (Yes/No) __No__

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: __MA-05__   Date: __8/14/2020__ Time: __0925__

Field Personnel: __Agrima Poudel and Rona Durborow__   GPS Coordinates: __39.148820__ (Lat.) __-76.601430__ (Long.)

Weather Conditions:

    Ambient Air Temperature: __75__ °F Weather: _Cloudy_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: 4.07   inches   Type: _x_ Rain _____ Snow _____ Mix

    Day of Sampling: 0.49   inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): __12.9__   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): _1.03__ feet   ____ High ____ Low _x_ Ebb

    [Low Flow (Baseflow) Sample] / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

 Water appears copper in color and higher water level than usual, flow appears slow.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	24.33	7.26	2.40	19.7	6.57	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __MA05-20200814__   Time Collected: _0938 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _Yes___ Sample ID _MADP-20200814 9:36 am_ Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: **MA-06**   Date: 8/14/2020   Time: 0905

Field Personnel: **Agrima Poudel and Rona Durborow**   GPS Coordinates: **39.151160** (Lat.) **-76.601720** (Long.)

Weather Conditions:

Ambient Air Temperature: 75 °F   Weather: Cloudy with some showers

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 4.07 inches   Type: _x_ Rain _____ Snow _____ Mix

Day of Sampling: 0.49 inches   Type: _x_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gauge Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 12.9 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 1.12 feet _____ High _____ Low _x_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Extremely overgrown vegetation, water appears murky, flow is fast, cattails along stream, bird activity in the area.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #5703	8/14/2020 0837	23.74	6.64	0.348	32.0	6.00	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA06-20200814**   Time Collected: 0916 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

Rosa Durborow + Grace Dai
8/12/2020, Wednesday

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result	
0945	~~GRADN~~	4	0GR042	3.96	4.00		1150	1.44	*first* ⎰ Mid-day
0950	~~GRADN~~	7	0GA693	6.74	7.01		1151	4.16	
0955	~~GRADN~~	10	9GL698	10.52	10.08		1153	7.37	
~~XXXX~~									
1157		4	↑ Same	1.44	3.99		1342	4.16	*second* ⎰ end of day
1201		7	↑ Same	6.71	7.01		1345	6.85	
1204		10	↑ Same	10.49	10.09		1347	10.04	

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
~~XXXX~~		~~XXX~~	~~XXX~~	~~XXX~~				~~XXX~~
			~~XXX~~	~~XXX~~				~~XXX~~
1017		1.413	9GL177	1.788	1.551		1349	1.324

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
1009		0	19S30173	-0.7	0.0		1350	-1.4
1013		126	20B2005 0054	140.7	125.9		1352	110.5

Model: **450 MDS**

Rental ID: **5703**

Calibration Location: Walmart Parking Lot

End of day bump test performed at FU-01 parking location

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: pH bump test following FU-05 - readings at first two sites very low (performed bump test at FU-05 parking area) Recalibrated pH as a result of low bump test readings (FU-04 + FU-05 only impacted)

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

A. Pamalal + R. Durbarow
8/14/2020 Friday

				pH Standard			Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
8/14								
8:07	Rona Durborow	4	06A042	4.02	3.99		1128	4.32
8:10	Rona Durborow	7	06A693	6.82	7.00		1130	6.83
8:14	Rona Durborow	10	962648	10.50	10.07		1132	9.96

				Conductivity			Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
8/14								
8:24	Rona Durborow	1.413	962177	~~1.414~~	1.413		1134	1.493
				↑1.388				

				Turbidity			Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
8/14								
8:29	Rona Durbrow	0	1938013	0.1	0.0		1137	0.1
8:37	Rona Durborow	126	2082008 0056	119	126.0		1138	114.6

Model: 650 MDS

Rental ID: 5703

Calibration Location: Walmart parking lot

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: Cloudy conditions during ~~pmce~~ calibration.
specific conductivity says "Out of range" during calibration

Bump test performed at HA-01 parking area

Sampling Station ID: <u>FU-01</u>   Date: <u>9/9/2020</u>   Time: <u>1130</u>

Field Personnel: <u>John Pellegrino</u>   GPS Coordinates: <u>39.15013</u> (Lat.) <u>-76.66172</u> (Long.)

Weather Conditions:

    Ambient Air Temperature: <u>76</u> °F Weather: <u>Light drizzle/overcast</u>

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: <u>0.00</u> inches   Type: __ Rain _____ Snow _____ Mix

    Day of Sampling: <u>0.03</u> inches   Type: _X_ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   <u>6.44</u>   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   <u>1.77</u> feet   __X__ High ____ Low ___ Ebb

    (Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

<u>Clear and fast moving. Wetland. Overgrown vegetation. Fallen trees upstream are altering stream height/causing stream rise.</u>

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0924	18.8	8.37	0.202	2.15	6.8	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: <u>FU01-20200909</u>   Time Collected: <u>1135 / 0.3 meters</u>

QA/QC samples: Duplicate Sample (Yes/No) <u>No</u> Sample ID <u>N/A</u>   Field Blank (Yes/No) <u>No</u>

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-02   Date: 9/9/2020   Time: 1100

Field Personnel: John Pellegrino   GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)

Weather Conditions:

    Ambient Air Temperature: 77   ºF   Weather: Overcast, rain soon (light mist)

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

    Day of Sampling: 0.03 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.44   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.76 feet   __X__ High ____ Low __ _ Ebb

    (Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. No odor. Fish present. Neighboring activities upstream: tree removal, construction.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0924	18.5	8.92	0.295	2.44	7.19	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20200909   Time Collected: 1112 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: <u>FU-03</u>   Date: <u>9/9/2020</u>   Time: <u>1040</u>

Field Personnel: <u>John Pellegrino</u>   GPS Coordinates: <u>39.17252</u> (Lat.) <u>-76.62697</u> (Long.)

Weather Conditions:

    Ambient Air Temperature: <u>74</u>   °F   Weather: <u>Overcast</u>

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling:<u>   0.00</u> inches   Type: __ Rain   _____ Snow   _____ Mix

    Day of Sampling: <u>0.03</u> inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   <u>6.44</u>   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   <u>1.75</u> feet   __X__ High ____ Low ____ Ebb

    (Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

<u>Transient encampments along stream. Adjacent "flea market" smells like feces/manure.</u>

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FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0924	18.9	9.12	0.421	9.48	7.10	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: <u>FU03-20200909</u>   Time Collected: <u>1044 / 0.3 meters</u>

QA/QC samples: Duplicate Sample (Yes/No) <u>___No___</u> Sample ID <u>__N/A_____</u>   Field Blank (Yes/No) <u>___No_____</u>

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   Date: 9/9/2020   Time: 1018

Field Personnel: John Pellegrino   GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)

Weather Conditions:

    Ambient Air Temperature: 74   ºF   Weather: Overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling:_____0.00_ inches   Type: __ Rain   _____ Snow   _____ Mix

    Day of Sampling: 0.03 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.44   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.71 feet   __X__ High ____ Low __ __ Ebb

    Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving, smells like sewage and death. Spiders in the sampling area. Debris and trash is in swale and riparian buffer zone.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0924	19.0	9.10	0.353	6.46	7.62	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20200909   Time Collected: 1023 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___Yes___ Sample ID _N/A_____ _____   Field Blank (Yes/No) ____No_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05   Date: 9/9/2020   Time: 0935

Field Personnel: John Pellegrino   GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)

Weather Conditions:

   Ambient Air Temperature: 74   °F   Weather: Overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling:_____0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

   Day of Sampling: 0.03 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:
   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.44   cfs
   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.65 feet   ____ High ____ Low __X__ Ebb
   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fast moving, clear. Sewage smell. Mosquitoes.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0924	18.6	9.03	0.346	4.05	7.35	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20200909   Time Collected: 0942 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _Yes_____   Sample ID _N/A_____   Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: <u>FU-06</u>   Date: <u>9/9/2020</u>   Time: <u>0830</u>

Field Personnel: <u>John Pellegrino</u>   GPS Coordinates: <u>39.18181</u> (Lat.) <u>-76.60700</u> (Long.)

Weather Conditions:

   Ambient Air Temperature: <u>74</u>   °F   Weather: <u>Overcast</u>

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling:<u>   0.00</u> inches   Type: <u>__</u> Rain   <u>_____</u> Snow   <u>_____</u> Mix

   Day of Sampling: <u>0.03</u> inches   Type: <u>_X_</u> Rain   <u>_____</u> Snow   <u>_____</u> Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   <u>6.44</u>   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   <u>1.52</u> feet   <u>____</u> High   <u>_X_</u> Low   <u>____</u> Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

<u>Burning smell. Slow moving, turbid water. Floating organic material. Transient encampment present in adjacent woods.</u>

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/9/2020 0824	21.0	6.89	1.774	15.33	7.39	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: <u>FU06-20200909</u>   Time Collected: <u>0842 / 0.3 meters</u>

QA/QC samples: Duplicate Sample (Yes/No) <u>___No___</u> Sample ID <u>___N/A_____</u>   Field Blank (Yes/No) <u>____No_____</u>

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   Date: 9/11/2020   Time: 1152

Field Personnel: John Pellegrino and Victoria Nelson   GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)

Weather Conditions:

   Ambient Air Temperature: 80_____ °F   Weather: Partly Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling:_____0.66_ inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.79   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.91 feet   _X__ High ____ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Two tires in water, no odor, fast moving water, moderately clear._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	22.0	8.01	0.249	7.83	6.44	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20200911_____ Time Collected: 1200 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-02   Date: 9/11/2020   Time: 1102

Field Personnel: John Pellegrino and Victoria Nelson   GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)

Weather Conditions:

   Ambient Air Temperature: 79   °F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 0.66 inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.79   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.87 feet   __ High ____ Low __X__ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High Turbidity, low visibility. Fecal odor, moderately moving. Flagging still present. Trash and transient community observed upstream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	22.3	8.01	0.209	29.5	6.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20200911   Time Collected: 1117 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   Date: 9/11/2020   Time: 1035

Field Personnel: John Pellegrino and Victoria Nelson   GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)

Weather Conditions:

    Ambient Air Temperature: 79   ºF Weather: Partly Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling:_____0.66 inches   Type: _X_ Rain _____ Snow _____ Mix

    Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.79   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.81 feet   ____ High ____ Low __X__ Ebb

    Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level significantly higher than normal; low visibility/high turbidity; fast moving water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	22.3	8.38	0.217	38.980	6.56	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20200911   Time Collected: 1042 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) __No___ Sample ID N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: MA-04   Date: 9/11/2020   Time: 0958

Field Personnel: John Pellegrino and Victoria Nelson   GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)

Weather Conditions:

   Ambient Air Temperature: 77   °F   Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 0.66 inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.79   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.80 feet   ____ High __X__ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Still water; high turbidity; low visibility; no odor.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	22.7	4.28	0.173	28.00	6.02	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20200911   Time Collected: 1007 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   Date: 9/11/2020   Time: 0933

Field Personnel: John Pellegrino and Victoria Nelson   GPS Coordinates: 39.14881 (Lat.) -76.60143 (Long.)

Weather Conditions:

   Ambient Air Temperature: 75   ºF   Weather: Partly Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling:_____0.66_ inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.79   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 0.80   feet   ___ High _X_ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; slightly turbid; signs of marine life (frogs); trash present in stream.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (µS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	24.0	8.30	1.89	12.80	6.70	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA05-20200911   Time Collected: 0943 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _MADP-09112020_____   Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Field Data Sheet

Sampling Station ID: <u>MA-06</u>   Date: <u>9/11/2020</u>   Time: <u>0856</u>

Field Personnel: <u>John Pellegrino and Victoria Nelson</u>   GPS Coordinates: <u>39.14881</u> (Lat.) <u>-76.60143</u> (Long.)

Weather Conditions:

   Ambient Air Temperature: <u>75</u>   ºF   Weather: <u>Overcast</u>

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: <u>0.66</u> inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: <u>0.00</u> inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   <u>8.79</u>   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   <u>0.82</u> feet   _ _ High __X__ Low _____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

<u>Zero visability/high turbidity; slow moving water; sewage odor.</u>

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #04495	9/11/2020 0851	23.0	7.24	0.180	55.00	6.76	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: <u>MA06-2020911</u>   Time Collected: <u>0920 / 0.3 meters</u>

QA/QC samples: Duplicate Sample (Yes/No) ___<u>No</u>___ Sample ID ___<u>N/A</u>_____   Field Blank (Yes/No) <u>MABL-20200911 8:56AM</u>

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

9/9/2020

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
0822	JP	4	DGA042	4.26	4.00			
0826	JP	7	0GA693	7.19	7.00			
0829	JP	10	966684	10.19	10.00			
0900		4		3.62	4.00	23.2	1159	4.07
		7		6.46	7.00	22.9	1200	6.79
0924		10		9.99	10.00	23.3	1202	10.25

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
0826	JP	1.413	06A037	1.519	1.413		1205	1.457

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
0820	JP	0	DI	-7.99	0		1153	0.74
		126	20220500	129.1	126		1157	121.4
			20320050056					

Model: YSI PRO DSJ

Rental ID: 04495 / 43715

Calibration Location: FU-06

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: pH sensor needed recal @ 0900

9/11

pH Standard

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Bump Date & Time	Result
0845	VN	4	06A042	4.20	4.00		1225	4.15
0848	VN	7	06A693	6.86	7.00		1230	6.81
0851	VN	10	96C648	10.31	10.00		1232	10.17

Conductivity

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Bump Date & Time	Result
0825	VN	1.413	06A037	1.409	1.413		12:17	1.403

Turbidity

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Bump Date & Time	Result
0830	VN	0	DI	8.56	0		1223	-1.75
0834	VN	126	202265b56	117.76	126		1220	125.25

Model: __ProDSS__

Rental ID: __45715 / 44954__

Calibration Location: __MA-06__

__75° OVERCAST__

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

_____

_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01 **Date:** 10/14/2020 **Time:** 1230

Field Personnel: Agrima Poudel and Victoria Nelson **GPS Coordinates:** 39.15013 (Lat.) -76.66172 (Long.)

Weather Conditions:

Ambient Air Temperature: 69 ºF Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 6.94 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 1.15 feet _____ High _X_ Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and moderately flowing water. Water level higher than usual. Lots of organisms in and around the stream.

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	14.4	8.64	0.196	0.81	6.87	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20201014 **Time Collected:** 1234 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No__ Sample ID __N/A_____ Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-02　　　　　　　　　　　　　　　**Date:** 10/14/2020　　　**Time:** 1145

Field Personnel: Agrima Poudel and Victoria Nelson　　　　　**GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　67　　　　°F　Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.41　inches　　Type: _X_ Rain　_____ Snow　_____ Mix

　　Day of Sampling:　　　　　　　　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　6.94　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __1.1_ feet　____ High　_X_ Low　____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and moderately flowing water. Sampling area is heavily vegetated.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	14.3	9.14	0.305	1.33	7.00	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20201014　　　　　**Time Collected:** 1153 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-03   **Date:** 10/14/2020   **Time:** 1100

Field Personnel: Agrima Poudel and Victoria Nelson   **GPS Coordinates: 39.17252 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 65   °F   Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.94   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.16 feet   ____ High __X__ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving; transient encampments observed downstream; heavy vegetation observed around sampling location; ladder

and used tired have been disposed of in the sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	15.3	9.30	0.385	2.78	7.26	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20201014   **Time Collected:** 1122 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 10/14/2020   **Time:** 1017

Field Personnel: Agrima Poudel and Victoria Nelson   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

   Ambient Air Temperature: 61   ºF   Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.63   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.28 feet   ____ High __X__ Low ___ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water; sampling area is heavily vegetated; trash observed along bank. Snake was observed close to sampling location, sample was collected 20ft upstream of sampling location to avoid walking past the snake.

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	14.03	9.57	0.325	1.80	7.25	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20201014   **Time Collected:** 1032 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-05   **Date:** 10/14/2020   **Time:** 0951

Field Personnel: Agrima Poudel and Victoria Nelson   **GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

   Ambient Air Temperature: 59   °F   Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 1.41 inches   Type: _X_ Rain _____ Snow _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.63   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.36 feet   ____ High __X__ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast-to-moderately flowing water. Some trash observed along the bank.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	13.9	9.52	0.318	3.77	7.04	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20201014   **Time Collected:** 0957 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_____   Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06   **Date:** 10/14/2020   **Time:** 0919

Field Personnel: Agrima Poudel and Victoria Nelson   **GPS Coordinates: 39.18181** (Lat.) **-76.60700** (Long.)

Weather Conditions:

   Ambient Air Temperature: 54   ºF   Weather: Clear & Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 1.41 inches   Type: __X__ Rain   _____ Snow   _____ Mix

   Day of Sampling: 0.00 inches   Type: ____ Rain   _____ Snow   _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.94   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.45 feet   ____ High   __X__ Low   ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderately flowing water. Transient encampment and heavy vegetation present in the sampling location.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/14/2020 0854	16.0	4.23	6.732	17.44	6.65	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20201014   **Time Collected:** 0925 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___Yes___   Sample ID _FUDP-20201014 @ 9:00 AM__   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   **Date:** 10/15/2020   **Time:** 1054

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 67   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.78 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.03   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.60 feet   ___ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is very clear and moderately flowing. Small bugs observed on water surface.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/15/2020 0854	14.5	8.96	0.320	4.52	7.12	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20201015   **Time Collected:** 1102 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02 _____ **Date:** 10/15/2020 _____ **Time:** 1018 _____

Field Personnel: Agrima Poudel and Claire Weinrib _____ **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

    Ambient Air Temperature: ____63____ °F Weather: Sunny _____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: ___0.78__ inches Type: _X_ Rain _____ Snow _____ Mix

    Day of Sampling: ___0.00__ inches Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): ____5.75____ cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __1.75_ feet ___ High __X__ Low ____ Ebb

    Low Flow (Baseflow) Sample / High Flow (Storm Event) sample (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Approach is very muddy. Water is moving moderately quickly and murky. _____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/1/2020 0854	14.3	9.13	0.312	3.88	7.24	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __MA02-20201015__ **Time Collected:** 1025 / 0.2 meters _____

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____ Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 10/15/2020   **Time:** 0955

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 63   ºF   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.78 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.03   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.83 feet   ____ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Significant amounts of trash due to proximity to highway. Water is slightly murky. Moderate flow rate.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/15/2020 0854	14.5	9.35	0.343	4.30	7.36	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20201015   **Time Collected:** 1003 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) __No___ Sample ID N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 10/15/2020   **Time:** 0931

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.78 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.03   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.99 feet   ____ High ____ Low __X__ Ebb

(Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Some trash adjacent to creek. Area is easily accessible. Water is slightly murky.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/1/2020 0854	14.3	6.15	0.370	9.43	7.01	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20201015   **Time Collected:** 0939 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-05   **Date:** 10/15/2020   **Time:** 0912

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.78 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.03   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): _2.04_ feet   __ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Approach to sampling location difficult due to vegetation and fallen branches. Water is slow flowing due to branch/leaf jam. Water is clear, though stagnant area adjacent to sampling location is murky.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/15/2020 0854	15.4	8.25	0.401	4.14	7.22	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA05-20201015**   **Time Collected:** 0921 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-06 　　　　　　　　　　　　　　　　　　　**Date:** 10/15/2020 　　　　**Time:** 0838

Field Personnel: Agrima Poudel and Claire Weinrib 　　　　　　　**GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

　　Ambient Air Temperature: 　　57　　　ºF 　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: 　　0.78 inches 　　Type: _X_ Rain 　_____ Snow 　_____ Mix

　　Day of Sampling: 　　　　　　　0.00 inches 　　Type: ___ Rain 　_____ Snow 　_____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 　　6.33 　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 　2.17 feet 　__ High 　____ Low 　_X_ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample 　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Access to creek very overgrown. Water level higher than normal, sample collected from creek edge due to inhibited access (water level).

Approach to creek has like sewage-like odor, possibly due to ongoing construction at adjacent sewage pump station. Higher than usual specific

conductivity reading. A bump test was performed to confirm YSI meter calibration.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #43855	10/15/2020 0854	20.0	0.70	20.21	6.14	6.85	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20201015 　　　　**Time Collected:** 8:54 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____ 　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

0/14/2020

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
08:26	AP.VVN	4	0GA042	4.03	4.0		12:39	4.23
8:26	AP&VN	7	0GA693	7.02	7.0		12:43	6.97
8:26	AP&VN	10	9GL648	10.28	10.0		12:41	10.01

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
8:36	AP&VN	1.413	0GG1105	1.215	1.413		12:45	1.539

Turbidity / Bump

	Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
	8:38	AP&VN	0	DI WATER	0	0			
	8:38	AP&VN	126	20B20050056	116.88	126			
CAL#2	8:54	AP&VN	0	DI WATER	-0.14	0		12:48	0.17
CAL#2	8:54	AP&VN	126	20B200500S~	110.14	126		12:44	123.33

Model: __PRO DSS__
Rental ID: __43855__

Calibration Location: __WALMART PARKING lot__
__Bump TEST @ FU-01__

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

_____

_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

		pH Standard				Temp (oC)	Bump	
Date & Time 10|15	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH		Date & Time	Result
8:10	AP	4	06A042	4.10	4.00		10|15 11:18	4.21
8:12		7	06A693	6.95	7.00		11:19	6.97
8:14	↓	10	96L698	10.03	10.00		↓ 11:21	10:01

		Conductivity				Temp (oC)	Bump	
Date & Time 10|15	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal		Date & Time 10|15	Result
8:16	AP	1.413	066110S	1.414	1413		9:01	1.472 (checked afte
							11:22	1.543 MADB)

		Turbidity				Temp (oC)	Bump	
Date & Time 10|15	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal		Date & Time 10|15	Result
8:18	AP	0	DI water	0.55	0		11:27	1.22
8:20	↓	126	20 B200	121.06	126		11:26	125.26
			4 500S6					

Model: **YSI ProDSS**
Rental ID: ~~Probe~~ iD 43855 (YSI)
Pine 46868 (probe)

Calibration Location: **walmart parking lot**

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01   **Date:** 11/11/2020   **Time:** 1019

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　67.8　　°F　Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: ____0.00_ inches　　Type: ___ Rain _____ Snow _____ Mix

　　Day of Sampling:　　　　　　____1.91_ inches　　Type: _X_ Rain _____ Snow _____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): ____6.91_ cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.96_ feet ____ High _X_ Low ___ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is slightly murky and moderately flowing. Lots of leaves and debris in the water. Wetland-like conditions surrounding the stream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	12.65	10.25	0.237	5.5	7.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20201111　　　　　**Time Collected:** 1024 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_____　　Sample ID _N/A_____　　Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-02   **Date:** 11/11/2020   **Time:** 955

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 67.6   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Day of Sampling: 1.91 inches   Type: __X__ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.60   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.9   feet   ____ High   __X__ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is fast moving and clear. Water is relatively low compared to previous sampling events. Lots of leaves and debris observed in water.

Some trash observed in water. Some trash observed adjacent to sampling location. Construction cones and tapes border manhole at

entrance of sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	12.57	10.73	0.385	1.7	7.68	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20201111   **Time Collected:** 1004 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____   Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03   **Date:** 11/11/2020   **Time:** 0937

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.17252 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 67.9   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Day of Sampling: 1.91 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.30   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.85   feet   _____ High   _X_ Low   _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is fast moving and clear. Bank is very sandy. Abandoned tire observed in sampling location. Lots of leaves and debris observed in water.

Transient encampments observed adjacent to sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	13.87	10.05	0.714	0.5	7.59	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20201111   **Time Collected:** 0943 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____   Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 11/11/2020   **Time:** 0918

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

   Ambient Air Temperature: 67.7   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: _____0.00_ inches   Type: ____ Rain _____ Snow _____ Mix

   Day of Sampling: 1.91 inches   Type: __X__ Rain _____ Snow _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.30   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __0.83_ feet   ____ High __X__ Low ___ Ebb

   (Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is fast flowing and slightly murky. Strong musty/murky odor at sampling location. Lots of leaves and debris observed in water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	12.61	11.02	0.414	2.3	7.44	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20201111   **Time Collected:** 0926 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-05   **Date:** 11/11/2020   **Time:** 0903

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

   Ambient Air Temperature: 67.7   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

   Day of Sampling: 1.91 inches   Type: __X__ Rain   _____ Snow   _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.30   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.84   feet ____ High __X__ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is fast moving and clear. Lots of leaves and debris in water. Lots of organic matter observed in water. A used tire observed downstream,

along with miscellaneous trash in water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	12.69	10.70	0.414	1.2	7.39	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU05-20201111**   **Time Collected:** 0909 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_____   Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-06   **Date:** 11/11/2020   **Time:** 0834

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

    Ambient Air Temperature: 68   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

    Past 72 hours prior to sampling: _____0.00_ inches   Type: ____ Rain _____ Snow _____ Mix

    Day of Sampling: 1.91 inches   Type: __X__ Rain _____ Snow _____ Mix

Flow Determination:

    USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.30   cfs

    Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.86__ feet _____ High __X__ Low ____ Ebb

    (Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is murky. Leaves and debris observed in water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/11/2020 0813	13.8	9.46	0.408	9.3	5.81	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20201111   **Time Collected:** 0841 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No____ Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-01   **Date:** 11/12/2020   **Time:** 1035

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59.9   °F   Weather: Slightly raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.91 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.83 inches   Type: _X_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   62.2   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.76   feet ___ High _X_ Low ____ Ebb

Low Flow (Baseflow) Sample (High Flow (Storm Event) sample)   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is very high compared to previous sampling events. Lots of leaves/debris observed in water. Water is very turbid and cloudy.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.28	12.92	0.099	51.6	8.29	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20201112   **Time Collected:** 1043 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-02　　　　　　**Date:** 11/12/2020　　**Time:** 0944

Field Personnel: Agrima Poudel and Justin Derato　　　**GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

　Ambient Air Temperature:　59.7　ᵒF　Weather: Slightly raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　Past 72 hours prior to sampling:　1.91　inches　　Type: _X_ Rain　_____ Snow　_____ Mix

　Day of Sampling:　　0.83　inches　　Type: _X_ Rain　_____ Snow　_____ Mix

Flow Determination:

　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　63.9　cfs

　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　0.88　feet　____ High　_X_ Low　____ Ebb

　Low Flow (Baseflow) Sample　(High Flow (Storm Event) sample)　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Sampling location is very flooded. Water level has reached adjacent marshy floodplain area. Water is very murky and turbid. Water level is higher than it has been compared to previous sampling events. The first round of readings on the YSI returned conductivity numbers that seemed inconsistent with conditions. The YSI meter cables were re-secured and a second round of readings were recorded.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.19	16.13	0.004	39.6	8.94	N/A
YSI6920 #7127	11/12/2020 0808	15.25	13.22	0.091	86.4	7.78	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20201112　　　　**Time Collected:** 1014 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____　　Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-03   **Date:** 11/12/2020   **Time:** 0926

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 60.1   °F   Weather: Overcast and some rain

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.91 inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: 0.83 inches   Type: _X_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   67.4   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.98   feet ____ High __X__ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Lots of trash observed around sampling location. Water level is highest it has been compared to previous sampling events. Water is fast

flowing and very murky/cloudy. Rotten fish odor observed at sampling location. Lots of trash observed downstream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.34	13.60	0.089	90.6	7.80	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20201112   **Time Collected:** 0934 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _Yes_   Sample ID _MADP-20201112 @ 9:24_   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 11/12/2020   **Time:** 0901

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 60.8   ºF   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____1.91__ inches   Type: _X_ Rain _____ Snow _____ Mix

Day of Sampling: ____0.83__ inches   Type: _X_ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____71.1__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.04__ feet ____ High __X__ Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is much higher compared to previous sampling events. Water is fast moving and very cloudy/murky. Lots of trash observed around

sampling location. A water channel has formed in the upstream marshy floodplain area adjacent to the residential area and is flowing towards the

sampling location. Homeowners from house adjacent to sampling location approached us with flooding concerns.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.4	13.71	0.091	85.2	8.0	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __MA04-20201112__   **Time Collected:** 0907 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05　　　　　　　　　　　　　　　　**Date:** 11/12/2020　　　**Time:** 0846

Field Personnel: Agrima Poudel and Justin Derato　　　　　　**GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　60.8　　　°F　Weather: Overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: 　　1.91　inches　　　Type: _X_ Rain 　_____ Snow 　_____ Mix

　　Day of Sampling: 　　　　0.83　inches　　　Type: _X_ Rain 　_____ Snow 　_____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 　　　71.1　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 　1.05　feet　___ High　_X_ Low 　____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is a lot higher compared to previous sampling events. Water is very murky and fast moving. Leaves and debris observed in water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.31	14.43	0.098	83.8	7.47	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA05-20201112　　　　**Time Collected:** 0851 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID _N/A_____　　　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 11/12/2020   **Time:** 0821

Field Personnel: Agrima Poudel and Justin Derato   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 61   °F   Weather: Raining and overcast

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.91 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.83 inches   Type: _X_ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   74.0   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.05   feet   __ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is very murky. Construction is currently being performed at the adjacent sewage collection point. Water is fast moving, lots of leaves

and debris in the water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI6920 #7127	11/12/2020 0808	15.46	13.13	0.085	92.0	7.36	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20201112   **Time Collected:** 0830 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

pH Standard							Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
11/11/20							11/11/20	
8:03	Justin D	4	06A092	4.01	4.00		10:38	10.06
8:02		7	96J499	6.75	7.00		~~10:28 10.09~~	
8:07	↓	10	96L648	10.80	10.09		10:36	4.04
8:06	↓	7	96J479	6.75	7.02		10:33	7.02

Conductivity							Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
11/11/20							11/11/20	
8:15	Justin D	1.413	06 A 037	1.370	1.411		10:41	1.456

Turbidity							Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
11/11/20							11/11/20	
8:12	Justin D.	0	20130290	-6.9	0	10:42	~~10:42~~	0.7
8:13	Justin D	126	19490157	144.8	126.0		1043	125.9

Model: YSI 6920

Rental ID: OSJ1693

Pin e 7127

Calibration Location: Walmart parking lot (cal)

park adjacent to Fu-01 (post cal).

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: YSI Meter difficult to calibrate ~pH 7 had to be recalibrate.

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

pH Standard						Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH		Date & Time	Result
11/12/20							11/12/20	
800	Justin D	4	06A042	4.01	3.99		1100	4.22
801	Justin D	7	96JA99	6.85	7.00		1102	7.13
803	Justin D	10	96L648	10.31	10.05		1104	10.02

Conductivity						Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal		Date & Time	Result
11/12/20								
805	Justin D	1.413	06A037	1.765	1.413		1106	1.471

Turbidity						Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal		Date & Time	Result
807	Justin D	0	20130298	1.1	0		1107	0.4
808	Justin D	126	19490152	122.3	126.0		11:08	125.4

Model: YSI 6920
Rental ID: 05J1093
PINE 7127

Calibration Location: walmart parking lot & MA01

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

_____

_____

Sampling Station ID: FU-01   **Date:** 12/9/2020   **Time:** 1122

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

   Ambient Air Temperature: 37   °F   Weather: Partly cloudy, low wind

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: _____0.00_ inches   Type: ___ Rain   _____ Snow   _____ Mix

   Day of Sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.45   feet   __X__ High _____ Low ___ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Wetland/swamp. Pools adjacent (standing water).

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	6.9	9.45	0.160	0.92	7.41	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20201209   **Time Collected:** 1128 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_   Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-02   **Date:** 12/9/2020   **Time:** 1050

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Overcast, partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.19   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.27   feet   ____ High ____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving, evidence of recent construction and brush-cutting on streambank adjacent upstream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	7.3	9.61	0.337	0.67	7.37	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20201209   **Time Collected:** 1055 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03   **Date:** 12/9/2020   **Time:** 1026

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.17252 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Overcast, partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.19   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.14   feet   _____ High   _____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water. Transient encampments. Sand deposits in streambed and along streambank. Trash and debris in surrounding woods.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	9.5	9.23	0.488	5.59	7.34	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20201209   **Time Collected:** 1032 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 12/9/2020   **Time:** 0958

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Overcast, partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: ____ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ____ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.93 feet   ____ High __X__ Low ___ Ebb

(Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water. Some foam on surface. Trash, debris, sand, and rocks in drainage swale.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	7.1	9.93	0.402	0.59	7.23	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20201209   **Time Collected:** 1002 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05　　　　　　　　　　　　**Date:** 12/9/2020　　　**Time:** 0925

Field Personnel: John Pellegrino and Sara Tolnay　　　　　　　　**GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　34　　　　°F　Weather: Overcast, partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: 　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

　　Day of Sampling:　　　　　　　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　8.19　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　0.7　feet　____ High　_X_ Low　____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	7.05	9.96	0.400	0.60	7.59	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　FU05-20201209　　　　　**Time Collected:** 0930 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_　　　　Sample ID _N/A_　　　　Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-06   **Date:** 12/9/2020   **Time:** 0852

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Overcast, partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.19   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.58   feet   ____ High   __X__ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is low, streambed exposed along shoreline, water is still. Transient encampments nearby.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/9/2020 0840	7.1	9.90	0.464	0.55	8.39	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20201209   **Time Collected:** 0859 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No___ Sample ID _FUBK-20201209___   Field Blank (Yes/No) _Yes_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-01　　　　　　　　　　　　　　　　**Date:** 12/10/2020　　　**Time:** 1122

Field Personnel: John Pellegrino and Claire Weinrib　　　　　　　**GPS Coordinates: 39.13693** (Lat.) **-76.61356** (Long.)

Weather Conditions:

　　Ambient Air Temperature:　　48　　　ºF　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: 　　0.00 inches　　Type: __ Rain 　　__ Snow 　　__ Mix

　　Day of Sampling: 　　　　0.00 inches　　Type: __ Rain 　　__ Snow 　　__ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　7.86　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　0.94　feet 　__ High 　__ Low 　_X_ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is flowing moderately quickly. Stream bank is eroded.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	7.4	9.70	0.335	0.59	7.16	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　MA01-20201210　　　　　**Time Collected:** 1133 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __Yes__　Sample ID _MADP-20201210_____　　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-02   **Date:** 12/10/2020   **Time:** 1052

Field Personnel: John Pellegrino and Claire Weinrib   **GPS Coordinates: 39.14233** (Lat.) **-76.60846** (Long.)

Weather Conditions:

   Ambient Air Temperature: 46   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

   Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.77   feet   ____ High   ____ Low   __X__ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and moderately moving. Stream banks are eroded. Sampling location is adjacent to a swampy wetland.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	6.2	10.17	0.324	1.07	7.51	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20201210   **Time Collected:** 1102 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 12/10/2020   **Time:** 1029

Field Personnel: John Pellegrino and Claire Weinrib   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 44   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.65   feet   ____ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water moving slowly. Silty stream bank. Some trash on bank across from sampling location. Dead deer on slope above sampling site.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	6.2	10.41	0.326	1.0	7.4	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20201210   **Time Collected:** 1040 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _Yes__   Sample ID _N/A_   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-04   **Date:** 12/10/2020   **Time:** 0948

Field Personnel: John Pellegrino and Claire Weinrib   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 39   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.53   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.52   feet ____ High __X__ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is still and has sunken leaf litter. Stream bank is eroded.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	5.4	8.16	0.289	1.05	7.43	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20201210   **Time Collected:** 0958 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-05   Date: 12/10/2020   Time: 0931

Field Personnel: John Pellegrino and Claire Weinrib   GPS Coordinates: **39.14882** (Lat.) **-76.60143** (Long.)

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: __ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.44   feet   ___ High   __X__ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is moving moderately quickly and has foam. Stream banks are eroded. Fallen trees creating pools downstream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	5.6	9.97	0.255	0.76	7.69	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA05-20201210**   Time Collected: 0938 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: MA-06   **Date:** 12/10/2020   **Time:** 0903

Field Personnel: John Pellegrino and Claire Weinrib   **GPS Coordinates: 39.15116** (Lat.) **-76.60172** (Long.)

Weather Conditions:

   Ambient Air Temperature: 34   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

   Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

   Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

   USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

   Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.40   feet __ High __X__ Low ____ Ebb

   Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is low, still, and murky. Significant trash at water's edge and around site. Active construction adjacent with no erosion and sediment controls in place. Evidence of sediment transport into water. Adjacent activities at pump station. Sewage odor present near pump station.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #044310	12/10/2020 0852	7.1	9.09	5.115	5.0	7.37	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20201210   **Time Collected:** 0910 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

12/9/20
0823

Bump

		pH Standard						Temp (oC)	Bump		Date/ time	Res
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH				Date & Time	Result		
0810	JP	4	06A042	3.96	4.00				10 17	4.17	11:38	4.20
		7	0G1615	6.98	7.00				1018	7.00	11:40	6.99
		10	96L648	10.15	10.00				1020	10.19	11:44	10.12
		ORP std	Lot #	Stab ORP	ORP							
		240	06D520	153.8	240.0							

		Conductivity		SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)		Bump		
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #					Date & Time	Result	
0840	JP	1.413	06C232	1.296	1.413					

Bump

		Turbidity		NTU Stab	NTU Cal	Temp (oC)		Bump		Date/ time	Res
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #					Date & Time	Result		0.12
0811	JP	0	DI	-2.67	0.00				1615	0.01	11:47	
0817		126	20290073	800	100.0						11:46	9.06

Model: Pro DSS
Rental ID: 64431 0

Calibration Location: Furnace Creek

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

12/10/2020

		pH Standard					Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
0847	JP/LW	4	OGA042	4.12	4.00		11:50	4.13
↓		7	OGI615	7.02	7.00		11:51	6.89
↓	↓	10	96L648	10.04	10.00		11:53	9.99

		Conductivity					Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
0852	JP/LW	1.413	O 0232	1.688	1.413	13.5	11:55	1.603

		Turbidity					Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab 0.10	NTU Cal	Temp (oC)	Date & Time	Result
0840	JP/LW	0	DI	0.74	0.00		11:44	-0.27
0845	↓	100 126	20290073	3.9210	100		11:46	99.7

Model: DSS Pro   Calibration Location: MA 06

Rental ID: METER: 044310

SONDE: 046681

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01　　　　　　　　　　**Date:** 1/13/2021　　　**Time:** 1104

Field Personnel: Agrima Poudel and Claire Weinrib　　　　**GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

　　Ambient Air Temperature: 　45　　　ºF　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling: 　0.00　inches　　Type: _____ Rain 　_____ Snow 　_____ Mix

　　Day of Sampling: 　　　　　　　0.00　inches　　Type: _____ Rain 　_____ Snow 　_____ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 　　7.86　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 　0.37　feet　_____ High 　__X__ Low 　___ Ebb

　　(Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Wetland conditions. Water is turbid/cloudy.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	5.9	11.06	0.209	43.2	6.41	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　FU01-20210113　　　　**Time Collected:** 1109 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No__　　　Sample ID _N/A_　　　　Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-02   **Date:** 1/13/2021   **Time:** 1037

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Sunny, cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.43   feet   _____ High   __X__ Low   _____ Ebb

(Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving. Water level is higher than usual. Construction observed at the entrance of sampling location.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	6.3	11.45	0.300	3.8	6.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **FU02-20210113**   **Time Collected:** 1047 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03   **Date:** 1/13/2020   **Time:** 1013

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: _____ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.51   feet   ____ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water. Transient encampments observed nearby.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	8.6	10.83	0.443	7.1	6.75	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20210113   **Time Collected:** 1025 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No)   No   Sample ID   N/A   Field Blank (Yes/No)   No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 1/13/2021   **Time:** 0953

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 34   °F   Weather: Sunny, clear

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: ____ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: ____ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____7.86_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.6_ feet   ____ High ____ Low __X__ Ebb

~~Low Flow (Baseflow) Sample~~ / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is higher than normal, and water is fast flowing. Lots of abandoned shopping carts leading to the sampling location.

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FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	5.9	11.92	0.356	7.6	6.5	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20210113   **Time Collected:** 1002/ 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05　　　　　　　　　　　**Date:** 1/13/2021　　**Time:** 0933

Field Personnel: Agrima Poudel and Claire Weinrib　　　　**GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

　Ambient Air Temperature:　　34　　　°F　Weather: Sunny, clear skies

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　Past 72 hours prior to sampling:　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

　Day of Sampling:　　　　0.00　inches　　Type: ___ Rain　_____ Snow　_____ Mix

Flow Determination:

　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　7.53　cfs

　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　0.68　feet　____ High　____ Low　__X__ Ebb

　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is fast moving and clear; water level is higher than usual. Some trash observed around sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	6.4	11.65	0.348	4.65	6.31	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20210113　　　　**Time Collected:** 0943 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No__　　　Sample ID __N/A__　　　Field Blank (Yes/No) __No__

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06   **Date:** 1/13/2021   **Time:** 0853

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

  Ambient Air Temperature: 34   °F   Weather: Sunny, clear skies

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

  Past 72 hours prior to sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

  Day of Sampling: 0.00 inches   Type: ___ Rain _____ Snow _____ Mix

Flow Determination:

  USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

  Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.84   feet   ____ High   ____ Low   __X__ Ebb

  Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is moderately flowing, and very turbid. Lots of debris/dirt became unsettled as sampler approached sampling location. Took YSI

readings twice because specific conductivity levels and turbidity levels seemed high. Transient encampments observed nearby.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/13/2021 0827	5.8	9.08	1.4	153	6.28	N/A
		5.7	10.64	0.965	86	6.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20210113   **Time Collected:** 0906 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No___ Sample ID N/A   Field Blank (Yes/No) N/A

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   **Date:** 1/14/2021   **Time:** 1123

Field Personnel: Agrima Poudel and Grace Dai   **GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 41   ⁰F   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.79   feet   ___ High   __X__ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	7.4	11.26	0.322	3.64	6.58	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20210114   **Time Collected:** 1133 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No__   Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02   **Date:** 1/14/2021   **Time:** 1040

Field Personnel: Agrima Poudel and Grace Dai   **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 41   ºF   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.87   feet   ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is somewhat clear (very minimal cloudiness). Lots of natural iron-rich deposits observed entering sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	5.9	11.97	0.314	5.23	6.42	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20210114   **Time Collected:** 1052 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 1/14/2021   **Time:** 1018

Field Personnel: Agrima Poudel and Grace Dai   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 36   ℉   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.86   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.97   feet   ____ High   ____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is somewhat clear and slow flowing. Lots of iron-rich deposits observed in stream. Trash observed at and around sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	5.8	12.11	0.322	6.88	6.75	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20210114   **Time Collected:** 1025 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 1/14/2021   **Time:** 0930

Field Personnel: Agrima Poudel and Grace Dai   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: __ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.53   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.18   feet ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Lots of iron-rich deposits observed in stream. Petroleum and organic sheen observed. Water is slightly cloudy. Some birds in area. Turbidity

reading was unusually low (negatives) so a second sample was collected and YSI readings recorded.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	4.8	9.56	0.356	N/A	6.43	N/A
		4.8	9.15	0.312	12.45	6.70	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20210114   **Time Collected:** 0944 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05　　　　　　　　　　　**Date:** 1/14/2021　　**Time:** 0905

Field Personnel: Agrima Poudel and Grace Dai　　　　**GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature:　　28　　　°F　Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches　　Type: __ Rain　_____ Snow　_____ Mix

Day of Sampling:　　　　　　　0.00 inches　　Type: __ Rain　_____ Snow　_____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　7.86　　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　1.32　feet　___ High　____ Low　__X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Lots of iron-rich deposits observed on top of stream bed. Water is still with organic and petroleum sheen. Water is clear.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	4.1	11.71	0.380	4.44	6.75	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　**MA05-20210114**　　　**Time Collected:** 0916/ 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) Yes___　Sample ID __MADP-20210114 @ 0906_____　　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 1/13/2021   **Time:** 0830

Field Personnel: Agrima Poudel and Grace Dai   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 32   °F   Weather: Clear skies

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches   Type: __ Rain _____ Snow _____ Mix

Day of Sampling: ____0.00__ inches   Type: __ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.19   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.42   feet   _X_ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is somewhat clear and moderately flowing. Lots of birds in the area. Excavation/construction adjacent to sampling location. Path into

sampling location blocked with construction materials.

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #20R100742	1/14/2021 0821	5.4	11.12	1.668	8.38	6.49	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20210114   **Time Collected:** 0851 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ____No____ Sample ID ____N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
1/13/21							1/13/21	
822	A. Poudel	4	06A092	4.01	4.00		1116	4.27
824	A. Poudel	7	06A693	1096	7.00		1118	7.01
827	A. Poudel	10	06H940	10.30	10.00		1120	10.05

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
1/13/21							1/13/21	
812	A. Poudel	1.413	0661105	1.433	1.413		1112	1.567

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
1/13/21							1/13/21	
814	A. Poudel	0	20250092	-0.5	0		1114	2.09
816	A. Poudel	126	20020130051	133	126		1115	124.03

Model: YSIProDSS

Rental ID: 20K100742

Calibration Location: Walmart parking lot FU01

Record date, time, and calibration analyst's name as you calibrate.

Record Lot # of each calibration solution.

Record temperature of pH solutions.

Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

		pH Standard				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH		Date & Time	Result
1/14/21							1/14/21	
804	A. Poudel	4	06A042	4.05	4.00		1140	4.09
806	A. Poudel	7	06A693	6.94	7.00		1143	7.02
810	A. Poudel	10	06H990	9.99	10.00		1145	10.10

		Conductivity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal		Date & Time	Result
1/14/21							1/14/21	
814	A. Poudel	1.413	0661105	1.514	1.413		1145	1.408

		Turbidity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal		Date & Time	Result
1/14/21							1/14/21	
816	A. Poudel	0	20250092	0.00	0.00		1147	2.13
821	A. Poudel	126	20D 2013005	126.0	126.0		1149	111.3

Model: YSI ProDSS

Rental ID: 20K100742

Calibration Location: Walmart parking lot MA01

Record date, time, and calibration analyst's name as you calibrate.

Record Lot # of each calibration solution.

Record temperature of pH solutions.

Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01   **Date:** 2/15/2021   **Time:** 1242

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.55 inches   Type: _____ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.47 inches   Type: _____ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.16   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.04   feet   _____ High   _____ Low   _X_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1150 (estm)	7.4	10.89	0.194	4.0	6.57	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20210215   **Time Collected:** 1245 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_   Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-02   **Date:** 2/15/2021   **Time:** 1218

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____ 0.55 _ inches   Type: _____ Rain   _____ Snow   __X__ Mix

Day of Sampling: _____ 0.47 _ inches   Type: _____ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.54   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.12   feet   _____ High   _____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fast flow; water is clear with no obvious odor; high water level.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1150 (estm)	7.4	11.24	0.461	3.0	6.99	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20210215   **Time Collected:** 1223 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A___   Field Blank (Yes/No) ___No___

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03   **Date:** 2/15/2020   **Time:** 1157

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.55 inches   Type: _____ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.47 inches   Type: _____ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.16   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.18   feet   ____ High ____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; sweet odor; water appears more orange; stream bed orange; orange sediment in sample.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1150 (estm)	8.5	7.88	0.964	3.5	7.31	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20210215   **Time Collected:** 1201 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04　　　　　　　　　　　　　　　　　**Date:** 2/15/2021　　**Time:** 1135

Field Personnel: John Pellegrino and Grace Dai　　　　　**GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature:　37　　　°F　Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: ____0.55__ inches　　Type: ____ Rain　_____ Snow　__X__ Mix

Day of Sampling:　　　　　____0.47__ inches　　Type: ____ Rain　_____ Snow　__X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　____9.16__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.28__ feet　　____ High ____ Low __X__ Ebb

(Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fast flow; high water level; foam on water; water is clear; unusual organic odor (avocado-like).

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1035 (estm)	7.3	10.31	0.720	4.8	7.10	N/A

BACTERIA SAMPLE COLLECTION

Sample ID:　FU04-20210215　　　　　**Time Collected:** 1137/ 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID _N/A_____　　Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05   **Date:** 2/15/2021   **Time:** 1115

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.55_ inches   Type: ___ Rain   _____ Snow   __X__ Mix

Day of Sampling: _____0.47_ inches   Type: ___ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.16   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.35   feet   __X__ High   ____ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; high water level.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1035 (estm)	7.6	10.54	0.643	3.5	7.17	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20210215   **Time Collected:** 1119 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No_____   Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06   **Date:** 2/15/2021   **Time:** 1050

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.55 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.47 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.16   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.40   feet   __X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Slow flow; high water level

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #46868	2/15/2021 1035 (estm)	7.2	10.04	0.721	4.9	6.85	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20210215   **Time Collected:** 1058 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __Y___ Sample ID FUDP-20210215 _____   Field Blank (Yes/No) N/A_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   **Date:** 2/16/2021   **Time:** 1046

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 41   ºF   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____1.02_ inches   Type: ___ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.39 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   28.1   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.68   feet   _X__ High   _____ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is very high. Water is fast moving and very murky, snow nearby.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	5.5	11.54	0.548	30.70	6.79	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20210216   **Time Collected:** 1056 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) __No___ Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02　　　　　　　　　　　　　　**Date:** 2/16/2021　　　**Time:** 1007

Field Personnel: Agrima Poudel and Claire Weinrib　　　　　　**GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

　　Ambient Air Temperature:　　39　　　　°F　Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

　　Past 72 hours prior to sampling:　　1.02　inches　　Type: ___ Rain　_____ Snow　__X__ Mix

　　Day of Sampling:　　　　　　0.39　inches　　Type: ___ Rain　_____ Snow　__X__ Mix

Flow Determination:

　　USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　28.8　cfs

　　Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　2.68　feet　__X__ High　_____ Low　_____ Ebb

　　Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Area is extremely murky and semi-flooded. Water is moderate-fast moving and very murky. Some snow in immediate area. Sample DO readings taken multiple times and all readings were 11.9-12.2 mg/L.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	4.7	12.00	0.517	77.91	6.81	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20210216　　　　**Time Collected:** 1020 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ___N/A_____　　Field Blank (Yes/No) ___No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 2/16/2021   **Time:** 0949

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 39   ºF Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.02 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.39 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   28.8   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.67   feet   __X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is very murky and moving moderately quickly. Some snow in area. Minimal trash adjacent to sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	4.8	11.95	0.545	78.41	6.69	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20210216   **Time Collected:** 0952 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _No___ Sample ID _N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 2/16/2021   **Time:** 0917

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 39   °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.02 inches   Type: ___ Rain _____ Snow __X__ Mix

Day of Sampling: 0.39 inches   Type: ___ Rain _____ Snow __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   29.5   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.62   feet __X__ High ____ Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Area is flooded. Water is still or very slow moving and murky. Trash in adjacent area. Some snow still present.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	4.1	12.22	0.577	95.37	6.69	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20210216   **Time Collected:** 0925 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   **Date:** 2/16/2021   **Time:** 0855

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   ºF   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____1.02_ inches   Type: ___ Rain   _____ Snow   __X__ Mix

Day of Sampling: 0.39 inches   Type: ___ Rain   _____ Snow   __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   30.2   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.58   feet   __X__ High _____ Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level is very high and water is very fast moving. Water is very murky. Minimal trash in adjacent area. Some snow still present.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	4.2	12.45	1.322	37.90	6.38	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA05-20210216   **Time Collected:** 0903/ 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No___ Sample ID __N/A_____   Field Blank (Yes/No) ____No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 2/16/2021   **Time:** 0837

Field Personnel: Agrima Poudel and Claire Weinrib   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 37   °F   Weather: Cloudy, misty

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 1.02 inches   Type: ___ Rain _____ Snow __X__ Mix

Day of Sampling: 0.39 inches   Type: ___ Rain _____ Snow __X__ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   30.9   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.49   feet _X_ High ____ Low ____ Ebb

Low Flow (Baseflow) Sampled High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Adjacent construction looks to be complete. Water level is high. Water is slow moving and very murky. Trash on bank. Some snow still present.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSIProDSS #49340	2/16/2021 0756	4.2	12.30	0.667	80.04	6.57	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20210216   **Time Collected:** 0842 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) ___No___ Sample ID ____N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

			pH Standard				Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
2/16/21	A. Poudel							
746	A. Poudel	4	061407	3.92	4.00	17.8	11:16	4.20
747	A. Poudel	7	06A1093	6.81	7.00	17.8	11.08	7.03
749	A. Poudel	10	96L148	10.08	10.00	17.9	11.09	10.20

			Conductivity				Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
2/16/21								
751	A. Poudel	1.413	06C232	1.821	1.413	17.9	11:10	1.481

			Turbidity				Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
2/16/21								
754	A. Poudel	0	DI wat	-2.49	0		11:14	3.95
755	A. Poudel	126	20D201300S11616	126			11:16	125.75
756	A. Poudel	126	" "	91.91	126			

Model: ProDSS

Rental ID: 49340

Calibration Location: Walmart parking lot

Record date, time, and calibration analyst's name as you calibrate.

Record Lot # of each calibration solution.

Record temperature of pH solutions.

Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01   **Date:** 3/10/2021   **Time:** 1120

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56   °F   Weather: Clear skies and sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____ 0.00 _ inches   Type: _____ Rain   _____ Snow   ____ Mix

Day of Sampling: 0.00 _ inches   Type: _____ Rain   _____ Snow   ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.14   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   -0.36   feet   ____ High   _X_ Low   __ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor; high water level.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	9.66	9.68	0.221	25.0	6.24	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-03102021   **Time Collected:** 1123 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-02   **Date:** 3/10/2021   **Time:** 1048

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56 °F   Weather: Clear skies and sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow   ____ Mix

Day of Sampling: ___0. 00_ inches   Type: _____ Rain   _____ Snow   ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   ___7.80_   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   _-0.38_   feet   ____ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fast flow; water is clear with no obvious odor.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	8.78	10.01	0.411	2.5	6.37	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-03102021   **Time Collected:** 1101 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-03   **Date:** 3/10/2021   **Time:** 1028

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 54   °F   Weather: Clear skies; sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain   _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.80   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __-0.43_ feet   ____ High   _X_ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor; stream bed orange; foam on water; brown algae on bed.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	10.53	9.54	0.538	9.9	6.59	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-03102021   **Time Collected:** 1034 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_   Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04　　　　　　　　　　　　　　　　　　　　**Date:** 3/10/2021　　　**Time:** 1012

Field Personnel: John Pellegrino and Grace Dai　　　　　　**GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 54　　°F　Weather: Clear skies; sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches　　Type: _____ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　　____0.00__ inches　　Type: _____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　____7.80__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___-0.43__ feet　____ High　_X_ Low　___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor; foam and suds on top of stream

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	8.49	10.17	0.476	20.0	6.41	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-03102021　　　　　**Time Collected:** 1018/ 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_　Sample ID _N/A_　　　　Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05   **Date:** 3/10/2021   **Time:** 0955

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 54 °F Weather: Clear skies; sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain _____ Snow ____ Mix

Day of Sampling: ____0.00_ inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____7.80_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___-0.44_ feet __X__ High __X__ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor. Brown algae on stream bed. Leaf litter and debris in stream.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	8.27	10.24	0.445	5.9	6.08	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-03102021   **Time Collected:** 1003 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_ Sample ID _N/A_   Field Blank (Yes/No) _No_

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06　　　　　　　　　　　　　　**Date:** 3/10/2021　　**Time:** 0917

Field Personnel: John Pellegrino and Grace Dai　　　　　　**GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 52　　°F　Weather: Clear skies, sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches　　Type: _____ Rain　_____ Snow　____ Mix

Day of Sampling: 　　　　　0.00 inches　　Type: _____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　　7.80　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____-0.41__ feet　____ High　__X__Low　____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Slow flow; low water level; no odor

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-10-2021, 0800	9.09	10.8	0.621	5.7	5.80	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-03102021　　　　**Time Collected:** 0930 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　Sample ID N/A　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01　　　　　　　　　　　　　**Date:** 3/11/2021　　　**Time:** 1038

Field Personnel: John Pellegrino and Grace Dai　　　　　**GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 65 　　°F　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 　　　0.00　inches　　　Type: _____ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　　　0.00　inches　　　Type: _____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　7.80　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　0.60　feet　___ High　_X_ Low　____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear with no obvious odor.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	9.55	10.84	0.371	2.7	6.03	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-03112021　　　　**Time Collected:** 1040 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　　Sample ID N/A　　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02   **Date:** 3/11/2021   **Time:** 1016

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 63____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow _____ Mix

Day of Sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____7.80_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.60__ feet ___ High __X_Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Low flow and low water level. No obvious odor._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	8.18	9.40	0.351	20.1	6.23	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-03112021   **Time Collected:** 1017 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No___ Sample ID N/A_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 3/11/2021   **Time:** 1002

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 63 ____°F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: _____ Rain   _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain   _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.80   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____0.62____ feet ____ High __X_ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Low flow and low water level. Water is slightly turbid with no obvious odor.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	8.17	10.21	0.388	9.0	6.33	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-03112021   **Time Collected:** 1004 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No___ Sample ID N/A_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 3/11/2021   **Time:** 0939

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 55_____°F Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Day of Sampling: _____0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____7.47 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.69 feet ____ High __X__Low ___ Ebb

~~Low Flow (Baseflow) Sample~~ / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Low flow and low water level. Water is slightly turbid with no odor.   .

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	6.55	10.88	0.265	12.0	6.13	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-03112021   **Time Collected:** 0943 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) Yes   Sample ID **MA-DUP-03112021**   Field Blank (Yes/No) Yes

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   **Date:** 3/11/2021   **Time:** 0924

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 55____ °F Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches   Type: _____ Rain _____ Snow ____ Mix

Day of Sampling: ____0.00__ inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   ____7.47__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.74__ feet ____ High __X__ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Low water level; low flow; water is clear with no obvious odor._____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	7.38	9.98	1.254	3.0	6.06	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA05-03112021**   **Time Collected:** 0925/ 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _No__ Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 3/11/2021   **Time:** 0910

Field Personnel: John Pellegrino and Grace Dai   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 55____ °F   Weather: Clear skies; sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.80   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.79   feet ____ High   _X_ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Low flow; medium-low water level; no odor, water is slightly turbid   ;

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI 6920 #27942 / 650MDS #R12840	3-11-2021, 0811	8.29	10.54	0.962	12.0	5.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-03112021   **Time Collected:** 0912 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No___ Sample ID **MA-BLK-03112021**_____Field Blank (Yes/No) Yes

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

YSI Multi-Probe Calibration Record

3/10/21

Date & Time	Cal or Bump	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	1.413 Std Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Std (NTU)	Lot #	NTU Stab	NTU Cal
0800	cal	JP	4	OG1407	3.89	4.00	OGC232	1.261	1.438		0	20130248	~~1000~~ 240	~~20~~ 0.3
↓	↓	↓	7	OG1615	7.04	7.00					126	20490054	~~2020~~ 170.0	~~05~~ 123.0
			10	OG4440	10.05	10.01								
1700	Bump		4		(3.89)			(1.466)			0			(-30)
↓	↓		7		7.01						126			120.0
	↓		10		10.1									

Record date, time, calibration analyst's name, and temperature of each solution as you calibrate.

Record Lot # of each calibration solution.

Record whether or not it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

SONDE: YSI 6920
#27947

MBTBR: YSI 650 MDS
#B12840

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

		pH Standard					Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
03/11/21 JP		4	0G1407	4.11	4.00			
		7	0G1615	6.83	7.00			
		10	0GH940	10.21	10.03			

08:11

		Conductivity					Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
03/11/21		1.413	0GC232	1.530	1.413			

		Turbidity					Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
03/11/21		0	20130248	-18 roet	000 -1			
		126	20490054	000 60	000 123			

Model: __YSI6920__ __YSI650MDS__   Calibration Location: __GLEN BURNIE, MD__ __MA 06__

Rental ID: __R12840__ __R12840__   _____

__27942__   _____

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01　　　　　　　　　　　　　　**Date:** 4/14/2021　　　**Time:** 1029

Field Personnel: John Pellegrino and Sara Tolnoy　　　　　**GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

Ambient Air Temperature:　57　　　°F　Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: ____0.01_ inches　　Type: __X__ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　____0.21_ inches　　Type: __X__ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　8.14　　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　2.69　feet　__X__ High　____ Low　__ Ebb

(Low Flow (Baseflow) Sample)/ High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Wetland; saturated with water. Water is moderately flowing and clear. Organic sheen on surface water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	13.4	10.34	0.239	5.50	6.46	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20210414　　　　**Time Collected:** 1036 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No__　Sample ID N/A　　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-02   **Date:** 4/14/2021   **Time:** 1010

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: __57__ °F   Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01__ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: ____0. 21__ inches   Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   ____7.80__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___2.78__ feet   __X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. High water level. Nearby vegetation has been disturbed by construction activities.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	13.0	10.15	0.405	1.76	6.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: __FU02-20210414__   **Time Collected:** 1012 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) _No__   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-03　　　　　　　　　　　　　**Date:** 4/14/2021　　　**Time:** 0945

Field Personnel: John Pellegrino and Sara Tolnay　　　　　**GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 57　　°F　Weather: Mostly Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 　　0.01　inches　　Type: __X__ Rain 　____ Snow ____ Mix

Day of Sampling: 　　　　0.21　inches　　Type: __X__ Rain 　____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 　　8.49　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 　2.87　feet　__X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample 　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. Some debris and trash in the stream.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	14.0	9.90	0.559	4.34	6.67	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20210414　　　　**Time Collected:** 0951 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　Sample ID N/A　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 4/14/2021   **Time:** 0925

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56____ °F   Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: ____0.01_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: ____0.21_ inches   Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   ____8.49_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___2.93_ feet   __X__ High ____Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Fast moving water, foam and suds on water surface.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	12.8	10.22	0.470	2.99	6.75	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20210414   **Time Collected:** 0925/ 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _No__   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05　　　　　　　　　　　　　　　**Date:** 4/14/2021　　　**Time:** 0855

Field Personnel: John Pellegrino and Sara Tolnay　　　　　　　**GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56　　°F　Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches　　Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: _____0.21_ inches　　Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____8.14_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __2.98_ feet __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	12.5	10.19	0.450	2.72	6.39	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20210414　　　　**Time Collected:** 0855 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　Sample ID N/A　　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-06   **Date:** 4/14/2021   **Time:** 0845

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56 °F   Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.21 inches   Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   8.14   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.98   feet   __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level. Still, slow moving water. Increase in the quantity of transient encampments in the general area.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-14-2021, 0800	15.6	8.53	2.159	1.84	6.30	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20210414   **Time Collected:** 0845 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   **Date:** 4/15/2021   **Time:** 1038

Field Personnel: John Pellegrino and Sara Tolnay   GPS Coordinates: **39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59   °F   Weather: Mostly Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.21 inches   Type: __X___ Rain   _____ Snow _____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain   _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.21   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.48   feet   __X_ High   ____Low   ____ Ebb

~~Low Flow (Baseflow) Sample / High Flow (Storm Event) sample~~   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Moderate flow; water is clear.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	14.4	9.68	0.323	4.67	6.48	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA01-20210414**   **Time Collected:** 1042 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02   **Date:** 4/15/2021   **Time:** 1015

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59 °F   Weather: Mostly Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.21 inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.21 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 2.54 feet __X__ High ____Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High and fast moving. Murky water. Leaf litter and debris in water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	13.8	9.51	0.297	13.45	6.45	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20210415   **Time Collected:** 1019 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 4/15/2021   **Time:** 0959

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 59____°F Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.21 inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.21   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.56   feet   __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water level high. Water is murky. Turtles spotted on the shore bank. Water is yellow in color.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	13.7	9.76	0.320	14.03	6.45	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20210415   **Time Collected:** 1005 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 4/15/2021   **Time:** 0925

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 57_____°F   Weather: Partly Cloudy_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.21_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: ____0.00_ inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____9.59___ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___2.61__ feet __X__ High _____Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level. Slow flow. Dark and murky water. Floating trash and debris._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	13.6	8.77	0.339	15.64	6.55	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20210415   **Time Collected:** 0930 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _Yes__   Sample ID **MADP-20210415**_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   **Date:** 4/15/2021   **Time:** 0900

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 57 _____ °F Weather: Mostly Sunny _____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____ 0.21 inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   9.21   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   2.62   feet   __X__ High _____Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level. Murky water. Foam and suds observed on water. _____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	14.4	9.42	0.419	9.85	6.62	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA05-20210415**   **Time Collected:** 0910 / 0.3 meters _____

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A _____   Field Blank (Yes/No) No _____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 4/15/2021   **Time:** 0845

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 55____ °F   Weather: Mostly sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.21_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: ____0.00_ inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:
USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   ____9.21__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___2.58__ feet ___X__ High ____ Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level, still water._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #49332, 49337	4-15-2021, 0800	13.9	7.99	1.073	12.3	6.63	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20210415   **Time Collected:** 0845 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) No_____   Sample ID _____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

	Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
				pH Standard				**Bump**	
@0820	4/14/21	ST	4	065387	3.76	4.00		1044	4.14
			7	06A693	6.87	7.00		1046	7.14
	↓	↓	10	966648	10.07	10.00		1048	10.16

	Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
				Conductivity				**Bump**	
@0815	4/14/21	ST	1.413	066 1105	1.272	1.413		1050	1.475

	Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
				Turbidity				**Bump**	
@0823	4/14/21	ST	0	DI	-1.75	0.00		1052	1.81
	↓	↓	126	70M20470230	119.41	126.0		1053	120.30

Model: YSI DSS PRO

Rental ID: 49372   49337

    SOUDE   METER

Calibration Location: FU-06

BUMP @ FU-01

PARTLY CLOUDY 57°F

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: MOSTLY SUNNY, 50°F

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

4/15/2021

		pH Standard					Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH			Date & Time	Result
0820	St	4	06J387	4.16	4.00			1050	4.00
0824	ST	7	06A693	7.09	7.00			1051	6.97
0830	ST	10	46L648	10.09	10.00			1053	10.09

		Conductivity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal		Date & Time	Result
0832	ST	1.413	06G1105	1.395	1.413		1056	1.569

		Turbidity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal		Date & Time	Result
0835	ST	0	DI	1.22	0.00		1057	-0.13
0837	ST	126	20M20470230	120.66	126.00		1059	118.9

Model: YSI DSS PRO

Rental ID: 49232   49327
        SONDE   METER

Calibration Location: MA-06

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: MOSTLY SUNNY, 53°F   BUMP @ MA-01, MOSTLY SUNNY 59°F

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-01 **Date:** 5/12/2021 **Time:** 1037

Field Personnel: John Pellegrino and Sara Tolnoy **GPS Coordinates: 39.15013 (Lat.) -76.66172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 53 °F Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.0 inches Type: ____ Rain ____ Snow ____ Mix

Day of Sampling: 0.0 inches Type: ____ Rain ____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): 7.00 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 0.67 feet ____ High ____ Low _X_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	12.5	9.92	0.233	2.2	6.88	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU01-20210512 **Time Collected:** 1047 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No Sample ID N/A Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-02   **Date:** 5/12/2021   **Time:** 1012

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: 53 °F   Weather: Partly Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 0.00 inches   Type: ____ Rain   _____ Snow   ____ Mix

Day of Sampling: 0.00 inches   Type: ____ Rain   _____ Snow   ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.68   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   0.77   feet   ____ High   ____ Low   __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	12.4	9.91	0.371	1.6	7.13	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU02-20210512   **Time Collected:** 1018 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-03   **Date:** 5/12/2021   **Time:** 0952

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 53____ °F   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: _____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____6.68____ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___0.88__ feet   ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	13.1	9.73	0.529	2.3	7.32	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU03-20210512   **Time Collected:** 0955 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) Yes   Sample ID FUDP-20210512   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04   **Date:** 5/12/2021   **Time:** 0920

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 53____ °F   Weather: Partly Cloudy_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: ____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____7.00____ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.00____ feet ___X__ High ____Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. Some suds on water surface. Sulfuric odor adjacent to site._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	12.3	10.15	0.431	2.3	7.04	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU04-20210512   **Time Collected:** 0930 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-05　　　　　　　　　　　　　　　　**Date:** 5/12/2021　　　**Time:** 0905

Field Personnel: John Pellegrino and Sara Tolnay　　　　　　**GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 51　　°F　Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches　　Type: ____ Rain _____ Snow ____ Mix

Day of Sampling:　　　　　　　0.00 inches　　Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　7.00　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.12__ feet __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving. Ducks observed upstream of monitoring point.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	12.2	10.03	0.418	2.1	7.00	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU05-20210512　　　　**Time Collected:** 0910 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　　Sample ID N/A　　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06   **Date:** 5/12/2021   **Time:** 0840

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 50 ____°F Weather: Cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: 0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   7.00   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.17__ feet __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level. Wildlife present; transient encampment observed at the monitoring location and across the channel.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-12-2021, 0830	14.2	9.79	4.817	2.9	6.90	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: FU06-20210512   **Time Collected:** 0845 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01　　　　　　　　　　　　　　　　　**Date:** 5/13/2021　　　**Time:** 1028

Field Personnel: John Pellegrino and Sara Tolnay　　　　**GPS Coordinates: 39.13693 (Lat.) -76.61356 (Long.)**

Weather Conditions:

Ambient Air Temperature: 64　　ºF　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches　　Type: _____ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　　____0.00_ inches　　Type: _____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　6.69　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):　1.06　feet　_X_ High　____Low　____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast moving water.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	12.7	9.76	0.451	4.0	7.23	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA01-20210513　　　**Time Collected:** 1035 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　　Sample ID N/A　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02   **Date:** 5/13/2021   **Time:** 1005

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 58_____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain _____ Snow _____ Mix

Day of Sampling: _____0.00_ inches   Type: _____ Rain _____ Snow _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____6.69___ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.16__ feet __X_ High _____Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and slow-moving water. Some organic sheen on water surface._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	12.1	7.86	0.442	4.3	7.42	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20210513   **Time Collected:** 1015 / 0.2 meters_____

QA/QC samples: Duplicate Sample (Yes/No) No___ Sample ID N/A_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03　　　　　　　　　　　　　　　**Date:** 5/13/2021　　　　**Time:** 0940

Field Personnel: John Pellegrino and Sara Tolnay　　　　　　**GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 58　　°F　Weather: _Sunny_

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: ____0.00__ inches　　Type: _____ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　　___0.00_ inches　　Type: _____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　___6.69__ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.26__ feet　__X__ High　____Low　____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is mostly clear and slow moving. Some debris collecting at the edges.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	12.2	8.26	0.482	4.3	7.47	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20210513　　　**Time Collected:** 0952 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No　Sample ID N/A　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 5/13/2021   **Time:** 0920

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 56   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: _____0.00_ inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____7.00_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.32_ feet __X__ High ____Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Organic sheen on stream surface; possibly some petroleum sheen. Water level is high; water is still/unmoving. Suspended sediment clouds are visible.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	12.4	6.27	0.478	24.0	7.45	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20210513   **Time Collected:** 0930 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   **Date:** 5/13/2021   **Time:** 0900

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 51_____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow   _____ Mix

Day of Sampling: _____0.00_ inches   Type: _____ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____7.00_   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.37_ feet __X__ High _____Low _____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and slow-moving water. Foam and suds accumulating at debris along stream. Water has a sweet-sickly odor, similar to coolant._____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	13.0	8.08	0.733	7.1	7.42	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA05-20210513   **Time Collected:** 0910 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A_____   Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 5/13/2021   **Time:** 0845

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 45 ____°F Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: _____ Rain   _____ Snow   ____ Mix

Day of Sampling: ____0.00 inches   Type: _____ Rain   _____ Snow   ____ Mix

Flow Determination:
USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.69   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.39   feet   _X_ High   ____ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level, still water, slight odor present, murky water.

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #46868, 039544	5-13-2021, 0829	14.1	5.53	2.950	10.1	6.97	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20210513   **Time Collected:** 0845 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

5/12/21 0810

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
							Bump	
8:00	ST	4	063264	4.01	4.00		1055	4.10
		7	063538	7.05	7.000		1059	7.02
	↓	10	966648	10.33	10.00		1101	10.12

5/12/21 0815

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
				Conductivity			**Bump**	
	ST	1.413	061235	1.323	1.413		1103	1.612
	↓			①				

5/12/21 0820 0830

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
				Turbidity			**Bump**	
	ST	0	DI	0.0	0		-0.05	-0.03 @1105
	↓	126	70M70170230	265.3	126		90.2	108.2 @1110
	↓	126	↓	90.5	125.8			

Model: __VSI PRO DSS__   Calibration Location: __FU-06__

Rental ID: __SONDE   METER__
        __46868   039544__

__BUMP @ FU-01__

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

5/13

pH Standard / Bump

Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
0815	SP	4	06J764	3.99	4.00		1045	4.07
0820		7	06J538	6.98	7.00		1049	7.02
0822	↓	10	96L648	10.04	10.00		1051	10.05

Conductivity / Bump

Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
0824	ST	1.413	06L235139	1.413			1055	1.800

Turbidity / Bump

Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
0826	ST	0	DI	-0.3	0.0	1043	1053	3.1
0829	↓	126	2012010230	78.7	126.0		1100	142.8

Model: YSI PRO DSS   Calibration Location: MA-06.

Rental ID: SONDE #46868   METER #034544

Bump @ MA-01

Record date, time, and calibration analyst's name as you calibrate.

Record Lot # of each calibration solution.

Record temperature of pH solutions.

Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: The Pro DSS is superior.

Sampling Station ID: FU-01   **Date:** 6/9/2021   **Time:** 1057

Field Personnel: John Pellegrino and Agrima Poudel   **GPS Coordinates:** 39.15013 (Lat.) -76.66172 (Long.)

Weather Conditions:

Ambient Air Temperature: 82   °F Weather: Partly Cloudy, Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____ 0.00 inches   Type: _____ Rain   _____ Snow   _____ Mix

Day of Sampling: _____ 0.01 inches   Type: __X__ Rain   _____ Snow   _____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.84   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): _____ 1.29   feet   _____ High   _____ Low   _X_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear, fast moving. Lots of spiderwebs near sampling location. Lots of vegetation near sampling location. Wetland-like conditions.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	18.5	8.29	0.190	3.60	6.93	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: *FU01-20210607   **Time Collected:** 1102 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No___ Sample ID N/A   Field Blank (Yes/No) No

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-02　　　　　　　　　　　　　　**Date:** 6/9/2021　　　　**Time:** 1031

Field Personnel: John Pellegrino and Agrima Poudel　　　　　　**GPS Coordinates: 39.16994 (Lat.) -76.63152 (Long.)**

Weather Conditions:

Ambient Air Temperature: __83__ °F　Weather: Partly Cloudy, Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00__ inches　　Type: ____ Rain　_____ Snow　____ Mix

Day of Sampling:　　　　　　　_____0.01__ inches　　Type: __X__ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　___6.84___ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ___1.39__ feet　____ High　____ Low　__X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving. Lots of vegetation surrounding sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	18.1	8.53	0.302	4.49	7.04	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: *FU02-20210607　　　　**Time Collected:** 1036 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No　　Sample ID N/A　　　　　Field Blank (Yes/No) No

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-03   **Date:** 6/9/2021   **Time:** 1005

Field Personnel: John Pellegrino and Agrima Poudel   **GPS Coordinates: 39.17152 (Lat.) -76.62697 (Long.)**

Weather Conditions:

Ambient Air Temperature: 83____ °F   Weather: Partly cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: 0.01 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.84 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.47 feet   ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear, fast moving water. Lots of vegetation obstructing sampling location access. Transient encampment observed across bank.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	18.5	8.54	0.435	4.62	7.37	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: *FU03-20210607   **Time Collected:** 1016 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-04　　　　　　　　　　　　　　　　**Date:** 6/9/2021　　　**Time:** 0951

Field Personnel: John Pellegrino and Agrima Poudel　　　　**GPS Coordinates: 39.17770 (Lat.) -76.62106 (Long.)**

Weather Conditions:

Ambient Air Temperature: 82　　°F　Weather: Sunny, cloudy

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: 　　0.00　inches　　Type: ____ Rain　_____ Snow　____ Mix

Day of Sampling: 　　　　0.01　inches　　Type: ____ Rain　_____ Snow　____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):　　　6.84　cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): 　1.58　feet　____ High　____Low　_X_ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast moving water. Lots of vegetation observed near sampling location. Lots of wildlife observed near sampling location (dragonflies).

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	18.8	8.72	0.351	5.52	7.20	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: *FU04-20210607　　　**Time Collected:** 0953/ 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No　　Sample ID N/A　　　　　Field Blank (Yes/No) No

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Sampling Station ID: FU-05   **Date:** 6/9/2021   **Time:** 0918

Field Personnel: John Pellegrino and Agrima Poudel   **GPS Coordinates: 39.18275 (Lat.) -76.61593 (Long.)**

Weather Conditions:

Ambient Air Temperature: 81____ °F Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: 0.01 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____6.84   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.7   feet ____ High ____Low __X__ Ebb

(Low Flow (Baseflow) Sample) / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is clear and fast moving. Sounds of wildlife nearby (birds). Lots of vegetation._____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	18.0	8.61	0.338	5.32	7.14	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: * FU05-20210607   **Time Collected:** 0927 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A_____   Field Blank (Yes/No) No_____

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: FU-06   **Date:** 6/9/2021   **Time:** 0900

Field Personnel: John Pellegrino and Agrima Poudel   **GPS Coordinates: 39.18181 (Lat.) -76.60700 (Long.)**

Weather Conditions:

Ambient Air Temperature: 81 °F   Weather: Sunny, clear

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____ 0.00 inches   Type: ____ Rain _____ Snow ____ Mix

Day of Sampling: _____ 0.01 inches   Type: ____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____ 6.84 cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____ 1.81 feet ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Lots of vegetation, water is moderately flowing and slightly cloudy. Transient encampments on opposite bank, and adjacent to sampling

location. Some trash observed around sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-9-2021, 0851	22.9	8.69	3.720	12.80	6.76	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: *FU06-20210607   **Time Collected:** 0903 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) Yes *FUBLK-20210607 0910

* incorrect date was recorded on the Chain of Custody; laboratory report reflects accurate date of collection.

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-01   **Date:** 6/10/2021   **Time:** 1025

Field Personnel: John Pellegrino and Sara Tolnay   GPS Coordinates: **39.13693** (Lat.) **-76.61356** (Long.)

Weather Conditions:

Ambient Air Temperature: 83____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01 inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.08 inches   Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.52   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.46   feet ___ High ____Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. Some suspended solids._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	19.0	8.09	0.344	5.11	7.07	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA01-20210610**   **Time Collected:** 1030 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-02　　　　　　　　　　　　　　　　　　**Date:** 6/10/2021　　　**Time:** 1005

Field Personnel: John Pellegrino and Sara Tolnay　　　　**GPS Coordinates: 39.14233 (Lat.) -76.60846 (Long.)**

Weather Conditions:

Ambient Air Temperature: 83 　　°F　Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches　　Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling:　　　　　　　_0.08_ inches　　Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500): _____6.84_ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): __1.57_ feet ___ High ____Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample 　　　(refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Slow moving, clear water. Floating sediment and some suspended solids observed. Transient encampments observed upstream.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	19.1	4.46	0.342	7.10	7.06	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA02-20210610　　　　**Time Collected:** 1000 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) No　Sample ID N/A　　　　Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-03   **Date:** 6/10/2021   **Time:** 0950

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14378 (Lat.) -76.60640 (Long.)**

Weather Conditions:

Ambient Air Temperature: 77____ °F   Weather: _Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches   Type: ___X___ Rain _____ Snow ____ Mix

Day of Sampling: 0.08_ inches   Type: ___X___ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____6.84____ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.6___ feet ____ High ____ Low __X__ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Water is mostly clear and slow moving. Some suspended solids observed._____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	19.2	5.38	0.370	6.18	7.20	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA03-20210610   **Time Collected:** 0953 / 0.2 meters

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-04   **Date:** 6/10/2021   **Time:** 0927

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14841 (Lat.) -76.60388 (Long.)**

Weather Conditions:

Ambient Air Temperature: 77____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01 inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: 0.08 inches   Type: _____ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.84   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.7   feet __X__ High _____Low ___ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Slow moving, murky water. Strong organic odor. Water is brownish-yellow in color._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	20.2	2.66	0.376	29.19	7.03	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA04-20210610   **Time Collected:** 0932 / 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) Yes____ Sample ID MADP-20210610_____ Field Blank (Yes/No) No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-05   **Date:** 6/10/2021   **Time:** 0910

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.14882 (Lat.) -76.60143 (Long.)**

Weather Conditions:

Ambient Air Temperature: 74____ °F   Weather: Sunny_____

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches   Type: __X__ Rain _____ Snow ____ Mix

Day of Sampling: ____0.08_ inches   Type: __X__ Rain _____ Snow ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   _____6.84___ cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680): ____1.78__ feet __X__ High ____Low ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

Clear and fast-moving water. Transient encampments observed upstream of monitoring station._____

_____

_____

_____

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	22.4	5.86	0.514	12.89	7.37	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: **MA05-20210610**   **Time Collected:** 0910/ 0.3 meters_____

QA/QC samples: Duplicate Sample (Yes/No) _No_   Sample ID _N/A_____   Field Blank (Yes/No) _No_____

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Field Data Sheet

Sampling Station ID: MA-06   **Date:** 6/10/2021   **Time:** 0850

Field Personnel: John Pellegrino and Sara Tolnay   **GPS Coordinates: 39.15116 (Lat.) -76.60172 (Long.)**

Weather Conditions:

Ambient Air Temperature: 76   °F   Weather: Sunny

Precipitation Data (obtain BWI data from https://w2.weather.gov/climate/index.php?wfo=lwx):

Past 72 hours prior to sampling: _____0.01_ inches   Type: __X__ Rain   _____ Snow   ____ Mix

Day of Sampling: 0.08 inches   Type: __X__ Rain   _____ Snow   ____ Mix

Flow Determination:

USGS Gage Data (obtain from https://waterdata.usgs.gov/usa/nwis/uv?01589500):   6.84   cfs

Tide Level (obtain from https://tidesandcurrents.noaa.gov/stationhome.html?id=8574680):   1.85   feet   __X__ High   ____ Low   ____ Ebb

Low Flow (Baseflow) Sample / High Flow (Storm Event) sample   (refer to tables on back and circle one)

Site Condition Observations (note things such as unusual sampling conditions, algal blooms, accumulated debris, presence of transient encampments, congregations or evidence of avian or other wildlife, stream water characteristics [color, turbidity, odor, flow, etc.]):

High water level, slight sewage odor at sampling location.

FIELD MEASUREMENTS

Instrument ID	Last Calibration (Date/Time)	Temp (°C)	DO (mg/L)	Specific Cond. (mS/cm)	Turbidity (NTUs)	pH (SU)	Chlorine (mg/L)
YSI Pro DSS #44514, 045809	6-10-2021, 0830	23.0	0.98	2.740	12.99	6.77	N/A

BACTERIA SAMPLE COLLECTION

Sample ID: MA06-20210610   **Time Collected:** 0855 / 0.3 meters

QA/QC samples: Duplicate Sample (Yes/No) No   Sample ID N/A   Field Blank (Yes/No) No

Flow Determination Threshold Rates

Monitoring Point Name	High Flow Threshold (cfs)	Low Flow threshold (cfs)
FU-1	> 18.70	<= 18.70
FU-2	> 18.70	<= 18.70
FU-3	> 18.70	<= 18.70
FU-4	> 18.70	<= 18.70
FU-5	> 18.70	<= 18.70
MA-1	> 18.37	<= 18.37
MA-2	> 18.37	<= 18.37
MA-3	> 18.37	<= 18.37
MA-4	> 18.37	<= 18.37
MA-5	> 18.37	<= 18.37

Tidal Monitoring Points Average High/Low Tide

Monitoring Point Name	Average High Tide (feet)	Average Low Tide (feet)
FU-6	1.37	0.22
MA-6	1.37	0.22

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

	pH Standard						Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH	Temp (oC)	Date & Time	Result
7	9	21								
832	A. Poudel	4	06J204	3.69	4.00		1112	4.25
837	A. Poudel	7	06J538	6.96	7.01		1114	7.18
839	A. Poudel	10	96L64B	10.17	10.01		1115	10.12

	Conductivity						Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal	Temp (oC)	Date & Time	Result
841	A. Poudel	1.413	06I235	1.538	1.413		1110	1.387

	Turbidity						Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal	Temp (oC)	Date & Time	Result
845	A. Poudel	0	DI wat	-0.22	0		1116	-0.10
851	A. Poudel	126		125.83	126		1117	125.89

20M2047 0230

Model: PRODSS

Rental ID: 44514, 045809

Calibration Location: FU06

Bump FU01

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Anne Arundel County Bacteria TMDL Monitoring: Marley and Furnace Creek Watersheds

Multi-Probe Sonde Calibration Record

		pH Standard				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	pH Std	Lot #	Stab pH	Cal pH		Date & Time	Result
6/10 0830	ST & JP	4	065264	4.13	4.00		6/10 10:40	4.08
6/10 0832		7	065538	7.12	7.00		6/10 10:42	7.01
6/10 0834	↓	10	96648	10.11	10.00		6/10 10:44	9.99

		Conductivity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (mS/cm)	Lot #	SC (mS/cm) Stab	SC (mS/cm) Cal		Date & Time	Result
6/10 0838	ST	1.413	06L235	1.510	1.413		6/10 10:45	1.513

		Turbidity				Temp (oC)	Bump	
Date & Time	Calibration Analyst's Name	Std (NTU)	Lot #	NTU Stab	NTU Cal		Date & Time	Result
6/10 0844	ST	0	DI	0.19	0.00		6/10 10:46	0.10
6/10 0845	ST	126	20M20470830	119.88	126.0		6/10 10:47	120.21

Model: YSI PRODSS

Rental ID: 14514   045809
SONDE   METER

Calibration Location: NA06, 74° PARTLY CLOUDY

Record date, time, and calibration analyst's name as you calibrate.
Record Lot # of each calibration solution.
Record temperature of pH solutions.
Record whether it is a calibration or bump test. If it is a bump test, start on an empty row. Record the result under "Stab" columns and record N/A under "Cal" columns.

Comments: _____
_____
_____

Appendix C

Laboratory Reports and Chain of Custody Forms

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 49893.
Samples received by Martel.
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 7/8/20

Monday, July 13, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000001	FU06-20200708, FURNACE CREEK 06				07/08/2020 09:15
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		548	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000002	FU05-20200708, FURNACE CREEK 05				07/08/2020 09:40
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1050	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000003	FU04-20200708, FURNACE CREEK 04				07/08/2020 10:40
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1120	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000004	FU03-20200708, FURNACE CREEK 03				07/08/2020 11:00
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		613	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000005	FU02-20200708, FURNACE CREEK 02				07/08/2020 11:25
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1550	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
49893	000006	FU01-20200708, FURNACE CREEK 01				07/08/2020 11:45
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		770	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

Martel Laboratories_JDS_ **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 FAX 410-821-1054

AECOMG

Questions, comments or concerns? Contact your Martel
representative or email martel@martellabs.com

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07/13/2020

MARTEL

Certificate of Analysis
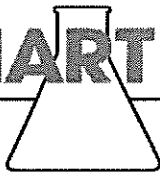
MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
49893	000007	FU-DUP-20200708, FURNACE CREEK DUP			07/08/2020 10:00

Compound	Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray	1550	mpn/100ml	SM Enterolert	1	07/08/2020 13:47 MA

SMPLOG03

Page 2 OF 2

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 FAX 410-821-1054 EMAIL: martel@martellabs.com

stdshdl.frx

Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

All samples tested were in acceptable condition, unless otherwise noted.
The results presented herein relate only to the samples or items tested.

Project Manager

Martel Laboratories _JDS_ Inc.

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 FAX 410-821-1054

AECOMG

Questions, comments or concerns? Contact your Martel representative or email martel@martellabs.com

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07/13/2020

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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Martel Log # __49893__   Client Code __AECOH G__

Sampler __Pellegrino__

Client Name/Phone/FAX: __AECOH / 301-820-3488 / 301-820-3000__

Project Name/# __## Co Entero__

Client Address: __12420 Milestone Center Dr Suite 150 Germantown, MD 20876__

Contract/P.O Number __6063047__

Client Email Address:

Sample Turnaround Time __STANDARD__

Station No./ Sample ID	Station Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-20200708	Furnace Creek - 06	W	Steril bottle - flip top	1	7/8/20	0715	IDDEX Enterolert
FU05-20200708	Furnace Creek - 05	W		1	7/8/20	0740	
FU04-20200708	Furnace Creek - 04	W		1	7/8/20	1040	
FU03-20200708	Furnace Creek - 03	W		1	7/8/20	1100	
FU02-20200708	Furnace Creek - 02	W		1	7/8/20	1125	
FU01-20200708	Furnace Creek - 01	W		1	7/8/20	1145	
FU-Dup 20200708	Furnace Creek	W	Steril bottle - flip top	1	7/8/20	1000	IDDEX Enterolert

Transferred by:	Date 7/8	Time 1320	Received by:		
Transferred by:	Date	Time	Received by:		
Transferred by:	Date	Time	Received by:		

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 49927.
Samples received by Martel.
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 7/9/20

Monday, July 13, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000001	MA06-20200709, MARLEY CREEK 06					07/09/2020 08:50
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		1050	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000002	MA05-20200709, MARLEY CREEK 05					07/09/2020 09:10
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000003	MA04-20200709, MARLEY CREEK 04					07/09/2020 09:28
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		1300	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000004	MA03-20200709, MARLEY CREEK 03					07/09/2020 10:15
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		1990	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000005	MA02-20200709, MARLEY CREEK 02					07/09/2020 10:30
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
49927	000006	MA01-20200709, MARLEY CREEK 01					07/09/2020 11:20
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		1550	mpn/100ml	SM Enterolert	1		07/09/2020 13:32 MA

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07/13/2020

Certificate of Analysis

Martel Laboratories _JDS_ Inc.

SMPLOG03

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Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

All samples tested were in acceptable condition, unless otherwise noted.
The results presented herein relate only to the samples or items tested.

Project Manager

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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Martel Log # 99927   Client Code __AECOH G__

Sampler: __Pellegrino__

Project Name/#: __AA Co Endero__

Contract/P.O Number: __60634097__

Client Name/Phone/FAX: AECOM / 301-820-3428 / 301-820-3000

Client Address: 12420 Milestone Center Drive, Suite 150, Germantown, MD 20874

Client Email Address: John.pellegrino@aecom.com

Station No./ Sample ID	Station Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
HA06-20200709	Marley Creek 06	W	Steri bottle- flip top	1	7/9/20	0850	IDDEX Enterolest
HA05-20200709	Marley Creek 05	W		1	7/9/20	0910	
HA04-20200709	Marley Creek 04	W		1	7/9/20	0728	
MA03-20200709	Marley Creek 03	W		1	7/9/20	1015	
MA02-20200709	Marley Creek 02	W		1	7/9/20	1030	
MA01-20200709	Marley Creek 01	W	↓	1	7/9/20	1120	↓

Transferred by: _Rena Dubroleus_   Received by: _____   Date 7/9/20   Time 1235

Transferred by: _____   Received by: _____   Date   Time

Transferred by: _____   Received by: _____   Date   Time

Cooler Receipt Information (**LAB USE ONLY**)   temp.= __6.0__
Received on ice/ice packs? - (Yes)/No   If No, explain
Sample containers pres'd? (Yes)/No
Custody Seal present/intact? - Yes/No (N/A)

Initials: __QQ__   Date: __7|9__

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 50335.
Samples received by Martel.
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 8/12/20

Monday, August 17, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000001	FU06-20200812, FURNACE CREEK 06					08/12/2020 11:20
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		866	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000002	FU05-20200812, FURNACE CREEK 05					08/12/2020 11:40
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		866	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000003	FU04-20200812, FURNACE CREEK 04					08/12/2020 12:25
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		921	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000004	FU03-20200812, FURNACE CREEK 03					08/12/2020 12:50
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		345	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000005	FU02-20200812, FURNACE CREEK 02					08/12/2020 13:12
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1050	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50335	000006	FU01-20200812, FURNACE CREEK 01					08/12/2020 13:35
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		326	mpn/100ml	SM Enterolert		1	08/12/2020 15:03 MA

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Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

All samples tested were in acceptable condition, unless otherwise noted.
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_____
Project Manager

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # S0235 **Client Code** AECOM 6

Client Name/Phone AECOM / 301-820-3488 / 301-820-3000

Client Address 12420 Hixestone Center Drive, Suite 150 Germantown MD 20874

E-mail Address aprima.Poudal @ aecom.com

Sampler G. Dai + R. Durborow

Project #/Name AA Co. Entero

Contract/P.O # 4063 6047

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-2820812	Furnace Creek 06	W	Steril bottle--fip +or	1	8/12/20	1120	IDEXX Enterolert
FU05-2820812	Furnace Creek 05			1	8/12/20	1140	
FU04-2820812	Furnace Creek 04			1	8/12/20	1225	
FU03-2820812	Furnace Creek 03			1	8/12/20	1250	
FU02-2820812	Furnace Creek 02			1	8/12/20	1312	
FU01-2820812	Furnace Creek 01			1	8/12/20	1335	

Transferred by: Grace Dai	Received by:	Date 8/12/20	Time 1442	**Cooler Receipt Information (LAB USE ONLY)**
Transferred by:	Received by:	Date	Time	Received on ice/blue ice? - Yes/No IR temp = 6
Transferred by:	Received by:	Date	Time	Sample containers pres'd? - Yes/No If No, explain

Custody Seal present? - Yes/No   Intact - Yes/No

Initials: ___   Date: 8/12

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 50405.
Samples received by Martel.
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 8/14/20

Monday, August 17, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000001	MA06-20200814, MARLEY CREEK 01					08/14/2020 09:16
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		866	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000002	MA05-20200814, MARLEY CREEK 02					08/14/2020 09:38
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1120	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000003	MA04-20200814, MARLEY CREEK 03					08/14/2020 09:58
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		2420	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000004	MA03-20200814, MARLEY CREEK 04					08/14/2020 10:17
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		770	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000005	MA02-20200814, MARLEY CREEK 05					08/14/2020 10:38
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		1550	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50405	000006	MA01-20200814, MARLEY CREEK 06					08/14/2020 11:17
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert		1	08/14/2020 12:54 MA

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08/17/2020

MARTEL

Certificate of Analysis

Compound	Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray	1120	mpn/100ml	SM Enterolert	1	08/14/2020 12:54 MA

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Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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Project Manager

Martel Laboratories_JDS_ **Inc.**

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08/17/2020

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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Martel Log # **SD 405**   Client Code **AECOM G**

Sampler: **A. Buell & L. Darboron**

Client Name/Phone/FAX: **AECOM/301-820-3498/ 301-820-3000**

Project Name/#: **AA Co. Enters**

Client Address: **12420 Milestone Center Drive, Suite 150, Germantown, MD 20876**

Contract/P.O Number: **40663q0q4**

Client Email Address: **aqrima.poudel@aecom.com**

Sample Turnaround Time

Station No./ Sample ID	Station Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
HA06-2020814	Harley Creek 01	W	Steril bottle- flip top	1	8/14/20	9:10	IDEX Enterolert
HA05-2020814	Harley Creek 02	W		1		9:38	
HA04-2020814	Harley Creek 03	W		1		9:58	
HA05-2020814	Harley Creek 04	W		1		10:17	
HA02-2020814	Harley Creek 05	W		1		10:38	
HA01-2020814	Harley Creek 04	W	→	1	→	11:17	→
MADY-2020814	MARLEY Creek DP	W		1		9:36	

		Date	Time			Date	Time
Transferred by:	Received by:	8/14	1230				
Transferred by:	Received by:	Date	Time				
Transferred by:	Received by:	Date	Time				

Transferred by: 8/14 12:25

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 50738.
Samples received on 9/9/20
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 9/9/20

Tuesday, September 15, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000001	FU01-20200909 FURNACE CREEK 01					09/09/2020 11:35
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		56	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000002	FU02-20200909 FURNACE CREEK 02					09/09/2020 11:12
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		326	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000003	FU03-20200909 FURNACE CREEK 03					09/09/2020 10:44
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		206	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000004	FU04-20200909 FURNACE CREEK 04					09/09/2020 10:23
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		461	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000005	FU05-20200909 FURNACE CREEK 05					09/09/2020 09:42
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		517	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
50738	000006	FU06-20200909 FURNACE CREEK 06					09/09/2020 08:42
Compound		Test Value	Test Unit	Method		Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		727	mpn/100ml	SM Enterolert		1	09/09/2020 13:36 MA

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09/15/2020
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Notes and references:

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the Examination of Water and Wastewater", American Public Health Association, American Water Works Association,
and Water Environment Federation. The results apply to the samples as received.

All samples tested were in acceptable condition, unless otherwise noted.
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Project Manager

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories JDS Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • Martel@Martellabs.com

Martel Log # __S0738__ Client Code __AECOM G__ Sampler __J. PELLEGRINO__

Client Name/Phone/FAX: __AECOM / 301-820-3498__ Project Name/# __AA Co ENTERO__

Client Address: __17410 MILESTONE CENTER DR. GERMANTOWN MD__ Contract/P.O Number __60636047__

Client Email Address: __agrima.poudel@aecom.com CC: john.pellegrino@aecom.com__ Sample Turnaround Time

Station No./ Sample ID	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU01- 20200909 FURNACE CREEK 01	W	FLIPTOP PLASTIC	1	9/9	1135	IDEXX ENTEROLERT
FU02- 20200909 02			1		1112	
FU03- 20200909 03			1		1044	
FU04- 20200909 04			1		1023	
FU05- 20200909 05			1		0942	
FU06- 20200909 06			1		0942	

Transferred by: _JP_ Received by: _____ Date 9/9 Time 1300

Cooler Receipt Information (**LAB USE ONLY**)
Received on Ice/ice packs? - Yes/No   temp.= 10-0
Sample containers pres'd? - Yes/No   if No, explain
Custody Seal present/intact? - Yes/No   N/A
Initials: OC   Date: 9/9/20

Transferred By: _____ Received by: _____ Date ___ Time ___

Transferred by: _____ Received by: _____ Date ___ Time ___

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Janet Frey/Agrima Poudel

Report for Lab No: 50786.
Samples received on 9/11/20
P.O. Number: 115488
Project Identification: #60636047, AA County Entero - 9/11/20

Tuesday, September 15, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000001	MA01-20200911, MARLEY CREEK 01				09/11/2020 12:00
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000002	MA02-20200911, MARLEY CREEK 02				09/11/2020 11:17
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000003	MA03-20200911, MARLEY CREEK 03				09/11/2020 10:42
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000004	MA04-20200911, MARLEY CREEK 04				09/11/2020 10:07
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000005	MA05-20200911, MARLEY CREEK 05				09/11/2020 09:43
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000006	MA06-20200911, MARLEY CREEK 06				09/11/2020 09:20
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

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09/15/2020

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MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000007	MADP-20200911, MARLEY CREEK DUP				09/11/2020 09:38
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		>=2420	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
50786	000008	MABK-20200911, MARLEY CREEK BLNK				09/11/2020 08:56
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		<1	mpn/100ml	SM Enterolert	1	09/11/2020 14:13 MA

SMPLOG03

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1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 FAX 410-821-1054 EMAIL: martel@martellabs.com

stdshdl.frx

Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation. The results apply to the samples as received.

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The results presented herein relate only to the samples or items tested.

Project Manager

Martel Laboratories JDS **Inc.**

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AECOMG

Questions, comments or concerns? Contact your Martel representative or email martel@martellabs.com

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09/15/2020

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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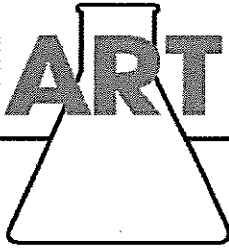
MARTEL Log # S0786   **Client Code** AECOM G

Sampler J.P

Client Name/Phone AECOM / 301-820-3488 / 240-401-0277

Project #/Name AA Co BNBRO

Client Address 17140 MILESTONE CENTER DR, SUITE 150
GERMANTOWN, MD

Contract/P.O # 60636047

E-mail Address agrima.powell@aecom.com
CC: john.pellegrino@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA01 -2020091|	MALLEY CREEK 01	W	FLIP TOP PLASTIC	1	9/11	1200	IDEXX ENTEROLERT
MA02 -2020091|	20			1		1117	
MA03 -2020091|	03			1		1042	
MA04 -2020091|	04			1		1007	
MA05 -2020091|	05			1		0943	
MA06 -2020091|	06			1		0920	
MA0P -2020091|	DP			1		0938	
MABK -2020091|	BLNK			1		0856	

Transferred by: _Viintra Mln_	Received by:	Date 09/11/20	Time 1341
Transferred by:	Received by:	Date	Time
Transferred by:	Received by:	Date	Time

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Manasa Damera/Agrima Poudel

Report for Lab No: 51212.
Samples received 10/14/20
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 10/14/20

Tuesday, October 20, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000001	FU01-20201014				10/14/2020 12:34
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		14	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000002	FU02-20201014				10/14/2020 11:53
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		75	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000003	FU03-20201014				10/14/2020 11:22
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		64	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000004	FU04-20201014				10/14/2020 10:32
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		248	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000005	FU05-20201014				10/14/2020 09:57
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		228	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000006	FU06-20201014				10/14/2020 09:25
Compound		Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray		980	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

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Page 1 OF 2
10/20/2020

MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51212	000007	FUDP-20201014				10/14/2020 09:00

Compound	Test Value	Test Unit	Method	Detection Limit	Analysis Date/Time/Initial
Enterococcus, Quantitray	921	mpn/100ml	SM Enterolert	1	10/14/2020 14:15 MA

SMPLOG03

Page 2 OF 2

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PH 410-825-7790 FAX 410-821-1054 EMAIL: martel@martellabs.com

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Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation. The results apply to the samples as received.

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Project Manager

Martel Laboratories _JDS_ Inc.

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10/20/2020

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MARTEL Log # 51212   **Client Code**

Sampler Agrima Poudel

Client Name/Phone AECOM / 51-2916-9547

Project #/Name AACO Enteo

Client Address 12420 Milestone Center Dr.

Contract/P.O #

E-mail Address agrima.poudel@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FW01	FW01 - 20201014	W	Enteo	1	10/14/20	1234	Enteo
FW02	FW02 - 20201014					1153	
FW03	FW03 - 20201014					1122	
FW04	FW04 - 20201014					1032	
FW05	FW05 - 20201014					957	
FW06	FW06 - 20201014					925	
FW07							
FWDP	FWDP - 20201014	↓	↓	↓	↓	900	↓

Transferred by: [signature] 10·14 @ 1334

Received by: [signature]   **Date** 10/14/20   **Time** 1334

Transferred by:

Received by: **Date**   **Time**

Transferred by:

Received by: **Date**   **Time**

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876

Attention: Manasa Damera/Agrima Poudel

Report for Lab No: 51231.
Samples received 10/15/20
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 10/15/20

Tuesday, October 20, 2020

FINAL
Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000001	MA01-20201015					10/15/2020 11:02
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		66	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000002	MA02-20201015					10/15/2020 10:25
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		52	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000003	MA03-20201015					10/15/2020 10:03
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		126	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000004	MA04-20201015					10/15/2020 09:39
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		326	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000005	MA05-20201015					10/15/2020 09:21
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		105	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
51231	000006	MA06-20201015					10/15/2020 08:54
Compound		Test Value	Test Unit	Method	Detection Limit		Analysis Date/Time/Initial
Enterococcus, Quantitray		921	mpn/100ml	SM Enterolert	1		10/15/2020 13:18 MA

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Certificate of Analysis

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PH 410-825-7790 FAX 410-821-1054 EMAIL: martel@martellabs.com

Notes and references:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation. The results apply to the samples as received.

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Project Manager

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # S1231   **Client Code** ACLOMG

Client Name/Phone AECOM/ 571-290-9547

Client Address 12420 Milestone Center Dr

E-mail Address agrima.Poudel@aecom.com

Sampler Agrima Poudel

Project #/Name

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA01	MA01-20201015	W	Entero	1	10/15/20	11:02	Entero Extended Dilution
MA02	MA02-20201015					10:25	
MA03	MA03-20201015					10:03	
MA04	MA04-20201015					9:39	
MA05	MA05-20201015					9:21	
MA06	MA06-20201015					8:54	

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Transferred by:	Received by:	Date	Time
Transferred by:	Received by:	Date	Time

MARTEL

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Tuesday, November 17, 2020
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 51580.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 11/11/20

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

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Notices:

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Measurement uncertainty for each listed test is available upon request.
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NODL2020   Page 1 of : `3`

Project Manager

MARTEL

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000001	FU06-20201111, FURNACE 06			11/10/2020 08:41
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		548	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000002	FU05-20201111, FURNACE 05			11/11/2020 09:09
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		143	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000003	FU04-20201111, FURNACE 04			11/11/2020 09:26
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		133	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000004	FU03-20201111, FURNACE 03			11/11/2020 09:43
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		150	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000005	FU02-20201111, FURNACE 02			11/11/2020 10:04
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		96	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION			Sample Date/Time
51580	000006	FU01-20201111, FURNACE 01			11/11/2020 10:24
Compound		Test Value	Test Unit	Method	Analysis Date/Time/Initial
Enterococcus, Quantitray		74	mpn/100ml	SM Enterolert	11/11/2020 13:29 MA

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PH 410-825-7790 martel@martellabs.com

AECOMG

Page 2

11/17/2020

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MARTEL Log # 5158U **Client Code** AECOMG

Sampler Agrima Poudel

Client Name/Phone Agrima Poudel/ 571.290.9547

Project #/Name Anne Arundel Bacteria Sampling

Client Address 12420 Milestone Center Dr.

Contract/P.O #

E-mail Address agrima.poudel@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-202011	Furnace 06 FU06-202011	W	sterile bottle hi/top	1	11/11/20	8:41	EDDX - enter extra dilution
FU05-202011	Furnace 05 FM05-202011					9:09	
FU04-202011	Furnace 04 FU04-202011					9:26	
FU03-202011	Furnace 03 FU03-202011					9:43	
FU02-202011	Furnace 02 FU02-202011					10:04	
FU01-202011	Furnace 01 FU01-202011					10:24	

Transferred by:	Received by:	**Date** 11/11/20 **Time** 11:30
Transferred by:	Received by:	**Date** **Time**
Transferred by:	Received by:	**Date** **Time**

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AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Tuesday, November 17, 2020
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 51597.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 11/12/20

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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NODL2020   Page 1 of : [3]

Project Manager

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000001	MA06-20201112, MARLEY CREEK 06				11/12/2020 08:30
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		13300	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000002	MA05-20201112, MARLEY CREEK 05				11/12/2020 08:51
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		14700	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000003	MA04-20201112, MARLEY CREEK 04				11/12/2020 09:07
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		16200	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000004	MA03-20201112, MARLEY CREEK 03				11/12/2020 09:34
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		21900	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000005	MA02-20201112, MARLEY CREEK 02				11/12/2020 10:14
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		13800	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000006	MA01-20201112, MARLEY CREEK 01				11/12/2020 10:43
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		10100	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
51597	000007	MADP-20201112, MARLEY CREEK DP				11/12/2020 09:24
Compound		Test Value	Test Unit	Method		Analysis Date/Time/Initial
Enterococcus, Quantitray		19600	mpn/100ml	SM Enterolert		11/12/2020 14:20 MA

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PH 410-825-7790 martel@martellabs.com

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11/17/2020

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MARTEL Log # 51597   Client Code AECOMG
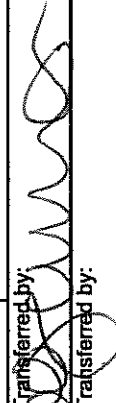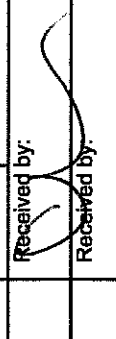
Client Name/Phone AEIOM151129005AT

Client Address 12420 Milestone center Dr

E-mail Address aayima.powdel @ aecom.com

Sampler Aayima Powdel

Project #/Name Anne Arundel bacteria sampling

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA06-2020112	Marley creek 06	W	string water	1	11/12/20	850	EDDX enterocunt
MA05-2020112	Marley creek 05		bottle flip TOP			851	
MA04-2020112	Marley creek 04					907	
MA03-2020112	Marley creek 03					951	
MA02-2020112	Marley creek 02					1014	
MA01-2020112	Marley creek 01					1045	
MADP-2020112	Marley creek DP					924	

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Transferred by:	Received by:	Date	Time

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Tuesday, December 15, 2020
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 51906.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 12/9/20

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

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LOQPQL2020   Page 1 of : [3]   Project Manager

MARTEL NO.
51906   000001

CLIENT SAMPLE IDENTIFICATION
FUBK-20201209, FURNACE 06

Sample Date/Time
12/09/2020 08:00

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	<1	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000002

CLIENT SAMPLE IDENTIFICATION
FU01-20201209, FURNACE 01

Sample Date/Time
12/09/2020 11:28

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	8	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000003

CLIENT SAMPLE IDENTIFICATION
FU02-20201209, FURNACE 02

Sample Date/Time
12/09/2020 10:55

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	15	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000004

CLIENT SAMPLE IDENTIFICATION
FU03-20201209, FURNACE 03

Sample Date/Time
12/09/2020 10:32

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	19	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000005

CLIENT SAMPLE IDENTIFICATION
FU04-20201209, FURNACE 04

Sample Date/Time
12/09/2020 10:02

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	60	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000006

CLIENT SAMPLE IDENTIFICATION
FU05-20201209, FURNACE 05

Sample Date/Time
12/09/2020 09:30

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	57	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

MARTEL NO.
51906   000007

CLIENT SAMPLE IDENTIFICATION
FU06-20201209, FURNACE 06

Sample Date/Time
12/09/2020 08:59

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	63	mpn/100ml	SM Enterolert	1	12/09/2020 13:50 MA

Martel Laboratories *JDS* **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790   martel@martellabs.com

AECOMG

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12/15/2020

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories JDS Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # 519106   **Client Code** AECOM5

Field	Value
Client Name/Phone	AECOM / 240 404 0277 agrima.powell@aecom.com;
Client Address	John.Pellegrino@aecom.com
E-mail Address	12420 MILESTONE CENTER DR, GROWN, MD

Sampler	JOHN PELLEGRINO
Project #/Name	ANNE ARUNDEL BACTERIA SAMPLING
Contract/P.O #	60636047
Sample Turnaround Time	

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FURK-20201209	FURNACE 06	W	STERILE BOTTLE FLIP TOP	1	12/9/20	0800	IDEXX ENTEROLERT
FU01-20201209	01					1128	
FU02-20201209	02					1055	
FU03-20201209	03					1001	
FU04-20201209	04					1007	
FU05-20201209	05					0930	
FU06-20201209	06					0859	

Transferred by:	Received by:	Date 12/9/20	Time 1135
Transferred by:	Received by:	Date	Time 1230
Transferred by:	Received by:	Date	Time

MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Tuesday, December 15, 2020

Certificate of Analysis
FINAL

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Project Information:

Report for Lab No: 51934.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero – 12/10/20

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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LOQPQL2020   Page 1 of : | 3 | Project Manager

MARTEL NO. 51934 000001	CLIENT SAMPLE IDENTIFICATION MA06-20201210, MARLEY CREEK 06				Sample Date/Time 12/10/2020 09:10
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	387	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000002	CLIENT SAMPLE IDENTIFICATION MA05-20201210, MARLEY CREEK 05				Sample Date/Time 12/10/2020 09:38
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	19	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000003	CLIENT SAMPLE IDENTIFICATION MA04-20201210, MARLEY CREEK 04				Sample Date/Time 12/10/2020 09:58
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	172	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000004	CLIENT SAMPLE IDENTIFICATION MA03-20201210, MARLEY CREEK 03				Sample Date/Time 12/10/2020 10:40
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	173	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000005	CLIENT SAMPLE IDENTIFICATION MA02-20201210, MARLEY CREEK 02				Sample Date/Time 12/10/2020 11:02
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	248	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000006	CLIENT SAMPLE IDENTIFICATION MA01-20201210, MARLEY CREEK 01				Sample Date/Time 12/10/2020 11:33
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	64	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

MARTEL NO. 51934 000007	CLIENT SAMPLE IDENTIFICATION MADP-20201210, MARLEY CREEK DUP				Sample Date/Time 12/10/2020 09:10
Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	116	mpn/100ml	SM Enterolert	1	12/10/2020 15:21 MA

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AECOMG

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12/15/2020

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # 519394   **Client Code** _____

Client Name/Phone AECom   **Sampler** John Pellegrino

Client Address 12430 Milestone Center Dr. Germantown, MD   **Project #/Name** Anne Arundel Bacteria Sampling

E-mail Address John.pellegrino@aecom.com   **Contract/P.O #**

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA-06-2020120	Marley Creek 06	W	Sterile bottle w/ Na₂S₂O₃	1	12/10/20	9:10	Iddex Enterolert
MA-05-2020120	Marley Creek 05			1		9:38	
MA-04-2020120	Marley Creek 04			1		9:58	
MA-03-2020120	Marley Creek 03			1		10:40	
MA-02-2020120	Marley Creek 02			1		11:02	
MA-01-2020120	Marley Creek 01			1		11:33	
MA DP 202012V	MC DUP						

Transferred by: _(signature)_   **Received by:** _(signature)_   **Date** 12/10/20   **Time** 1250

Transferred by: _____   **Received by:** _____   **Date** _____   **Time** _____

Transferred by: _____   **Received by:** _____   **Date** _____   **Time** _____

Cooler Receipt Information (LAB USE ONLY)
Received on ice/blue ice? - Yes/No   IR temp = S.S
Sample containers pres'd? - Yes/No   If No, explain
Custody Seal present? - Yes/No   Intact - Yes/No

Initials: QQ   Date: 12/10/20

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, January 18, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 52286.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 1/13/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

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Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000001	FU06-20210113 FURNACE CREEK 6					01/13/2021 09:06
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		23	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000002	FU05-20210113 FURNACE CREEK 5					01/13/2021 09:43
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		26	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000003	FU04-20210113 FURNACE CREEK 4					01/13/2021 10:02
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		29	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000004	FU03-20210113 FURNACE CREEK 3					01/13/2021 10:25
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		19	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000005	FU02-20210113 FURNACE CREEK 2					01/13/2021 10:47
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		39	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52286	000006	FU01-20210113 FURNACE CREEK 1					01/13/2021 11:09
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		41	mpn/100ml	SM Enterolert	1	01/13/2021 15:02 MA	

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01/18/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # 52286   **Client Code**

Client Name/Phone AECOM 51-296-9547

Client Address 12420 Milestone center Dr

E-mail Address agrima.povdel @ aecom.com

Sampler Agrima Povdel

Project #/Name

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-20210113	Furnace creek 6	W	120 flipbur Entero	1	11/13/21	906	Entero & dilution
FU05-20210113	Furnace creek 5					943	
FU04-20210113	Furnace creek 4					1002	
FU03-20210113	Furnace creek 3					1025	
FU02-20210113	Furnace creek 2					1047	
FU01-20210113	Furnace creek 1					1109	

		Date	Time
Transferred by:	Received by:	11/13/21	121 D
Transferred by:	Received by:	Date	Time
Transferred by:	Received by:	Date	Time

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, January 18, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 52308.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 1/14/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

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Notices:

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LOQPQL2020

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Project Manager

MARTEL NO.
52308   000001

CLIENT SAMPLE IDENTIFICATION
MA06-20210114 MARLEY CREEK 06

Sample Date/Time
01/14/2021 08:51

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	31	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000002

CLIENT SAMPLE IDENTIFICATION
MA05-20210114 MARLEY CREEK 05

Sample Date/Time
01/14/2021 09:16

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	20	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000003

CLIENT SAMPLE IDENTIFICATION
MA04-20210114 MARLEY CREEK 04

Sample Date/Time
01/14/2021 09:44

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	20	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000004

CLIENT SAMPLE IDENTIFICATION
MA03-20210114 MARLEY CREEK 03

Sample Date/Time
01/14/2021 10:25

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	53	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000005

CLIENT SAMPLE IDENTIFICATION
MA02-20210114 MARLEY CREEK 02

Sample Date/Time
01/14/2021 10:52

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	91	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000006

CLIENT SAMPLE IDENTIFICATION
MA01-20210114 MARLEY CREEK 01

Sample Date/Time
01/14/2021 11:33

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	37	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

MARTEL NO.
52308   000007

CLIENT SAMPLE IDENTIFICATION
MADP-20210114 MARLEY CREEK DP

Sample Date/Time
01/14/2021 09:06

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	19	mpn/100ml	SM Enterolert	1	01/14/2021 14:33 MA

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PH 410-825-7790 martel@martellabs.com

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01/18/2021

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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Martel Log # __S2308__   Client Code _____

Sampler __Agrima Poudel / Grace Dai__

Client Name/Phone/FAX: __AECOM Germantown__

Project Name/#: __Anne Arundel Sampling__

Client Address: _____

Contract/P.O Number _____

Client Email Address: __agrima.poudel@aecom.com__

Sample Turnaround Time _____

Station No./ Sample ID	Station Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA06-20210114	Marley creek 06	W	Enttro	1	1/14/21	851	Enttro EPA
MA05-20210114	Marley creek 05					916	
MA04-20210114	Marley creek 04					944	
MA03-20210114	Marley creek 03					1025	
MA02-20210114	Marley Creek 02					1052	
MA01-20210114	Marley creek 01	↓	↓	↓	↓	1133	
MA0P-20210114	Marley Creek DP					904	↓

Transferred by: Grace Dai	Received by:	Date 01/14/21	Time 1235
Transferred by:	Received by:	Date	Time
Transferred by:	Received by:	Date	Time

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: **Manasa Damera/Agrima Poudel**

Friday, February 19, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 52685.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 2/15/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

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MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000001	FU06-20210215, FURNACE CREEK 06				02/15/2021 10:58

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	31	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000002	FU05-20210215, FURNACE CREEK 05				02/15/2021 11:19

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	29	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000003	FU04-20210215, FURNACE CREEK 04				02/15/2021 11:37

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	19	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000004	FU03-20210215, FURNACE CREEK 03				02/15/2021 12:01

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	22	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000005	FU02-20210215, FURNACE CREEK 02				02/15/2021 12:23

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	20	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000006	FU01-20210215, FURNACE CREEK 01				02/15/2021 12:45

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	24	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52685	000007	FU-DP-20210215, FURNACE CREEK DUP				02/15/2021 10:38

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	36	mpn/100ml	SM Enterolert	1	02/15/2021 13:55 BJ

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1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

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02/19/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories _JDS_ Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # 52685   **Client Code** _____

Sampler JOHN PELLEGRINO

Client Name/Phone AECOM / 571 296 9547

Project #/Name Anne Arundel Bacteria Sampling

Client Address 12420 MILESTONE CENTER DR.

Contract/P.O # 60030047

E-mail Address agrima.poudel@aecom.com

Sample Turnaround Time _____

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-20210215	FURNACE CREEK 06	W	Sterile bottle Flip Top	1	02/15/2021	10:58	EDDX ENTERO/GET
FU05-20210215	FURNACE CREEK 05					11:19	
FU04-20210215	FURNACE CREEK 04					11:37	
FU03-20210215	FURNACE CREEK 03					12:01	
FU02-20210215	FURNACE CREEK 02	↓	↓	↓	↓	12:43	
FU01-20210215	FURNACE CREEK 01	↓	↓	↓	↓	12:45	
FU-DP-20210215	FURNACE CREEK DUP.	↓	↓	↓	↓	10:38	↓

✱ Sample No. ending # should be : 20210215, not 20200215.

Transferred by: _(signature)_ GENE IYH	Received by: _(signature)_	**Date** 02/15/21	**Time** 1332
Transferred by:	Received by:	Date	Time
Transferred by:	Received by:	Date	Time

Cooler Receipt Information (LAB USE ONLY)

Received on ice/blue ice? Yes/No   IR temp = S.S

Sample containers pres'd? Yes/No   If No, explain

Custody Seal present? - Yes/No   Intact - Yes/No

Initials: _(initials)_   Date: 2/15/21

Page 3

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Friday, February 19, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 52692.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 2/16/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

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LOQPQL2020

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Project Manager

MARTEL NO.
52692 000001

CLIENT SAMPLE IDENTIFICATION
MA06-02162021, MARLEY CREEK 06

Sample Date/Time
02/16/2021 08:42

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	3840	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

MARTEL NO.
52692 000002

CLIENT SAMPLE IDENTIFICATION
MA05-02162021, MARLEY CREEK 05

Sample Date/Time
02/16/2021 09:03

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	3890	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

MARTEL NO.
52692 000003

CLIENT SAMPLE IDENTIFICATION
MA04-02162021, MARLEY CREEK 04

Sample Date/Time
02/16/2021 09:17

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	921	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

MARTEL NO.
52692 000004

CLIENT SAMPLE IDENTIFICATION
MA03-02162021, MARLEY CREEK 03

Sample Date/Time
02/16/2021 09:52

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	1990	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

MARTEL NO.
52692 000005

CLIENT SAMPLE IDENTIFICATION
MA02-02162021, MARLEY CREEK 02

Sample Date/Time
02/16/2021 10:20

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	1990	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

MARTEL NO.
52692 000006

CLIENT SAMPLE IDENTIFICATION
MA01-02162021, MARLEY CREEK 01

Sample Date/Time
02/16/2021 10:56

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	2420	mpn/100ml	SM Enterolert	1	02/16/2021 14:00 BJ

Martel Laboratories *JDS* **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

AECOMG

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02/19/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories JDS Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # 52602   **Client Code**

Client Name/Phone AECOM 571-290-9547

Client Address 12420 Milestone Center Dr.

E-mail Address aarima.poudel@aecom.com

Sampler Aarima Poudel

Project #/Name Anne Arundel Bacteria Sampling

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA06-02162021	Marley creek 06	W	Sterile bottle, flip cap	1	2/16/21	8:42	EDDX entero
MA05-02162021	Marley creek 05	W			2/16/21	9:03	
MA04-02162021	Marley creek 04	W			2/16/21	9:17	Actual sample collection time was 0925 hrs
MA03-02162021	Marley creek 03	W			2/16/21	9:52	
MA02-02162021	Marley creek 02	W			2/16/21	10:20	
MA01-02162021	Marley creek 01	W			2/16/21	10:54	

Transferred by: Anne Bennal   **Received by:**   **Date** 2/16/21 **Time** 12:00

Transferred by: **Received by:**   **Date** **Time**

Transferred by: **Received by:**   **Date** **Time**

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AECOM
12420 Milestone Center Dr, Suite 150

Tuesday, March 16, 2021
Certificate of Analysis
FINAL

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Project Information:

Report for Lab No: 52968.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 3/10/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

Notices:

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All samples tested were in acceptable condition, unless otherwise noted.

LOQPQL2020   Page 1 of : [3]   Project Manager

MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000001	FU06-03102021, FURNACE CREEK 06					03/10/2021 09:30
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		50	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000002	FU05-03102021, FURNACE CREEK 05					03/10/2021 10:03
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		4	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000003	FU04-03102021, FURNACE CREEK 04					03/10/2021 10:18
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		2	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000004	FU03-03102021, FURNACE CREEK 03					03/10/2021 10:34
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		4	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000005	FU02-03102021, FURNACE CREEK 02					03/10/2021 ~~10:01~~ 11:01
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		14	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
52968	000006	FU01-03102021, FURNACE CREEK 01					03/10/2021 11:23
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		4	mpn/100ml	SM Enterolert	1	03/10/2021 13:49 MA	

Martel Laboratories JDS **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

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03/16/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories JDS Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # S2968   **Client Code** AECOM

Sampler J. PELLEGRINO

Client Name/Phone AECOM / 301-820-3408

Project #/Name AA CO ENTERO

Client Address 12420 MILESTONE CENTER DR.

Contract/P.O # (circled)

E-mail Address agrima.poudel@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU06-03102021	FURNACE CREEK 06 05	W	FLIPTOP PLASTIC	1	03/10/2021	0930	IDEXX ENTEROLERT
FU05-03102021	04			1		1003	
FU04-03102021	03			1		1018	
FU03-03102021	02			1		1034	
FU02-03102021	01			1		11:01	
FU01-03102021				1		11:23	

Transferred by: GRACE DAI

Received by:

Date 03/16/2021 **Time** 1300

Transferred by:

Received by:

Date **Time**

Transferred by:

Received by:

Date **Time**

Cooler Receipt Information (LAB USE ONLY)
Received on ice/blue ice? - Yes/No   IR temp = 5.5
Sample containers pres'd? - Yes/No   If No, explain
Custody Seal present? - Yes/No   Intact - Yes/No

Initials: QQ   **Date:** 3/10/21

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: **Manasa Damera/Agrima Poudel**

Tuesday, March 16, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 52994.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 3/11/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

Notices:

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All samples tested were in acceptable condition, unless otherwise noted.

LOQPQL2020   Page 1 of :   3

Project Manager

MARTEL

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000001	MA06-03112021, MARLEY CREEK 06				03/11/2021 09:12
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		36	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000002	MA05-03112021, MARLEY CREEK 05				03/11/2021 09:25
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		16	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000003	MA04-03112021, MARLEY CREEK 04				03/11/2021 09:43
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		10	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000004	MA03-03112021, MARLEY CREEK 03				03/11/2021 10:04
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		14	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000005	MA02-03112021, MARLEY CREEK 02				03/11/2021 10:17
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		31	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000006	MA01-03112021, MARLEY CREEK 01				03/11/2021 10:40
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		15	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000007	MA-DUP-03112021, MARLEY CREEK DUP				03/11/2021 09:35
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		8	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
52994	000008	MA-BLK-03112021, MARLEY CREEK BLK				03/11/2021 09:00
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		<1	mpn/100ml	SM Enterolert	1	03/11/2021 14:34 MA

Martel Laboratories _JDS_ **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

AECOMG

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03/16/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # 52099   **Client Code**

Sampler J. PELLEGRINO

Client Name/Phone AECOM 571-296-9547

Project #/Name AACO BACTERIA SAMPLING

Client Address 12420 MILESTONE CENTER DR

Contract/P.O #

E-mail Address agrima.pudul@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA06-03112021	MARLEY CREEK 06	W	BOTTLE FLIP TOP STERILE	1	03/11/2021	0912	1064 6000x ENTEROLERT
MA05-03112021	05					0925	
MA04-03112021	04					0943	
MA03-03112021	03					1004	
MA02-03112021	02					1017	
MA01-03112021	01					1040	
MA-Dup-03112021		→	→	→		0935	
MA-BLK-03112021		↓	↓	↓	↓	0900	↓

Transferred by: GRACE DAI	**Received by:**	Date 03/11/2021	Time 1157
Transferred by:	**Received by:**	Date	Time
Transferred by:	**Received by:**	Date	Time

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Tuesday, April 20, 2021
Certificate of Analysis
FINAL

Germantown, MD 20876
Attention: **Manasa Damera/Agrima Poudel**
Samples analyzed according to method requirements and QC exceptions available.
Project Information:

Report for Lab No: 53464.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 4/14/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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All samples tested were in acceptable condition, unless otherwise noted.

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Project Manager

MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000001	FU01-20210414					04/14/2021 10:36
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		11	mpn/100ml	SM Enterolert	1	04/14/2021 14:42 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000002	FU02-20210414					04/14/2021 10:12
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		24	mpn/100ml	SM Enterolert	1	04/14/2021 14:42 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000003	FU03-20210414					04/14/2021 09:51
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		44	mpn/100ml	SM Enterolert	1	04/14/2021 14:42 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000004	FU04-20210414					04/14/2021 09:25
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		73	mpn/100ml	SM Enterolert	2	04/14/2021 14:42 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000005	FU05-20210414					04/14/2021 08:55
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		84	mpn/100ml	SM Enterolert	1	04/14/2021 14:42 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
53464	000006	FU06-20210414					04/14/2021 08:45
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		127	mpn/100ml	SM Enterolert	1	04/14/2021 14:42 MA	

Martel Laboratories _JDS_ Inc.

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

AECOMG

Page 2
04/20/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories JDS Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # 53464   **Client Code**

Client Name/Phone AECOM

Client Address 12410 MILESTONE CENTER DR SUITE 150
GERMANTOWN, MD 20876

E-mail Address agrima.poudel@aecom.com

Sampler J DAUGHERTY

Project #/Name AA Co ENVIRO

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FU01-2021041114	FU-01	W	PULP TOP	1	4/14/21	1036	IDDEX ENTEROLERT W/DILUTION
FU02-2021041114	FU-02			1		1012	
FU03-2021041114	FU-03			1		0951	
FU04-2021041114	FU-04			1		0915	
FU05-2021041114	FU-05			1		0855	
FU06-2021041114	FU-06			1		0845	

Transferred by: S. TOLNAY

Received by: **Date** 4/14/21   **Time** 11:30

Transferred by: **Received by:**   **Date**   **Time**

Transferred by: **Received by:**   **Date**   **Time**

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Tuesday, April 20, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 53476.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 4/15/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

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LOQPQL2020   Page 1 of :   3

Project Manager

MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000001	MA-01-20210415		04/15/2021 10:42

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	326	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000002	MA-02-20210415		04/15/2021 10:19

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	387	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000003	MA-03-20210415		04/15/2021 10:05

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	365	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000004	MA-04-20210415		04/15/2021 09:30

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	1730	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000005	MA-05-20210415		04/15/2021 09:10

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	326	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000006	MA-06-20210415		04/15/2021 08:45

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	1410	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION		Sample Date/Time
53476	000007	MA-DP-20210415		04/15/2021 09:20

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	1810	mpn/100ml	SM Enterolert	1	04/15/2021 13:40 MA

Martel Laboratories_JDS_ **Inc.**

1025 Cromwell Bridge Road - Baltimore, Maryland 21286
PH 410-825-7790 martel@martellabs.com

AECOMG

Page 2

04/20/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Martel Laboratories *JDS* Inc. • 1025 Cromwell Bridge Road • Baltimore, MD 21286 • (410) 825-7790 • FAX (410) 821-1054 • martel@martellabs.com

MARTEL Log # 53476   Client Code

Client Name/Phone AECOM G

Client Address 12420 MILESTONE CENTER DR.

E-mail Address john.pellegrino@aecom.com

Sampler SARA TOLNAY

Project #/Name AA (o EUTERO

Contract/P.O # aarina.paceta@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA-01-20210415	MA-01	W	FLIP TOP PLASTIC	1	4/15/21	1042	ENTEROLERT w/DILUTIONS
MA-02-20210415	MA-02			1		1019	
MA-03-20210415	MA-03			1		1005	
MA-04-20210415	MA-04			1		0930	
MA-05-20210415	MA-05			1		0910	
MA-06-20210415	MA-06			1		0845	
MA-DP-20210415	MA-DP	↓	→	1	↓	0260	→

Transferred by: Sara Tolnay	**Received by:**	**Date** 4/15/21 **Time** 11:50
Transferred by:	**Received by:**	**Date** **Time**
Transferred by:	**Received by:**	**Date** **Time**

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, May 17, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 53814.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 5/12/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method are the responsibility of the client. Received dates are included in the chain of custody portion of the report.

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LOQPQL2020   Page 1 of :   3

Project Manager

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000001	FU01-20210512, FURNACE CREEK 01				05/12/2021 10:47
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		2	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000002	FU02-20210512, FURNACE CREEK 02				05/12/2021 10:18
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		86	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000003	FU03-20210512, FURNACE CREEK 03				05/12/2021 09:55
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		51	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000004	FU04-20210512, FURNACE CREEK 04				05/12/2021 09:30
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		184	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000005	FU05-20210512, FURNACE CREEK 05				05/12/2021 09:10
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		291	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000006	FU06-20210512, FURNACE CREEK 06				05/12/2021 08:45
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		276	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53814	000007	FUDP-20210512, FURNACE CREEK DP				05/12/2021 09:40
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		172	mpn/100ml	SM Enterolert	1	05/12/2021 13:51 MA

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Page 2
05/17/2021

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MARTEL Log # 53814   **Client Code** _____

Client Name/Phone AECOM G

Client Address 12420 MILESTONE CENTER DR, SUITE 150
GERMANTOWN, MD

E-mail Address axprima.poster@aecom.com; john.pellegrino@aecom.com

Sampler J. PELLEGRINO & S. TOLWAY

Project #/Name AA Co BACTERIA MONITORING

Contract/P.O #

Sample Turnaround Time

Sample No.	Sample Location		Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
PU01-2210512	FURNACE CREEK	01	W	FLIP TOP BOTTLE	1	5/12	1047	100EX ENTERO W/DILUTIONS
PU02-2210512		02			1		1018	
PU03-2210512		03			1		0955	
PU04-2210512		04			1		0930	
PU05-2210512		05			1		0910	
PU06-2210512		06			1		0845	
PU07-2210512	FURNACE CREEK				1		0940	

Transferred by: Sara Tolway Murphy   **Received by:**   **Date** 5/12/21   **Time** 11:50

Transferred by: **Received by:**   **Date**   **Time**

Transferred by: **Received by:**   **Date**   **Time**

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AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, May 17, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 53838.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 5/13/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method are the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

Notices:

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Measurement uncertainty for each listed test is available upon request.
The results presented herein relate only to the samples or items tested.
All samples tested were in acceptable condition, unless otherwise noted.

LOQPQL2020

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Project Manager

MARTEL

Certificate of Analysis

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000001	MA01-20210513, MARLEY CREEK 01				05/13/2021 10:35

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	291	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000002	MA02-20210513, MARLEY CREEK 02				05/13/2021 10:15

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	11500	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000003	MA03-20210513, MARLEY CREEK 03				05/13/2021 09:52

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	4710	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000004	MA04-20210513, MARLEY CREEK 04				05/13/2021 09:30

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	6020	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000005	MA05-20210513, MARLEY CREEK 05				05/13/2021 09:10

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	411	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
53838	000006	MA06-20210513, MARLEY CREEK 06				05/13/2021 08:45

Compound	Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray	2750	mpn/100ml	SM Enterolert	1	05/13/2021 13:37 MA

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05/17/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # 53838   **Client Code** _____

Client Name/Phone AECOM 6

Client Address 12410 MILESTONE CENTER DR. SUITE 150

E-mail Address agrima.padel@aecom.com

Sampler S. TALLAY + J. PELLEGRINO

Project #/Name AA 6 BACTERIA MONITORING

Contract/P.O # _____

Sample Turnaround Time _____

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA01-2021053	MALLOY CREEK 01	W	FLIP TOP BOTTLE	1	5/13	1035	IDEXX ENTERO w/ DILUTIONS
MA02-2021053	02			1		1015	
MA03-2021053	03			1		0952	
MA04-2021053	04			1		0930	
MA05-2021053	05			1		0910	
MA06-2021053	06			1		0845	

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Transferred by: **Received by:** **Date** **Time**

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, June 14, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 54157.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 6/9/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method are the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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All samples tested were in acceptable condition, unless otherwise noted.

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MARTEL

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MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000001	FU06-20210607, FURNACE CREEK 06					06/09/2021 09:03
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		2160	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000002	FU05-20210607, FURNACE CREEK 05					06/09/2021 09:27
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		1550	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000003	FU04-20210607, FURNACE CREEK 04					06/09/2021 09:53
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		1730	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000004	FU03-20210607, FURNACE CREEK 03					06/09/2021 10:16
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		816	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000005	FU02-20210607, FURNACE CREEK 02					06/09/2021 10:36
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		517	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000006	FU01-20210607, FURNACE CREEK 01					06/09/2021 11:02
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		461	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION					Sample Date/Time
54157	000007	FUBLK-20210607, FURNACE CREEK BLK					06/09/2021 09:10
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial	
Enterococcus, Quantitray		<1	mpn/100ml	SM Enterolert	1	06/09/2021 13:35 MA	

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06/14/2021

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MARTEL Log # 54157   **Client Code** AECOMG

Sampler Agrima Poudel

Client Name/Phone AECOM | 571-296-9547

Project #/Name Anne Arundel County

Client Address 12420 Milestone Center Dr. Suite 150

Contract/P.O #

E-mail Address agrima.poudel@aecom.com

Sample Turnaround Time

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
FW06-20210907	Furnace Creek 06	W	Sterile bottle, Flip Top	1	9/7/21 9TH	903	IDEXX Enterolert
FW05-20210907	Furnace Creek 05					927	
FW04-20210907	Furnace Creek 04					953	
FW03-20210907	Furnace Creek 03					1016	
FW02-20210907	Furnace Creek 02					1034	
FW01-20210907	Furnace Creek 01					1102	
FWBLK-20210907	Furnace Creek BLK					910	

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	Date	Time
	9/9/21	1200
Date	Time	
Date	Time	

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MARTEL

AECOM
12420 Milestone Center Dr, Suite 150

Germantown, MD 20876
Attention: Manasa Damera/Agrima Poudel

Monday, June 14, 2021
Certificate of Analysis
FINAL

Project Information:

Report for Lab No: 54193.
P.O. Number: 128358
Project Identification: #60636047, AA County Entero - 6/10/21

Samples received by Martel and the results apply to the samples as received. Martel is not responsible for sample collection or transportation to the laboratory. Sampling Plan and Sampling Method are the responsibility of the client. Received dates are included in the chain of custody portion of the report.

References and Important Notes:

40CFR136=U.S. "Code of Federal Regulations", Title 40, Protection of the Environment, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. SM="Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, and Water Environment Federation.

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LOQPQL2020   Page 1 of :   3

Project Manager

MARTEL

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000001	MA01-20210610, MARLEY CREEK 01				06/10/2021 10:30
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		613	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000002	MA02-20210610, MARLEY CREEK 02				06/10/2021 10:00
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		23600	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000003	MA03-20210610, MARLEY CREEK 03				06/10/2021 09:53
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		16700	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000004	MA04-20210610, MARLEY CREEK 04				06/10/2021 09:32
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		2310	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000005	MA05-20210610, MARLEY CREEK 05				06/10/2021 09:10
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		921	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000006	MA06-20210610, MARLEY CREEK 06				06/10/2021 08:55
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		2420	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

MARTEL NO.		CLIENT SAMPLE IDENTIFICATION				Sample Date/Time
54193	000007	MADP-20210610, MARLEY CREEK DP				06/10/2021 09:32
Compound		Test Value	Test Unit	Method	LOQ/PQL	Analysis Date/Time/Initial
Enterococcus, Quantitray		3450	mpn/100ml	SM Enterolert	1	06/10/2021 13:21 MA

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Page 2
06/14/2021

MARTEL CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

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MARTEL Log # a SHO 54193 **Client Code** _____

Sampler I. PELLEGRINO & STOWAY

Client Name/Phone AECOM a 4ln 240 409 0227

Project #/Name AA Co ENTERO JUNE 2021

Client Address 12426 MILESTONE CENTER DR, GERMANTOWN MD

Contract/P.O # _____

E-mail Address aurima.poule@aecom.com

Sample Turnaround Time _____

Sample No.	Sample Location	Matrix	Container Description/Preservation Status	# of Containers	Date	Time	Analyses Required/Comments
MA01-2021060	MACUDY CREEK 01	W	FLIP TOP BOTTLE	1	6/10	10:30	IDDEX ENTERO W/ DILUTIONS
MA02-2021060	02	W		1		10:05	
MA03-2021060	03	W		1		9:53	
MA04-2021060	04	W		1		9:32	
MA05-2021060	05	W		1		09:10	
MA06-2021060	06	W		1		08:55	
MA07-2021060	07	W		1		09:32	

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Transferred by: _____ **Received by:** _____ **Date** _____ **Time** _____

Transferred by: _____ **Received by:** _____ **Date** _____ **Time** _____

Page 3

Appendix D
Electronic Database

Appendix C

Rhode River Water Quality Monitoring – 2021 Summary

Bear Neck Creek/Rhode River

Annual Report 2021

Agreement #10652

Prepared for

Anne Arundel County Department of Public Works

Tammy Domanski, Director

AACC Environmental Center

1. **Introduction.**

Conversion of the Mayo Water Reclamation Facility (MWRF) from a treatment plant to a pumping station was completed late in 2017. The need to assess the impact on Rhode River water quality resulted in this study which has been conducted from late May through late August since 2017 by the Anne Arundel Community College Environmental Center. The conversion was predicted to significantly reduce nitrogen and phosphorous flow into the Rhode River and Chesapeake Bay in accordance with Chesapeake Bay TMDL reduction goals (Total Maximum Daily Load). Parameters measured include dissolved oxygen, conductivity, salinity, pH, clarity, suspended solids, ammonia, nitrate/nitrite, phosphate, and three forms of chlorophyll. In addition, enterococci levels were measured.
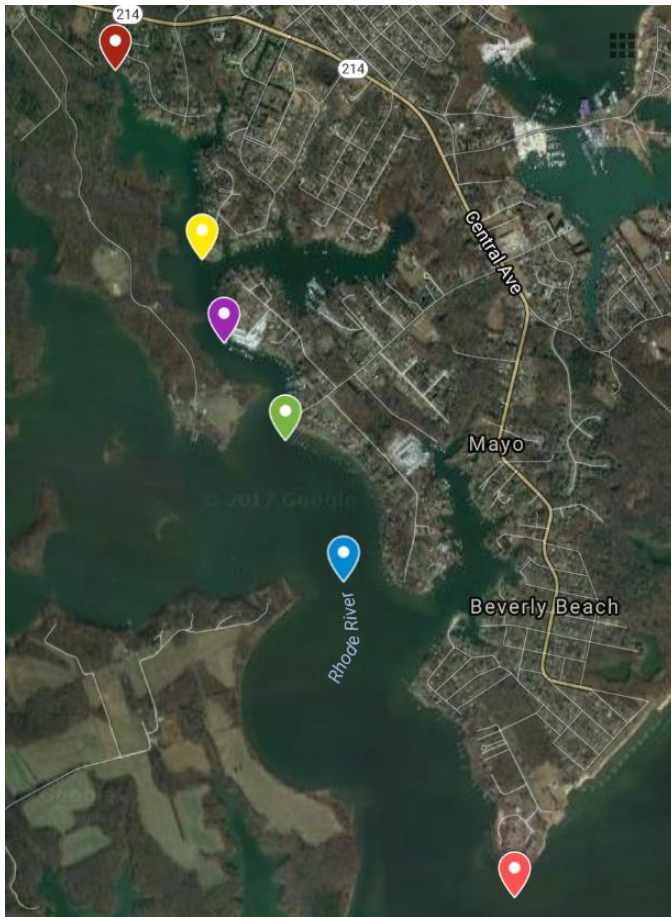
Figure 1. Sampling Sites.
Red marker= dock on West Shore Drive (WSH); Yellow marker=dock on Overhill Drive (OP); Purple Marker = midstream near Rhode Marina (RO3); Green marker= Carrs Wharf pier (CW); Blue marker= midstream between Locust Point and mouth of Cadle Creek (RO2); Orange marker= midstream near Mayo Facility outfall (SM)

Six sites were chosen for monitoring (Fig 1) based on the need to monitor the length of the river, to compare and contrast mid-stream and shore locations and to study sites differentially affected by shore runoff versus outfall flow or flow from the Bay into the river. In addition, the sites fit the criteria set forth by the Mid-Atlantic Tributary Assessment Coalition (Wicks et al., 2011). Three sites are collected mid-stream (RO2, RO3, SM). Three sites are collected from docks by AACC Environmental Center technicians (WSH, OP, CW). The sites can also be divided into three groups based on location with two sites are near the headwaters (WSH, OP), representing slower mixing and exchange. Two points are midway down the river (RO3, CW), and two points are closer to the mouth of the river and the outfall (RO2, SM).

While the first three years of monitoring were complicated by delayed project completion and record-setting rain that impacted two seasons, both 2020 and 2021 saw average rainfall and a general stabilization of several assessed parameters. There was also an observed decrease in

ANNE ARUNDEL COMMUNITY COLLEGE

nitrate/nitrite concentration and improved dissolved oxygen. Enterococci concentrations were stable with only the most upstream site having a seasonal geometric mean above the threshold.

2. Methods.

The following parameters were monitored weekly with a YSI meter (YSI Professional Plus (YSI 556 was used in 2017, 2018 and a portion of 2021 when the Pro Plus required repair): water temperature, dissolved oxygen, conductivity, pH and salinity. Measurements were made at the surface and 0.2 m from bottom. Over the 5-year course of the study, there are two dates that do not have dissolved oxygen readings due to technical issues with equipment (May 28, 2020 and June 22, 2021).

Clarity measurements were made with a Secchi Disk. Two water samples were collected at each site, one in a sterile plastic, 150 mL bottle and one in an acid-washed, plastic 250 mL bottle, and each sample was placed on ice for transport to the AACC lab. At AACC, samples were filtered for total suspended solids (TSS) and enterococci measurements. In addition, a portion of each filtrate and the glass fiber filter membrane were frozen for later transport to, and analysis at, the Chesapeake Biological Laboratories (CBL) (Solomons, MD).

Sampling took place between 8 a.m. and 1 p.m. on Wednesdays (with two exceptions) and samples were processed by 4 p.m. The first sampling event in 2021 took place on a Tuesday afternoon and 22 June monitoring took place on a Tuesday morning. TSS and enterococci were calculated 24 hrs after processing. Frozen nutrient filtrate and chlorophyll-containing filters were typically transported to CBL within 28 days.

Enterococci enumeration was conducted using EPA Method 1600 using membrane filtration and selection on indoxyl-β-D-glucoside (mEI) agar. Nutrient and Chlorophyll measurements were performed at CBL. Specifically, the tests performed included: 1) chlorophyll a utilizing spectrophotometry, 2) total nitrogen by a cadmium reduction method, and 3) phosphate (PO_4) by the ascorbic acid method. Method details are outlined at https://www.umces.edu/nasl/methods .

For all parameters, quality control measurements were performed at a rate of approximately 10%. Quality control measurements that deviated by more than 10% were further analyzed and potentially removed from data analysis if an error in method or reporting was confirmed. In addition, regular laboratory quality control analyses are performed to ensure the validity of methods and performance of equipment.

Rainfall daily totals were tracked at multiple sources including the Community Collaborative Rain, Hail and Snow Network (www.cocorahs.org).

3. Results and Discussion.

A. Rainfall. The impact of stormwater runoff is significant and the magnitude is affected by the rate of rainfall, the amount of impervious surface near the shore and the timing of the rain event in relation to sampling. However, rain events of 0.5 inches or more in less than 24 hours are often the threshold used for proactively closing recreational beaches. Table 1 lists rainfall dates

of at least 0.1 inches. The values in table 1 represent data from three collection sites near the shore of, west of, and south of Rhode River.

The rain total during the 2021 season was about average (vims.edu/bayinfo) with only three of the 2021 sampling days impacted, similar to the pattern seen in 2020.

Table 1. 2017-202 Rainfall of 0.1 inches or greater along Rhode River. (data from www.cocorahs.org). Highlighted rows indicate at least 0.4 inches up to 48 hours prior to sample collection.

2017		2018		2019		2020		2021	
Date	**Rain**	**Date**	**Rain**	**Date**	**Rain**	**Date**	**Rain**	**Date**	**Rain**
5/05/17	.60	5/13/18	.99	5/24/19	.46	5/22/20	.18	5/27/21	.1
5/06/17	.85	5/14/18	.55	5/27/19	.27	5/23/20	1.10	5/29/21	.49
5/07/17	.11	5/15/18	.79	5/29/19	.99	5/29/20	.41	5/30/21	.71
5/12/17	.93	5/16/18	.70	5/31/19	.78	6/5/20	.85	6/3/21	.1
5/13/17	1.29	5/17/18	.79	6/10/19	.27	6/6/20	.44	6/11/21	1.88
5/23/17	.40	5/18/18	2.47	6/11/19	.13	6/18/20	.27	6/12/21	.56
5/25/17	.35	5/19/18	1.09	6/13/19	1.85	6/21/20	.22	6/15/21	1.13
5/26/17	.65	5/27/18	.10	6/14/19	.14	6/23/20	.11	6/22/21	.5
6/17/17	.12	6/01/18	.49	6/18/19	.36	6/26/20	.57	6/23/21	.3
6/20/17	.41	6/3/18	.21	6/19/19	.57	6/28/20	.21	7/2/21	2.19
6/23/17	.18	6/4/18	2.03	6/25/19	.10	7/1/20	.45	7/9/21	.1
6/24/17	.20	6/10/18	.10	7/7/19	.20	7/2/20	.49	7/10/21	.78
7/5/17	.46	6/11/18	.66	7/9/19	1.17	7/7/20	2.25	7/18/21	.34
7/6/17	.38	6/20/18	1.18	7/12/19	1.21	7/14/20	.17	8/2/21	.32
7/7/17	.91	6/23/18	.39	7/18/19	.37	7/21/20	.87	8/8/21	.27
7/15/17	.19	7/18/18	1.54	7/23/19	.14	7/23/20	.50	8/10/21	1.43
7/21/17	.22	7/22/18	7.32	8/2/19	.36	7/31/20	.24	8/11/21	.51
7/23/17	.94	7/23/18	3.37	8/8/19	.61	8/1/20	.14	8/14/21	2.06
7/24/17	.89	7/24/18	1.76	8/18/19	.14	8/3/20	.35	8/15/21	1.47
7/28/17	.41	7/25/18	1.14	8/22/19	.52	8/4/20	1.47	8/17/21	.77
7/29/17	2.67	7/26/18	.22	8/24/19	.35	8/5/20	2.50	8/18/21	.1
8/8/17	1.32	7/28/18	.19			8/6/20	.24	8/19/21	.31
8/12/17	.30	8/01/18	.61			8/8/20	2.69	8/20/21	.26
8/13/17	.64	8/03/18	1.06			8/13/20	.20	8/21/21	.56
8/18/17	.42	8/13/18	.12			8/14/20	.71		
8/19/17	1.22	8/14/18	.17			8/16/20	.86		
8/29/17	.50	8/22/18	.76			8/17/20	.12		
8/30/17	.80					8/18/20	.55		
						8/20/20	.15		
						8/26/20	.10		
						8/29/20	.80		
						9/2/20	.25		
TOTAL =	**18.36**	**TOTAL =**	**30.8**	**TOTAL =**	**10.99**	**TOTAL =**	**20.46**	**TOTAL=**	**17.24**

A. Water Temperature, Dissolved Oxygen and Clarity. The 2017-2021 average surface and bottom temperatures are illustrated in Figure 2. There is a drop in both surface and bottom water temperatures in 2021 when compared to 2020. ANOVA 1-way analysis of the five years of surface and bottom temperature data resulted in a p-value of 1.9×10^{-7}, confirming that the change over time is significant. In a two-tail t-test (unequal variances) the temperature change from 2020 to 2021 was not considered significant (p=0.06), although anecdotally the temperature decrease from 2020 to 2021 is near equal to the increase seen from 2019 to 2020, when the change was significant. This trend over the summer months, with the increase in 2020 and return to near average in 2021 was also reported in the Eyes on the Bay program dataset (eyesonthebay.dnr.maryland.gov).

Figure 2. Average Seasonal Water Temperature
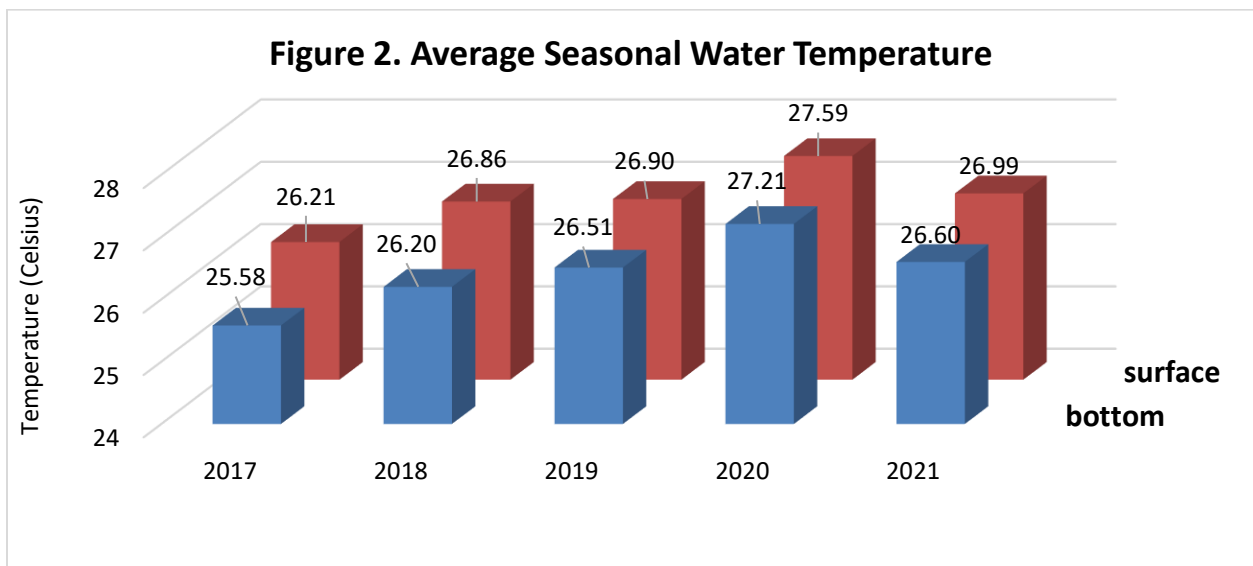
During the 2021 season, the highest surface temperatures was recorded on July 14th with the highest temperature at Overhill Drive Pier. The overall trend was similar to previous years with temperatures increasing over the course of the season and significant temperature dips associated with significant rain events.

Figure 3. 2017-2021 Surface Temperature
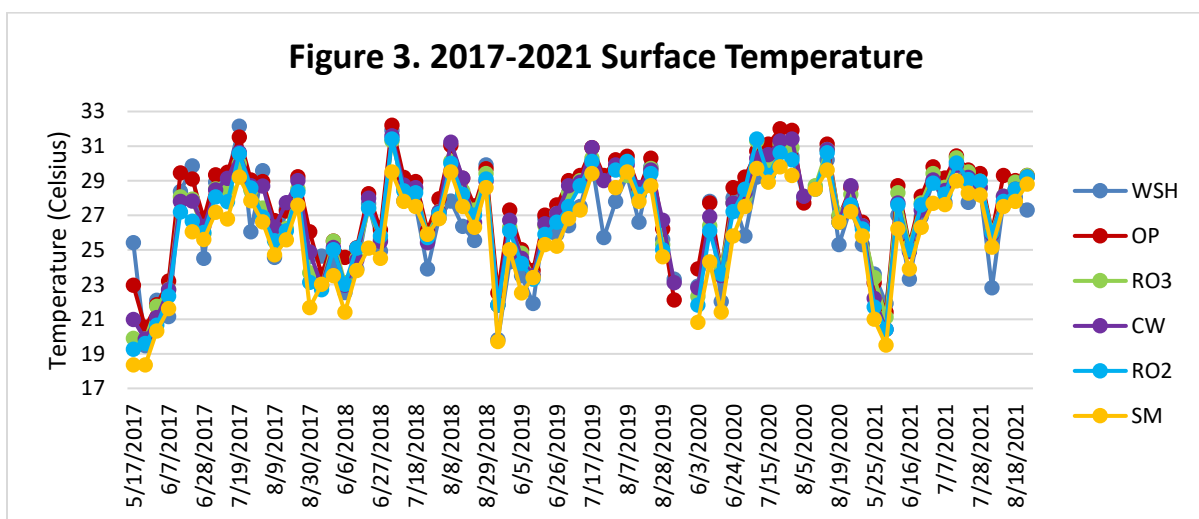
Higher water temperatures can be associated with lower dissolved oxygen levels, increased algal growth and decreased clarity. Levels of DO below 5 mg/L are not optimal for most aquatic organisms, and DO concentrations can be significantly affected by algal blooms that initially produce oxygen during photosynthesis, but eventually deplete oxygen as the algae die and decompose.

Because the WSH site is upstream in the shallow headwaters, only surface readings were recorded at 0.2 m. Figure 4 shows the percentage of surface measurements at WSH above 5.0 mg/L. This site is often less than 0.5 m in depth, is marshy and often very still. The lack of mixing and submerged aquatic vegetation often result in hypoxic conditions. WSH did have one occurrence of a reading below 2.0 mg/L in 2021, and unlike the trend at the other sites on the Rhode River, the average DO was lower in 2021, at 4.15 mg/L, than in 2020, at 4.61 mg/L.

Figure 4. Percent Headwaters Dissolved Oxygen Measurements > 5 mg/L

Figure 5. Bottom Dissolved Oxygen 2017-2021
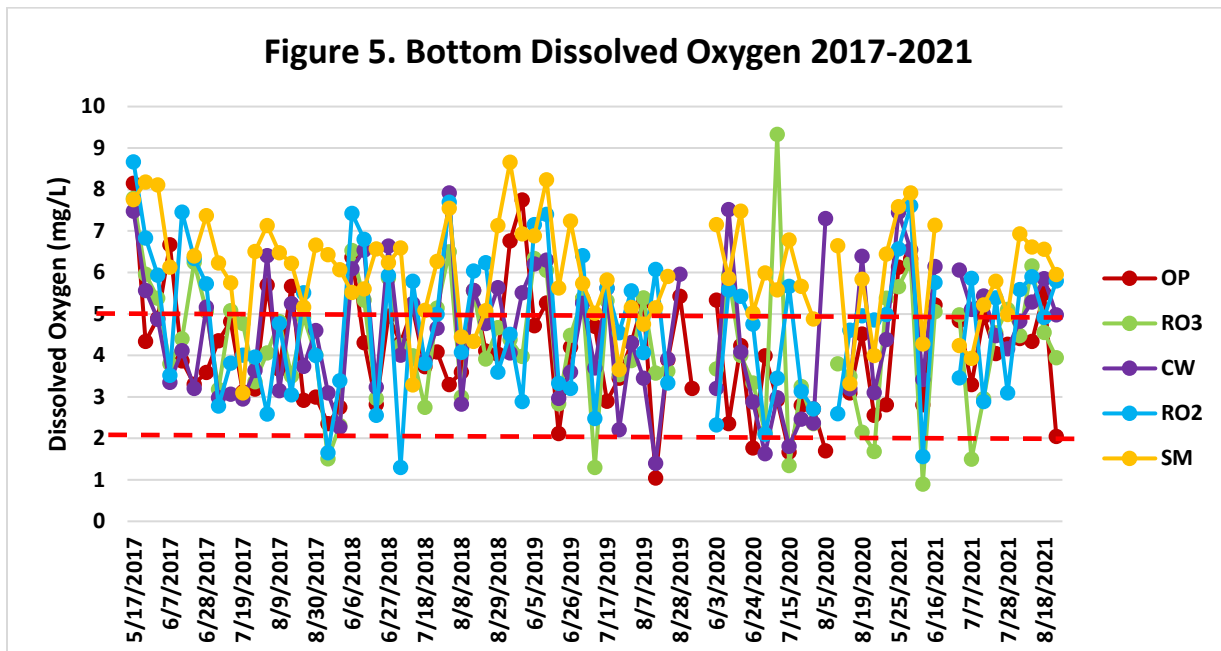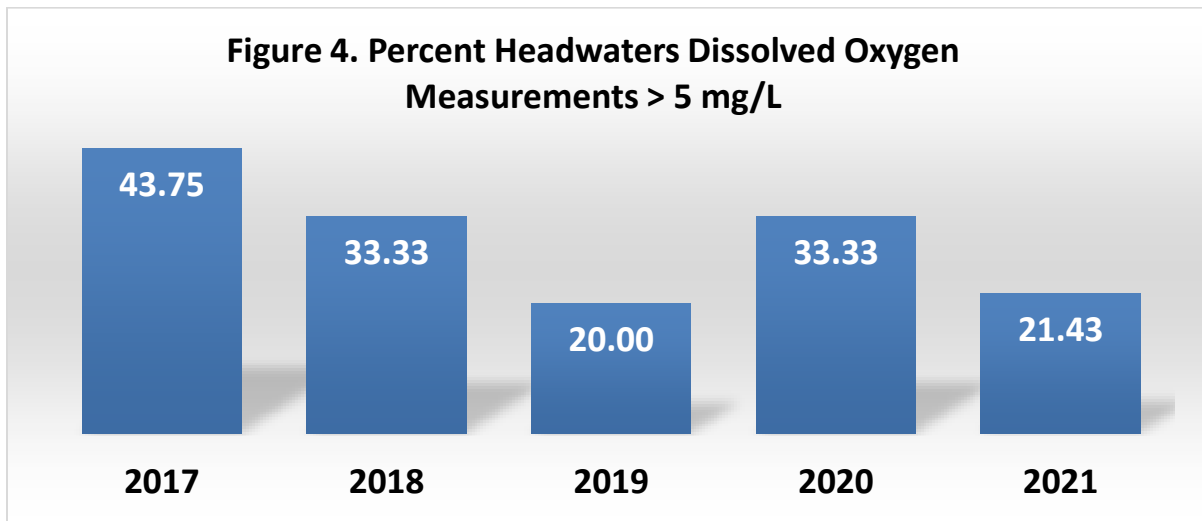
Figure 5 shows the bottom data for the other 5 sites. Dissolved oxygen values below 5.0 mg/L put stress on marine organisms, and levels below 2.0 mg/L are considered hypoxic. In 2021 53% of bottom DO readings were above 5 mg/L compared to only 29.6% of bottom DO readings above 5.0 mg/L in 2020. The 2021 percentage of measurements over 5.0 mg/L was the highest since the project began. Of note, there was one less 2021 sampling date compared to 2020 and one other date lacked DO measurements due to equipment failure. However, the missing weeks were not from the portion of the season when temperatures are warmest and DO readings expected to be low. In addition, only 3 readings were below 2.0 mg/L in 2021, a significant improvement over the 7 occurrences in 2020 and more typical of 2017-2019. Additionally, the total average bottom DO in 2021 was 5.01 mg/L, the first time during the 5 seasons of this project that the overall average was above the optimum threshold.

Dissolved oxygen levels are also related to clarity. In this study, Secchi Depth was determined weekly at each site (Figure 6). Secchi Depths were compared to thresholds set forth in the MTAC Sampling and Data Analysis Protocols for the Mid-Atlantic Tidal Tributary indicators (Wickes et al, 2011). The guidelines provide a score that can be assigned to Secchi depths in brackish water (0=< 30 cm; 1= 30-60; 2= 60-100, 3=100-160; 4= 160-180; 5= >180). Figure 6 does not include the WSH sampling site, since that site is very shallow, typically less than 0.5 m, and often clear to the bottom. Although the goal of this project is not to assign a grade, these cutoffs provide a convenient tool for comparing sites to each other over the five seasons of sampling.

Figure 6. Secchi Depths 2017-2021
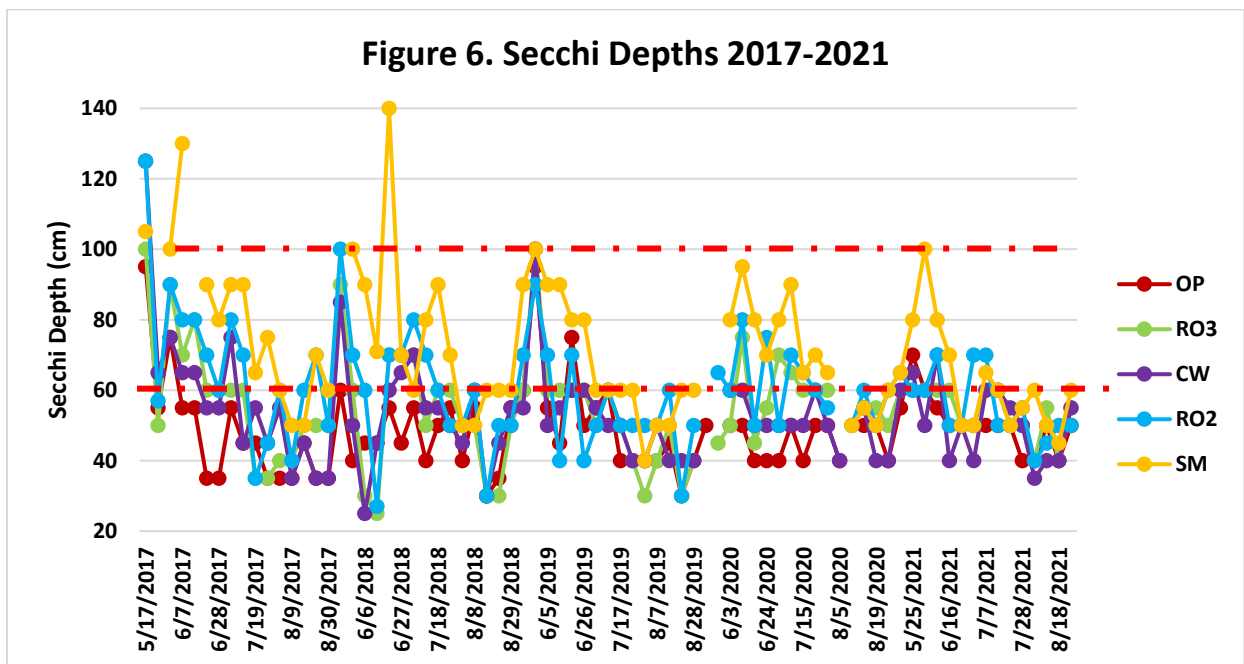
The 2021 results showed a slight overall decrease in average clarity, but a drop in the percentage of readings with least 60 cm clarity. One 2021 measurement reached the 100 cm (1 m) threshold (SM on 2 June). While this is an improvement over 2020 which had no readings that reached 100 cm, the 2017-2019 had 4.1- 7.5% measurements at least 100 cm, the threshold needed for

sufficient light to support underwater grasses. However, only 34% of Secchi depths were between 60-99 cm in 2021, the lowest percentage in all 5 seasons. The second lowest was 38.7% in 2019, while 2017, 2018 and 2020 were between 42.5% and 43.8%. 2018 was the only season with clarity values under 30 cm, and that season had three measurements below 30 cm. At WSH, the headwaters site, during 2020 total depth never reached 1 m, and 50% of the time the water was clear to the bottom with the lowest measured Secchi depth at 10 cm and the highest at 50 cm.

Average Secchi depths were calculated excluding the values at WSH which would skew calculations due to the "clear to bottom" values. After three years of decline from a high of 61.8 cm in 2017 to a low of 52.9 cm in 2019, 2020 rebounded with an average of 56.9 cm. However, there was a slight decrease to 54.4 cm in 2021. All seasons demonstrated a pattern of decreasing clarity as the season progressed and water temperature increased. There is often a small increase in clarity toward the end of the season.

B. Total Suspended Solids (TSS). TSS values higher than 15 mg/L do not support SAV growth (Batiuk et al., 1992). In general, higher Secchi Depth values correlate with lower TSS values (Figures 6 and 7). Unfortunately figure 7 shows a trend of increasing average and minimum TSS values over the course of this project, with very few values below the 15 mg/L threshold. While 2018 looked promising with multiple measurements below the threshold and the lowest seasonal average TSS, 23.7 mg/L, that year has been followed by annual increases (25.6 mg/L in 2019, 29.2 mg/L in 2020 and 30.4 mg/L in 2021).

The very shallow WSH site at the headwaters has been responsible for the highest TSS spikes. However, when TSS averages and trends were analyzed with the WSH data removed, the same increasing trend is observed. Not surprisingly, the three sites near or at the shore, WSH, OP and CW tend to have higher TSS values which may be due to runoff or the fact that the water is shallower at those sites and more prone to sediment disturbance.

Figure 7. Total Suspended Solids 2017-2021
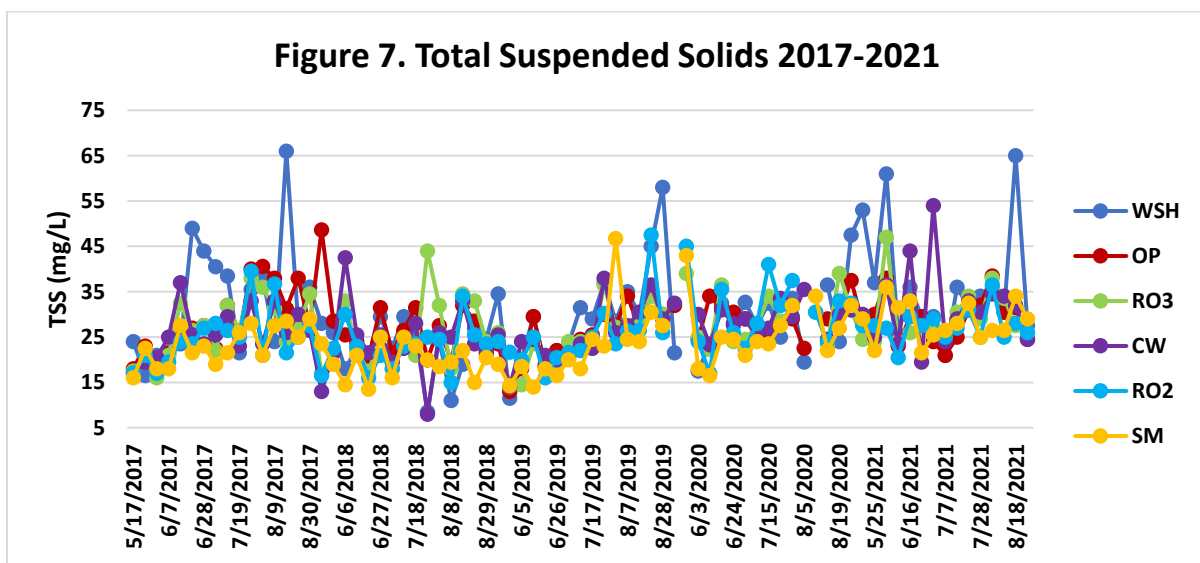
C. Chlorophyll a. Chlorophyll a, a photosynthetic pigment in phytoplankton, is an indicator of phytoplankton biomass. The Chesapeake Bay Program has determined that chlorophyll concentrations above 15 µg/L are detrimental to SAV growth. As illustrated in Figure 8, the measurements along Rhode River regularly exceed the threshold. During the 2021 season, there were only three measurements below the 15 µg/L threshold (9 June), and only one value above 100 µg/L on 2 June at the headwaters site. While overall chlorophyll a values are higher than desired, compared to the previous four seasons, the absence of extreme highs and an overall narrower range averaged to a relative low 31.8 µg/L in 2021, an average significantly lower than 45.9 µg/L in 2020 (p=.0005 in two-tailed t-test). This was not surprising considering that 2021 did not have any reports of large algal blooms like the widespread *Prorocentrum minimum* bloom in 2020.

Figure 8. Chlorophyll a 2017-2021
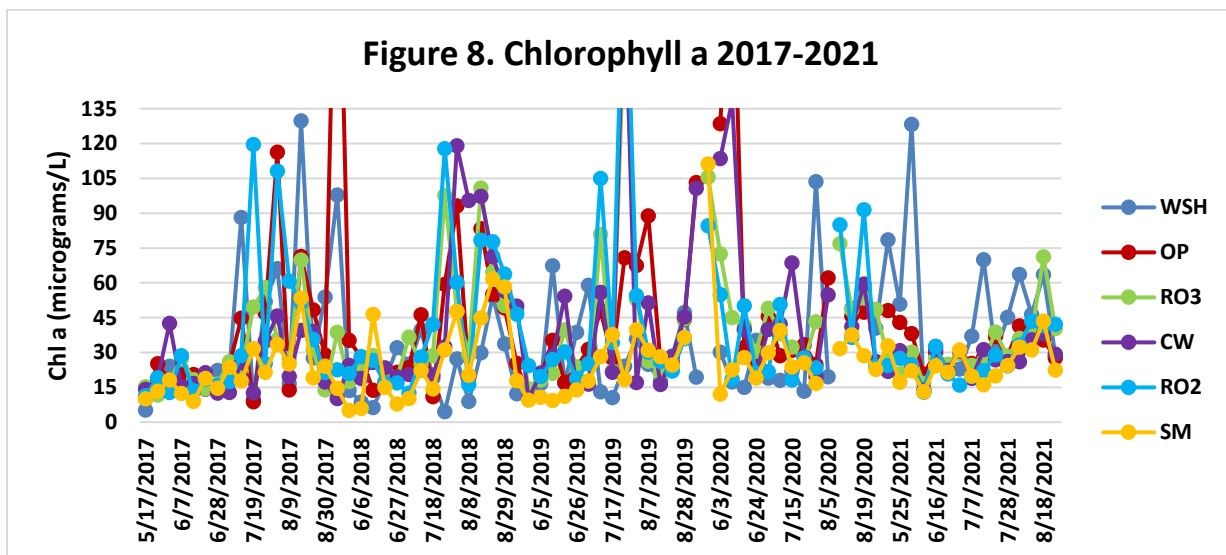
D. Nutrients: Nitrate and Nitrite, Ammonia, Total Dissolved Nitrogen. High levels of nutrients promote algal growth and can result in blooms that are detrimental to overall water quality including clarity, dissolved oxygen and pH. After two years of higher than expected nitrate/nitrite concentrations in 2018 and 2019, driven mostly by spikes at the mouth of the river, due to record rainfall during and after the 2018 season (table 1). However, toward the end of 2019 and into 2020 nitrate/nitrite levels began to stabilize and decrease, and that trend continued in 2021. In figure 9a there is a clear distinction between the extreme spikes at the mouth of the Rhode River (SM) in 2018-2019 and the much lower, and more stable values from mid-season 2019 through 2021. Figure 9b, with a truncated vertical scale, illustrates that 2021 values never reached the extremes measured in previous years. There was a characteristic spike early in the 2021 season, most notable at the mouth of the river. That spike has been observed each season, although the source is still unknown.

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Figure 9a. Nitrate/Nitrite 2017-2021

Figure 9b. Nitrate/Nitrite 2017-2021
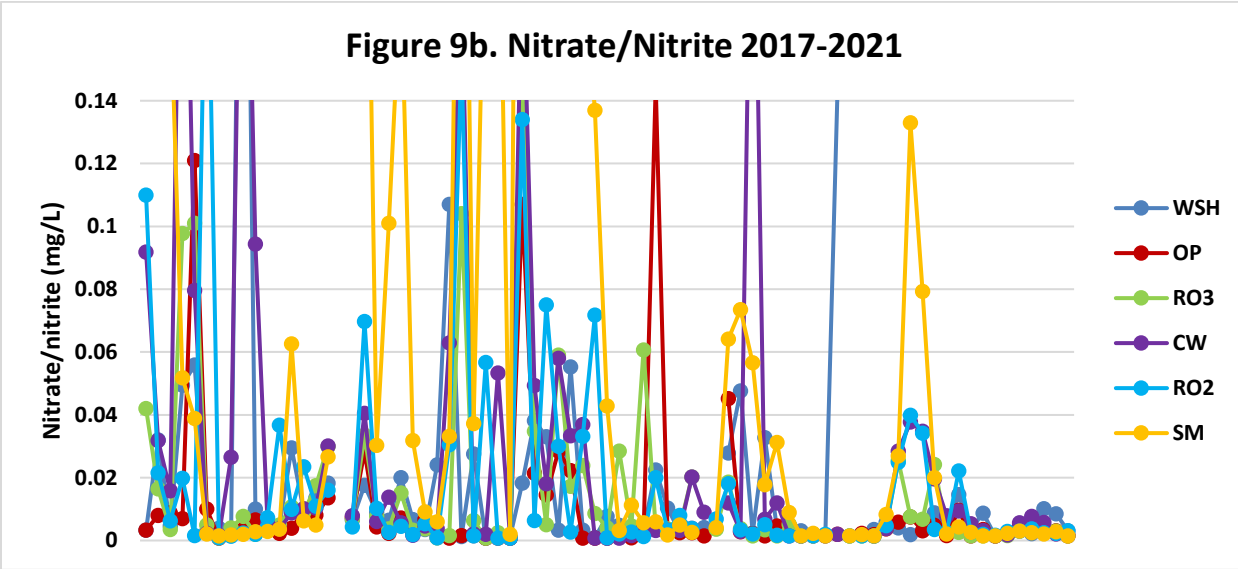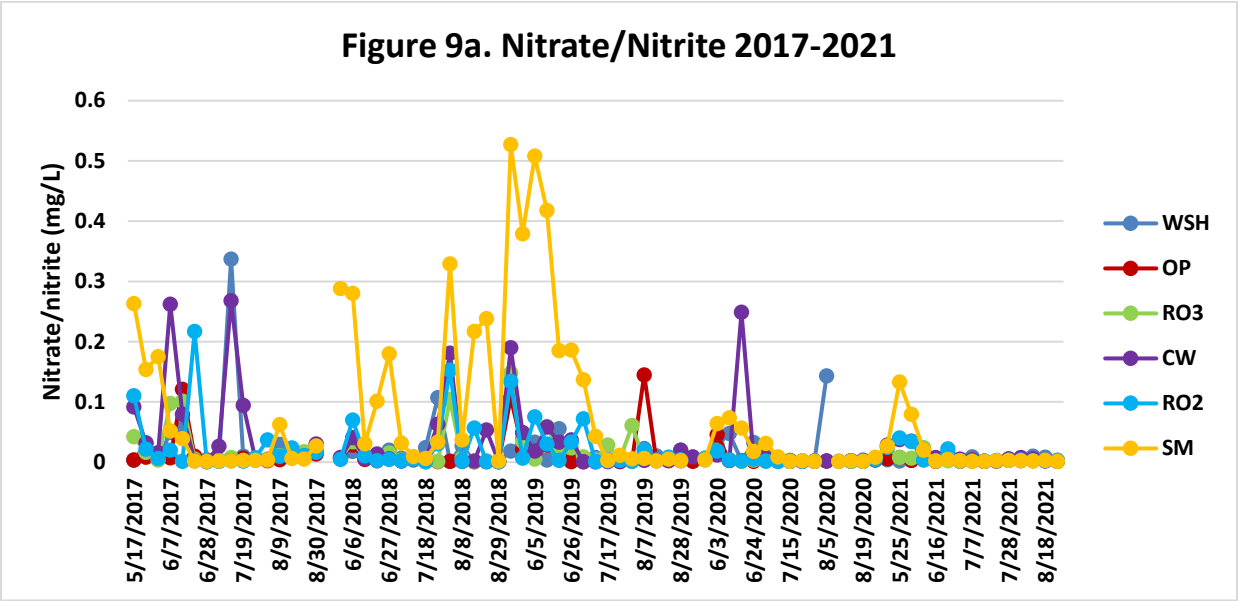
Analysis of nitrate/nitrite averages each year to compare pre- and post-conversion levels was conducted. The Mayo WRF conversion took place after the 2017 season, so 2017 is the one pre-conversion data set. Both 2018 and 2019 were complicated by the record rainfall causing significant input from the Chesapeake Bay, so 2020 and 2021 are the most appropriate post-conversion data sets for comparison. Both years showed significant nitrate/nitrite concentration decreases when compared with 2017 (two-tailed $p=.004$ and $p=0.001$, respectively). Figure 10 illustrates the significant drop in nitrate/nitrite concentration.

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Figure 10- Nitrate/Nitrite Averages 2017-2021
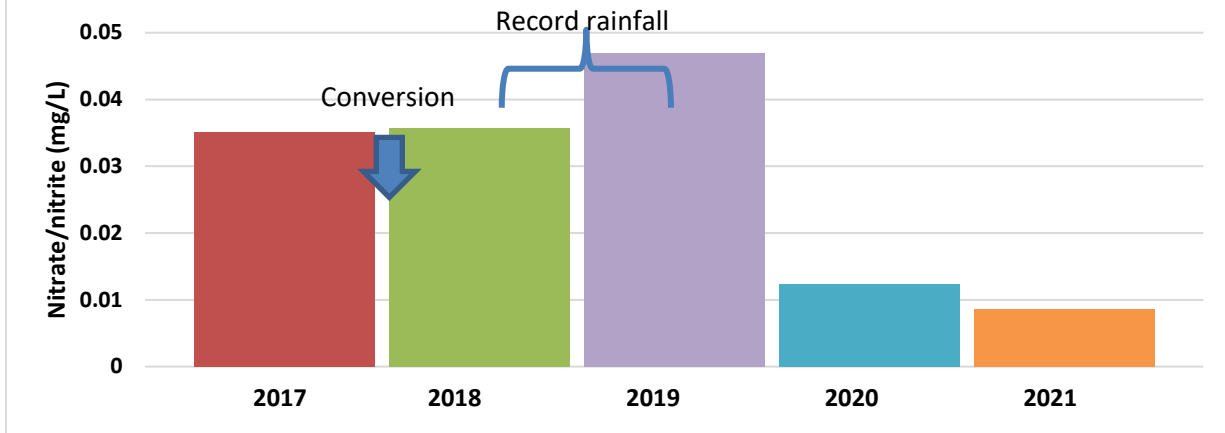
Contrary to the decrease in nitrate/nitrite observed in 2021, there was disconcerting increase in average ammonia concentration (figure 11). After three years of decreasing ammonia, the 2021 average was higher than 2020 and slightly higher than pre-conversion measurements in 2017.

Figure 11. Ammonia Averages
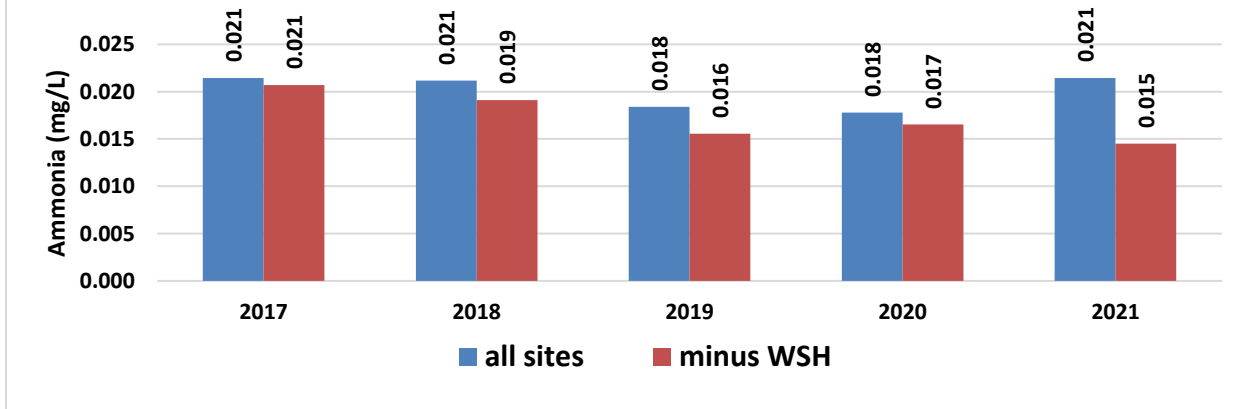
Figure 12. Ammonia 2017-2021
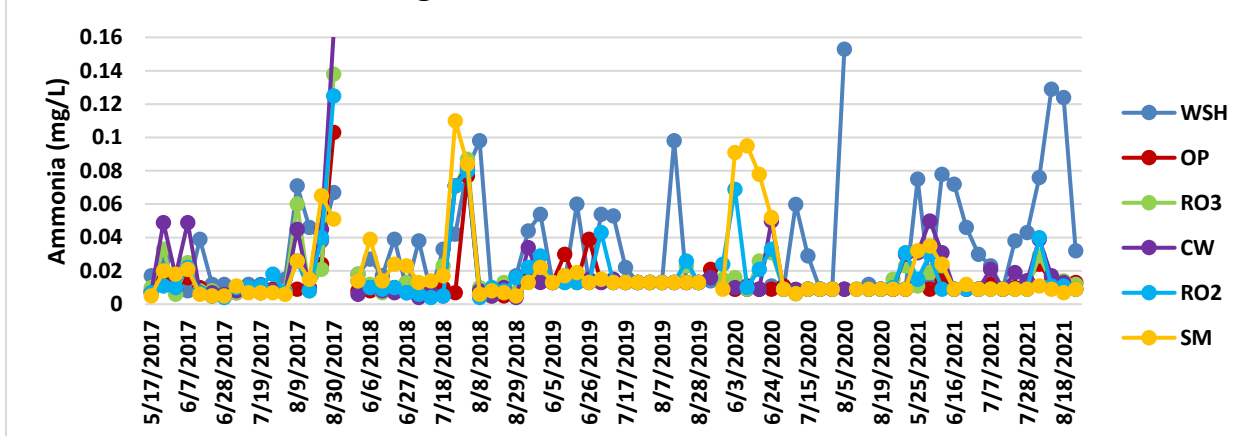
Unlike the 2018 and 2019 nitrate/nitrite increases which were driven by input from the Bay with the highest values at the mouth of the river (SM), all of the high 2021 ammonia spikes are at the headwaters site (WSH) (figure 12). Figure 11 illustrates that the ammonia average is trending down at all sites other than WSH.

The Chesapeake Bay Program defines total dissolved nitrogen as the sum of nitrate, nitrite and ammonia, with an upper healthy threshold of 0.15 mg/L (Batiuk et al, 1992). The overall seasonal average has remained below the threshold and has decreased each season with the exception of 2019 (0.057 mg/L in 2017 and 2018; 0.065 mg/L in 2019; 0.030 mg/L in 2020 and 2021). In all four seasons greater then 85% of the samples were below the threshold (91% in 2017, 89% in 2018, and 86% in 2019, 96% in 2020, and 98.9% in 2021) with a significant increase in the percentage when comparing pre- to post-conversion of the Mayo WRF (figure 13).

Figure 13. Total Dissolved Nitrogen 2017-2021
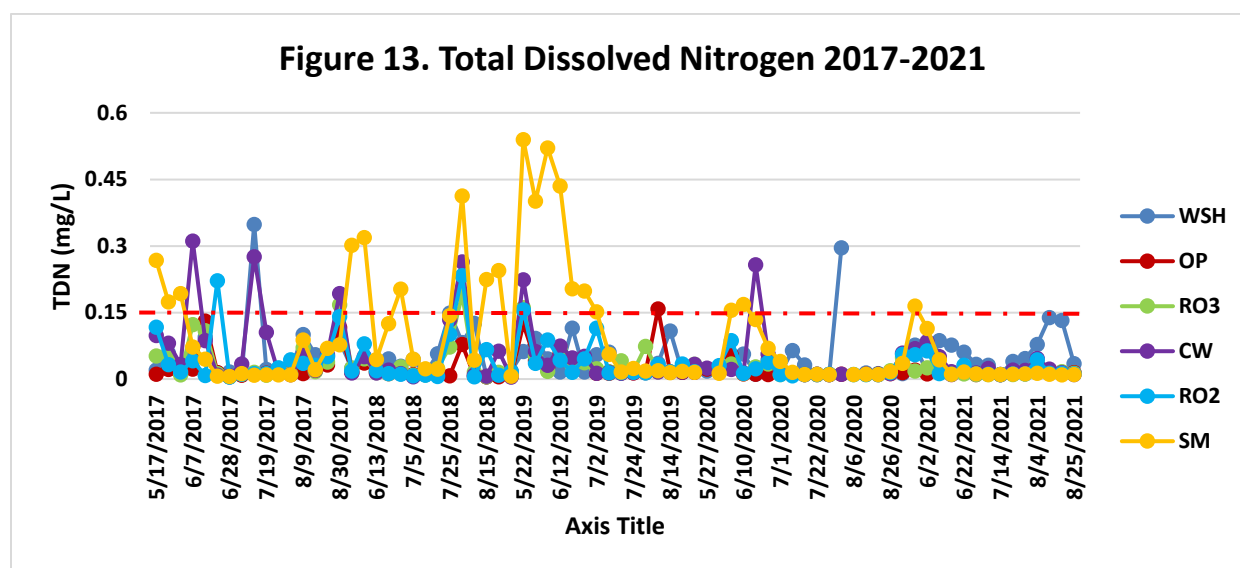
E. Nutrients: Phosphate. The Chesapeake Bay Foundation sets the maximum healthy concentration for phosphate at 0.02 mg/L. The average phosphate concentrations were 0.012 mg/L in 2017, 0.014 mg/L in 2018, 0.012 mg/L in 2019, 0.018 mg/L in 2020, and 0.012 mg/L in 2021). ANOVA analysis illustrated that there is a significant variation in the sampling period (p=.044). In a two-tailed t-test 2021 was found to be significantly lower than 2020 (p=0.03). This reverses the trend in the previous several seasons.

However, while most samples were below the threshold, WSH has exceeded the threshold over 63% of the time and near 80% of the events in 2021. The consistently high values measured at the headwaters site can't be accounted for by rain since only three sampling events were preceded by significant rain. Instead, levels of enterococcus at WSH are correlated with high phosphate levels. There is a positive logarithmic correlation ($r^2 = 0.24$). This is a relatively weak correlation, but when analyzing all sites other than WSH, there is no significant correlation ($r^2 < 0.01$).

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Figure 14. Phosphate 2017-2021
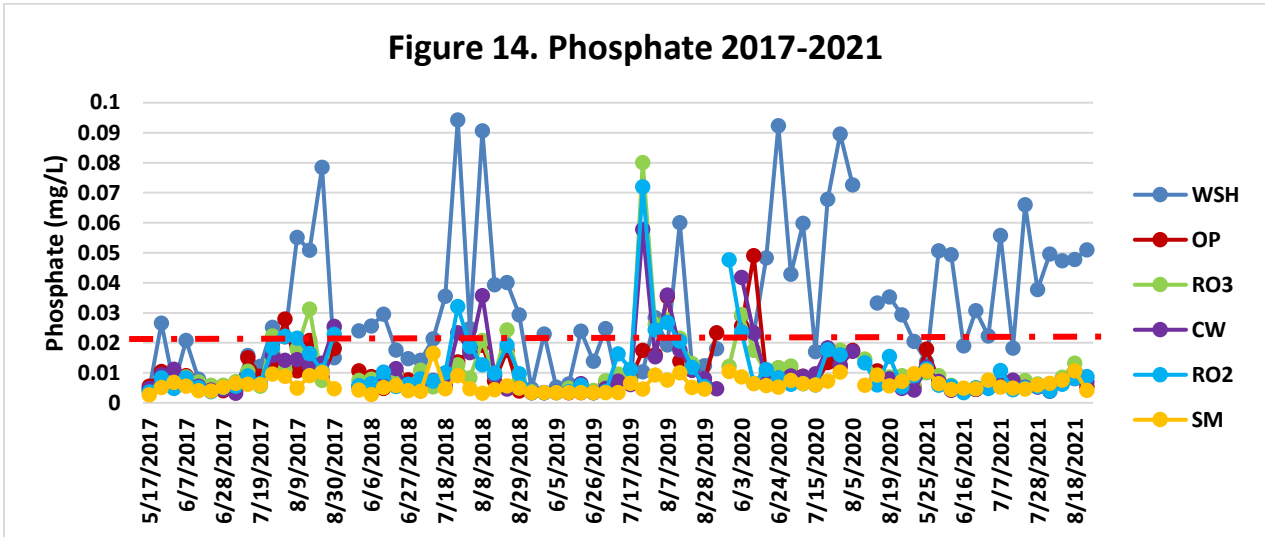
F. Salinity. Salinity can be significantly affected by rainfall. Table 1 lists rain events of 0.1 inches or more from May through August with rainfall greater than 0.4 in within 48 hours prior to sampling highlighted.

Figure 15. Surface Salinity 2017-2021
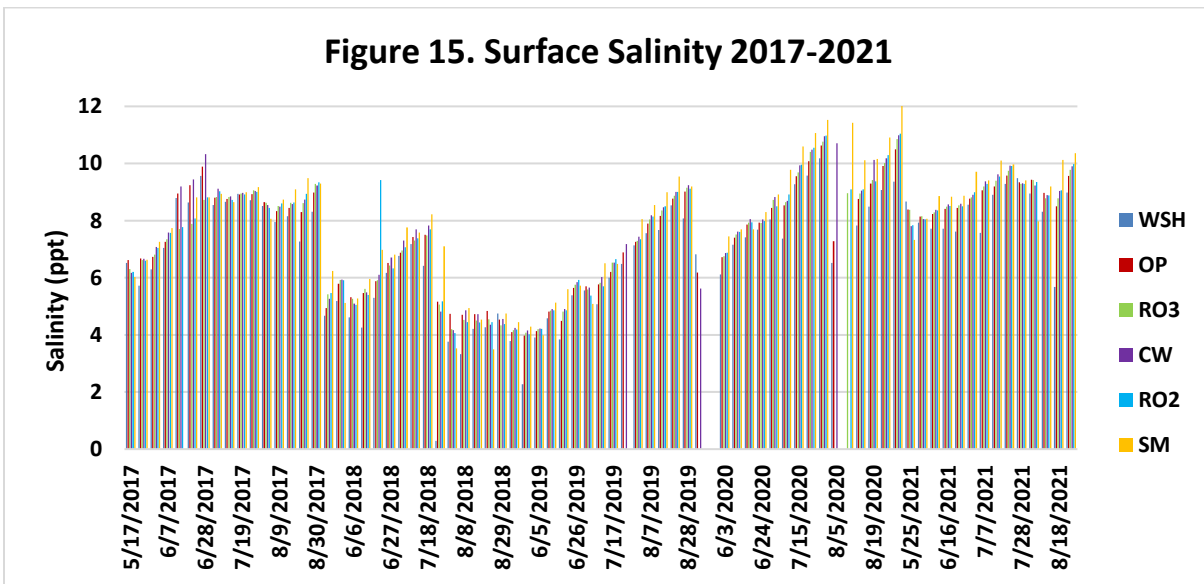
Salinity averages, including surface and bottom values but leaving out the extra early May sampling in 2017, were 8.48 ppt in 2017, 5.74 ppt in 2018, 6.34 ppt in 2019, 9.21 ppt in 2020, and 8.97 ppt in 2021. The data illustrate that salinity has fully recovered from the unprecedented rainfall and inflow from late 2018 through early 2019. The slight decrease in overall salinity from 2020 to 2021 is not significant. The slightly lower than average salinity and dip observed in late August has also been observed along the Severn and Magothy Rivers as reported by the Eyes on the bay program (https://eyesonthebay.dnr.maryland.gov/) and may be a result of over 5 inches of rain in a 7-day period (table 1).

G. pH. According to the EPA, values between 6.5 and 8.5 are optimal for plant and marine life.

All pH values in 2021 were between 6.5 and 8.5, and pH averages over the four seasons were 7.53 in 2017, 7.82 in 2018, 7.73 in 2019, 7.69 in 2020, and 7.72 in 2021.

Figure 16. Surface pH 2017-2021
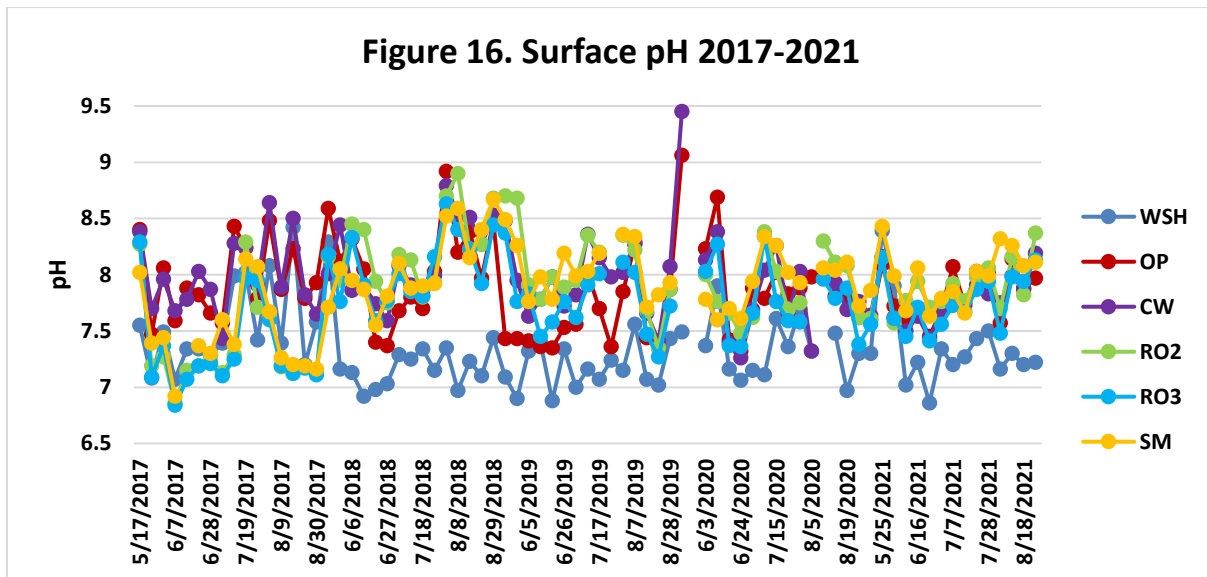
H. Fecal bacteria: Enterococci. Enterococci are indicators of fecal contamination from warm-blooded animals such as mammals (humans, dogs, livestock and wildlife) and some bird species (geese and ducks). Enterococci can cause human disease, and its presence is also an indicator for the possible presence of more pathogenic bacteria. There is a strong correlation between enterococcal levels and the potential for human illness, especially in the young and elderly (EPA method 1600). As illustrated in Figure 17, 91.8% of the 2017 values were below the 104 cfu/100 mL cutoff, compared with 85.5% in 2018, 88.9% in 2019, 86.7% in 2020, and 88.2% in 2021. In 2021, 9 of the 10 enterococcus concentrations above 104 cfu/100 mL were at the headwaters site, WSH. That area is shallow, narrow and near the marshy wetland.

Figure 17. Enterococcus 2017-2021
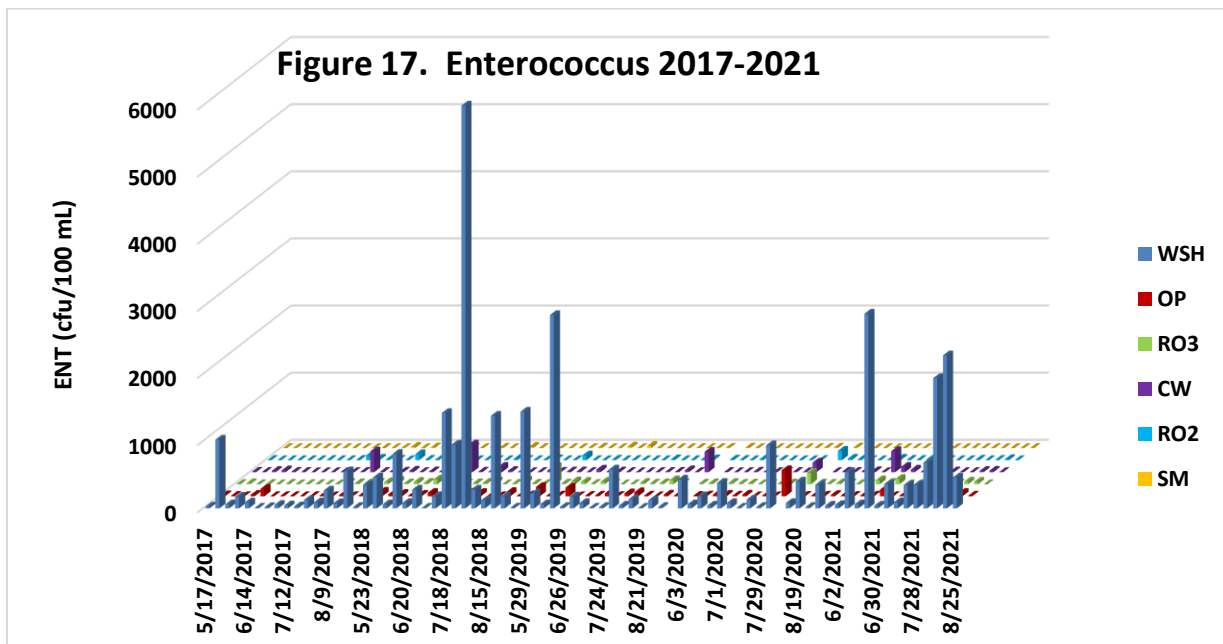
Like 2020, only 3 sampling days were affected by significant rainfall in 2021. However, as figure 17 illustrates, WSH enterococcus concentrations were over the acceptable threshold on multiple occasions, and the magnitude of the values was higher in most cases than observed in 2020 or 2019.

The EPA threshold of 104 cfu/100 mL in a single sample is most useful for recreational swimming sites so that real-time decisions can be made about the safety for swimmers. However, for long-term assessment of water quality geometric means are more useful as they remove the impact of extreme values that can have a disproportionate effect on the seasonal mean. The EPA guidance for geometric mean values cites 35 cfu/100 mL as the threshold. It is concerning that the geometric mean at headwaters site, WSH, increased so noticeably from 2020 to 2021, especially considering that overall rain and sampling events affected by rain were similar in both seasons. The geometric mean values at the remaining 5 sites remained stable and well below the threshold.

Table 2. Enterococcus Geometric Means

SITE	GEOMETRIC MEAN (cfu/100 mL)				
	2017	**2018**	**2019**	**2020**	**2021**
WSH	74	314	88	97	297
OP	8	17	15	12	12
RO3	6	19	14	11	10
CW	8	12	7	8	11
RO2	5	5	4	5	4
SM	3	3	4	3	2

4. Conclusions.

The 2021 season was the nearest to an 'average' season since the beginning of this project in 2017. Initial characterization of many of the measured parameters also suggests a stabilization in values and fewer extremes. While the 2020 and 2021 seasons were similar in rainfall, 2020 was affected by a large early season algal bloom that contributed to high chlorophyll, low dissolved oxygen and poor clarity during that period of time. In comparison, the 2021 season did not have significant algal blooms and rainfall was average. Consequently, several favorable trends that began in 2020, continued and improved further in 2021.

The pre-conversion nitrate average in 2017 was 0.035 mg/L. Unfortunately, the next two seasons were significantly impacted by the record rainfall that began during the second half of 2018 and continued through spring of 2019. The nitrate averages increased in those seasons (0.036 mg/L and 0.046 mg/L, respectively). A similar trend was observed in other area rivers and in the Chesapeake Bay. Although the overall 2019 value was elevated, nitrate values were trending downward as the season progressed. Then in 2020 the average was significantly lower at 0.013 mg/L. The average in 2021 decreased further to 0.009 mg/L. The overall total nitrogen levels, the sum of nitrate/nitrite and ammonia, also decreased in 2021. There is a recurring early season

nitrate/nitrite spike that has been observed in each year of monitoring, although with decreasing magnitude each year.

Other parameters have also stabilized and improved during the 2021 season. Average water temperature was lower than 2020 and similar to the average in 2019. The cause of the slightly lower average temperature is unclear, and does not represent a yearly average, being limited to the 14 weeks of the season. Cooler water can hold higher concentrations of oxygen, and dissolved oxygen values increased in both the percentage of readings above 5.0 mg/L (53% compared to 29.6 % in 2020) and seasonal average across all sites (5.01 mg/L).

Average phosphate stabilized over the past two seasons, recovering from a significant increase in 2019. Chlorophyll levels were also lower in 2021 compared with previous years. High levels of chlorophyll can indicate an algal bloom, as observed May through June 2020. Algal blooms can also result in pH extremes, also observed in 2020 and in earlier seasons. All 2021 pH values were within the optimum 6.5-8.5 range, another indicator that there weren't any significant algal blooms. Excessive nutrient levels can contribute to the development of blooms, so it is encouraging that Rhode River did not experience any large blooms during the 2021 season.

There are several parameters that are still of concern and not trending in a positive direction. Clarity and total suspended solids (TSS) are parameters that have worsened over the course of the project. It is not surprising that when comparing shoreline site TSS values (WSH, OP, CW) to mid-stream values (RO3, RO2, SM) shoreline sites were significantly higher than mid-stream, 28.5 mg/L and 25.8 mg/L, respectively ($p=9.9 \times 10^{-6}$ in two-tailed t-test). In addition, TSS values were significantly higher at the headwaters and decreased toward the mouth (Table 3). Clarity increases further from the headwaters and away from the shore. These data illustrate the expected impact of runoff, but it does not explain why the impact of runoff has increased over time. Since 2021 rainfall was not above average and only 3 dates were affected by rainfall, similar to 2020, the impact would be expected to be similar in each year. In addition, the pattern of high TSS and low clarity are not only associated with rain events (figures 6 and 7).

Table 3. Total Suspended Solids and Clarity Averages of all data points 2017-2021.

SITE	Total Suspended Solids average (mg/L)	Secchi Depth (cm)
WSH	30.29	ND
OP	27.85	48.6
RO3	27.30	54.93
CW	27.24	53.18
RO2	26.09	59.79
SM	24.05	71.07

ND= Not determined. WSH often too shallow to measure Secchi Depth.

The decreasing water quality at the WSH site is of concern. Multiple parameters at the headwaters site have worsened over time including dissolved oxygen, phosphate, ammonia and bacterial concentrations. As expected, there is often a relationship between rain events and high concentrations of enterococci. Runoff from storms can also bring nutrients like phosphate into

the water. However, bacterial counts at WSH are often above the 104 cfu/100 mL threshold absent of a rain event (figure 18, blue bars), so the issues can't be fully explained by rain events and runoff.

The decreasing water quality at the headwaters site likely indicates worsening conditions in the upstream watershed area. Whether increasing development and impervious surfaces, leaching from sediments, increased wild or domestic animal activity, problems in the headwaters will eventually affect areas downstream.

Figure 18. Enterococcus versus Phosphate Concentration WSH 2017-2021
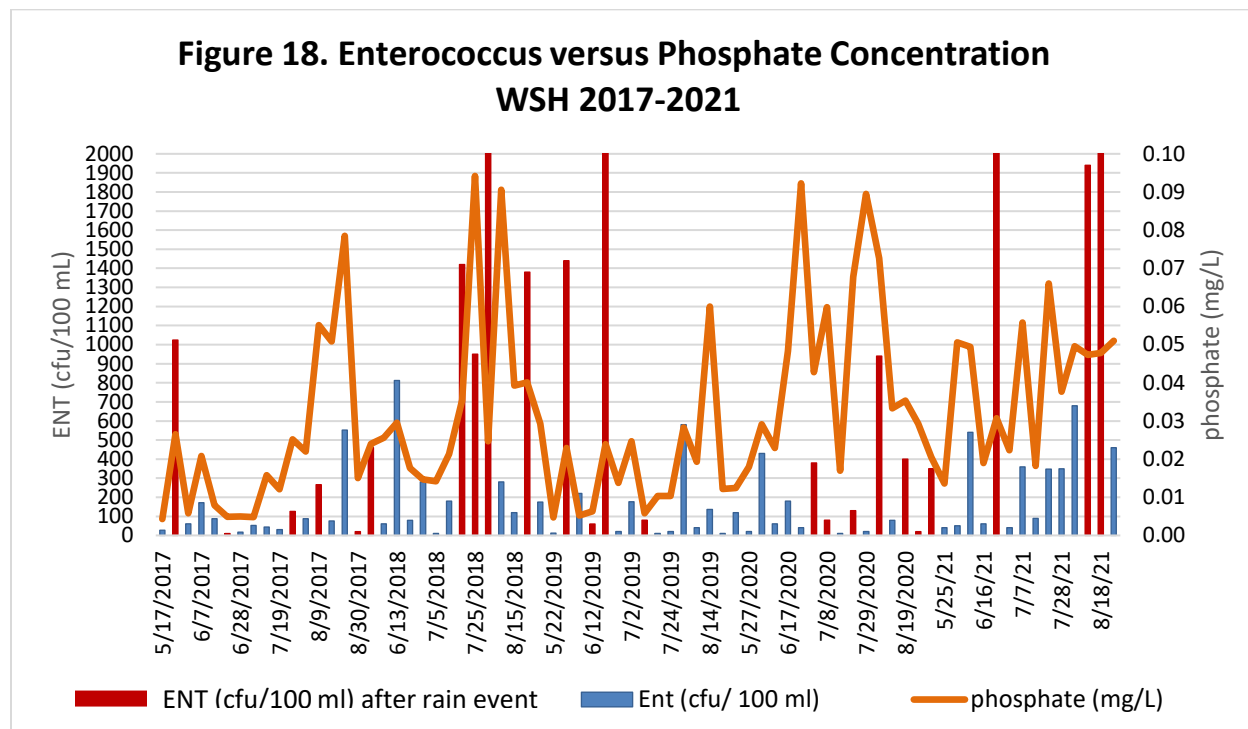
It is encouraging that 2021 has demonstrated that the goal to decrease nutrient flow into the river has been successful. Nitrogen levels have decreased significantly and other parameters have trended in the right direction. These parameters can help prevent algal blooms and the development of dead zones in the river. Unfortunately, sustaining the improvement and keeping the trend moving in the right direction will be a challenge. Data collected at the headwaters site suggests that there are increasing impacts from upstream, and over time those impacts can be detrimental further downstream. How effectively the ecosystem responds to and absorbs the impact will depend on careful management of the parameters that can be assessed and controlled. Limiting the increase in impervious surfaces, ensuring that pet waste is cleaned up, and educating communities and businesses about the damaging effects of fertilizer and detergents are all steps in the right direction. Actively working toward re-establishing underwater grasses and can also add to the resiliency of the river by improving clarity, removing nutrients that make it to the water, increasing dissolved oxygen, and stabilizing sediment.

5. Acknowledgements and References.

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DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
5/25/21	WSH	S	0.2	4:21	45	23.6	14.91	8.67	9.75	8.39	rising	0.05	40	37	0.0019	0.075	0.0769	0.0136	50.18	50.80	0.46
5/25/21	OP	S	0.2	4:04	70	23.1	14.45	8.39	6.82	8.09	rising	0.05	8	30	0.0075	0.013	0.0205	0.0179	46.76	43.01	6.99
5/25/21	OP	B	2			23	14.48	8.41	6.13	7.98	rising	0.05									
5/25/21	RO3	S	0.2	3:04	60	23.4	14.44	8.38	7.23	8.15	rising	0.05	4	24	0.0076	0.011	0.0186	0.01	23.1	20.81	4.25
5/25/21	RO3	B	2.6			22.4	14.32	8.31	5.66	7.83	rising	0.05									
5/25/21	CW	S	0.2	3:16	65	22.2	13.53	7.81	7.48	8.16	rising	0.05	16	25	0.0377	0.031	0.0687	0.0119	34.25	30.79	6.42
5/25/21	CW	B	1.4			22.2	13.87	7.98	7.45	8.09	rising	0.05									
5/25/21	RO2	S	0.2	3:26	60	21.7	13.55	7.84	7.16	8.15	rising	0.05	4	27.5	0.0399	0.015	0.0549	0.0113	29.8	27.56	4.2
5/25/21	RO2	B	2.8			21.6	13.63	7.88	6.57	8.06	rising	0.05									
5/25/21	SM	S	0.2	3:38	80	21	12.72	7.32	8.32	8.43	rising	0.05	2	22	0.133	0.032	0.165	0.0106	19.42	17.17	4.16
5/25/21	SM	B	3.8			20.9	12.75	7.38	7.59	8.31	rising	0.05									
5/25/21	WSH QA	S	0.2	4:23	45	23.8	14.91	8.67	9.88	8.39	rising	0.05	20								
6/2/21	WSH	S	0.2	10:19	40	21.9	13.7	7.93	7.26	7.9	rising	0	50	61	0.0032	0.011	0.0142	0.0506	135.68	128.22	14.11
6/2/21	WSH	B	0.3			21.9	13.69	7.92	7.13	7.87	rising	0									
6/2/21	OP	S	0.2	10:00	60	21.4	14.04	8.14	7.02	7.72	rising	0	8	38	0.0031	0.009	0.0121	0.0074	42.96	38.19	8.81
6/2/21	OP	B	2			21.2	14.02	8.13	6.33	7.71	rising	0									
6/2/21	RO3	S	0.2	7:41	60	21.1	14.05	8.15	6.33	7.61	rising	0	2	47	0.0068	0.019	0.0258	0.0091	34.52	30.21	7.95
6/2/21	RO3	B	2.4			21	14.04	8.14	6.23	7.54	rising	0									
6/2/21	CW	S	0.2	7:52	50	20.4	13.89	8.05	6.58	7.62	rising	0	2	36.5	0.0348	0.05	0.0848	0.0071	28.28	24.51	6.95
6/2/21	CW	B	0.5			20.4	13.88	8.05	6.55	7.61	rising	0									
6/2/21	RO2	S	0.2	9:12	60	20.4	20.4	8.04	7.57	7.57	rising	0	22	27	0.0342	0.03	0.0642	0.0058	28.05	24.73	6.12
6/2/21	RO2	B	4.3			20.3	20.3	8.03	7.61	7.61	rising	0									
6/2/21	SM	S	0.2	9:26	100	19.5	19.5	8.06	7.99	7.99	rising	0	2	36	0.0793	0.035	0.1143	0.0064	24.87	22.1	5.13
6/2/21	SM	B	1.8			19.4	19.4	8.06	7.92	7.92	rising	0									
6/9/21	WSH	S	0.2	9:01		27	13.44	7.72	1.59	7.02	falling	0.05	540	25.5	0.0088	0.078	0.0868	0.0494	16.38	12.86	6.45
6/9/21	WSH	B									falling	0.05									
6/9/21	OP	S	0.2	8:46	55	28.7	14.29	8.23	5.04	7.57	falling	0.05	10	23	0.0048	0.015	0.0198	0.0052	26.17	20.58	10.24
6/9/21	OP	B	1.9			27.3	14.65	8.41	2.81	7.28	falling	0.05									
6/9/21	RO3	S	0.2	7:45	60	28.3	14.38	8.29	4.6	7.45	falling	0.05	60	24	0.0242	0.023	0.0472	0.0059	21.71	16.67	9.2
6/9/21	RO3	B	2.6			25.5	15.14	8.8	0.9	7.02	falling	0.05									
6/9/21	CW	S	0.2	7:58	70	27.7	14.51	8.38	4.7	7.5	falling	0.05	314	23.5	0.0196	0.031	0.0506	0.0041	17.41	13.9	6.42

DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
6/9/21	CW	B	1.3			26.6	14.95	8.68	3.42	7.27	falling	0.05									
6/9/21	RO2	S	0.2	8:04	70	27.6	14.46	8.35	6.3	7.77	falling	0.05	6	20.5	0.0035	0.009	0.0125	0.0055	15.74	12.99	5.04
6/9/21	RO2	B	3.5			24.5	15.74	9.18	1.56	7.06	falling	0.05									
6/9/21	SM	S	0.2	8:23	80	26.2	15.24	8.86	6.18	7.68	falling	0.05	2	31.5	0.02	0.024	0.044	0.0045	16.46	13.06	6.24
6/9/21	SM	B	3.3			24.3	15.47	9.34	4.28	7.39	falling	0.05									
6/16/21	WSH	S	0.2	9:21	50	23.3	13.38	7.72	2.96	7.22	rising	1.1	60	36	0.0047	0.072	0.0767	0.019	37.99	32.63	9.88
6/16/21	WSH	B	0.5								rising	1.1									
6/16/21	OP	S	0.2	9:06	50	25.3	14.51	8.41	5.51	7.66	rising	1.1	10	29.5	0.0016	0.009	0.0106	0.0038	35.42	29.85	10.24
6/16/21	OP	B	2			25.2	14.48	8.39	5.22	7.63	rising	1.1									
6/16/21	RO3	S	0.2	7:40	60	25.2	14.65	8.49	5.95	7.71	rising	1.1	20	26	0.0026	0.009	0.0116	0.0035	32.77	27.69	9.34
6/16/21	RO3	B	2.8			25.1	14.74	8.55	5.06	7.54	rising	1.1									
6/16/21	CW	S	0.2	7:50	40	24.9	14.77	8.57	5.28	7.63	rising	1.1	80	44	0.0079	0.009	0.0169	0.0037	38.13	31.22	12.69
6/16/21	CW	B	0.5			24.8	14.73	8.56	6.15	7.62	rising	1.1									
6/16/21	RO2	S	0.2	8:31	50	25	14.67	8.51	7.01	7.94	rising	1.1	4	29.5	0.0025	0.009	0.0115	0.0034	36.87	32.63	7.82
6/16/21	RO2	B	3			25.1	14.65	8.51	5.76	7.8	rising	1.1									
6/16/21	SM	S	0.2	8:41	70	23.9	15.17	8.84	7.28	8.06	rising	1.1	2	33	0.0021	0.009	0.0111	0.0049	28.59	24.16	8.15
6/16/21	SM	B	3.8			23.8	15.28	8.88	7.14	7.98	rising	1.1									
6/22/21	WSH	S	0.2	9:13		26.9	13.25	7.62		6.86	falling	0.5	2900	29.5	0.0146	0.046	0.0606	0.0307	26.85	21.84	9.19
6/22/21	WSH	B	0.1								falling	0.5									
6/22/21	OP	S	0.2	9:00	50	28.1	14.61	8.44		7.45	falling	0.5	100	29.5	0.0096	0.009	0.0186	0.0045	31.1	24.76	11.62
6/22/21	OP	B	1.9			27.9	14.72	8.52		7.36	falling	0.5									
6/22/21	RO3	S	0.2	8:08	50	27.7	14.75	8.53		7.41	falling	0.5	80	27.5	0.0026	0.009	0.0116	0.005	31.3	24.87	11.77
6/22/21	RO3	B	2.4			27.3	14.85	8.59		7.35	falling	0.5									
6/22/21	CW	S	0.2	8:16	50	27.3	14.83	8.59		7.43	falling	0.5	40	19.5	0.0094	0.009	0.0184	0.0045	28.13	22.23	10.79
6/22/21	CW	B	1.8			26.7	15.1	8.76		7.4	falling	0.5									
6/22/21	RO2	S	0.2	8:25	50	27.6	14.7	8.5		7.71	falling	0.5	10	27.5	0.0221	0.009	0.0311	0.005	26.57	20.8	10.55
6/22/21	RO2	B	3.4			26.6	15.32	8.9		7.4	falling	0.5									
6/22/21	SM	S	0.2	8:35	50	26.3	15.27	8.87		7.63	falling	0.5	16	21.5	0.0043	0.012	0.0163	0.0047	26.73	21.51	9.58
6/22/21	SM	B	2.8			25	15.91	9.29		7.5	falling	0.5									
6/30/21	WSH	S	0.2	9:58	20	28.94	14.82	8.56	3.38	7.34	rising	0	40	29.5	0.0036	0.03	0.0336	0.0223	28.89	22.79	11.16
6/30/21	WSH	B	0.2								rising	0									

DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
6/30/21	OP	S	0.2	9:49	50	29.79	15.17	8.77	6.35	7.69	rising	0	4	24	0.0015	0.009	0.0105	0.0068	36.18	30.14	11.09
6/30/21	OP	B	1.8			29.37	15.18	8.79	4.84	7.48	rising	0									
6/30/21	RO3	S	0.2	8:46	50	29.41	15.21	8.81	5.49	7.56	rising	0	2	27	0.0015	0.009	0.0105	0.005	35.18	29.63	10.2
6/30/21	RO3	B	2.5			28.88	15.27	8.84	4.98	7.43	rising	0									
6/30/21	CW	S	0.2	8:57	40	29.03	15.36	8.9	6.06	7.67	rising	0	4	54	0.0053	0.009	0.0143	0.0063	36.59	30.68	10.85
6/30/21	CW	B	0.5			28.98	15.37	8.9	6.06	7.66	rising	0									
6/30/21	RO2	S	0.2	9:20	70	28.85	15.5	8.99	6.54	7.76	rising	0	2	29	0.0026	0.009	0.0116	0.0048	19.32	16.01	6.07
6/30/21	RO2	B	3			27.58	16.66	9.75	3.46	7.35	rising	0									
6/30/21	SM	S	0.2	9:11	50	27.69	16.61	9.71	6.88	7.79	rising	0	2	25.5	0.0026	0.009	0.0116	0.0076	35.8	31.12	8.63
6/30/21	SM	B	2.2			27	17.16	10.04	4.24	7.35	rising	0									
7/7/21	WSH	S	0.1	9:49	10	27.76	13.89	7.57	3.75	7.2	falling	0	360	21	0.0087	0.023	0.0317	0.0558	40.88	36.98	7.25
7/7/21	WSH	B	0.1								falling	0									
7/7/21	OP	S	0.2	9:33	50	29.14	16.87	9.06	7.16	8.07	falling	0	10	21	0.0035	0.012	0.0155	0.0064	29.66	25.27	8.07
7/7/21	OP	B	1.7			28.32	16.92	9.26	3.3	7.38	falling	0									
7/7/21	RO3	S	0.2	8:42	60	28.61	16.92	9.2	5.5	7.73	falling	0	4	25	0.0015	0.009	0.0105	0.0063	29.23	24.52	8.64
7/7/21	RO3	B	2.4			27.85	16.86	9.31	1.5	7.2	falling	0									
7/7/21	RO2	S	0.2	9:00	70	28.22	16.94	9.29	6.72	7.92	falling	0	2	25	0.002	0.009	0.011	0.0108	23.58	19.65	7.21
7/7/21	RO2	B	3.3			27.92	16.97	9.37	5.86	7.68	falling	0									
7/7/21	CW	S	0.2	8:52	60	28.43	17.15	9.38	7.54	7.73	falling	0	4	24	0.0032	0.021	0.0242	0.0077	23.22	18.89	7.94
7/7/21	CW	B	1.2			28.18	17.18	9.44	5.11	7.57	falling	0									
7/7/21	SM	S	0.2	9:09	65	27.61	17.45	9.41	6.28	7.85	falling	0	2	26.5	0.0015	0.009	0.0105	0.0052	23.74	19.87	7.11
7/7/21	SM	B	2.8			26.89	17.77	10.06	3.93	7.51	falling	0									
7/14/21	WSH	S	0.2	9:50	30	30.1	16.83	8.9	4.65	7.27	falling	0	90	36	0.0015	0.009	0.0105	0.0182	76.15	70	11.46
7/14/21	WSH	B	0.5										0									
7/14/21	OP	S	0.2	9:34	50	30.42	17.51	9.19	6.19	7.73	falling	0	2	25	0.0015	0.009	0.0105	0.0048	33.95	27.96	10.98
7/14/21	OP	B	2			30.29	17.67	9.31	4.94	7.58	falling	0									
7/14/21	RO3	S	0.2	8:48	60	30.32	17.83	9.4	5.32	7.67	falling	0	2	30.5	0.0015	0.009	0.0105	0.0052	32.58	26.26	11.57
7/14/21	RO3	B	2.8			29.67	18.05	9.67	2.96	7.32	falling	0									
7/14/21	CW	S	0.2	9:02	60	29.88	18.07	9.62	6.09	7.75	falling	0	2	29	0.0015	0.009	0.0105	0.0076	36.79	31.3	10.09
7/14/21	CW	B	3			29.07	18.3	9.9	5.44	7.58	falling	0									
7/14/21	RO2	S	0.2	8:53	50	30.02	17.97	9.54	6.24	7.77	falling	0	2	27	0.0017	0.009	0.0107	0.0044	26.98	22.12	8.92

DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
7/14/21	RO2	B	3.2			29.27	18.25	9.85	2.89	7.27	falling	0									
7/14/21	SM	S	0.2	9:12	60	28.98	18.56	10.1	6.06	7.66	falling	0	2	28	0.0015	0.009	0.0105	0.0049	20.59	16.1	7.3
7/14/21	SM	B	3.1			28.06	19.09	10.61	5.22	7.62	falling	0									
7/21/21	WSH	S	0.2	9:49	50	27.74	16.79	9.28	2.58	7.43	falling	0	348	31.5	0.0017	0.038	0.0397	0.066	34.63	29.84	8.83
7/21/21	WSH	B	0.3																		
7/21/21	OP	S	0.2	9:36	50	29.61	17.9	9.58	5.8	8.03	falling	0	18	31	0.0024	0.01	0.0124	0.0066	43.98	36.95	12.93
7/21/21	OP	B	1.9			29.55	18.15	9.73	4.05	7.74	falling	0									
7/21/21	RO3	S	0.2	8:47	50	29.5	18.15	9.75	4.95	7.87	falling	0	20	34	0.0016	0.009	0.0106	0.0075	45.92	38.78	13.13
7/21/21	RO3	B	2.3			29.52	18.41	9.89	4.55	7.75	falling	0									
7/21/21	CW	S	0.2	8:55	55	29.19	18.34	9.92	5.23	7.91	falling	0	12	33	0.0018	0.019	0.0208	0.0052	33.03	26.84	11.35
7/21/21	CW	B	2.5			28.95	18.37	9.98	4.48	7.77	falling	0									
7/21/21	RO2	S	0.2	9:03	50	29.05	18.26	9.91	5.76	7.98	falling	0	2	31	0.0029	0.009	0.0119	0.005	34.85	28.88	10.97
7/21/21	RO2	B	3.3			28.79	18.3	9.98	5.39	7.88	falling	0									
7/21/21	SM	S	0.2	9:13	50	28.28	18.1	9.97	6.01	8.03	falling	0	2	32.5	0.0023	0.009	0.0113	0.0046	24.07	19.93	7.61
7/21/21	SM	B	2.8			28.2	18.08	9.97	5.79	7.98	falling	0									
7/28/21	WSH	S	0.2	9:50	30	28.56	17.4	9.49	3.31	7.5	high/fa	0	350	34	0.0036	0.043	0.0466	0.0377	50.75	45.22	10.23
7/28/21	WSH	B	0.3								high/fa	0									
7/28/21	OP	S	0.2	9:35	40	29.4	17.43	9.34	6.19	8.01	high/fa	0	10	32	0.0044	0.014	0.0184	0.0055	34.22	28.39	10.69
7/28/21	OP	B	2.1			29.13	17.32	9.33	4.27	7.67	high/fa	0									
7/28/21	RO3	S	0.2	8:46	50	28.96	17.19	9.29	5.98	7.94	high/fa	0	16	29	0.003	0.009	0.012	0.0063	33.2	28.26	9.09
7/28/21	RO3	B	2.8			28.59	17.13	9.33	5.11	7.7	high/fa	0									
7/28/21	RO2	S	0.2	9:04	55	28.96	17.19	9.29	6.73	8.06	high/fa	0	8	25	0.003	0.009	0.012	0.0054	28.82	24.24	8.41
7/28/21	RO2	B	3.2			28.08	17.15	9.44	3.1	7.46	high/fa	0									
7/28/21	CW	S	0.2	8:55	50	28.62	17.11	9.31	5.11	7.83	high/fa	0	4	30.5	0.0056	0.014	0.0196	0.0052	31.81	26.16	10.36
7/28/21	CW	B	2			28.41	17.08	9.33	4.16	7.63	high/fa	0									
7/28/21	SM	S	0.2	9:12	55	28.17	17.13	9.41	5.91	7.99	high/fa	0	2	24.9	0.003	0.009	0.012	0.006	27.56	24.32	7.8
7/28/21	SM	B	2.8			27.74	17.22	9.52	4.99	7.78	high/fa	0									
8/4/21	WSH	S	0.2	9:49	30	22.81	14.69	8.95	3.53	7.16	falling	0	680	35.5	0.0022	0.076	0.0782	0.0496	69.55	63.7	10.9
8/4/21	WSH	B									falling	0									
8/4/21	OP	S	0.2	9:30	40	26.05	16.46	9.43	4.55	7.57	falling	0	40	38.5	0.0038	0.024	0.0278	0.0061	48.8	41.47	13.49

DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
8/4/21	OP	B	1.8			26	16.45	9.43	4.41	7.54	falling	0									
8/4/21	RO3	S	0.2	8:43	40	26.08	16.46	9.42	4.81	7.48	falling	0	12	38	0.005	0.029	0.034	0.0059	42.74	36.12	12.16
8/4/21	RO3	B	2.6			26.04	16.45	9.42	4.48	7.28	falling	0									
8/4/21	RO2	S	0.2	9:00	40	25.99	16.32	9.35	5.9	7.7	falling	0	2	36.5	0.0037	0.04	0.0437	0.0039	40.79	33.3	13.73
8/4/21	RO2	B	3.2			25.92	16.34	9.38	5.59	7.59	falling	0									
8/4/21	CW	S	0.2	8:51	35	25.89	16.09	9.23	5.99	7.75	falling	0	4	34.5	0.0077	0.039	0.0467	0.0038	32.58	25.95	12.15
8/4/21	CW	B	2.6			26.07	16.38	9.37	4.83	7.46	falling	0									
8/4/21	SM	S	0.2	9:10	60	25.16	13.87	7.98	8.06	8.32	falling	0	2	26.5	0.0025	0.011	0.0135	0.0065	37.44	32.31	9.45
8/4/21	SM	B	3.8			25.83	14.51	8.14	6.93	8.12	falling	0									
8/11/21	WSH	S	0.2	10:05	40	27.8	14.39	8.31	2.8	7.3	falling	0.26	1940	30.5	0.0101	0.129	0.1391	0.0473	52.07	46.43	10.43
8/11/21	WSH	B									falling	0.26									
8/11/21	OP	S	0.2	9:50	50	29.3	15.47	8.97	6.11	8.14	falling	0.26	8	30.5	0.0028	0.014	0.0168	0.0069	49.37	42.72	12.26
8/11/21	OP	B	2.2			28.3	15.42	8.95	4.34	7.8	falling	0.26									
8/11/21	RO3	S	0.2	9:06	55	28.1	15.14	8.78	5.24	7.98	falling	0.26	40	33.5	0.0044	0.013	0.0174	0.0085	45.54	37.95	13.94
8/11/21	RO3	B	2.6			28	14.69	8.5	6.16	7.94	falling	0.26									
8/11/21	RO2	S	0.2	9:22	45	27.8	15.3	8.88	6.14	8.16	falling	0.26	4	25	0.0025	0.011	0.0135	0.0062	48.92	43.55	9.94
8/11/21	RO2	B	2.4			27.6	15.3	8.89	5.9	8.08	falling	0.26									
8/11/21	CW	S	0.2	9:15	40	28.1	15.32	8.89	5.16	7.99	falling	0.26	20	34	0.0057	0.017	0.0227	0.0073	42.45	35.54	12.69
8/11/21	CW	B	2.8			27.8	15.31	8.88	5.29	7.94	falling	0.26									
8/11/21	SM	S	0.2	9:31	50	27.5	15.78	9.19	7.42	8.26	falling	0.26	2	26.5	0.0021	0.009	0.0111	0.0076	35.89	31.09	8.84
8/11/21	SM	B	2.2			27.1	16.5	9.65	6.62	8.09	falling	0.26									
8/18/21	WSH	S	0.2	9:45	35	28.03	10.12	5.68	2.77	7.2	rising	0.8	2280	65	0.0085	0.124	0.1325	0.0478	70.85	63.49	13.63
8/18/21	WSH	B									rising	0.8									
8/18/21	OP	S	0.2	9:31	40	29	14.71	8.5	5.45	7.88	rising	0.8	50	31.5	0.0031	0.011	0.0141	0.0081	42.39	35.4	12.82
8/18/21	OP	B	2			28.9	14.8	8.56	5.5	7.88	rising	0.8									
8/18/21	RO3	S	0.2	8:49	40	28.9	15.16	8.78	5.36	7.94	falling	0.8	36	27.5	0.003	0.014	0.017	0.0132	79.59	71.24	15.46
8/18/21	RO3	B	2.6			28.7	15.54	9.02	4.56	7.81	falling	0.8									
8/18/21	RO2	S	0.2	9:03	50	28.5	15.6	9.06	5.36	7.82	rising	0.8	16	28	0.0023	0.011	0.0133	0.0081	44.16	41.58	4.86
8/18/21	RO2	B	2.8			28.3	15.98	9.34	4.92	7.68	rising	0.8									

DATE	Station	Layer	Depth	Time	Secchi (cm)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH	Tide	Rain (in.)	Ent (cfu/ 100 ml)	TSS (mg/L)	nitrate (mg/L)	NH3 (mg/L)	TDN (mg/L)	PO4 (mg/L)	chl total (ug/L)	chl active (ug/L)	chl phaeo (ug L)
8/18/21	CW	S	0.2	8:55	40	28.5	15.56	9.04	5.55	7.87	falling	0.8	24	32	0.0021	0.013	0.0151	0.0103	44.29	37.97	11.64
8/18/21	CW	B	2			28.5	15.57	9.05	5.85	7.86	falling	0.8									
8/18/21	SM	S	0.2	9:12	45	27.8	17.27	10.13	6.42	8.08	rising	0.8	2	34	0.0028	0.007	0.0097	0.0106	49.11	43.5	10.37
8/18/21	SM	B	1.2			27.9	17.27	10.13	6.56	8.09	rising	0.8									
8/25/21	WSH	S	0.2	9:51	40	27.3	15.45	8.98	2.69	7.22	falling	0	460	27.5	0.0031	0.032	0.0351	0.051	31.79	28.49	5.86
8/25/21	WSH	B									falling	0									
8/25/21	OP	S	0.2	0:32	50	29.3	16.4	9.56	5.53	7.97	falling	0	10	24.5	0.0015	0.013	0.0145	0.0054	34.34	27.7	11.89
8/25/21	OP	B	1.9			28.7	16.91	9.88	2.05	7.43	falling	0									
8/25/21	RO3	S	0.2	8:40	55	29.3	16.75	9.78	6.24	8.13	falling	0	2	26	0.0015	0.012	0.0135	0.0086	46.01	40.38	10.03
8/25/21	RO3	B	2.5			28.5	17.31	10.15	3.95	7.75	falling	0									
8/25/21	RO2	S	0.2	9:00	50	29.2	17.07	9.98	7.8	8.37	falling	0	2	26	0.0031	0.009	0.0121	0.0087	46.96	42.1	8.62
8/25/21	RO2	B	2.3			28.7	17.23	10.08	5.8	7.96	falling	0									
8/25/21	CW	S	0.2	8:49	55	29.2	16.96	9.9	6.61	8.19	falling	0	4	24.5	0.0017	0.009	0.0107	0.007	34.53	29.35	9.24
8/25/21	CW	B	1.8			28.7	17.28	10.11	4.98	7.81	falling	0									
8/25/21	SM	S	0.2	9:10	60	28.8	17.65	10.36	5.59	8.11	falling	0	4	29	0.0015	0.009	0.0105	0.0041	26.82	22.41	7.88
8/25/21	SM	B	3.1			28.7	17.67	10.37	5.95	8.05	falling	0									

Appendix D

Pet Waste Outreach Bacteria Monitoring – Year 1 Summary

Project Name: *Pet Waste Outreach – Bacteria Monitoring*

October 2020 – September 2021

Year 1 Summary Report

Prepared by:

Anne Arundel Community College Environmental Center

Date Submitted: 29 October, 2021

ENVIRONMENTAL CENTER

Table of Contents:

Introduction and Scope:

In accordance with the 2014 Anne Arundel County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (Permit Number MD0068306) requirements the County has developed a bacterial TMDL restoration plan (2017) that includes community education to inform pet owners about the potential fecal contamination contribution of pet waste at local beaches. In the 2017 report, of the four categories of fecal contributors, 46% is estimated to be from dog waste, particularly after storm events (2016 Annual TMDL Report). In the 2017 report, public education was cited as an effective tool for decreasing pet waste contribution to the bacterial load.

To assess water quality prior to implementation of a pilot community education program the Anne Arundel Community College Environmental Center (AACC EC) monitored bacteria for a 12 months at two beach sites-Manhattan Beach in Severna Park and Avalon Shores community pier in Shady Side-beginning October 2020 and continuing through September of 2021. Sampling took place on Wednesday mornings between 8 and 11 a.m (with one exception where sampling occurred slightly after 12 pm).   Parameters measured include total suspended solids, enterococci and physical parameters of clarity, water temperature, dissolved oxygen (DO), salinity, conductivity, and pH. Air temperature, tide, cloud cover, general wind direction, and rainfall within 72 hours prior to sample collection were also recorded. A map showing the sampling sites and the full data set are included in the appendix.

Method Comments:

The detailed procedures employed are outlined in the '*Pet Waste Outreach Program - Bacteria Monitoring AACC EC Project Plan'* submitted to, and accepted by, the Department of Public Works, as account 4601.7405 on 1 October, 2020. Minimal modifications were made as required for environmental conditions.

Specifically, at Manhattan Beach the technician waded into the water to a depth of approximately four feet for data and sample collection. At Shady Side sampling was conducted from a pier that extends out next the beach area. This prevented the need for access at a locked gate.

The water level at the Shady Side location was often less than 0.6 m, making it impossible to reasonably measure surface (0.2m) and bottom YSI readings. In those cases, only surface measurements were recorded.

In July 2021, both YSI Pro Plus units required repair so were temporarily replaced with YSI 556 units. The 556 units were calibrated per the manufacturer's instructions. The data on 7 and 21 July and on 4 August were collected with the 556 units. There wasn't significant deviation from the Pro Plus units, but the data could not be stored and downloaded.

In addition, in one case, on 10 February, 2021 snow resulted in a campus closure on 11 February. In anticipation of the closure, incubation of Enterococcus-selective agar plates was performed at an off-campus location, and temperature control was potentially compromised. The quality control sample was compromised and not included.
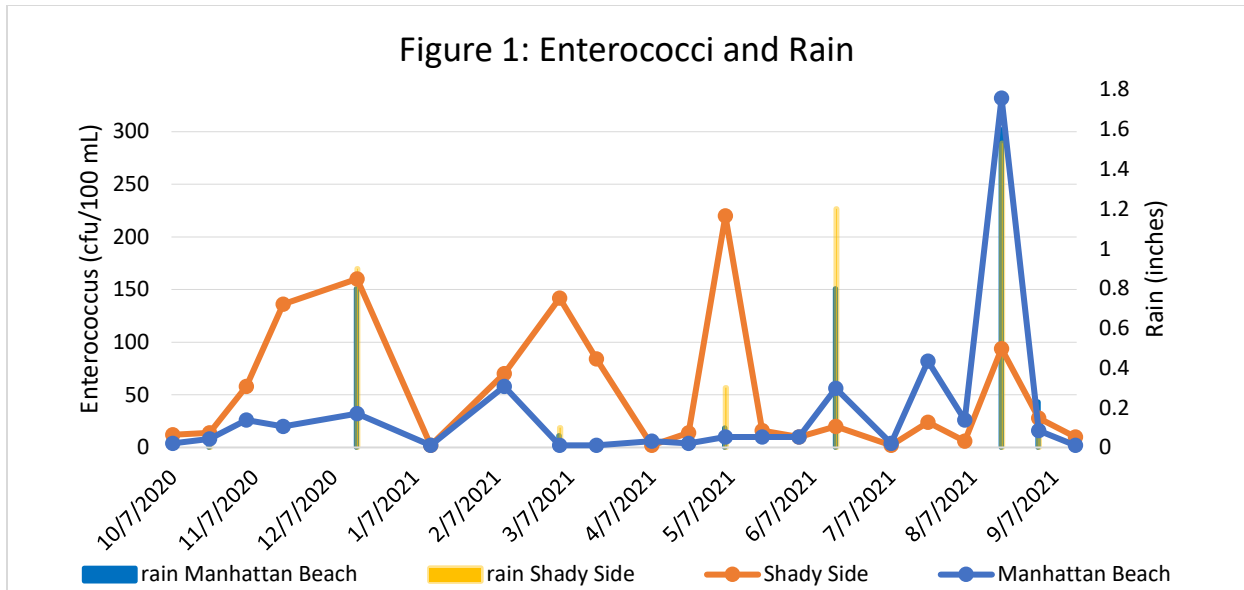
Data:

Precipitation and Enterococci: A complete data set is included in the appendix. Enterococcus concentrations and conditions that may contribute to high levels are specifically addressed in this section. Rain events, especially rain events of 0.5 inches or more with 48 hours prior to sampling are often correlated with enterococcus spikes. Single values greater than 104 cfu/ 100 mL are considered unsafe for swimming per the Code of Maryland Regulations Sec. 26.08.02.03-3 that addresses water quality. A site with a geometric mean calculated over time, in this case calculated for the entire testing period, that exceeds 35 cfu/ 100 mL is designated as impaired. Note that the geometric mean requires at least 5 data points and collected over a period of 90 days. The geometric mean reported here is calculated over 12 months, and for dates affected by over 0.3 inches of rain there were not sufficient data points to support a geometric mean calculation.

Table 1. ENTEROCOCCUS (ENT) expressed as colony-forming units per 100 mL (cfu/100 mL)						
	All samples		No Rain 48 hrs prior		Rain >= 0.01 in	Rain > 0.3 in
	Mean ENT	Geometric Mean ENT	Mean ENT	Geometric Mean ENT	Mean ENT	Mean ENT
Manhattan Beach	33.9	11.8	20.8	10.8	51.3	140
Shady Side	53.5	23.3	29.0	12.3	86.2	91.3

Of the 21 sample days, 9 were impacted by some amount of rain, although only 3 dates were impacted by more than 0.3 inches of rain. Overall, over the course of the sampling period, the geometric mean was below the 35 cfu/100 mL threshold at both locations (Table 1). Figure 1 illustrates the general pattern of mostly higher concentrations of bacteria at Shady Side, and the finding that rain was correlated with the high counts on several occasions. However, over 88% of the 42 samples fell below the threshold.

The Manhattan Beach location only exceeded the single data point threshold one time after 1.6 inches of rain had fallen over a 48-hour period before sampling. The 332 cfu/100 mL on that date was the highest count during the study. Shady Side exceeded the 104 cfu/100 mL limit on 4 occasions, 3 of the 4 occurred after some amount of rain, but none of them after rain over 0.3 inches.

Figure 1: Enterococci and Rain

Of note, the 3 March 2021 data point for Shady Side (142 cfu/100 mL) was collected just over 72 hours following a rain event over 1.0 inches, although only 0.1 inch fell within 48 hours. In addition, the 16 June 2021 samples were both significantly below the threshold although there had been over 1 inch of rain at each site that occurred approximately 48 hours before sampling. There was no rain within 24 hours of testing.

Although anecdotally the enterococcus averages are higher at Shady Side than at Manhattan Beach and the values are higher on dates affected by rain, the differences are not statistically significant in a t-test (assuming unequal variance).

Enterococci , Clarity and Total Suspended Solids:

While rain is certainly a significant factor in runoff that can lead to increased enterococcus contamination, the variation in counts over the course of the study indicates that other factors play a considerable role, although differentiating the relative importance of each weather and water quality parameter is difficult and requires large data sets. Both wind direction and tide were analyzed for possible correlation, considering that a rising tide or wind pushing water toward the shore might prevent mixing and dilution, but neither of those parameters showed any pattern to explain the occasions when bacterial concentrations exceeded, or nearly exceeded the threshold. As mentioned above, the depth at the Shady Side location was often very shallow, and on three occasions the depth was less than 0.5 m. However, there was not a correlation between depth and enterococcus concentration.

Total suspended solids (TSS) were also measured at each site, and the possibility of a correlation between material being washed into the water that would carry bacteria along with it, was also analyzed. Figure 2 illustrates that there is not a correlation between TSS and bacterial levels. There was a pattern of higher concentrations of suspended materials at the Shady Side location.

This is likely due to the fact that site was often shallower and more prone to significant waves and closer to impervious surfaces.

Figure 2. Total Suspended Solids and Enterococci
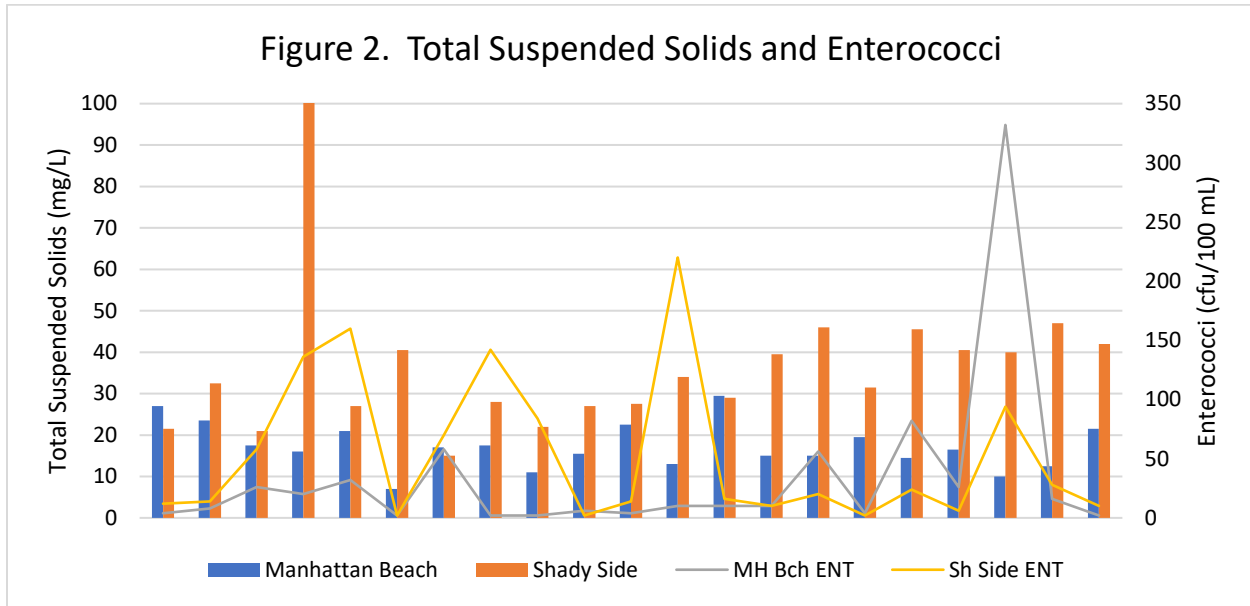
General Physical Parameters:

Clarity and Total Suspended Solids: Secchi Depth as a measure of clarity in this study is skewed by the fact that the water was clear to the bottom on most sampling dates from November 2020 through early April 2021. This is not surprising as the cooler temperatures typically result in greater clarity. However, during the summer months clarity was typically lower than the 100 cm threshold considered necessary to support underwater grasses. On two occasions Manhattan Beach was clear to the bottom at 90 cm, suggesting sufficient clarity. However, at Shady Side, even with the shallowness of the water, clarity was typically poor, never exceeding 60 cm from May through September 2021.

Total suspended solids (TSS) should optimally be below 15 mg/L. Only 21.4% of the measurements during the 12 month period were at, or below that value, and Shady Side only met the threshold once in 21 sample events. Runoff, significant turbulence, and algal blooms can lead to high TSS values, and this could also be contributing to increased enterococcus levels. Whether the TSS levels are related to increased nutrient levels, which promote algal blooms and may allow the persistence of bacteria, is unclear from the data collected thus far.

Dissolved Oxygen: Levels of dissolved oxygen are a key measure of water quality and dissolved oxygen levels 5.0 mg/L or greater are the necessary to prevent stress on various marine organisms. During the course of the project 90.5% of surface measurements (0.2 m) and 94% of bottom measurements were above 5.0 mg/L.

Figure 3. Surface Dissolved Oxygen (mg/L)
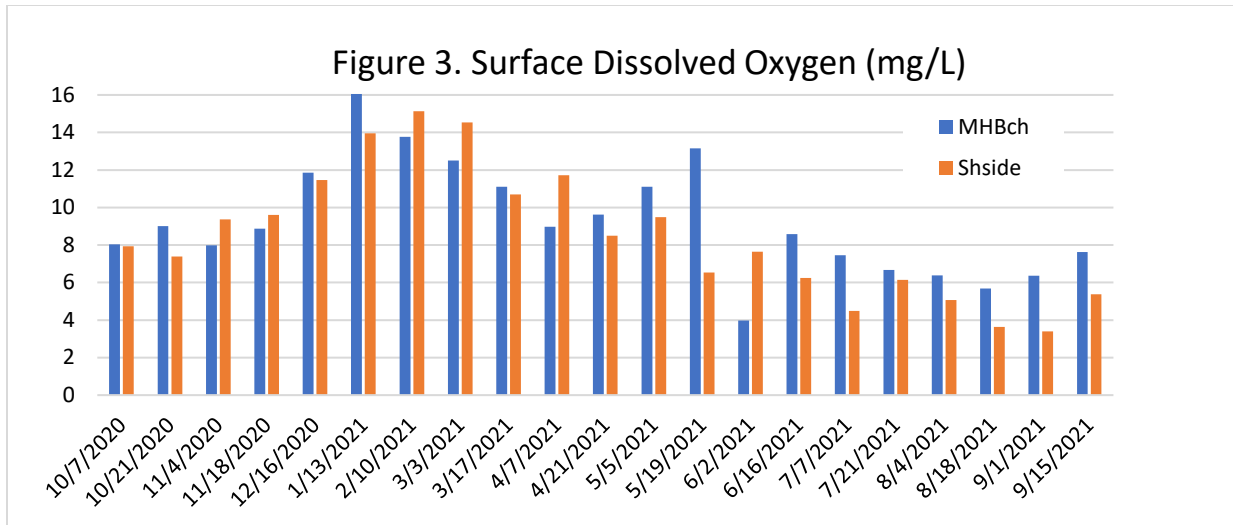
Salinity and pH:

While salinity may not have a direct effect on bacterial counts, it is an important measure of water quality, affecting the health of other estuarine organisms and potentially producing an environment that alters local populations, as some species favor, or require, certain salinity ranges. The salinity over the testing period demonstrated lower than average salinity levels, with the effect even more dramatic at the Manhattan Beach site. This pattern was seen by other groups measuring salinity on the Magothy River (informal communications with the Magothy River Association). Comparing the two rivers over the monitoring period, they start off with very similar concentrations, but diverge beginning in March of 2020. Comparing data along each river, there is a noticeable difference between the beginning of October 2020 and the end of September 2021.

Rain can significantly alter salinity, as observed when salinity levels dropped precipitously in 2018 due to record amounts of rain. However, 2021 did not have higher than normal rain totals and the salinity was very, very low in January at both sites. The very low surface salinity at Manhattan Beach may be an artifact, as the bottom measurement on that day was significantly higher (3.36 ppt versus 9.07 ppt at bottom).

Figure 4. Salinity (ppt)
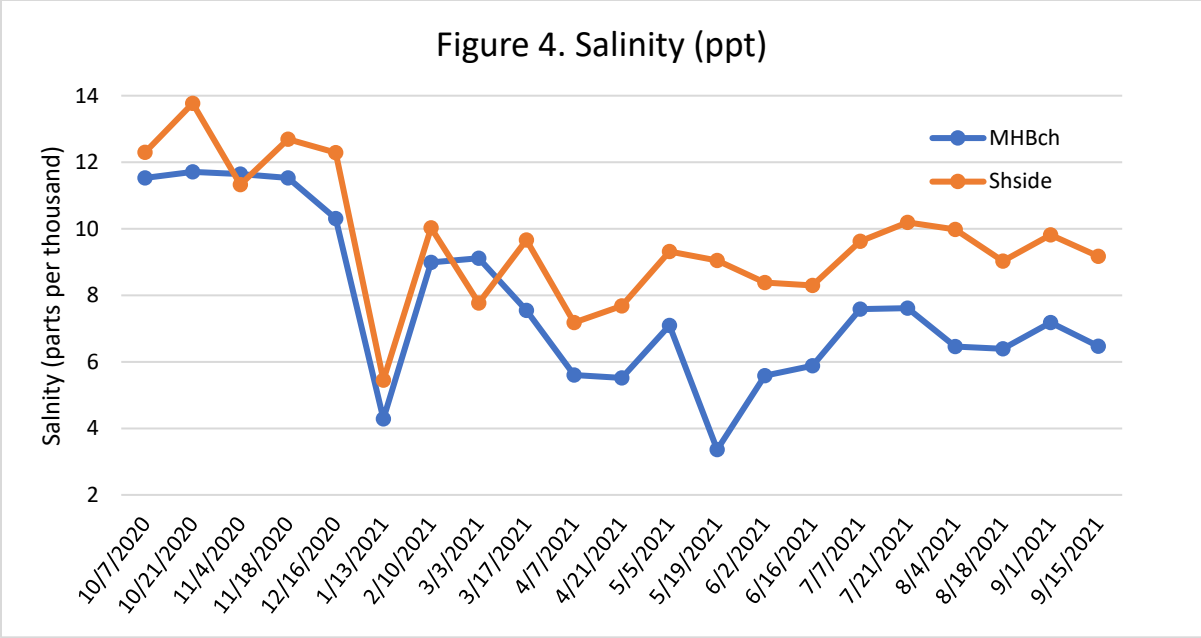
For the most part, pH values were stable in the normal range of 6.5 to 8.5. Manhattan Beach showed more variability and demonstrated a significant spike then drop between the 19 May and 2 June 2021 (Figure 5). Interestingly, the highest TSS measurement at Manhattan Beach was measured on 19 May 2021. Algal blooms can result in both high TSS values and cause significant pH changes as the algae first undergo a burst of photosynthesis (which can increase pH) which is followed by high respiration as the algae are broken down (a process that can cause pH decrease). While there were no reports of widespread algal blooms during the 2021 season, the pH values, TSS and DO levels (spike on 19 May and drop on 2 June 2021) strongly suggest an algal bloom at the Manhattan site over that period of time.

Figure 5. Surface pH Values
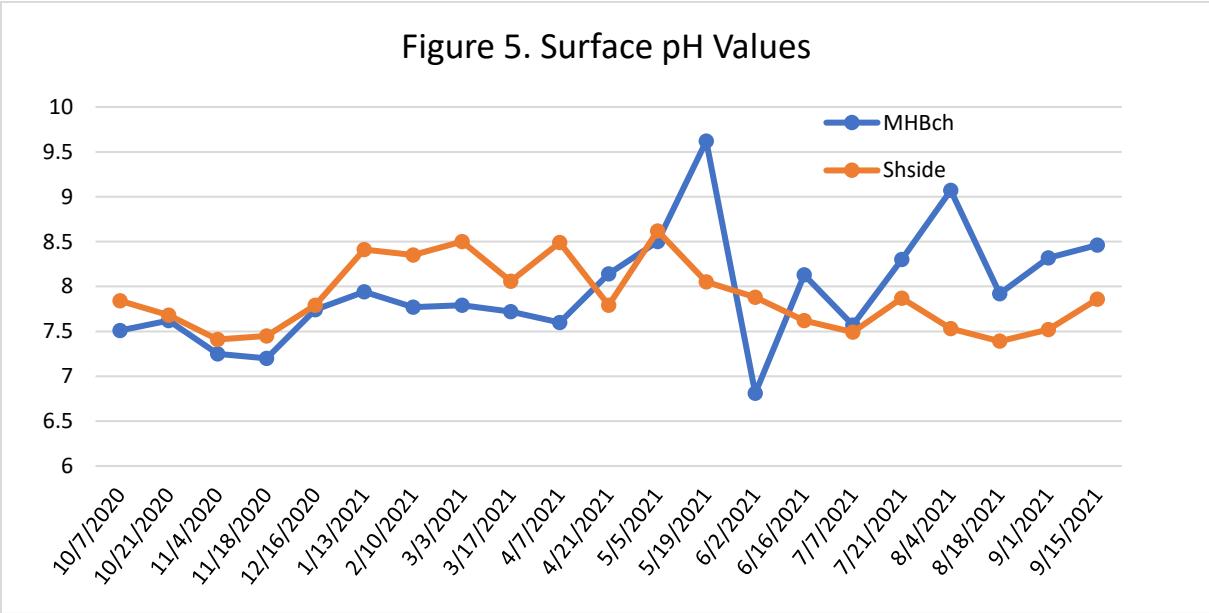
Quality Control:

Each week a set of replicate measurements and samples were collected at one of the two sites. Those data are included in the full data set in the appendix. Figure 6 shows the field replicate sample values. Sample variation was lower, as a percentage of the total count, for higher values s expected. Over the course of the study, none of the samples processed warranted further analysis.

Figure 6. Enterococcus Quality Control

Figure 7. Total Suspended Solid Quality Control
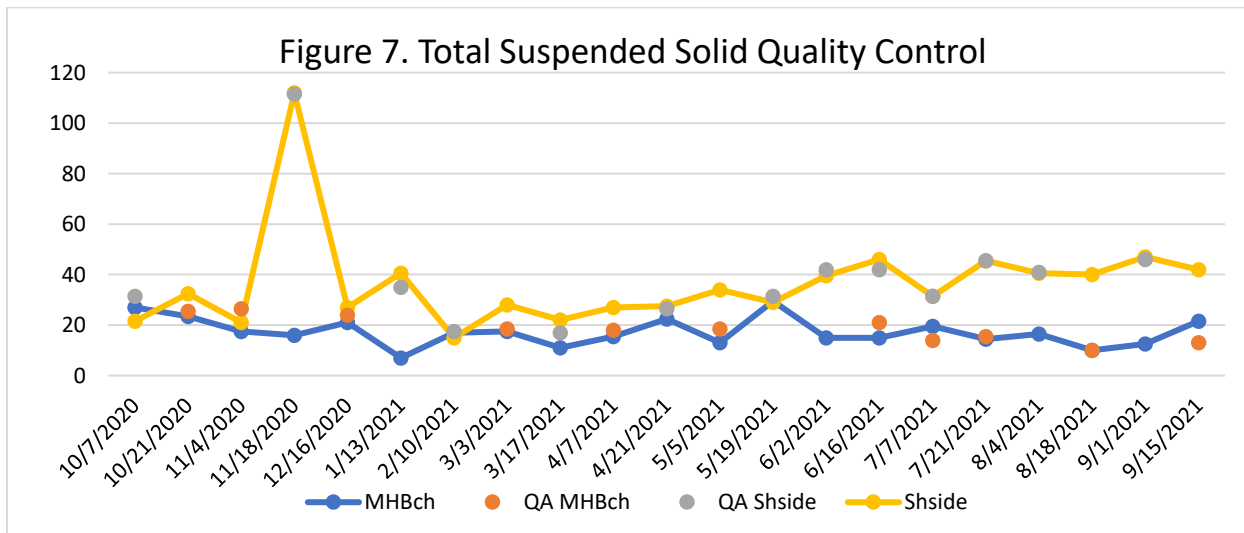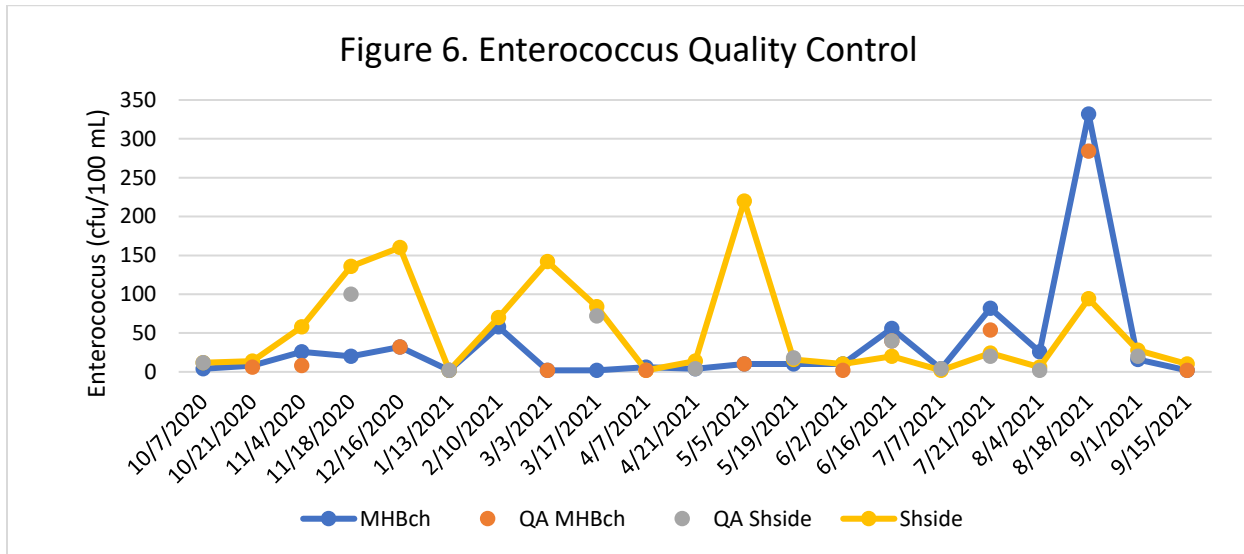
Other quality control methods, including testing each new batch of selective media and performing gram-staining on several positive and negative colonies were performed. The media pre-checks were always within 10% of the expected results (30 cfu +/- 4 as reported by Biomerieux).

Summary:

The 12 month study from October 2020-September 2021 provides a baseline of data at each of the two selected locations. While the number of data points limits the statistical conclusions that can be drawn, there are some location conditions that may impact each area, contributing to the differences observed in enterococcus and other values. The overall averages and geometric means were higher at the Shady Side location. There was not visual evidence of pet waste left at the site, but there was more visual evidence of ducks and geese. In addition, the Shady Side location is located closer to the paved road with a paved boat ramp adjacent to the community beach. This is different from the Manhattan Beach location that is further from the paved road and some restoration, including grass reseeding during the sampling season (mid-summer 2021).

In conclusion, water quality at the sites chosen for this study are typical for community beaches along the Magothy and West Rivers. In the absence of significant rain of at least 0.3 inches, enterococcus levels are usually well below the threshold of 104 cfu/100 mL established by the EPA. As has been widely reported, a rain event of greater than 0.5 inches may cause elevated bacterial levels for a period of 24 to 48 hours (the guidance followed by the Anne Arundel County Department of Health). The significance of pet waste contribution at these sites remains uncertain, but up to 46% of fecal contamination in local rivers is estimated to be from pet waste.

Appendix:

<u>Site Photos:</u>

Manhattan Beach Site. The photo to the left shows the site restoration and reseeding that was done during the summer of 2021 to stabilize the site and prevent erosion. The photo to the right shows the beach area where sampling is conducted. The technician wades out to just over 1 m depth.

Shady Side Avalon Shores Site. The photo on the left shows the boat ramp that is right next to the community beach, and the photo on the right shows the dock that extends out adjacent to the swim area and is used for sampling.

Magothy River

Manhattan Beach Site

West River

Shady Side Site

Date	Station	layer	rain (in)	hours prior	Ent cfu/100 ml	TSS (mg/L)	air temp (F)	cloud cover (%)	wind	tide	Depth (m)	Total depth (m)	Time	Secchi (cm) (blue is clear to bottom)	Temp	SPC Con (mS/cm)	Sal (ppt)	DO (mg/L)	pH
10/7/2020	MHBch	S	0	0	4	27	70	5	sw9	high falling	0.2	0.7	11:09	70	20.6	19.34	11.53	8.03	7.51
10/7/2020	MHBch	B						5	sw9	high falling	0.6				20.6	19.38	11.55	8.44	7.38
10/7/2020	Shside	S	0	0	12	21.5	73	5	ssw11	falling	0.2	0.65	12:15	65	20.6	20.53	12.3	7.93	7.84
10/7/2020	Shside	B						5	ssw11	falling	0.6				20.6	20.58	12.34	7.49	7.8
10/7/2020	QA Shside	S	0	0	12	31.5	73	5	ssw11	low falling	0.2	0.65	12:17	65	20.6	20.55	12.32	7.72	7.81
10/7/2020	QA Shside	B						5	ssw11	low falling	0.6				20.5	20.56	12.33	7.57	7.78
10/21/2020	MHBch	S	0.01	0	8	23.5	64	100	sse4	rising	0.2	0.75	9:12	75	18.7	19.6	11.71	9.01	7.62
10/21/2020	MHBch	B						100	sse4	rising	0.6				18.7	19.64	11.73	9.3	7.61
10/21/2020	Shside	S	0.01	0	14	32.5	66	100	s6	falling	0.2	0.85	10:14	80	18.9	22.75	13.77	7.39	7.68
10/21/2020	Shside	B						100	s6	falling	0.7				18.8	22.82	13.82	7.02	7.64
10/21/2020	QA MHBch	S	0.01	0	6	25.5	64	100	sse4	high rising	0.2	0.75	9:16	75	18.8	19.61	11.72	8.92	7.6
10/21/2020	QA MHBch	B						100	sse4	high rising	0.6				18.8	19.66	11.75	9.24	7.66
11/4/2020	MHBch	S	0	0	26	17.5	52	5	N1	high falling	0.2	0.85	9:25	85	13.5	19.5	11.64	7.99	7.25
11/4/2020	MHBch	B						5	N1	high falling	0.7			85	13.4	19.47	11.62	8.13	6.99
11/4/2020	Shside	S	0	0	58	21	61	5	WMW2	falling	0.2	0.3	10:25	30	10.8	19.08	11.33	9.37	7.41
11/4/2020	Shside	B						5	WNW2	falling				30					
11/4/2020	QA MHBch	S	0	0	8	26.5	52	5	N1	high falling	0.2	0.85	9:30	85	13.4	19.47	11.56	7.98	7.46
11/4/2020	QA MHBch	B						5	N1	high falling	0.2			85	13.5	19.6	11.71	7.97	7.41
11/18/2020	MHBch	S	0	0	20	16	42	60	WNW8	falling	0.2	0.85	9:30	85	12	19.35	11.53	8.87	7.2
11/18/2020	MHBch	B						60	WNW8	falling	0.6			85	12	19.33	11.53	8.87	6.99

Date	Site	Type							Dir	Trend			Time						
11/18/2020	Shside	S	0	0	136	112	44	30	WNW10	falling	0.2	0.3	10:33	20	8.4	21.23	12.69	9.6	7.45
11/18/2020	Shside	B						30	WNW10	falling				20					
11/18/2020	QA Shside	S	0	0	100	111.5	44	30	WNW10	falling	0.2	0.3	10:31	20	8.3	21.24	12.54	9.9	7.45
11/18/2020	QA Shside	B						30	WNW10	falling				20					
12/16/2020	MHBch	S	0.8	48	32	21	34	95	ENE12	falling	0.2	0.8	9:40	80	5.7	17.62	10.31	11.86	7.74
12/16/2020	MHBch	B						95	ENE12	falling	0.6			80	5.8	17.79	10.41	12.04	7.73
12/16/2020	Shside	S	0.9	48	160	27	34	95	ENE13	falling	0.2	0.6	8:48	60	6.8	20.68	12.29	11.46	7.79
12/16/2020	Shside	B						95	ENE13	falling	0.5			60	6.8	20.6	12.26	11.15	7.82
12/16/2020	QA MHBch	S	0.8	48	32	24	34	95	ENE12	falling	0.2	0.8	9:42	80	5.9	17.83	10.42	11.7	7.8
12/16/2020	QA MHBch	B						95	ENE12	falling	0.6			80	5.8	17.92	10.49	11.65	7.81
1/13/2021	MHBch	S	0	0	2	7	27	5	NE1	falling	0.2	0.8	8:23	80	4.4	7.81	4.29	16.12	7.94
1/13/2021	MHBch	B						5	NE1	falling	0.6			80	4.4	7.82	4.29	16.29	7.66
1/13/2021	Shside	S	0	0	2	40.5	30	5	E1	falling	0.2	0.45	9:37	45	2.8	9.83	5.45	13.95	8.41
1/13/2021	Shside	S	0				30	5	E1	falling		0.45		45					
1/13/2021	QA Shside	S	0	0	2	35	30	5	E1	falling	0.2	0.45	9:39	45	2.8	9.84	5.45	15.46	8.61
1/13/2021	QA Shside	B						5	E1	falling				45					
2/10/2021	MHBch	S	0	0	58	17	32	50	N4	falling	0.2	0.65	8:32	65	3	15.65	8.99	13.76	7.77
2/10/2021	MHBch	B						50	N4	falling	0.5			65	3.1	15.67	8.99	13.73	7.64
2/10/2021	Shside	S	0	0	70	15	35	50	N5	falling	0.2	0.35	9:36	35	3.4	17.33	10.03	15.13	8.35
2/10/2021	Shside	B						50	N5	falling				35					
2/10/2021	QA Shside	S	0	0		17.5	35	50	N5	low falling	0.2	0.35	9:38	35	3.4	17.32	10.04	14.85	8.48
3/3/2021	MHBch	S	0.06	48	2	17.5	34	5	SSW5	falling	0.2	0.9	8:32	90	5.4	15.74	9.11	12.5	7.79
3/3/2021	MHBch	B						5	SSW5	falling	0.7			90	5.4	15.74	9.11	12.72	7.82
3/3/2021	Shside	S	0.1	48	142	28	47	0	W5	rising	0.2	0.6	10:06	40	4.8	13.6	7.77	14.54	8.5
3/3/2021	Shside	B						0	W5	rising	0.4			40	4.4	13.36	7.6	14.15	8.2

Date	Site	S/B							Dir	Tide			Time						
3/3/2021	QA MHBch	S	0.06	48	2	18.5	34	5	SSW5	falling	0.2	0.9	8:39	90	5.5	15.72	9.11	12.45	7.8
3/3/2021	QA MHBch	B						5	SSW5	falling	0.7			90	5.3	15.76	9.12	12.53	7.8
3/17/2021	MHBch	S	0.01	24	2	11	40	100	S4	rising	0.85	0.85	8:25	85	8	13.14	7.55	11.11	7.72
3/17/2021	MHBch	B						100	S4	rising	0.85			85	7.9	13.14	7.55	11.1	7.65
3/17/2021	Shside	S	0.01	24	84	22	41	100	SE7	falling	0.9	0.9	9:34	90	8.9	16.5	9.66	10.69	8.06
3/17/2021	Shside	B						100	SE7	falling	0.9			90	8.9	16.49	9.67	11.01	7.98
3/17/2021	QA Shside	S	0.01	24	72	17	41	100	SE7	falling	0.9	0.9	9:43	90	8.9	16.49	9.66	10.63	8.13
3/17/2021	QA Shside	B						100	SE7	falling	0.9			90	8.9	16.49	9.66	10.69	8.11
4/7/2021	MHBch	S	0	0	6	15.5	56	45	WNW1	falling	0.2	0.8	8:30	80	13.2	9.9	5.6	8.97	7.6
4/7/2021	MHBch	B						45	WNW1	falling	0.6			80	13.3	9.91	5.61	9.02	7.63
4/7/2021	Shside	S	0	0	2	27	55	15	ENE2	rising	0.2	0.7	9:48	60	14.6	12.47	7.18	11.72	8.49
4/7/2021	Shside	B						15	ENE2	rising	0.5			60	14.2	12.43	7.16	11.73	8.24
4/7/2021	QA MHBch	S	0	0	2	18	56	45	WNW1	falling	0.2	0.8	8:36	80	13.2	9.89	5.59	8.86	7.62
4/7/2021	QA MHBch	B						45	WNW1	falling	0.6			80	13.2	9.89	5.59	9.16	7.63
4/21/2021	MHBch	S	0.01	48	4	22.5	61	70	SSW10	rising	0.2	0.9	8:30	80	15	9.76	5.52	9.62	8.14
4/21/2021	MHBch	B						70	SSW10	rising	0.7				15	9.77	5.52	9.68	8.07
4/21/2021	Shside	S	0.1	48	14	27.5	61	30	SSW13	rising	0.2	0.95	9:31	70	15.4	13.27	7.68	8.5	7.79
4/21/2021	Shside	B						30	SSW13	rising	0.8				15.4	13.29	7.71	8.61	7.84
4/21/2021	QA Shside	S	0.1	48	4	26.5	61	30	SSW13	rising	0.2	0.95	9:34	65	15.5	13.28	7.69	8.48	7.82
4/21/2021	QA Shside	B						30	SSW13	rising	0.8				15.5	13.3	7.7	8.59	7.86
5/5/2021	MHBch	S	0.1	24	10	13	64	100	N1	falling	0.2	1	8:21	95	18.6	12.33	7.09	11.11	8.5
5/5/2021	MHBch	B						100	N1	falling	0.8				18.4	12.3	7.08	10.8	8.41
5/5/2021	Shside	S	0.3	24	220	34	64	100	SSW4	rising	0.2	0.8	9:24	60	19.3	15.9	9.32	9.48	8.62
5/5/2021	Shside	B						100	SSW4	rising	0.6				18.9	16.09	9.46	7.71	8.27

Date	Location	S/B	C1	C2	C3	C4	C5	C6	Wind	Tide	C9	C10	Time	C12	C13	C14	C15	C16	C17
5/5/2021	QA MHBch	S	0.1	24	10	18.5	64	100	N1	falling	0.2	1	8:27	95	18.6	12.34	7.09	11.17	8.54
5/5/2021	QA MHBch	B						100	N1	falling	0.8				18.5	12.33	7.09	11.06	8.5
5/19/2021	MHBch	S	0	0	10	29.5	64	10	W4	rising	0.2	0.9	8:18	55	21.3	11.16	3.36	13.16	9.62
5/19/2021	MHBch	B						10	W4	rising	0.7				21.8	15.5	9.07	6.43	8.02
5/19/2021	Shside	S	0	0	16	29	70	5	W5	rising	0.2	0.8	9:23	55	21.7	15.48	9.05	6.54	8.05
5/19/2021	Shside	B						5	W5	rising	0.6				21.5	15.45	9.04	6.3	8.01
5/19/2021	QA Shside	S	0	0	18	31.5	70	5	W5	rising	0.2	0.8	9:26	55	21.8	15.5	9.07	6.43	8.02
5/19/2021	QA Shside	B						5	W5	rising	0.6				21.7	15.47	9.04	6.49	8.04
6/2/2021	MHBch	S	0	0	10	15	68	98	SSW 2	rising	0.2	0.85	9:10	85	20.19	8.977	5.58	3.98	6.81
6/2/2021	MHBch	B						98	ssw2	rising	0.65				20.2	9.016	5.61	4.14	6.72
6/2/2021	Shside	S	0	0	10	39.5	72	30	SSE7	rising	0.2	0.9	10:54	50	21.6	14.4	8.38	7.64	7.88
6/2/2021	Shside	B						30	SSE7	rising	0.7				21.3	14.43	8.39	6.73	7.65
6/2/2021	QA Shside	S	0	0		42	72	30	SSE7	rising	0.2	0.9	10:58	50	21.6	14.41	8.38	7.47	7.85
6/2/2021	QA Shside	B						30	SSE7	rising	0.7				21.2	14.43	8.39	6.4	7.62
6/2/2021	QA MHBch					2													
6/16/2021	MHBch	S	0.8	48	56	15	69	70	NW7	rising	0.2	1	8:40	70	25.18	10.43	5.88	8.59	8.13
6/16/2021	MHBch	B						70	NW7	rising	2.8				25.16	10.43	5.89	8.49	8.05
6/16/2021	Shside	S	1.2	48	20	46	69	35	NW7	rising	0.2	0.8	9:57	50	24.6	14.33	8.3	6.24	7.62
6/16/2021	Shside	B						35	NW7	rising	0.6				24.6	14.28	8.27	6.1	7.59
6/16/2021	QA MHBch	S	0.8	48	40	21	69	70	NW7	rising	0.2	1	8:43	70	25.15	10.42	5.88	8.5	8.15
6/16/2021	QA MHBch	B						70	NW7	rising	2.58				25.14	10.42	5.88	8.41	8.12
6/16/2021	QA Shside	S	1.2	48	40	42			NW7	rising	0.2	0.8	10:00	50	24.8	14.3	8.31	6.37	7.65
6/16/2021	QA Shside	B							NW7	rising	0.8				24.6	14.32	8.29	6.04	7.58
7/7/2021	MHBch	S	0	0	4	19.5	84	0	N0	falling	0.7	0.9	8:29	90	27.31	13.8	7.58	7.46	7.57
7/7/2021	MHBch	B						0	N0	falling	0.2				27.3	13.8	7.59	7.54	7.54

Date	Location																			
7/7/2021	Shside	S	0	0	2	31.5	89	0	SSW2	falling	0.2	0.5	10:25	50	28.58	17.61	9.62	4.49	7.49
7/7/2021	Shside	B						0	SSW2	falling									
7/7/2021	QA MHBch	S	0	0		14	84	0	N0	falling	0.7	0.9	8:38	90	27.3	13.83	7.59	7.72	7.63
7/7/2021	QA MHBch	B						0	N0	falling	0.2				27.3	13.8	7.58	7.48	7.59
7/7/2021	QA Shside	S	0	0	4	31.5	89	0	SSW2	falling	0.2	0.5	10:26	50	28.65	17.68	9.64	5.32	7.46
7/7/2021	QA Shside	B						0	SSW2	falling									
7/21/2021	MHBch	S	0	0	82	14.5	77	40	W4	falling	0.2	1	8:46	80	28.63	13.29	7.61	6.68	8.3
7/21/2021	MHBch	B						40	W4	falling	0.8				28.58	13.29	7.62	6.54	7.92
7/21/2021	Shside	S	0	0	24	45.5	81	0	WNW4	falling	0.2	0.6	10:24	35	28.7	18.63	10.19	6.15	7.87
7/21/2021	Shside	B						0	WNW4	falling	0.4								
7/21/2021	QA Shside	S	0	0	20	45.5	81	0	WNW4	falling	0.2	0.6	10:27	35	28.71	18.66	10.2	6.16	7.89
7/21/2021	QA Shside	B						0	WNW4	falling	0.4								
7/21/2021	QA MHBch	S	0	0	54	15.5	77	40	W4	falling	0.2	1	8:49	80	28.67	13.29	7.61	6.82	8.28
7/21/2021	QA MHBch	B						40	W4	falling	0.8				28.63	13.29	7.61	6.64	7.98
8/4/2021	MHBch	S	0	0	26	16.5	72	95	NNE7	falling	0.2	1	11:01	70	26.46	11.38	6.46	6.39	9.07
8/4/2021	MHBch	B						95	NNE7	falling	0.8				26.41	11.39	6.46	6.48	9.01
8/4/2021	Shside	S	0	0	6	40.5	72	90	NE9	falling	0.2	0.6	10:16	35	25.62	17.2	9.98	5.07	7.53
8/4/2021	Shside	B						90	NE9	falling									
8/4/2021	QA MHBch	S	0	0			72	95	NNE7	falling	0.2	1	11:04	70	26.43	11.38	6.46	6.48	9.08
8/4/2021	QA MHBch	B						95	NNE7	falling	0.8				26.44	11.39	6.46	6.45	9.07
8/4/2021	QA Shside	S	0	0	2	41	72	90	NE9	falling	0.2	0.6		35	25.63	17.2	9.98	5.08	7.6
8/4/2021	QA Shside	B						90	NE9	falling									
8/18/2021	MHBch	S	1.6	48	332	10	79	100	SSW3.6	falling	0.2	0.9	8:46	90	28.2	11.29	6.39	5.68	7.92

Date	Site	S/B																	
8/18/2021	MHBch	B						100	SSW3.6	falling	0.9				28.2	11.44	6.4	5.5	7.9
8/18/2021	Shside	S	1.53	48	94	40	83	40	SSE13	rising	0.2	0.9	10:20	40	28.2	15.54	9.03	3.63	7.39
8/18/2021	QA MHBch	S	1.6	48	284	10	79	100	SSW3.6	falling	0.2	0.9	8:49	90	28.2	11.32	6.41	5.54	7.93
8/18/2021	QA MHBch	B						100	SSW3.6	falling	0.9				28.2	11.43	6.48	5.31	7.9
9/1/2021	MHBch	S	0.23	48	16	12.5	75	100	S5	Falling	0.2	1	8:28	95	29.1	12.58	7.18	6.37	8.32
9/1/2021	MHBch	B						100	S5	Falling	0.8				29.1	12.58	7.18	6.54	8.33
9/1/2021	Shside	S	0.1	48	28	47	73.5	100	S10	Rising	0.2	1	9:32	35	28.4	16.79	9.82	3.39	7.52
9/1/2021	Shside	B						100	S10	Rising	0.8				28.3	16.8	9.82	2.78	7.52
9/1/2021	QA Shside	S	0.1	48	20	46	73.5	100	S10	Rising	0.2	1	9:43	35	28.4	16.8	9.82	3.57	7.51
9/1/2021	QA Shside	B						100	S10	Rising	0.8				28.4	16.8	9.82	2.82	7.47
9/15/2021	MHBch	S	0	0	2	21.5	73	5	S5	falling	0.2	1	8:27	75	25.8	11.38	6.47	7.63	8.46
9/15/2021	MHBch	B						5	S5	falling	0.8				25.7	11.39	6.47	7.34	8.42
9/15/2021	Shside	S	0	0	10	42	74	5	SW6.9	rising	0.2	0.9	9:40	25	26.1	15.76	9.17	5.38	7.86
9/15/2021	Shside	B						5	SW6.9	rising	0.7				26	15.68	9.15	5.21	7.85
9/15/2021	QA MHBch	S	0	0	2	13	73	5	S5	falling	0.2	1	8:32	75	25.8	11.4	6.48	7.63	8.46
9/15/2021	QA MHBch	B						5	S5	falling	0.8				25.7	11.41	6.48	7.48	8.42